ABSTRACT

Title of Dissertation: INVESTMENT AND ECONOMIC PERFORMANCE IN EUROPE: THE ROLE OF THE INVESTMENT CLIMATE

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This dissertation investigates how investment, the investment climate, and economic integration affect the economic performance of 31 European countries. A major contribution is the development of two new composite indicators—the European Investment Attractiveness Index (IAI) and the European Union (EU) Economic Integration Index (EEI). The study conceptualizes the investment climate both as a multidimensional construct and as a framework for understanding how political, economic, and social factors interact and affect the attractiveness of a country for foreign and domestic investment. In addition, it considers how trade, financial, monetary, and value chain relationships have shaped the process of economic integration at the EU level.

The study then uses the indices to examine the impact of foreign and domestic investment on gross domestic product (GDP). The results from cross-

country regression and dynamic panel data analyses reveal that both types of investment have a positive and significant impact on economic growth in Europe (although, notably, exports seem to have a larger impact than either foreign or domestic investment). Moreover, this study finds that the investment climate matters for economic performance. Attractive investment climates and higher levels of economic integration—particularly among the Central and Eastern European economies—are associated with higher per capita GDP levels and growth rates.

Finally, the dissertation examines the relationship between foreign direct investment (FDI), exports, and GDP in 11 countries in Central and Eastern Europe (CEE). While the goal is not to establish "true" causality, the results show that links between foreign investment, exports, and GDP differ significantly across these countries. While for many of them there is a reinforcing relationship between foreign investment and GDP, there does not seem to be a "causal" relationship between their exports and GDP. These findings challenge the validity of policy guidelines that emphasize—often almost exclusively—attracting foreign investment and boosting exports for development under the assumption that FDI or exports "cause" growth. Thus, policies aimed at improving the fundamentals of these economies (i.e., the investment climate) might be key in generating and sustaining economic growth.

INVESTMENT AND ECONOMIC PERFORMANCE IN EUROPE: THE ROLE OF THE INVESTMENT CLIMATE

by

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Dedication

To my wife, Carly E. Schwarzenberg, for her love, encouragement, and unwavering support.

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Chapter 1
Overview of the Dissertation

1.1 Introduction

The objective of this dissertation is threefold. First, it identifies factors that affect the investment climate in European countries. While the focus is on the investment climate, it also examines the factors that affect and determine the level of economic integration among these countries. Second, it analyzes the impact of the investment climate and economic integration on economic performance—defined here as growth in per capita gross domestic product (GDP) and convergence towards the average EU-15 per capita GDP level.[1] Finally, it determines the type of relationship between foreign direct

[1] EU-15 refers to the 15 Member States of the European Union before the accession of Cyprus, Malta, and 11 Central and Eastern European countries in 2004, 2007, and 2013. The 15 Member States are Belgium, Denmark, Germany, Ireland, Greece, Spain, France, Italy, Luxembourg, Netherlands, Austria, Portugal, Finland, Sweden, and the UK.

investment (FDI) and economic growth and exports and economic growth in Central and Eastern European (CEE) countries.

The study develops two new composite indicators—the European Investment Attractiveness Index (IAI) and the European Union (EU) Economic Integration Index (EEI). It conceptualizes the investment climate both as a multidimensional construct and as a framework for understanding how political, economic, and social factors interact and affect the attractiveness of a country for foreign and domestic investment. In addition, the study considers how trade, financial, monetary, and value chain relationships have shaped the process of economic integration at the EU level. The indices provide snapshots of the investment climate and level of economic interdependence of these countries over the past decade (2006-2016). While both the IAI and EEI are intended to capture unique dimensions or aspects of European investment climates and economic integration, similar indices can be tailored and built—using many of the same indicators—to study other regions. However, this is subject to data availability. For many countries, particularly in Africa and Latin America, macroeconomic and survey data might not be available.

The study then uses the indices to examine the effects of foreign and domestic investment on GDP. The results from cross-country regression and dynamic panel data analyses reveal that both types of investment have a positive and statistically significant impact on economic growth in Europe (although, notably, exports seem to have a larger impact than either foreign or

domestic investment). Moreover, this study finds that the investment climate matters for economic performance. Attractive investment climates and higher levels of economic integration—particularly among the Central and Eastern European economies—are associated with higher per capita growth rates and GDP levels.

Finally, the dissertation examines the "causal" relationship between foreign direct investment (FDI) and GDP and exports and GDP in 11 countries in Central and Eastern Europe (CEE). It is important to note that there are numerous issues surrounding the formulation of causality, as direction may depend on the frequency of observations and type of data analyzed, as well as on the statistical tests used, which cannot always be adjusted to yield accurate inferences (Bhargava 2008). This is especially true when dealing with short time series. (For many of the CEE countries analyzed here, there is simply no data prior to the mid-1990s.) The goal of the analysis, therefore, is not to establish "true" causality, but rather to capture potential trends and likely links. It is not necessary for this policy exercise to answer "the question of whether the analysis has [in fact] uncovered a [true] causal structure" (Adams et al. 2003). While there are challenges that limit the scope for analysis and policy prescriptions, the exercise can nevertheless be helpful and might reveal some of the relationships that motivate the analysis.

The results of show that the "causality" patterns among foreign investment, exports, and GDP differ significantly across these countries. While

for many of them there is a reinforcing relationship between foreign investment and GDP, there does not seem to be a "causal" relationship between their exports and GDP. While foreign investment still contributes to economic growth, these findings challenge the assumption that growth in the region is "FDI-led."

The following sections (Sections 1.2 through 1.4) present the three main research questions that the dissertation seeks to address, summarize the findings, and provide an overview of each chapter.

1.2 Assessing the Investment Climate in Europe

Research Question

What are the factors that affect the investment attractiveness of countries in Europe?

The first objective of this dissertation is to identify the political, economic, business, and social factors that affect the attractiveness of European countries for investment. In recent decades, scholars and policymakers have come to realize that measuring multiple dimensions of the investment climate is key to understanding its components, to benchmarking success, and to catalyzing improvement. Traditional measures of the business environment tend to focus on the political institutions, ease of starting a business, access to credit, and regulatory quality. While these are important, they do not fully capture the overall attractiveness of a country for investment. More importantly, they are not sufficient to assess the capacity of a country to

realize the benefits of investment, particularly the contributions it can make to a country's economic and social well-being.

The lack of a broad and comprehensive composite indicator that is capable of capturing various dimensions of an attractive investment climate and that focuses exclusively on Europe, however, prevents us from understanding the dynamics between these dimensions and measure improvements at the European level. To fill this gap, this dissertation proposes an index for Europe—the Investment Attractiveness Index—that can quantify country performance on a wide range of aspects that are relevant for creating and maintaining an enabling environment for private sector development. The Index enables an assessment of both absolute and relative country performance compared to other European countries. It also identifies strengths and weaknesses in their investment climates, which enables the comprehensive and systematic measurement of developments over time.

Similar to Konig and Ohr (2013)'s rationale for developing their index, there are many composite indices out there that "cover a much larger number of countries and years" than the Investment Attractiveness Index.[2] Thus, as the authors note, "it is legitimate to question the benefit of adding another" one (Konig and Ohr 2013). I see at least three reasons. First, the investment

[2] These include, among many others, the World Economic Forum (WEF)' Global Competitiveness Index (GCI), the Fraser Institute's Economic Freedom Index, the Heritage Foundation's Index of Economic Freedom, the World Bank's Doing Business, A.T. Kearney's Foreign Direct Investment Confidence Index, The Economist Intelligence Unit (EIU) Business Environment Rankings, IMD's World Competitiveness Scoreboard, KOF Index of Globalization, Michigan State University's IBC Market Potential Index, UNCTAD's Foreign Direct Investment (FDI) Performance Index, and UNCTAD's Trade and Development Index.

climate of individual European countries is of interest in its own right. With respect to Europe, one has to take into account the specific dimensions and aims of integration across Europe. Globalization indices, however, are not designed to capture important aspects of European investment environments. Second, current composite measures that assess business climates and competitiveness discuss merely a few of the requirements necessary to foster an enabling investment environment. Third, there are opportunities to improve the aggregation and weighing methods of existing indices. Many of the existing "indices use either subjective *a priori* weightings or they use statistical aggregation procedures without making use of all the necessary information" available (Konig and Ohr 2013). Improvements in these methods can be therefore valuable for constructing new indices.

The Investment Attractiveness Index aggregates 41 indicators that cover four broad dimensions: political, economic, business, and social. The 41 indicators may not be exhaustive, but they represent important components of an attractive investment climate across four dimensions. These are: (1) Political and Institutional Environment; (2) Economic Environment; (3) Business Environment; and (4) Knowledge, Innovation, and Labor Market Environment. Two sets of indices have been created: four sub-indices and an overall investment attractiveness index. All composite indicators were calculated by linearly "weight-aggregating" their components, and the weights were determined by using principal component analysis (PCA)—a statistical

procedure that reduces a large dataset into a smaller one to extract the important information and dynamics that underlie it.

In the overall rankings for 2016, Switzerland emerges as the most attractive country for investment, followed closely by Sweden and Finland. Estonia and the Czech Republic stand out as the two most attractive countries in Central and Eastern Europe. The least attractive countries in Europe are Greece and Hungary, with Hungary falling significantly in all the rankings when compared to 2006.

Among the Central and Eastern European countries, Estonia's "political and institutional environment" and "knowledge, innovation, and labor market environment" sub-indices scores are quite high. An examination of the data reveals that these high scores are driven primarily by strong adherence to the rule of law, low levels of corruption, transparent and accountable public sectors, effective regulatory frameworks, and strong property rights protection. It also reflects the relatively high quality of Estonia's education system and scientific research.

In addition, using the methodology employed for the Investment Attractiveness Index, the EU Economic Integration Index was also developed to understand how various economic factors affect economic integration in the EU. This index found that the Slovak Republic is the most economically integrated EU member state, while not surprisingly, the United Kingdom is the least integrated. Slovakia's score reflects its relatively high level of

integration within the EU at all levels or dimensions. Over the past decade, the analysis finds that seven of eleven Central and Eastern European countries have become more integrated—by strengthening their trade, investment, financial, and industry ties—within the EU.

Overview of Part 1

Countries in Europe have recorded heterogeneous growth and development paths over the past three decades. These differences became evident in the aftermath of the global financial and economic crises. The nearly decade-long global recession that resulted highlighted marked differences among European economies in their levels of economic development, as well as the urgency for reform and the inadequacy of past efforts. The recession also brought to the forefront of academic and policy debates the question of how to address structural challenges and stimulate economic growth in today's highly interconnected global economy. This has been the case not only in transition economies, but also in developing and developed ones alike.

States seeking membership to the European Union (EU), developing states with newly liberalized economies, and even well-established economies attempting to overcome the depressing effects of aging populations and expensive social safety nets can all benefit from reinvigorated economic growth. Efforts aimed at addressing these challenges, however, are more likely to succeed in environments that are conducive to private sector development and that can attract and encourage high quality investment—foreign and

domestic. Hence, understanding the complex dynamics that give rise to—and sustain—an attractive investment environment is critically important.

As noted by Wernick, Haar, and Sharma (2014), "[w]hile the impact of governance on overall economic… [performance] has been widely studied, recent empirical work has tended to focus on how… [some political institutions or factors (e.g., the rule of law, corruption, and regulations) affect investment levels and output growth. The] broad consensus of this literature is that good institutions are indeed a key—if not 'the' key—determinant of long-run economic growth" (Wernick, Haar, and Sharma 2014). Relatively little has been written on how the political, economic, financial, and social dimensions that comprise a country's overall investment climate *together* create the necessary conditions for socio-economic development. Factors that affect governance and political institutions matter as much as those that affect economic, innovative, and social capacity.

This dissertation fills this gap in two ways. First, it conceptualizes the "investment climate" both as a multidimensional construct and as a framework for understanding how policy and non-policy factors interact and affect the investment climate. In doing so, it brings out the critical importance of public governance. Second, it develops a composite indicator—the European "Investment Attractiveness Index" (IAI)—that distills information captured by many of the policy and non-policy factors that shape the environment for investment—public and private, domestic and foreign, thereby providing a

powerful snapshot of European countries' overall investment attractiveness over a recent 11-year period (2006-2016).

The goal is to assist policy makers, scholars, and business leaders in evaluating policies and reforms that influence a country's ability to attract—and benefit from—domestic and foreign investment. Structured around the Organisation for Economic Co-operation and Development (OECD)'s Policy Framework for Investment and the United Nations Conference on Trade and Development (UNCTAD)'s Investment Policy Framework for Sustainable Development, the Investment Attractiveness Index goes beyond the typical components of an enabling business environment (e.g., political stability, low levels of corruption, regulatory quality, national treatment of foreign investment, investment treaties, and investment and tax incentives) to cover a wider range of political, economic, and social factors affecting the investment environment (e.g., innovation, human capital, domestic and foreign competition, labor markets, and infrastructure, among others).

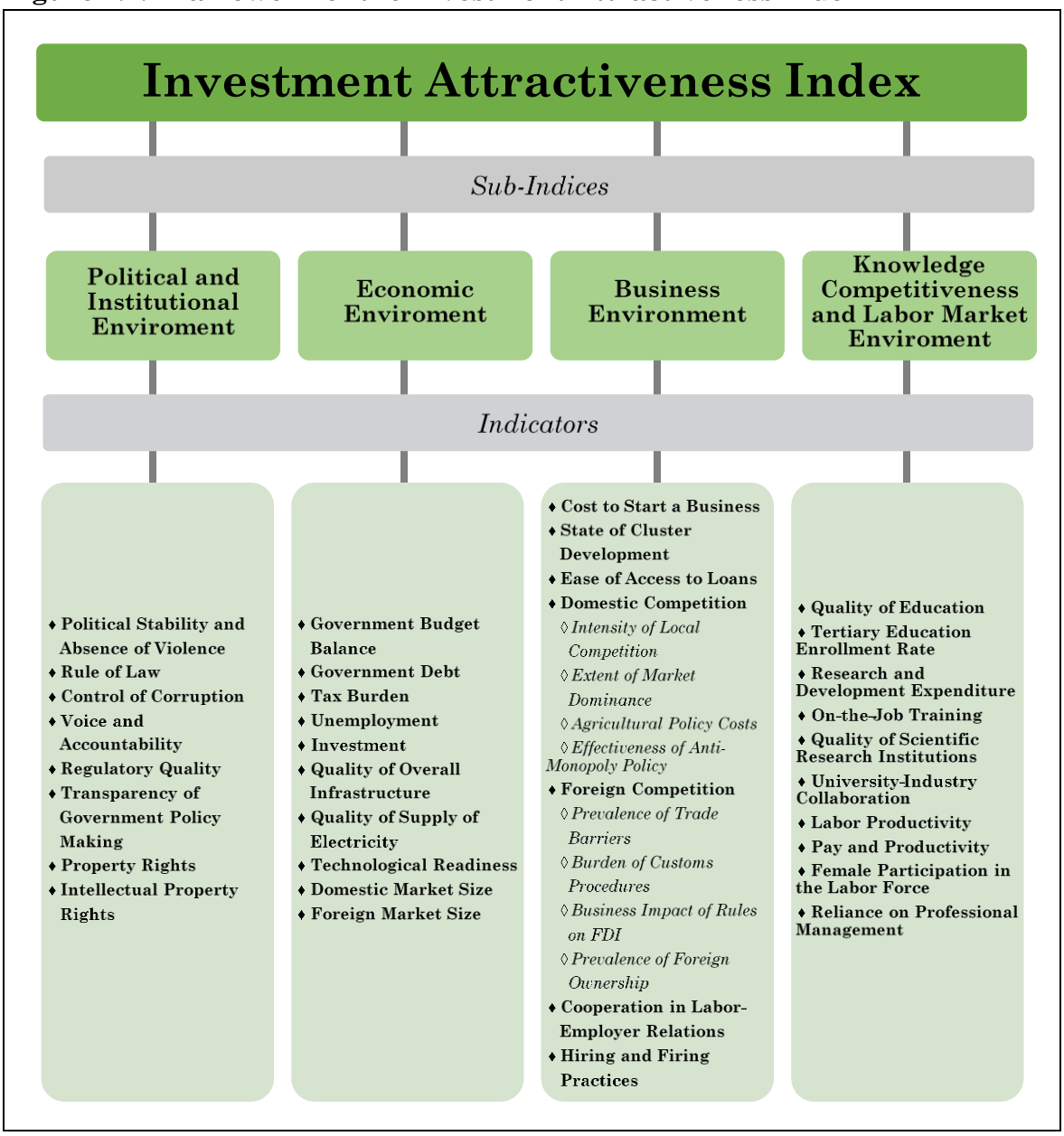
Although the focus of this project is on Central and Eastern Europe, 29 European economies are covered in the Index. Four dimensions are analyzed. These are: (1) Political and Institutional Environment; (2) Economic Environment; (3) Business Environment; and (4) Knowledge, Innovation, and Labor Market Environment. Resources and data reliability did not permit inclusion of every European country, nor of every factor or public policy determinant that affects the investment environment. Nevertheless, an

attempt was made to incorporate as many relevant and reliable indicators as possible. Figure 1.1 presents the conceptual framework of the Index.

The study also contributes to the literature by assessing the impact of various improvements in the investment climate of European countries stacks against current economic indices. While many of the existing indices focus on how integrated, developed, competitive, or innovative countries are at the global level, the Investment Attractiveness Index examines these issues from a regional perspective.

I build upon the existing literature and employ principal components analysis to develop the Investment Attractiveness Index. Using specific assumptions and two different approaches, I develop an overall index and four sub-indices. The choice of methodology allows me to develop an empirical justification for including or excluding variables and indicators, and also to create sub-indices based on the relative contributions of specific indicators towards the constitution of composite indicators.

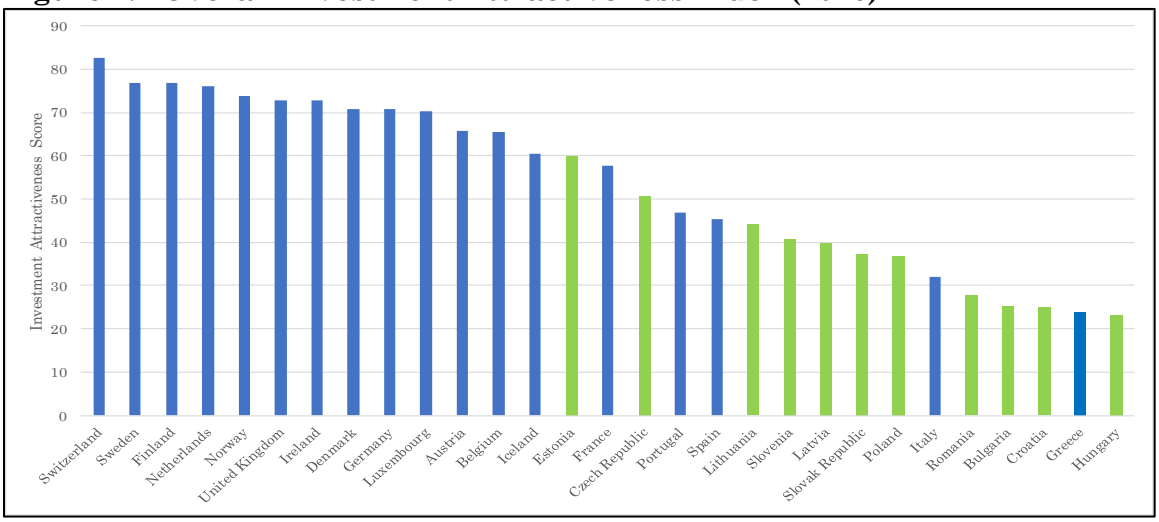
Figure 1.1. Framework of the Investment Attractiveness Index



The Investment Attractiveness Index reveal country rankings and index points (or scores) for current EU Member States (not including Cyprus and Malta) and European Free Trade Association (EFTA) member states (not including Liechtenstein) (Figure 1.2). The results show that Switzerland was the most attractive country, followed by Sweden, Finland, and the Netherlands, receiving only marginally lower scores than Switzerland. Among

the Central and Eastern European countries, the investment climates of Estonia, the Czech Republic, and Lithuania are the most attractive. Estonia in fact ranks higher than France. Estonia does particularly well in terms of its business environment, while the Czech Republic does especially well in terms of its economic environment.

Figure 1.2 Overall Investment Attractiveness Index (2016)



Source: Author's own calculations.

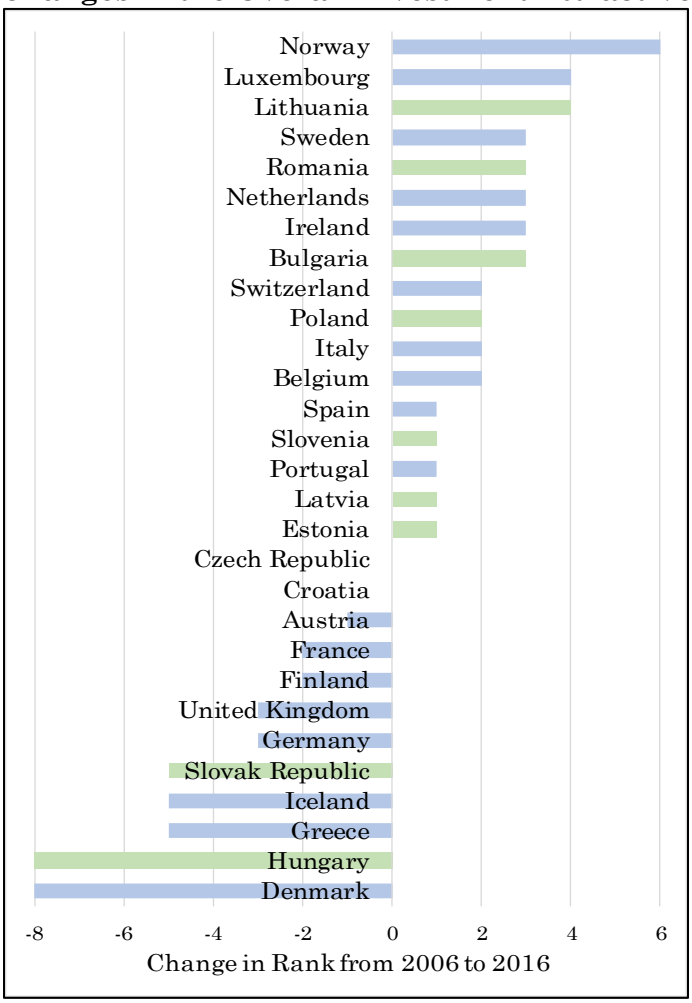
Italy and Greece are the EU-15 countries whose investment climates are the least attractive. Six Central and Eastern European countries rank higher than Italy, and both Italy and Greece score relative poorly in terms of their business environment. Hungary and the three newest EU Member States—Croatia, Bulgaria, and Romania—have the lowest scores, Hungary being the least attractive for investment in Europe. The results indicate that the surge of investment—both foreign and domestic—that these countries have experienced during the past decade might be "driven mainly by a domestic market that is attractive enough to compensate for an unattractive investment climate" (Copenhagen Economics 2016).

Relative to other countries, seven Central and Eastern European countries have increased their attractiveness for investment over the past decade (Figure 1.3). The three countries that have moved up the most in the Index are Lithuania, Bulgaria, and Romania. The investment climate in Hungary and the Slovak Republic, however, has deteriorated significantly in recent years. Hungary has fallen the most places in the ranking, due mainly to the decline in Hungary's regional economic "competitiveness" in recent years. Unpredictable "tax and regulatory policies have favored national and government-linked companies" (U.S. Department of State 2017). In addition, according to the European Commission, bankruptcy proceedings are increasingly seen as unfriendly to remediation. Moreover, its strong anti-migrant rhetoric and actions are likely having a negative impact on the attractiveness of the country for investment.

It is worth noting that the impact of the global financial and economic crises does not seem to have affected overall trends (positive or negative) in the investment climates of most countries. When I analyze the attractiveness of countries by period, trends prior to 2009 are generally similar to those that we observe in recent years (after 2013). For instance, Ireland and Portugal—two countries that were severely affected by the crises—were improving their investment climates prior to 2009. Conditions deteriorated during the crises, but since 2013, they have resumed their positive trends. (The absolute and relative scores of many of the indicators that make up their investment

climates have increased.). Similarly, conditions in Hungary and Slovakia, which were deteriorating prior to the crises, have continued to do so in recent years. While this analysis reveals trends in overall conditions, it is very difficult—if not impossible—to assess the extent to which the crises affected the various dimensions of these countries' investment climates.

Figure 1.3 Changes in the Overall Investment Attractiveness Index

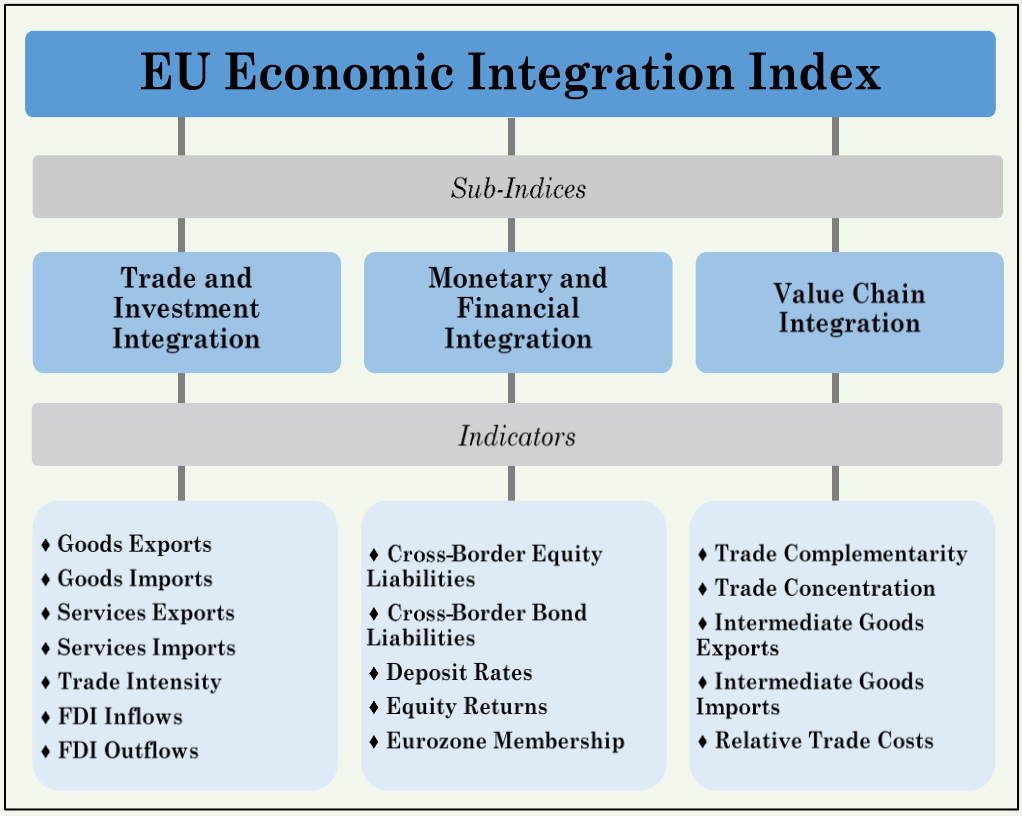


Source: Author's own calculations.

The EU Economic Integration Index

Deeper economic integration is thought to help expand markets, "maximize the efficiency of resource allocation, and [boost] productivity and investment opportunities, all serving stronger economies" (Huh and Park 2017). Through these channels, greater economic integration can affect economic performance, while producing "important noneconomic benefits through greater security and political stability and sociocultural harmonization" (Huh and Park 2017).

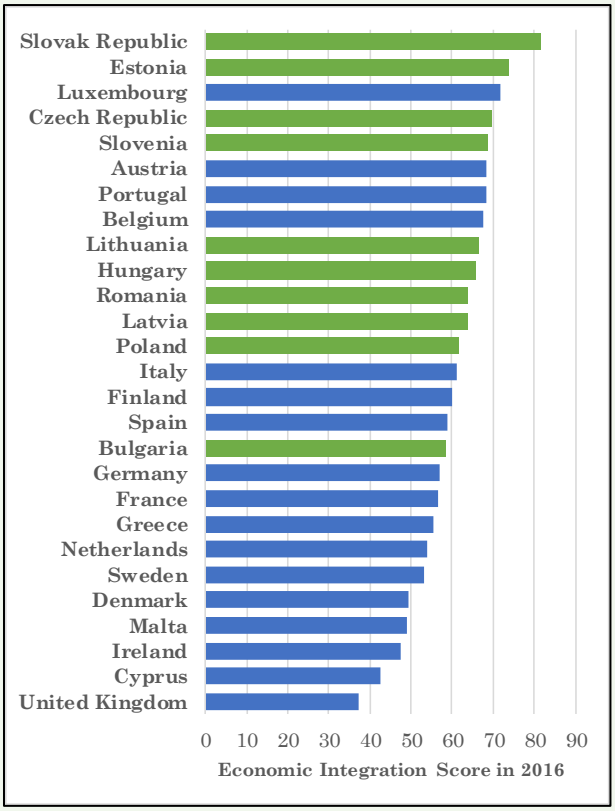
Similar to the Investment Attractiveness Index, this dissertation also develops an EU Economic Integration Index. The study conceptualizes "economic integration" as a multidimensional construct and as a framework for understanding how various economic factors affect economic integration in the EU. As a construct, it is comprised of a number of dimensions. As a framework, it recognizes that economic integration is affected by the interplay of various economic trends and developments. These include, for example, exports, imports, inward and outward foreign direct investment, financial transactions, and industry ties within the EU.



Despite the academic and policy interest in European integration, recent empirical work has focused rather narrowly on the political and monetary dimension of this process. The broad consensus among policymakers is that integration has been beneficial—politically, socially, and economically. Yet, comparatively little has been done to measure the extent to which European countries have become economically interdependent, determine if and how greater integration affects economic performance, or compare relative levels of trade, monetary, financial, and value chain integration.

The constituent elements of the European Investment Attractiveness Index are grouped under three broad dimensions or sub-indices: (1) Trade and Investment Integration; (2) Monetary and Financial Integration; and (3) Value Chain Integration. The three sub-indices comprise a total of 17 indicators. The relationships among dimensions are highly complex. European economic integration is a multidimensional process, and thus difficult to quantify by a composite indicator. Nevertheless, the Economic Integration Index distills information captured by many of the macroeconomic variables that affect economic integration in Europe, thereby providing a snapshot of 27 EU economies over a recent 11-year period (2006-2016).

The scores from the Index and sub-indices range from 0 to 100: higher scores indicate higher levels of economic integration relative to other EU member states. The overall scores and rankings of members states in 2016 are depicted in the figure below. The Slovak Republic is the most economically integrated member state within the EU, while the United Kingdom is the least integrated.



The Economic Integration Index is used in the dissertation to assess if there is any correlation between higher levels of economic integration and higher GDP levels or growth rates in EU member states. Together with the Investment Attractiveness Index, the Economic Integration Index is included in the econometric analysis of Chapter 3 to study the relationship between foreign and domestic investment, the investment climate, economic integration, and economic performance in the EU.

Before carrying out the econometric analysis, I calculate the period averages of real per capita GDP, foreign investment, and domestic investment for each country and relate them to the scores of the Investment Attractiveness Index and the Economic Integration Index (see text box below for more detail on the Economic Integration Index). While this analysis might be "trivial" in that the comparison between index scores and per capita macroeconomic variables does not control for the effect of other economic factors, the exercise can reveal some tendencies in the relationships among these variables.

Figure 1.4 shows the relationship between average real per capita GDP and average Investment Attractiveness Index scores between 2006 and 2016 across all countries, and across Central and Eastern Europe in particular. The figure indicates that higher investment attractiveness scores are associated with higher per capita incomes. The relationship is also strong among Central and Eastern European countries. The slope coefficient from an OLS regression is highly significant and suggests that if the investment attractiveness score increases by one point, this would bring in, on average, an extra US$1,016 (3.2%) of income per person when considering all countries together. For Central and Eastern European countries as a group, a similar increase would bring in an additional US$385 (2.6%) of income per person.

When it comes to economic integration, Figure 1.5 seems to indicate that there is no relationship between the scores of the European Economic Integration Index and per capita GDP. However, when I look at the Central

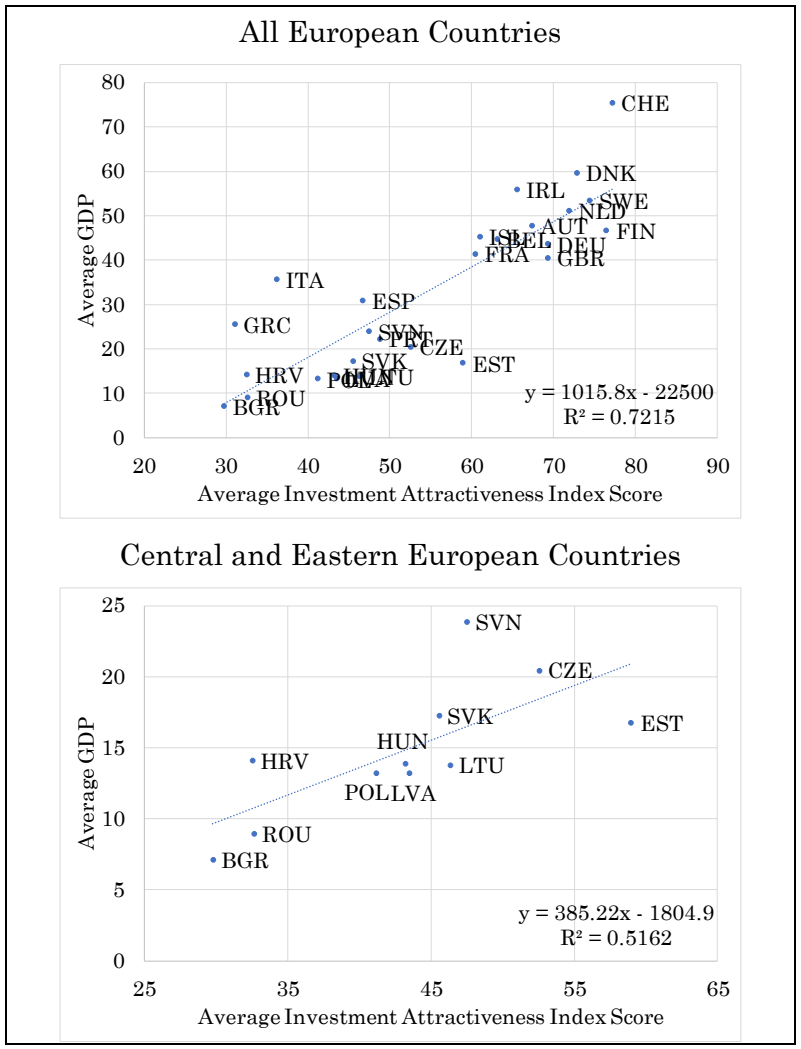
and Eastern European countries, there seems to be a strong positive and statistically significant relationship between how economically integrated a country is within Europe and its per capita GDP. The slope coefficient from an OLS regression is highly significant and suggests that if the economic integration score increases by one point, it would bring in, on average, an extra US$504 (3.4%) of income per person in Central and Eastern European countries.

When it comes to investment, Figures 1.6 and 1.8 show that there is a strong relationship between real per capita inward FDI stock, real per capita domestic investment, and investment attractiveness scores for all countries, and in particular for those of Central and Eastern Europe. The figures indicate that higher investment attractiveness scores are associated with higher per capita investment. The relationship, again, is even stronger among the Central and Eastern European economies. The slope coefficients from OLS regressions are highly significant and suggest that an increase in the investment attractiveness score of one point would bring in, on average, an extra US$2,249 (3.3%) of inward FDI stock per person and an extra US$209 (4.0%) in domestic investment per person when considering all countries together.

The level of economic integration does not seem to be correlated with foreign or domestic investment (Figure 1.7 and 1.9), at least when looking at all the countries together. However, for Central and Eastern European countries, this relationship is positive and statistically significant. The slope

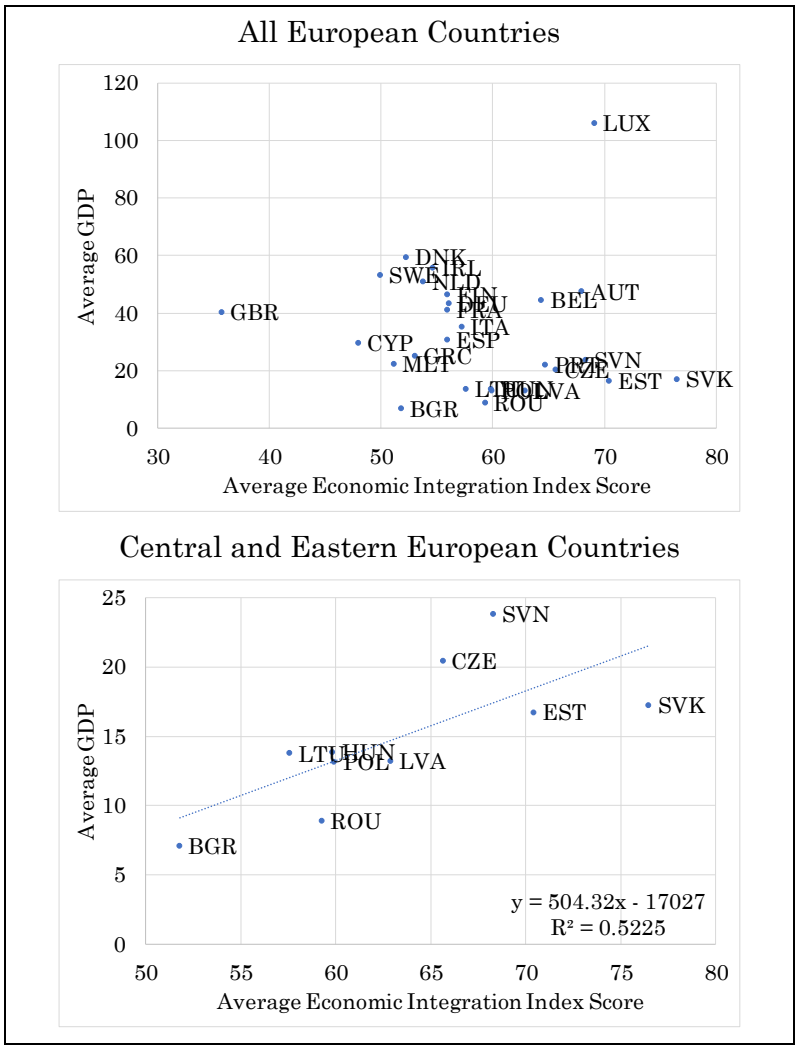
coefficients from OLS regressions are highly significant and suggest that a one-point increase in the economic integration score could bring in, on average, an extra US$351 (3.9%) of domestic investment and US$132 (4.2%) of foreign investment per person in Central and Eastern European countries.

Figure 1.4 GDP and the Investment Climate
(2006-2016, per capita, in thousands of constant 2010 US$)



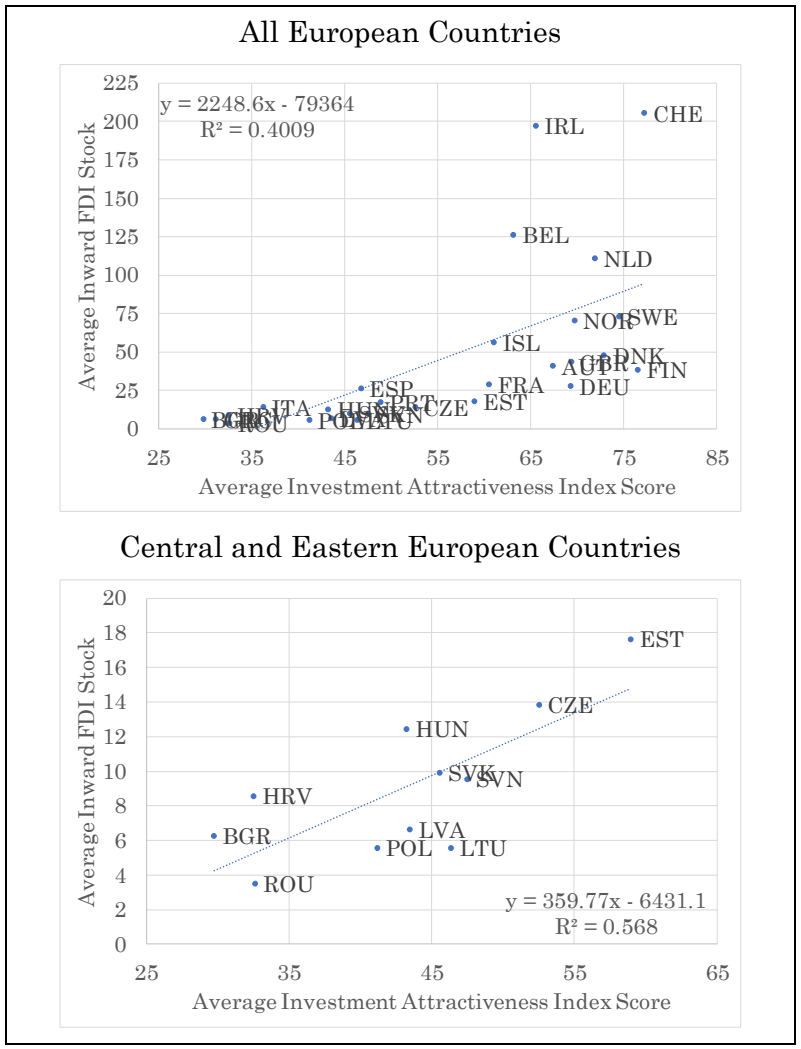
Source: Author's own calculations.

Figure 1.5 GDP and Economic Integration
(2006-2016, per capita, in thousands of constant 2010 US$)



Source: Author's own calculations.

Figure 1.6 FDI and the Investment Climate
(2006-2016, per capita, in thousands of constant 2010 US$)



Source: Author's own calculations.

Figure 1.7 FDI and Economic Integration
(2006-2016, per capita, in thousands of constant 2010 US$)

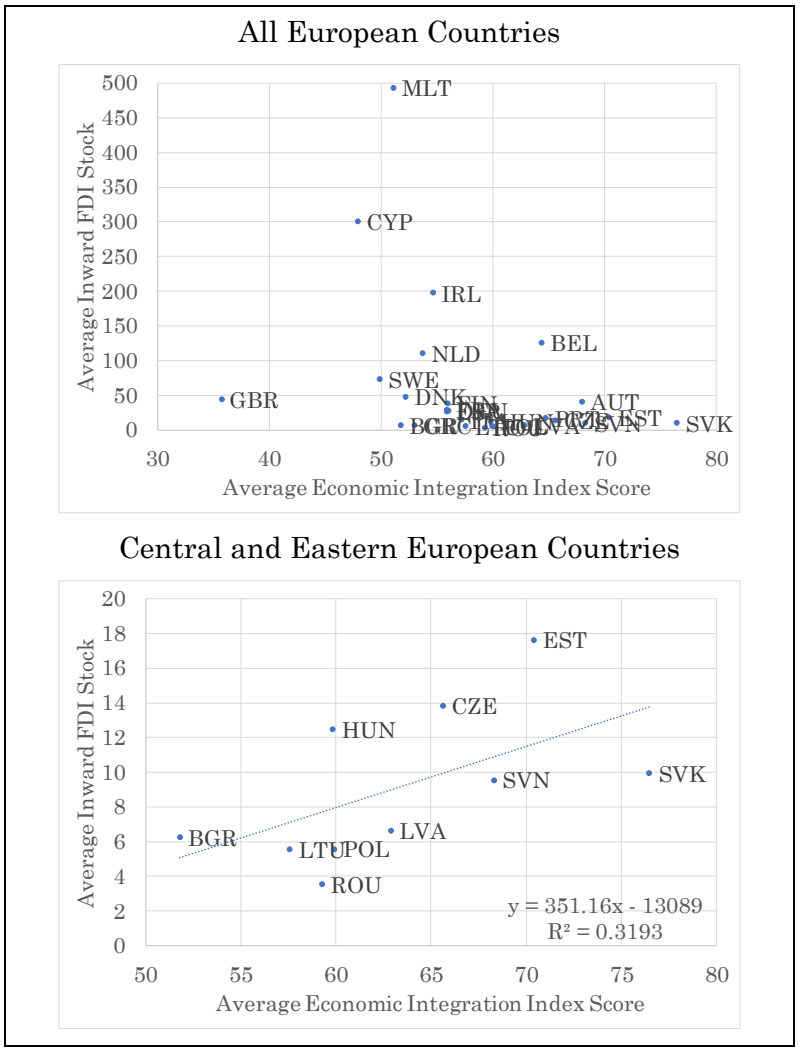
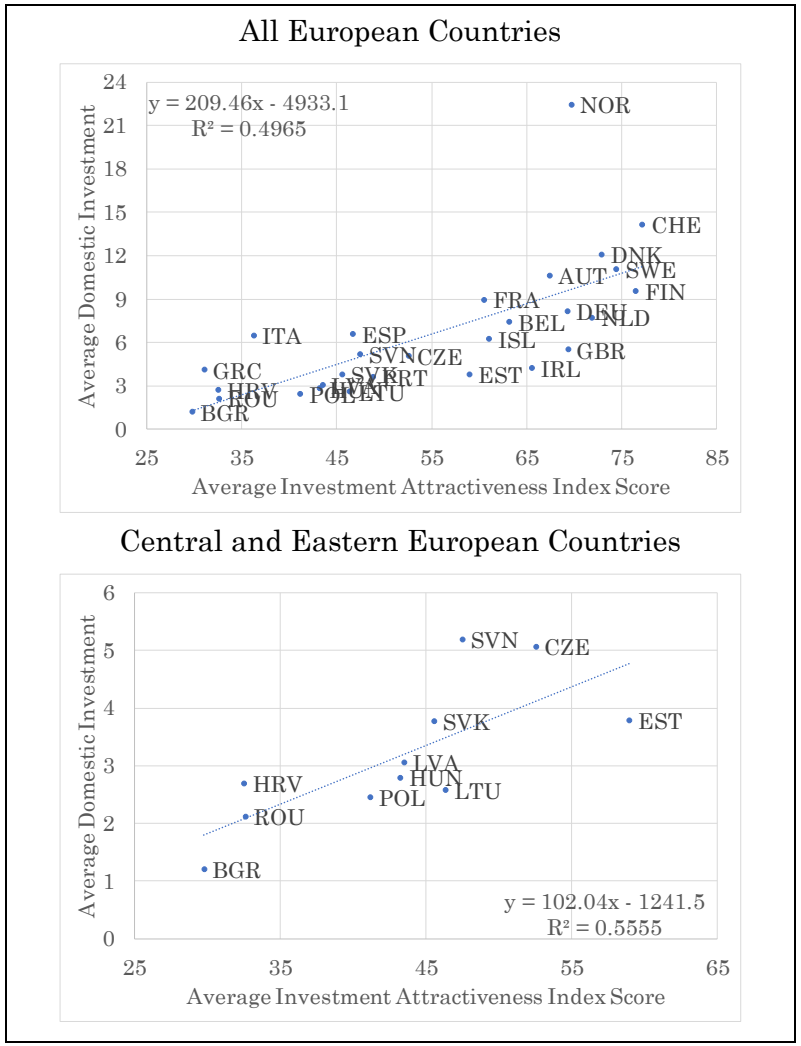
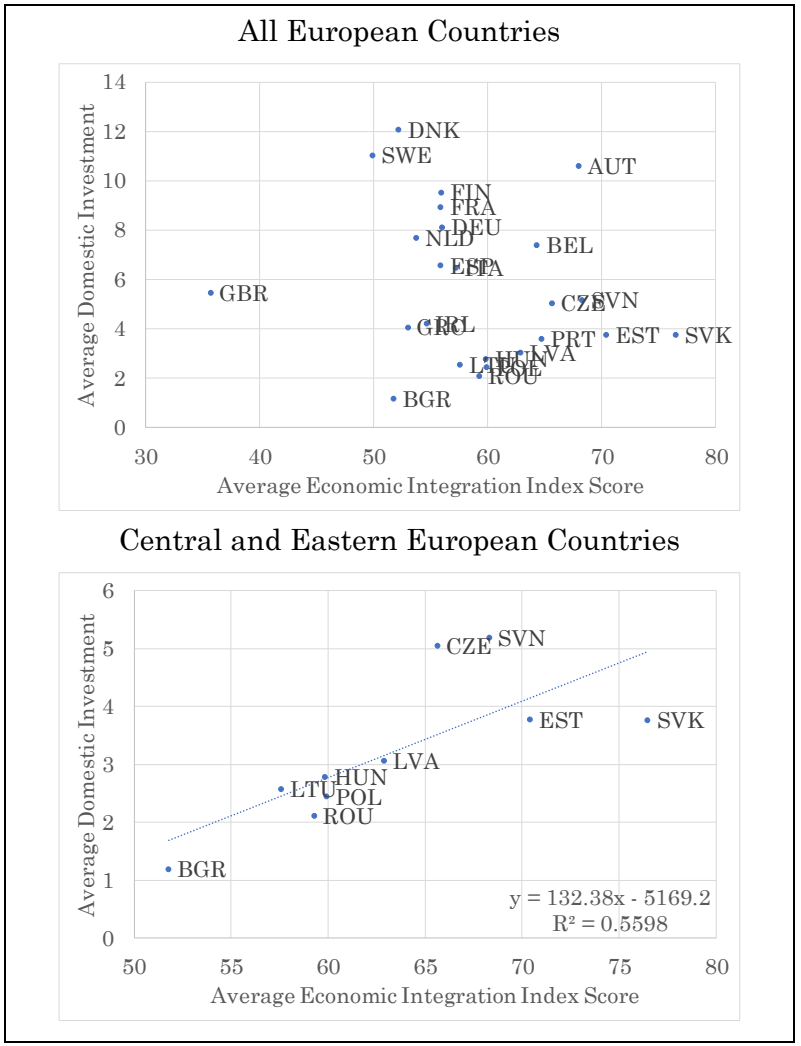


Figure 1.8 Domestic Investment and the Investment Climate (2006-2016, per capita, in thousands of constant 2010 US$)



Source: Author's own calculations.

Figure 1.9 Domestic Investment and Economic Integration (2006-2016, per capita, in thousands of constant 2010 US$)



Source: Author's own calculations.

1.3 Analyzing Investment and Economic Performance in Europe

Research Question

How do foreign and domestic investment affect the economic performance of European countries? Do the investment climate and economic integration matter for economic performance?

The second objective of this dissertation is to investigate empirically how foreign and domestic investment, the investment climate, and economic integration effect economic performance in European countries, and particularly in those of Central and Eastern Europe. The lack of data prior to the early 1990s for many of these countries prevented the use of standard econometric techniques for output regressions, such as general method of moments (GMM) and two-stage least squares (2SLS).

Using a sample of 31 countries, this dissertation studies the impact of foreign and domestic investment, the investment climate, and economic integration on real GDP (in levels and growth rates). GDP is the dependent variable in all regressions, while inward FDI stock, domestic investment, exports, government consumption, inflation, unemployment, and—at least for the first part of the econometric analysis—the scores from the Investment Attractiveness and European Economic Integration Indices are used as the key independent variables. In line with the prevailing literature, it tests the hypothesis that many of these variables have a positive and statistically significant impact on the economies of many countries of this region.

The study estimates and runs a fixed effects (FE) model to control for omitted variable bias, and it checks the results for their robustness for different specifications. Moreover, it makes use of a dynamic panel estimation method—the Pooled Mean Group (PMG) estimator—to carry out additional empirical analyses. A benefit of this estimator is that it allows short run dynamic specifications to vary from country to country. Both methods—FE and PMG—provided strong statistical evidence that investment, together with the investment climate and economic integration, has a positive and significant effect on economic output. The results were tested in a number of model specifications, especially against the inclusion of other explanatory variables. In all estimations, the regression coefficients on foreign and domestic investment, investment attractiveness, and economic integration turned out to be positive and highly significant.

I find that increases in investment, improvements in the investment climate, and greater levels of economic integration among European countries are generally associated with higher levels of economic output. Had it not been for the limited and often unreliable data available on investment for many of the countries in the sample, the findings may have been strengthened substantially, as this additional data could have helped to account for some of the extreme values of growth and levels of per capita GDP, and foreign and domestic investment in the dataset. Nevertheless, the results are significant

and consistent with the findings of other analyses examining the link between GDP, investment, and exports.

The primary policy implication of the results is that governments should design policies and initiatives that attract both foreign and domestic investment, as it may continue to enhance economic growth. In addition, as the coefficient of domestic investment is higher than the coefficient of foreign investment in almost all of the regressions ran as part of this study, the findings suggest that developing an environment that fosters private sector development and encourages domestic investment might be a more effective and complementary policy than primarily targeting foreign investors—that is, if stimulating economic growth is the ultimate objective. However, further research that accounts for both country-specific factors and sectors is necessary. Studies that analyze the effectiveness of investment by sector, for instance, have the potential to help governments design policies that encourage and channel investment to those sectors of the economy that have the greatest potential to generate economic growth.

Designing effective programs and incentives, however, is a challenging task, particularly in many of the economies in transition analyzed here. Even almost 30 years after the collapse of the Soviet Union, they continue to face numerous political, economic, and cultural challenges. As Blomstrom et al (2003) suggests, "the incentives should ideally not be of an ex ante type that is granted and paid out prior to the investment, but should instead promote those

activities that create a potential for spillovers. In particular, they include education, training, and R&D activities, as well as linkages between foreign and local firms" (19). Therefore, investment policies should be carefully developed and implemented. Otherwise, their adoption could ultimately create market distortions (as in the case of poorly designed or targeted tax breaks and duty exemptions for businesses and multinational enterprises) or inefficiencies (as in the case of economies unable to absorb appropriately the positive spillover effects created by foreign investment) that reduce a country's overall economic welfare.

Overview of Part 2

The second part of the dissertation (Chapter 3) provides empirical evidence about how foreign and domestic investment, exports, the investment climate, and economic integration affect economic output in European countries. While I carry out an analysis of 31 countries, the focus is on 11 Central and Eastern European countries during the period 1995-2016 using yearly data and panel data econometric methods. Central and Eastern European is a region of interest for studying the impact of investment and trade for a number of reasons. In particular, foreign investment in the region has been significant and continues to grow. When "[c]ompared to other regions of the world, [Central and] Eastern Europe stands out as a region in transition" (Zuhlke 2009). Also, the endeavor for EU accession in other Eastern and Southeastern European countries has triggered additional and significant

reform dynamics that affect economic performance. Finally, there are open research questions regarding the relationship between investment and trade liberalization and economic performance in this region.

It is worth noting that it is challenging to isolate the specific effects of foreign and domestic investment and exports on GDP. However, while investment and exports alone are not the ultimate drivers of economic growth, they are believed to be important means for generating it, especially in transition countries. This presumption is the focal point of the present analysis. Also, as foreign investment is considered to be a vehicle for capital and technology transfer, and inflows to the transition countries have been high, it is hypothesized that foreign investment has contributed positively and significantly to the economic performance of countries in Europe, and to a greater extent, to that of Central and Eastern European countries.

To examine thoroughly the links between foreign and domestic investment, economic integration, and economic performance in Europe, different specifications were estimated to test the extent to which the initial findings are robust. The results derived from the fixed effect (FE) estimations show that the exogenous components of foreign and domestic investment exert a reliable and positive impact on economic growth in all specifications tested. The coefficient of foreign investment ranges from 0.033 to 0.180, while that of domestic investment ranges from 0.027 to 0.126. In other words, a 10 percent increase in foreign and domestic investment would lead to increase in GDP of

0.3 to 1.8 percent and 0.3 to 1.3 percent, respectively. Foreign and domestic investment both positively and significantly contribute to economic output when controlling for exports, government consumption, inflation, the investment climate, and economic integration. The coefficient of inflation is negative and significant, which indicates that higher rates of inflation are associated with lower levels of GDP across the sample.

Particularly surprising, when exports of goods and services are included in the regression—both together and separately, the size of the coefficients of foreign investment and domestic investment, while remaining positive and significant, are much smaller than in the benchmark regression. These results suggest that for European countries in general, exports have a greater impact on GDP than foreign and domestic investment. Also noteworthy is that both the scores of the Investment Attractiveness Index and European Economic Integration Index enter the regressions significantly. When both are included, the size of the investment attractiveness coefficient is almost twice as large as that of the coefficient of economic integration.

The results indicate that the investment climate matters for economic growth in Europe. A 10 percent increase in the investment attractiveness score could increase GDP, on average, by 0.5 to 1.2 percent. Economic integration also seems to affect economic growth positively. In three out of the five regressions in which the economic integration score is included, its coefficient is positive and statistically significant. A 10 percent increase in the economic

integration score has the potential to increase GDP, on average, by 1.0 to 1.2 percent.

To determine if foreign and domestic investment, the investment climate, and economic integration impact the economies of Western European countries differently than those of Central and Eastern Europe, the sample was divided into two groups: EUROPE-20 and CEE-11. Similarly to the regressions estimated with the full sample, all of the variables of interest have a positive and significant effect on economic output.

The impact of domestic investment is much more pronounced when looking at the CEE countries. GDP generally has a significantly higher sensitivity to domestic investment and exports (total and of goods only) for this group than for the EUROPE-20 and full samples. Surprisingly, European economic integration seems to have a greater impact on GDP than the investment climate for the newest members of the EU (CEE-11), while the opposite seems to be the case for the oldest ones. A 10 percent increase in the investment attractiveness score could increase GDP by 0.7 to 1.5 percent in Western European countries and by 0.3 and 1.0 percent in Central and Eastern European countries. An equivalent increase in the economic integration score could lead to a 0.3 to 0.9 percent increase in GDP for Western European countries and a 0.9 to 1.3 percent increase for countries in Central and Eastern Europe. The results indicate that for both sets of countries, economic integration does not seem to matter when I account for government spending

and inflation. In addition, economic integration does not seem to be significant in Central and Eastern European countries when government spending, inflation, and the investment climate are all taken into account.

Overall, the estimates from the simple fixed effects regression analysis indicate that foreign and domestic investment, the investment climate, and economic integration are all positively associated with much higher levels of GDP in the "average" European country. Moreover, the impact of these variables differs for Central and Eastern European countries.

As an alternative to using cross-section fixed effects to study the long-run effects of investment on economic output, this dissertation also employed a relatively new dynamic panel econometric technique—the (pooled) mean group (PMG) estimator—to assess the impact of investment, both domestic and foreign, on economic output. The "estimator constrains the long-run coefficients to be identical, but allows for different adjustment coefficients and error variances across countries" (Neuhaus 2005). To the best of my knowledge, no single study has employed the PMG estimator to analyze the impact of foreign and domestic investment on economic growth in the 31 European countries studied here.[3] The goal was to use as much of the data available as possible. Because of methodological requirements (e.g., long time periods), the

[3] Neuhaus (2005), whose research strategy and methodology I follow closely in this section, used PMG to analyze the impact of foreign investment on the economic growth of 13 Central and Eastern European and Western Balkans transition economies from the early 1990s to 2002.

Investment Attractiveness and Economic integration Indices were not included in this part of the analysis, as they only cover a short time period (11 years).

The primary focus of the analysis was on the common long-run coefficients. I wanted to find how—in the long run and on average across all countries—an increase in inward FDI stock leads to an increase in GDP. Of similar interest will be the long-run effect of domestic investment on GDP. Other variables only served as a means to test the robustness of the foreign and domestic investment coefficients.

In the regression in which all the countries in the sample are included and where GDP is explained only by foreign and domestic investment and conditional convergence, the results show highly significant coefficients and the expected signs. The estimated coefficient of foreign and domestic investment were 0.13 and 0.33, respectively. This means that a one-time, 10 percent increase in the stock of inward FDI increases GDP by approximately 1.3 percent in the long run, while an equivalent increase in domestic investment increases GDP by 3.3 percent. Compared to domestic investment (long-run coefficient), the impact of foreign investment on GDP appears to be rather small. The income elasticity of domestic investment is 2.5 times higher than that of foreign investment.

To check the robustness of these coefficients, I alternately added several control variables to the model, including exports, government consumption, inflation, and unemployment. I did not add more than one policy variable at

the time to the benchmark model in order to ensure that the model had a sufficient number of degrees of freedom.

When exports of goods and services are included, the long-run coefficient of foreign investment decreases by half, from 0.13 to 0.065. Domestic investment also had an income elasticity slightly lower than that of the benchmark model. The coefficient of exports is not only positive but also highly significant, which indicates that they have a positive impact on GDP. Thus, the inclusion of exports into the regression model broadly confirms the significance of the long-run coefficient of foreign investment. These results do not change significantly when I substitute total exports (goods plus services) by exports of goods and services separately.

Including government consumption in the regression also supports the results of the benchmark regression. All regression coefficients on foreign and domestic investment, as well as the convergence parameters, reach levels similar to those of the benchmark model. The long-run coefficient of foreign investment is around 0.11 and of domestic investment 0.28. In other words, a one-time increase in foreign and domestic investment by 10 percent would result in an increase of GDP by 1.1 and 2.8 percent, respectively. In addition, the coefficient of government consumption is highly significant and positive in its impact on GDP.

The results do not change significantly when inflation and unemployment are introduced as two other alternative control variables to the

model. The fact that neither the sign nor the significance of the coefficients changes significantly when these other policy variables are added indicates the strength of the benchmark model. It has high explanatory power and explains GDP through its most basic factors: the accumulation of domestic and foreign capital.

Finally, I also analyze two sub-sets of countries separately, namely the Western European countries, including Cyprus and Malta (EUROPE-20) and the Central and Eastern European ones (CEE-11). I estimated equations for both subsets, and comparing the results with those of the overall sample reveals some differences among these groups.

First, GDP tends to have higher sensitivity to foreign and domestic investment in Central and Easter European countries than for the entire sample. Second, the GDP responsiveness of investment is slightly less pronounced in Central and Eastern Europe than for the full sample when I incorporate exports—total exports and exports of goods and services separately. This suggests that exports—particularly exports of goods—are important for Central and Eastern European countries. A 10 percent increase in exports of goods has the potential to increase GDP, on average, by 2.2 percent in countries of this region, compared to the 1.2 percent increase that would result in Western European countries. Third, the results suggest that government spending does not seem to matter for either sub-set of countries when I analyze them separately. Finally, inflation does not seem to be

significant for Western European countries, while unemployment is significant. The opposite seems to be the case for Central and Eastern European countries: inflation matters for economic performance, but unemployment does not.

1.4 Determining "Causal" Relationships: FDI, Exports, and GDP in CEE

Research Question

Is there a "causal" relationship between foreign direct investment (FDI), exports, and economic performance in Central and Eastern European countries?

The third and final objective of this dissertation was to examine the relationship between foreign direct investment (FDI), exports, and economic growth in Central and Eastern European countries since the early 1990s. It is important to note that there are numerous issues surrounding the formulation of causality, as direction may depend on the frequency of observations and type of data analyzed, as well as on the statistical tests used, which cannot always be adjusted to yield accurate inferences (Bhargava 2008). This is especially true when dealing with short time series. (For many of the CEE countries analyzed here, there is simply no data prior to the mid-1990s.) The goal of the analysis, therefore, is not to establish "true" causality, but rather to capture potential trends and likely links. It is not necessary for this policy exercise to answer "the question of whether the analysis has [in fact] uncovered a [true] causal structure" (Adams et al. 2003). While there are challenges that limit the

scope for analysis and policy prescriptions, the exercise can nevertheless be helpful and might reveal some of the relationships that motivate the analysis.

To carry out the analysis, I test the direction of "causality" between GDP and foreign investment and between GDP and exports in eleven transition economies in Central and Eastern Europe between 1990 and 2016. The results, based on a version of Granger's causality test developed by Toda and Yamamoto (1995), reveal that the "causality" patterns among foreign investment, exports, and GDP differ significantly across countries.

The findings suggest that, in most countries, there is a reinforcing relationship between foreign investment and GDP. In only three countries there is a unidirectional link going foreign investment to GDP. More surprisingly, however, are the results from the analysis of the relationship between GDP and exports. For most countries, the results indicate that there is no "causal" link between exports and GDP. In the case of the Czech Republic—a country analyzed in detail in this study, the results reveal that there might be a reinforcing relationship between economic output and domestic investment, even when accounting for foreign investment alone and foreign investment and exports together. In addition, some of the results from the "causality" analysis seem to suggest that there is a unidirectional relationship going from domestic investment to foreign investment and to exports in the Czech Republic. In other words, higher levels of domestic investment might help to both attract foreign investment and boost exports.

The overall findings challenge the validity of policy guidelines that emphasize attracting FDI and boosting exports for development under the assumption that "FDI causes growth" or "exports cause growth." More emphasis should be put on the overall role of economic growth in increasing FDI and exports, and how to benefit from them—as well as to the role of human capital, infrastructure, governance, and trade, investment, and competition policies. As emphasized by Gorg and Greenway (2004), "general policies aimed at altering the fundamentals are more important than specific policies aimed at attracting particular investments" or boosting exports.

The findings also suggest that more country analysis at the individual level are needed, as the "causality" between foreign investment (or exports) and GDP is country-specific. Collecting more reliable and disaggregated data, for longer time-periods, and employing other time-series methodologies to detect "causality" may enable us to reach conclusions and craft policy recommendations that are more robust regarding trade and investment. We cannot rule out, however, that the lack of evidence for the growth enhancing effects of foreign investment and exports for many of the Central and Eastern European countries in this analysis is due to the bivariate nature of the VAR models and lack of degrees of freedom in the time-series framework. Hence, the results motivate further future analysis in which various channels of the GDP-FDI and GDP-exports nexuses can be investigated and other variables—perhaps disaggregated by industry—included for a much longer time period.

Overview of Part 3

The third and final part of the dissertation (Chapter 4) examines the nexus between FDI, exports, and GDP—one that has been the subject of much debate and controversy since the 1990s. Particularly after the collapse of the Soviet Union, the explosion of foreign capital stocks, combined with the widespread belief that trade and investment liberalization are beneficial for development, triggered a large body of research on the determinants of economic growth in formerly communist countries. While there might be consensus among policymakers that foreign investment and exports are important drivers of economic growth, the empirical literature examining their relationship reveals mixed and inconclusive results on the direction of "causality," especially when it comes to foreign investment. While many studies find that foreign investment has a positive and statistically significant impact on economic growth,[4] there are others that reveal that foreign investment does not have a positive or significant effect on growth, or that its effects are in fact negative.[5]

Many of these studies analyze the impact of foreign investment and export performance on growth and development using panel or cross-sectional econometric techniques, and those that analyze their effects employing time-

[4] For instance, Alfaro et al 2004; Blomström et al 1996; Borensztein et al 1998; Chang 2010; De Gregorio 1992; de Mello 1999; Fortanier 2008; Johnson 2006; Lensink and Morrissey 2006; Li et al 2007; Luiz and de Mello 1999; Mody and Wang 1997; Nair-Reichert and Weinhold 2001; Neto et al 2008; Wacker 2011; and Wacker et al 2013.

[5] For instance, Carkovic and Levine 2002; Grilli and Milesi-Ferretti 1995; Haddad and Harrison 1993; Javorcik 2004; Mencinger 2003; and Saltz 1992.

series techniques focus on one or few countries at a time. However, econometric problems accompany cross-country studies, which can "have serious consequences as far as the appropriateness of the derived conclusions" (Podkaminer 2013). Pooling together "qualitatively different" countries (Central and Eastern European countries, former Soviet republics, and even China, Mongolia and Vietnam) "increase[s] the size of the 'sample of observations' and thus formally creates scope for estimation of more parameters… than would be possible otherwise. But the genuine value of eventual findings from such exercises" can be questionable (Podkaminer 2013). Failing to complement cross-country studies with single-country studies may lead to misleading or inadequate policy recommendations.

The dissertation seeks to overcome some of these problems by estimating bivariate vector autoregressive (VAR) models and applying Toda and Yamamoto (1995)'s causality testing approach to individual countries.[6] It contributes to the literature by focusing on the formerly communist countries that are now members of the EU. To my knowledge, no study has carried out a "causality" analysis for all of all of these countries in a systematic way. Specifically, I study the "causal" relationship between foreign investment and GDP and between exports and GDP in eleven Central and Eastern European

[6] As noted above, there are numerous issues surrounding the formulation of causality, and the goal of the analysis here is not to establish "true" causality, but rather to capture potential trends and likely links.

countries during the period 1990-2016. The time period reflects the availability of data.

Understanding the causal link between foreign investment, exports, and growth has important policy implications. As noted by Zang (2012) unidirectional "causality" from FDI (exports) to GDP "would support the FDI-led [(export-led)] growth hypothesis that" foreign investment (exports) "promotes economic growth [and development] in… host countrie[s]." On the other hand, a "causal" link running from GDP to foreign investment (exports) would "imply that economic growth may be a prerequisite for countries to attract" and benefit from foreign investment (higher exports) (Zang 2012). If the "causal" process is bidirectional, then foreign investment (exports) and GDP have a mutually reinforcing relationship.

The "causality" test results (Table 1.1) indicate unidirectional "causality" from GDP to inward FDI stock in one country (Latvia), unidirectional causality from inward FDI stock to GDP in five countries (Estonia, Hungary, Lithuania, Romania, and Slovenia), bidirectional "causality" in three countries (Bulgaria, Croatia, and Slovakia), and no "causal" relationship in two countries (Czech Republic and Poland). When it comes to the relationship between inward FDI flows and GDP, the "causal" link seem to run from GDP to inward FDI flows in three countries (Croatia, Hungary, and Lithuania), from inward FDI flows to GDP (reverse "causality") in two countries (Bulgaria and Latvia), and no evidence of "causality" is found

in six countries (Czech Republic, Estonia, Poland, Romania, Slovakia, and Slovenia). Finally, the results show a "causal" link from exports to GDP in two countries (Estonia and Poland) and bidirectional "causality" in two countries (Croatia and Latvia). No "causality" is found between exports and GDP in seven countries (Bulgaria, Czech Republic, Hungary, Lithuania, Romania, Slovakia, and Slovenia).

Table 1.1 "Causality" Tests Results

GDP and inward FDI stock	GDP → *s*FDI	Latvia
	*s*FDI → GDP	Estonia, Hungary, Lithuania, Romania, Slovenia
	GDP ↔ *s*FDI	Bulgaria, Croatia, Slovakia
	No Causality	Czech Republic, Poland
GDP and inward FDI flows	GDP → *f*FDI	Croatia, Hungary, Lithuania
	*f*FDI → GDP	Bulgaria, Latvia
	GDP ↔ *f*FDI	none
	"No Causality"	Czech Republic, Estonia, Poland, Romania, Slovakia, Slovenia
GDP and exports	GDP → EXP	none
	EXP → GDP	Estonia, Poland
	GDP ↔ EXP	Croatia, Latvia
	"No Causality"	Bulgaria, Czech Republic, Hungary, Lithuania, Romania. Slovakia, Slovenia

Source: Author's own calculations using STATA 15.

1.5 Data Limitations

As noted by Macdougald (2011), the reliability "of any empirical analysis depends on the quality of the data available, and this study is no exception."

As I investigate "aggregate country-level phenomena, data that has been combined for each country and year is [thus] appropriate" (Macdougald 2011). While all data used in this dissertation have been cross-checked to ensure their consistency using at least two sources, there is undoubtedly collection and measurement errors in all of them. However, as these sources are sometimes the primary and only ones "for cross-country panel studies in the economic literature… [I] rely on the assumption that the errors are random and not systemic and therefore do not introduce bias into the samples" ((Macdougald 2011)

Investment Data

Lack of reliable, disaggregated, and detailed data limits the proper assessment of the size, scope, and implications of foreign and domestic investments.[7] The validity and appropriateness of conclusions and policy recommendations derived from econometric analyses—like those carried out in this dissertation—depend not only on the statistical methods used but also on the reliability of the data and number of observations (timespan). Policymakers rely on empirical work to understand much "of the evolving processes of global competition and its impact on the changing organizational structure of business and economics" (Bellak 1998). A major challenge is that

[7] In this dissertation, I differentiate between FDI and investment projects (e.g., construction activities). "FDI" entails ownership and includes greenfield investments and mergers and acquisitions (M&A), but it does not include portfolio investment (e.g., securities). Investment projects, on the other hand, may refer to construction services performed in the host country—which may or may not be related to an FDI transaction.

"the level and extent of globalization is… [measured, in part,] by foreign direct investment (FDI) data or indicators built from it. [And despite major improvements,] the quality of FDI data remains limited" (Bellak 1998).

The Organisation for Economic Co-operation and Development (OECD) and the International Monetary Fund (IMF) have been at the forefront of the research and policy debate on the compilation and dissemination of FDI statistics. Yet, as noted by the International Trade Centre (ITC)'s Investment Map Project, OECD and IMF reporting practices and standards are often either neglected by those who collect data or not followed uniformly. For instance, some countries deviate from the ten-percent threshold value of foreign ownership, while others may not include all three "components of FDI (equity capital, intra-company loans, and reinvested earnings)" in their official statistics (UNCTAD 2008).

Other issues that affect the data include time period discrepancies in recording transactions, "the identification of the ultimate owner and target company for cross-border mergers and acquisitions," problems of valuations, investments that are "round-tripped" or "transshipped," and the "the role of special-purpose entities (companies) located in tax heavens" (ITC 2019).[8]

[8] For more detail, see International Trade Centre, Investment Map, "Data Sources and Limitations." Special purpose entities (SPEs), "which are frequently established in offshore financial centers, engage primarily in international transactions but have few or no local operations... [T]he use of SPEs for 'round tripping' has attracted attention in connection with... [FDI data]. The term 'round tripping' refers to the practice of channeling local funds to SPEs abroad and the subsequent return of the funds to the local economy in the form of FDI capital. These transactions are motivated by tax and other incentives available to foreign investors" (Patterson, Montanjees, Motala, and Cardillo 2004).

Chinese and Russian Investment

Another challenge encountered in this dissertation involved identifying the types and sources of investment—both foreign and domestic, since official disaggregated data are rarely available. This was particularly the case with Russian and Chinese investments and related projects in some Central and Eastern European countries. Despite a deterioration in their investment climates, some of these countries have experienced a surge in investment from Russia and China in recent years. The terms of these deals and transactions are not always publicly clear or transparent. Most notable is the fact that no comprehensive, standardized, or authoritative data are available on all Russian and Chinese overseas economic activities.

A number of think tanks and private research firms have developed their own datasets to track investment by state-owned firms and institutions using commercial databases and news reports. However, these "data trackers" often have limitations. Their data may represent both actual and proposed transactions, as they often record initial announcements of investments, regardless of whether they lead to actual transfer of financial resources. Thus, the data may at times both underestimate and overestimate actual amounts. Also, as the Economist Intelligence Unit (2005) notes with respect to China, "Chinese statistics record approved projects rather than actual money transfers," and "[c]ompanies often list the initial port of call of their capital, rather than its final destination, thus falsely inflating the importance of stop-

over locations such as Hong Kong and various tax havens. Countries also use different definitions of FDI, thus creating comparability problems."

In addition, it is not always possible to determine if an asset or project is wholly or partially owned, financed, built, or operated by a Russian or Chinese entity. Because projects may involve several phases and a sometimes-evolving cast of stakeholders, it is not always possible to distinguish between the phases of acquisition or construction and those of operations—as they are often blended in terms of time and firms involved. For instance, many of the overseas infrastructure projects in which Chinese entities are involved are public, which presents distinct challenges not always encountered when trying to identify and analyze private investments (e.g., multinational corporations building a new factory or acquiring an existing domestic firm). To attract foreign investment and transfer risks to the private sector, it is common for host countries to offer long-term concessions or leases—for both construction and operation. These typically allow foreign firms the right to use land and facilities (e.g., ports and highways) for a defined period of time in exchange for providing services. Because these land and facilities tend to be owned by the host government, investments can come in the form of use-rights through leases or joint ventures, which technically do not fall under the definition of FDI.

Finally, data availability limitations also may arise to the extent that China often finance infrastructure projects through its export credit agencies

and development banks. China (and Russia) is not part of the OECD Arrangement on Officially Supported Export Credits, which includes rules on transparency procedures for government-backed export credit financing. Some countries have been working to develop a new set of international rules, but progress arguably has been limited.

Chapter 2

Assessing the Investment Climate: A European Investment Attractiveness Index

2.1 Introduction

Europe's former communist countries have undergone a dramatic political and economic transformation over the last 28 years. Although they all reintegrated successfully into the world economy, and most achieved sustainable improvements in the living standards of their citizens, these countries have nevertheless recorded heterogeneous growth and development paths. These differences became evident in the aftermath of the global financial and economic crises. The nearly decade-long global recession that resulted highlighted noticeable differences in the levels of economic development among European countries, as well as the urgency for reform and the inadequacy of past efforts.

The recession also brought to the forefront of academic and policy debates the question of how to address structural challenges and stimulate economic growth in today's highly interconnected global economy. This has been the case not only in transition economies, but also in developing and developed ones alike. States seeking membership to the European Union (EU), developing states with newly liberalized economies, and even well-established economies attempting to overcome the depressing effects of aging populations and expensive social safety nets can all benefit from reinvigorated economic growth. Efforts aimed at addressing these challenges, however, are more likely to succeed in environments that are conducive to private sector development and that can attract high quality investment—foreign and domestic. Hence, understanding the complex dynamics that give rise to—and sustain—an attractive investment environment is critically important.

As noted by Wernick, Haar, and Sharma (2014), "[w]hile the impact of governance on overall economic… [performance] has been widely studied, recent empirical work has tended to focus on how… [some political institutions or factors (e.g., the rule of law, corruption, and regulations) affect investment levels and output growth. The] broad consensus of this literature is that good institutions are indeed a key—if not 'the' key—determinant of long-run economic growth" (Wernick, Haar, and Sharma 2014). Relatively little has been written on how the political, economic, financial, and social dimensions that comprise a country's overall investment climate *together* create the

necessary conditions for socio-economic development. Factors that affect governance and political institutions matter as much as those that affect economic, innovative, and social capacity.

This chapter seeks to fill this gap in two ways. First, it conceptualizes the "investment climate" both as a multidimensional construct and as a framework for understanding how policy and non-policy factors interact and affect the investment climate. In doing so, it brings out the critical importance of public governance. Second, it develops a composite indicator that distills information captured by many of the policy and non-policy variables that affect the investment climate, thereby providing a powerful snapshot of 29 European countries' overall investment attractiveness over a recent 11-year period (2006-2016).

This European "Investment Attractiveness Index" (IAI) is able to assess the attractiveness of each country for investment on an annual basis. The goal is to assist policy makers, scholars, and business leaders in evaluating policies and reforms that influence a country's ability to attract—and benefit from—domestic and foreign investment. Structured around the Organisation for Economic Co-operation and Development (OECD)'s Policy Framework for Investment and the United Nations Conference on Trade and Development (UNCTAD)'s Investment Policy Framework for Sustainable Development, the Investment Attractiveness Index goes beyond the typical components of an enabling business environment (e.g., political stability, low levels of corruption,

quality of regulations, national treatment of foreign investment, investment treaties, and investment and tax incentives) to cover a wider range of political, economic, and social factors affecting the investment environment (e.g., innovation, human capital, domestic and foreign competition, labor markets, and infrastructure, among others). The specific dimensions covered by the Index are: (1) Political and Institutional Environment; (2) Economic Environment; (3) Business Environment; and (4) Knowledge, Innovation, and Labor Market Environment.

The study also contributes to the literature by assessing the impact of various improvements in the investment climate of European countries stacks against current economic indices. While many of the existing indices focus on how integrated, developed, competitive, or innovative countries are at the global level, the Investment Attractiveness Index examines these issues from a regional perspective. Moreover, I attempt to assess "whether heterogeneity differences have led to the formation of country groups" within Europe succeeding (or failing to succeed) in creating and sustaining the conditions for private sector development (Konig and Ohr 2013).

I build upon the existing literature and employ principal components analysis (PCA) to develop the Investment Attractiveness Index. (PCA is a statistical method that enables us to reduce large datasets into smaller number of variables to extract the important information and dynamics that underlie them.) Using specific assumptions and two different approaches, I develop an

overall index and four sub-indices. The choice of methodology allows me to develop an empirical justification for including or excluding variables and indicators, and also to create sub-indices based on the relative contributions of specific indicators towards the constitution of composite indicators.

This first chapter is organized as follows: Section 2.2 explains the reasons for creating the Index while Section 2.3 provides a definition of the investment climate. The chapter then goes on to describe the Index in Section 2.4, and to outline and justify the indicators forming the index in Sections 2.5. Sections 2.6 and 2.7 describe the data and statistical approach. The final two sections present a brief overview of the findings of the Investment Attractiveness Index and its sub-indices.

2.2 Why Another Index?

Bases on the work of scholars such as North and de Soto during the early to mid-1990s, researchers at the World Bank began to gather "cross-national data on governance and formulating a methodology for ranking countries on the basis of expert perceptions of the quality of their governing institutions" (Wernick, Haar, and Sharma 2014). The World Bank's World Governance Indicators project, as it "came to be called, identified six core 'dimensions' of governance discussed in the literature, and it framed a research agenda around analyses of their contributions to economic performance. The availability of this data set, along with others compiled by organizations" and think-tanks "such as the World Economic Forum (WEF), the Fraser Institute, and the

Heritage Foundation… spurred cross-disciplinary" research into the impact of political institutions and public policies on investment, competitiveness, and overall economic performance (Wernick, Haar, and Sharma 2014).

For instance, since the early 2000s, efforts have been taken to quantify various aspects of the investment climate. *Doing Business*, another World Bank project, was one of the first attempts to build a composite score to assess a country's business environment. Its ease-of-doing-business measure was meant to capture "several important dimensions of the regulatory environment as it applies to local firms. It provides quantitative indicators on regulation for starting a business, dealing with construction permits, getting electricity, registering property, getting credit, protecting minority investors, paying taxes, trading across borders, enforcing contracts, and resolving insolvency" (World Bank 2017). Several others followed or were significantly revised, including the A.T. Kearney's Foreign Direct Investment Confidence Index, IMD's World Competitiveness Scoreboard, The Economist Intelligence Unit (EIU) Business Environment Rankings, KOF Index of Globalization, Michigan State University's IBC Market Potential Index, UNCTAD's Foreign Direct Investment (FDI) Performance Index, UNCTAD's Trade and Development Index, and WEF's Global Competitiveness Index (GCI). As Konig and Ohr (2013) note regarding their index, "these indices differ in the amount of countries, years, indicators, and weighting schemes, each of them combines data on a country-by-country basis into one aggregate statistic." Since most of

them asses many more countries and cover more years than the Investment Attractiveness Index, it is valid to question the value of creating one more composite indicator on top of existing "economic" indices.

I contend that there are several reasons. First, the investment climate of individual European countries is of interest in its own right. All of the countries analyzed here participate in the European Single Market, and as such, they are politically, economically, and even socially integrated to various degrees. In particular, when it comes to the EU, increasing economic ties between EU Members is a key goal of the EU project, as evidenced by Members' commitment "to continue the process of creating an ever-closer union" and as outlined in the Treaty on European Union Moreover, EU institutions work towards reducing disparities and promoting economic cohesion between Members, particularly in areas that affect the investment climate. When studying the investment climate of European economies, however, there are specific aims of Europe-wide integration and unique dimensions that cannot be ignored. And the various globalization indices, however, are not designed to capture important aspects of European investment environments.

Second, current composite measures that assess business climates and competitiveness discuss merely a few of the requirements necessary to foster an enabling investment environment. As discussed in the introductory section, the investment climate is a multidimensional construct, affected by political, economic, and social factors. While it might be challenging to comprehensively

assess and quantify a concept such as the "investment environment" with a single composite indicator, it seems to be a much needed first step in setting the private sector development debate on a more solid scientific base. As far as I know, no such comprehensive indicator has been developed.

Third, there are opportunities to improve the aggregation and weighing methods of existing indices. Many of the existing "indices use either subjective *a priori* weightings or they use statistical aggregation procedures without making use of all the necessary information" available (Konig and Ohr 2013). Improvements in these methods can be therefore valuable for constructing new indices.

Overall, a composite indicator measuring "investment attractiveness" should not be a more complicated measure of relative development. An attractive investment environment is characterized by important political, institutional, economic, and social dimensions, all of which are captured by my index.

2.3 Defining an Attractive Investment Climate

The "investment climate"[9] is conceptualized here both as a multidimensional construct and as a framework for understanding how a wide range of policy and non-policy factors interact and affect the investment climate. It attempts to do so "while also bringing out the critical importance of

[9] In its 2005 *World Development Report*, the World Bank defines the investment climate as the "factors that shape the opportunities and incentives for firms to invest productively, create jobs, and expand."

public governance" (OECD 2015). As a construct, it is comprised of a political, economic, business, and social dimension. As a framework, it recognizes that the investment climate is affected by the interplay of key policy areas. These include public governance, human capital and innovative capacity development, the financial system, physical and digital infrastructure development, tax policy, corporate governance, investment policy, competition policy, and trade policy. Thus, the chapter presents an "operational definition" by listing important characteristics or drivers of an attractive investment environment, which are found in the literature.

The OECD (2015), in its *Policy Framework for Investment*, notes that "[b]eyond macroeconomic stability, political predictability... and upholding the rule of law, which are pre-conditions for development," an "attractive" or "enabling" environment for investment "provides opportunities for all investors: public and private, large and small, and foreign and domestic." It is an environment that

> "helps to mobilize capital, skills, technology and intermediate inputs to allow firms to expand. It helps to channel resources to productive uses, and, through competitive pressure and the discipline imposed by the market, ensures that all firms strive to improve their efficiency and allows inefficient ones to exit. It should allow businesses to invest productively and profitably, but it is not just about improving the conditions for doing business and improving profitability. It should also ensure that investment brings about the highest possible economic and social impact" (OECD 2015).

As such, it is extremely difficult to pinpoint a single theoretical definition of an "attractive" investment climate.

2.4 Investment Attractiveness Index

The Investment Attractiveness Index (IAI) is both a quantitative and qualitative assessment of policy and non-policy factors that affect the conditions for investment—public and private, domestic and foreign. Although the focus of this project is on Central and Eastern Europe, 29 European economies are covered in the Index. They are listed in *Table 2.1.* Four dimensions are analyzed. These are: (1) Political and Institutional Environment; (2) Economic Environment; (3) Business Environment; and (4) Knowledge, Innovation, and Labor Market Environment. Resources and data reliability did not permit inclusion of every European country, nor of every factor or public policy determinant that affects the investment environment. Nevertheless, I attempted to incorporate as many relevant and reliable indicators as possible.

Table 2.1. Countries Included in the Investment Attractiveness Index

Austria	Greece	Poland*
Belgium	Hungary*	Portugal
Bulgaria*	Iceland	Romania*
Croatia*	Ireland	Slovak Republic*
Czech Republic*	Italy	Slovenia*
Denmark	Latvia*	Spain
Estonia*	Lithuania*	Sweden
Finland	Luxembourg	Switzerland
France	Netherlands	United Kingdom
Germany	Norway	

Note: * denotes the 11 formerly communist countries of Central and Eastern Europe (CEE) that now belong to the European Union (EU). All countries listed here belong to the EU or the European Free Trade Association (EFTA) and participate in the European Single Market. Cyprus, Lichtenstein, and Malta are not included in the index or the analyses due to data limitations.

2.4.1 Relevance of the Index

One of the impacts of an index that assesses the investment climate is the likely signal that it can send to policymakers. Both the Physical Quality of Life Index and the Human Development Index (HDI), "for instance, were explicitly intended to send the message that there is more to well-being" development than improvements in economic output alone (McGillivray 2006). As noted by McGillivray (2006), "[t]he HDI has been particularly successful in this regard... [It acts as a reminder to] policymakers in developing countries that achieving better levels of health, education and incomes are particularly desirable outcomes." Noorbakhsh (2002) and McGillivray and Noorbakhsh (2004) observe, "however, that the history of composite measures tells us that their impact is limited and not sustained over time" when "they are not geared to policy implementation at national or sub-national levels" (McGillivray 2006).

Therefore, the Investment Attractiveness Index is presented as a tool which all European countries included in the analysis can use to measure—and communicate progress on—improvements in their investment environments. It has been conceived as a "yardstick" that allows countries to assess their status relative to others attempting to improve their investment environments. It does so by scoring countries' on a scale of 0 to 100 (unattractive to attractive) on the overall investment climate and its four dimensions. The rankings can be perceived as representative of national

capabilities, as well as a means to enhance national positions for purposes such as attracting investment, gaining leverage in international negotiations, and justifying the adoption of painful but needed reforms domestically. More importantly, apart from being a tool of comparative assessment, the Index is meant to be a simple and transparent communication tool to monitor the evolution of the investment climate over time in European economies.

2.4.2 Importance of Evaluating and Monitoring the Investment Environment

The development of effective public policies requires that the investment climate be evaluated and monitored using indicators that are defined clearly and properly. This enables "policymakers to assess the extent to which policy objectives have been fulfilled. It also provides a basis for identifying strengths and weaknesses of various policies and making necessary adjustments. Monitoring can ensure better coordination and consistency between policies" at the national and EU levels (OECD 2006). Moreover, if done comparatively, it may incentivize policymakers to take action and carry out reforms.

Monitoring and evaluating the policies and non-policy factors that affect the investment climate, however, is a challenging task. Often, there is a lag between the time a policy is developed, implemented, and has an impact. In addition, as noted by the OECD (2006), we cannot always "isolate the impact of any single measure, or... establish direct causality between policy" choices and outcomes. However, research "suggests that there is a positive correlation between sound government policies and... [effective institutions and]

investment, particularly when these policies are combined in the right manner to create a critical mass of reforms" (OECD 2006).

2.5 Conceptual Approach to the Investment Attractiveness Index

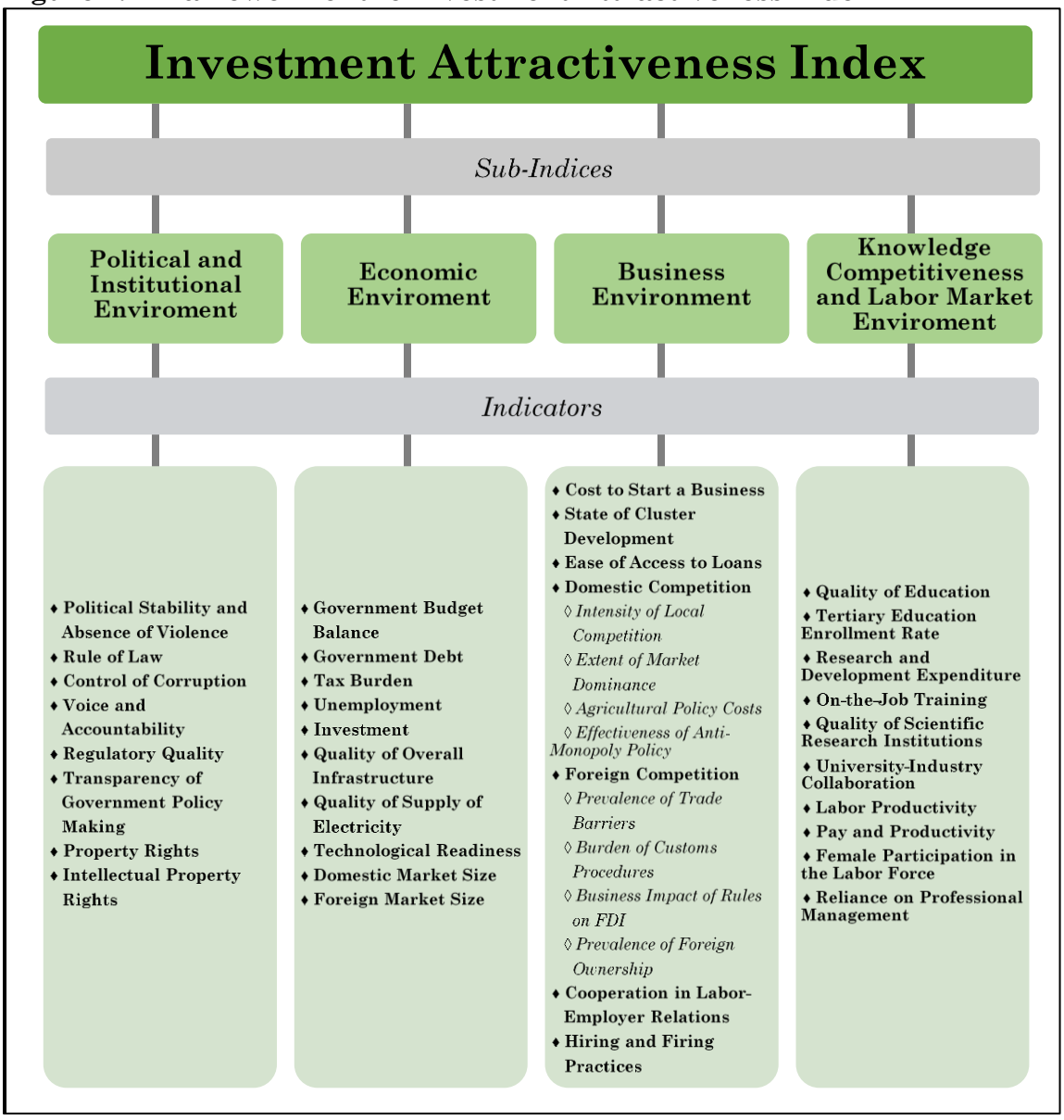
As indicated above, the constituent elements of the Investment Attractiveness Index are grouped under four sets of factors, which I refer to as dimensions or sub-indices: (1) Political and Institutional Environment, (2) Economic Environment, (3) Business Environment, and (4) Knowledge, Innovation, and Labor Market Environment. The links between these sub-indices, "which themselves are composed of a number of... [indicators,] are complex, mutually interacting and multi-directional, so that each of the indicators is both a cause of change in others and an outcome of the influences of the latter" (UNCTAD 2005 and 2007). Figure 2.1 below presents the conceptual framework of the Index.

The four sub-indices of the Index include a total of 41 indicators (Tables A.1–through A.4). In the construction of the Index, I have focused mostly on those factors that policymakers can influence, making the Index more "operational" for scholars and policymakers. In addition, the Index can track developments over the years and provide useful information about the evolution of European countries' conditions for investment. However, as with any composite indicator, it is challenging "to capture the interactions among the constituent parts of... [the Index] in a single numerical figure. Therefore,

the choice of indicators and methodology assumes special significance in this regard" (UNCTAD 2005).

The relative scores of Index range from 0 to 100: 100 is a highly attractive investment climate, while 0 is one that is highly unattractive. The overall Index scores is the weighted sum of the country's four sub-indices scores, which in turn is the weighted sum of all the indicators that make up each sub-index. I calculate the Index for the 2006-2016 period to demonstrate developments over time. However, the discussion in this chapter will focus mainly on the results from 2006 and 2016.

Figure 2.1 Framework of the Investment Attractiveness Index



2.5.1 Selection of Indicators

In choosing each of the indicators, I had to balance issues related to the quality and availability of data for each country. Lack of available or reliable data limits the number of countries that I can include in the Index. Cyprus and Malta from the EU, and Albania, Bosnia and Herzegovina, Kosovo, Macedonia, Montenegro, and Serbia from Southeastern Europe, have not been included in

the Investment Attractiveness Index. In addition, not all factors that shape the investment climate are be measured, quantified, or compared systematically across all counties. Therefore, important factors such as the role of export and investment promotion agencies, financial and tax incentives, and firm- and sector-specific drivers cannot be included in the Index.

But how do we select indicators on a sound basis? General notions of interrelationships among candidates for inclusion in the Investment Attractiveness Index framework "are useful... [but] they alone do not constitute a sound basis for selecting [the variables] and indicators... [Therefore, an] extensive literature survey was... conducted" and regression analyses were carried out to choose potential indicators that could be included in the framework (UNCTAD 2005). This process led to the selection of the indicators outlined below.

2.5.1.2 Political and Institutional Environment Sub-Index

This sub-index includes indicators that help assess the quality and effectiveness of political institutions. Good institutions are necessary to foster an environment that is attractive for investment. In addition, a stable and transparent political, legal, and regulatory environment can help to reduce the risks of investing in a country and ensure the safety of investments. Research has found that these are among the most important factors for foreign investors when considering where to invest (see, for example, Ernst and Young 2015).

To account for this dimension of a country's investment climate, I include indicators that attempt to measure (i.e., quantify) political stability, the rule of law, levels of corruption, political freedoms and accountability, quality and effectiveness of regulations, transparency of government policymaking, and the protection of property rights have been selected. The property rights indicators, which instead could have been part of the business dimension, have been included in this sub-index, as they assess the extent to which national laws protect the rights of individuals against the unlawful acts of others—including the government—and allows individuals to freely accumulate private property (Heritage Foundation 2016).

2.5.1.3 Economic Environment Sub-Index

The effective macroeconomic management of an economy is of paramount importance to maintaining an environment that attracts and fosters both domestic and foreign investments. The Investment Attractiveness Index captures this aspect of the investment environment via several indicators, including government budget balance, government debt, tax burden, and unemployment. The government spending and debt components capture the burden imposed by government expenditures and present a picture of its overall fiscal health. Although there is no optimal level of government spending, the "growth in size and scope of the public sector" may lead to the "misallocation of resources and to the loss of economic efficiency... [Empirical research has] shown that excessive government spending that causes chronic

budget deficits" and increases the debt burden can be important drags on economic dynamism (Heritage 2017). Deteriorating fiscal health, in turn, is a deterrent to long-term productive investment, and it is associated with macroeconomic instability and economic uncertainty.

A high quality physical and digital infrastructure is also important for overall economic development, since enables a country to integrate with the global economy. It "makes the country more attractive for multinational companies that seek to optimize their supply chains, while easy access to imports and exports facilitates integration in global value chains" (Copenhagen Economics 2016). At the same time, such infrastructure provides faster and cheaper access to international markets. Therefore, the economic environment sub-index also includes indicators measuring the level investment, quality of infrastructure, reliability of electricity supply, technological readiness, and size of a country's domestic and foreign markets.

2.5.1.4 Business Environment Sub-Index

The business environment sub-index assesses the extent to which policies and non-policy factors constrain or affect the operation of businesses in a country. It accounts for various factors that affect the ease and cost of starting and operating a business, as well as the restrictions—regulatory or otherwise—that may be imposed on investment. In particular, ease of access to credit is important, as credit is required "to finance working capital and investment in fixed capital... If not functioning properly, [the credit market]

may fail to direct available" resources "to where they can be used or invested most efficiently" or effectively (UNCTAD 2005).

This sub-index also includes measures of cluster development, domestic competition, and foreign competition. Domestic competition is proxied by the intensity of local competition, extent of market dominance, costs associated with agricultural policy, and the effectiveness of anti-monopoly regulations, while foreign competition is proxied by the prevalence of trade barriers—explicit and implicit, the perceived impact of regulations on foreign investment, the prevalence of foreign ownership, and the burden of customs procedures., The sub-index also accounts for the legal and regulatory factors that affect a country's labor market environment, including the extent to which regulations allow flexible hiring and firing of workers, as well how businesses perceive overall relations between employers and workers.

2.5.1.5 Knowledge, Innovation, and Labor Market Environment Sub-Index

Quality human capital (i.e., education) is an important component of the investment climate. It "has been found to play a major role in enhancing labor productivity and eventually the economic growth of a country" (UNCTAD 2005). In addition, a labor force that has high levels of knowledge and capacity to innovate is likely to "attract companies that compete in global markets and are dependent on continuously improving their competitiveness" (Copenhagen Economics 2016). For instance, as noted by recent work on the investment

climate by Copenhagen Economics (2016), research and development (R&D)-intensive sectors depend on "having secure access to highly skilled labor," and they "benefit from close cooperation with local universities and R&D facilities." Labor cost competitiveness is also important for most investors, particularly for those foreign investors that seek new ways to improve efficiency.

In order to capture the importance of the knowledge, innovation, and labor market environment for the investment climate, the following indicators have been selected: quality of education, tertiary education enrollment rate, R&D expenditure, on-the-job training, quality of scientific research institutions, university-industry collaboration, labor productivity, female participation in the labor force, perception of pay *versus* productivity, and reliance on professional management.

2.5.2 Strengths and Limitations of the Index

The Investment Attractiveness Index (IAI) can help governments identify and prioritize reforms, as well communicate improvements. Similar to the OECD's Investment Reform Index (2006), the IAI can encourage "structured policy debate between the public and private sectors and... [the exchange] of good practices between... [scholars, policymakers, and the business community.] The comparative scoring... [is intended to create] a strong impetus for effective policy reform. As a management tool, the... [Index] not only provides comparative measurements" but also reveals policy and non-policy factors that can be influenced by policymakers, as well as practices that

countries can consider, adapt, or adopt in their quest to improve their investment climates.

2.5.2.1 Strengths of the Conceptual and Methodological Approach

Methodologically, the Investment Attractiveness Index has a number of advantages. First, it aggregates existing data from international organizations, as well as original data collected by think tanks and other institutions, which can help policymakers and investors identify strengths and weaknesses in investment climates. Second, the use of a common "scoreboard" that ranks countries in relative terms can help facilitate debate between policymakers and investors. As noted above, such a measure can help policymakers to track progress and better identify areas where additional reform might be needed. Finally, similar to the OECD (2006)'s Investment Reform Index, the sub-indices here cover aspects of the investment climate that are important but which may not be part of the EU's *acquis communautaire*.

2.5.2.2 Limitations of the Conceptual and Methodological Approach

The Investment Attractiveness Index has a number of limitations. First, the Index does not cover all the policy and non-policy factors that help create an enabling and attractive environment for private sector development. Second, measuring effective implementation of government policies and reforms over the period analyzed can be difficult. The Index combines available

quantitative data with qualitative data, whose evaluation requires judgment as information can be limited and data not always reliable. Third, normalization, weighting, and aggregation methods is always subject to questioning and criticism. Finally, "as countries are at different stages of development, all dimensions" of the investment climate "are not equally important for each country. Human capital might currently be more of a priority in Bulgaria and Romania, for example... [Hence, we must interpret each country's scores and rankings] based on its specific development context."

The methodological and data challenges outlined here demonstrate that assessing the investment environment is not an exact science. Nevertheless, I believe that "by adopting a common comparative framework... and incorporating quantitative and qualitative data from a wide range of [reliable] sources, the results [of the Index] still provide a much clearer picture of" the investment attractiveness of individual European countries—particularly of Central and Eastern Europe—than is available elsewhere (OECD 2006).

2.6 Data Description

2.6.1 Indicators

The framework incorporates 41 indicators (Tables A.1 through A.4). Similar to the data classification outlined in the methodology of the Global Innovation Index (Dutta, Lanvin, and Wunsch-Vincent 2017), the indicators used for the Investment Attractiveness Index fall into three categories: (1)

quantitative, objective, or economic data; (2) data from indices or composite indicators; and (3) survey (e.g., qualitative) data.

2.6.1.1 Economic Data

Economic data (also known as "hard" data) series for 12 indicators of the Index are drawn from a variety of public sources. They include the World Bank, the International Monetary Fund (IMF), the World Trade Organization (WTO), the United Nations Educational, Scientific and Cultural Organization (UNESCO), the European Commission, the International Telecommunications Union (ITU), the International Labor Organization (ILO), and the Heritage Foundation.

2.6.1.2 Index Data

Composite indicators come from the World Bank and the World Economic Forum. In general, statisticians recommend not using indices within indices "on two main grounds: the distorting effect of the use of different computing methodologies and the risk of duplicating variables" (WIPO 2018). The normalization procedure partially solves the first issue (see next section). Attempts were made to avoid including indicators more than once, either directly or indirectly through another index, by selecting composite indicators with a narrow focus (six in total). Whenever possible, index data was "recalculated" using economic data and the original methodology. As indicated by WIPO in its development of the World Innovation Index, "[a]ny remaining

downside [to the use of composite indicator data] is [thought to be] outweighed by the gains in terms of model parsimony, acknowledgement of expert opinion, and focus on multi-dimensional phenomena that can hardly be captured by a single indicator" (WIPO 2018).

2.6.1.3 Survey Data

The Investment Attractiveness Index draws survey data from the World Economic Forum's Executive Opinion Survey (EOS). These data can "capture subjective perceptions on specific topics;" (WIPO 2018). I selected twenty-three survey questions to describe factors and conditions related to the investment environment for which we do not have economic data—either because they do not exist or are not available for most countries in the sample.

2.6.2 Normalization

Because "indicators convey quantitatively different information, some can be incommensurate with others" or "have different measurement units. Normalization is required" in order to aggregate them (Huh and Park 2017). There are various normalization methods, and they all have advantages and disadvantages (OECD 2008). In this study, normalization was made according to the "min-max method." This method has been employed in the construction of other indices, including the Doing Business Index, Africa Regional Integration Index (ARII), Human Development Index (HDI), KOF Index of Globalization, and the Economic Freedom of the World Index. I normalized the

41 indicators into a [0, 100] scale, in which the higher the score, the better the outcome.

When higher values of the original indicator denote "better" performance or outcomes, the normalization formula for indicator X_i is

$$\left[\frac{X_i - X_{i,min}}{X_{i,max} - X_{i,min}}\right] \text{x } 100 \qquad (2.1)$$

where $X_{i,max}$ is the maximum and $X_{i,min}$ is the minimum value of that indicator. In cases in which higher scores of an indicator or variable indicate "worse" performance or outcomes, the normalization formula for indicator X_i is

$$\left[1 - \frac{X_i - X_{i,min}}{X_{i,max} - X_{i,min}}\right] \text{x } 100 \qquad (2.2)$$

where the minimum and maximum "values were given by the minimum and maximum indicator sample values respectively" (Huh and Park 2017).

2.7 Statistical Approach

2.7.1 Weighting Procedures

In addition to normalizing the data, I had to determine the weights of the indicators and sub-indices before I could aggregate them. As noted by Konig and Ohr (2013), "[t]he selection of an appropriate... weighting procedure is crucial to the construction of a multidimensional index, as it may have a direct effect on the outcome of the overall" Investment Attractiveness Index and the rankings of countries. This study follows two schemes. It uses weights determined by principal component analysis, as well as equal weights.

2.7.1.1 Principal Component Analysis

Principal component analysis (PCA) is a statistic procedure used to analyze interrelations among many variables, reduce their number, and cluster them into small groups known as components. In recent years, it has gained popularity in the context of building composite indicators. Nevertheless, "there are fundamental differences between the various studies on how to handle the results delivered by PCA. Gwartney and Lawson (2001), Lockwood and Redoano (2005) and Dreher (2006) simply use the first component of PCA to derive the weights... Important information from the PCA is disregarded in these studies" (Konig and Ohr 2013). Other studies rely on Jolliffee's (1972 and 1973) methods for the "objective selection of a few variables among a wider set of correlated variables" (Ogwang and Abdou 2001). Many of these studies, however, do not account for eigenvalue sizes or factor loadings of the remaining components or suitable the dataset is to carry out principal component analysis.

I used principal component analysis to calculate the weights of Investment Attractiveness Index's sub-indices and of sub-indices' components. This project mostly follows the approaches taken by Noorbakhsh (1998), Nicoletti et al. (2000), Konig and Ohr (2013), and Huh and Park (2017), in that it uses as much as possible the information derived from the data. Principal component analysis helps us "transform a large set of correlated variables into a smaller set of uncorrelated variables called principal components, which

account for most of the variation in the original set of variables" (Cho, Ogwang, and Opio 2010). In other words, in "[a]nalyzing a dataset comprised of a large number of variables, we try to get a more compact measure by exploiting the pattern of dependence among the variables... Apart from the parsimonious measure obtained, the coefficients obtained from the analysis shed some light on the importance of each of the factors in the composite measure" (Dastidar 2013). Arguably, the use of principal component analysis help us address some of the problems associated with choosing weights arbitrarily.[10]

[10] As explained by Dastidar (2013), "PCA essentially determines the coefficient of all the variables in the composite measure by maximizing the variation among the related variables (to extract maximum information relating to dependence among the variables in the multivariate system), subject to the constraint that the sum of square of coefficients equals one. This maximization exercise solves for the coefficients for all the variables that appear in the composite measure, subject to the scaling constraint and the orthogonality constraint. The composite measure is then obtained by linearly combining the values of the individual variables times the respective coefficients obtained from the maximization problem. The first principal component (PC 1) thus obtained, extracts (say) x percent of the variation in the observed multivariate data. The second principal component (PC 2) obtained from the same problem, gives us another set of coefficients and we obtain our 'second' principal component in a similar manner. Owing to the second constraint (the orthogonality constraint), our second principal component is designed to explain the remainder of the variation, (100 – x) percent. So, if we proceed to extracting all the components, the proportion of variation that is extracted by each of the principal components add up to 100 percent. This is the significance of the orthogonality assumption in the optimization problem." Ogwang and Abdou (2001) also note that "[f]or a set of k variables, a maximum of k principal components can be extracted. However, if the k variables are highly correlated with one another, only a few principal components capture most of the variation in the original set of variables. The proportion of variation attributed to a particular principal component is obtained by dividing the associated eigenvalue (or characteristic root) by the sum of all the characteristic roots."

Algebraic Approach to Principal Components

Similar to Huh and Park (2007), I follow their approach to PCA:

> "Let $\mathbf{X}' = [X_1, X_2,\ldots, X_p]$, a data vector comprised of p variables, have the correlation matrix $\sum$ with the eigenvalue-eigenvector pairs (λ_1, e_1), $(\lambda_2, e_2),\ldots,$ (λ_p, e_p), where $\lambda_1 \geq \lambda_2 \geq \ldots \geq \lambda_p$. Then, the i^{th} principal component is given by
>
> $$Y_i = \boldsymbol{e_i}'\mathbf{X} = e_{i1}X_1 + e_{i2}X_1 + \ldots + e_{ip}X_p \qquad i = 1, 2,\ldots, p \tag{2.3}$$
>
> where the coefficient e_{ip} represents the weight for the i^{th} principal component and p^{th} variable. These coefficients are normalized so that
>
> $$\sum_{i=1}^{p} e_{i1}^2 = \sum_{i=1}^{p} e_{i2}^2 = \cdots = \sum_{i=1}^{p} e_{ip}^2 = 1 \tag{2.4}$$
>
> The variance for each principal component is given by
>
> $$\text{Var}(Y_i) = \boldsymbol{e}_i'\sum\boldsymbol{e}_i = \lambda_i \qquad i = 1, 2,\ldots, p \tag{2.5}$$
>
> Principal component analysis "seeks linear combinations of the original variables with the maximum variance of Y_p. Accordingly, the eigenvector corresponding to the largest eigenvalue λ_1 determines $\boldsymbol{e}_1 = (e_{11}, e_{21},\ldots, e_{p1})'$ and the first principal component $Y_1 = \boldsymbol{e}_1'\mathbf{X}$ explains the largest possible variation in the data. The second principal component, Y_2, is constructed using the eigenvector corresponding to the second-largest eigenvalue λ_2, that is, $Y_2 = \boldsymbol{e}_2'\mathbf{X}$. It is completely orthogonal to the first principal component and explains additional but less variation than the first component. Subsequent principal components are orthogonal to previous components, and each one captures additional but progressively smaller variations in the data. Orthogonality of the principal components implies that changes in one component do not affect other components. Since total data variance is p (the number of variables) and equals the sum of eigenvalues, the proportion of total data variance accounted for by the i^{th} principal component is λ_i / p." (Huh and Park 2017)

2.7.1.2 Equal Weighting

According to Nardo et al. (2005), many existing composite indices use equal weighting (e.g., the United Nation's Human Development Index [HDI]). The assumption here is that each component or variable is equally relevant or important throughout time, which seems unlikely but is acknowledged by those that build them. For instance, the United Nations Development Programme (UNDP) "recognizes this but justifies the HDI weighting scheme on the basis of Occam's razor... [In other words,] since it is probably impossible to achieve agreement on what the weights should be, the simplest response is the best, that being to assign an equal weight to each component" (McGillivray and Noorbakhsh 2004). As we will see later, the equal weighting scheme for the Investment Attractiveness Index does not differ significantly from the one resulting from principal component analysis.

2.7.2 Aggregation

As is the case for weighting, aggregation is an area of methodological controversy when it comes to building composite indicators. According to Nardo et al. (2005), there are two main methods: "additive" or "linear" aggregation and "geometric" aggregation. In this study, I use linear aggregation as it seems to be the most appropriate method for my data and also the one that is employed most frequently in the construction of indices. As Lieser and Groh (2010) point out, "linear aggregation assigns base indicators

proportionally to the weights" (Nardo et al. 2005) and "is most adequate when all indicators and sub-indices have the same measurement unit" (Ebert and Welsch 2004). This is the case in this study, as all data have been normalized as described in the data section (Section 2.6).

Linear aggregation is defined as follows:

$$\bar{x} = \sum_i w_i \, x_i, \qquad \text{where } 0 \leq \mathrm{w_i} \leq 1 \text{ and } \sum_i w = 1 \tag{2.6}$$

2.7.3 Weighting and Aggregating: An Illustration

Below is an illustration of how I generated the weights assigned to individual indicators and sub-indices to aggregate and construct the desired composite indicators. Below is an illustration, provided by Huh and Park (2017), as to how I used principal component analysis in this study.

> "Let the $\mathbf{X}'$ = [X_1, X_2, X_3, X_4] and the first two principal components (Y_1 and Y_2) be sufficient to characterize data variation. Correlation coefficients between X and Y are called loadings and are given as $\mathrm{Corr}(X_j, Y_i) = \rho_{ji} = e_{ji}\sqrt{\lambda_i}$, j =1, 2, 3, and 4 and i = 1 and 2, where e_{ji} is the j^{th} element of the eigenvector i^{th}. (For derivation and proof, see Johnson and Wichern 2007). The square of loadings, ρ_{ji}^2, represent the proportion of variance in variable X_j, explained by the principal component Y_i. As $\sum_{i=1}^{4} e_{i1}^2 = \sum_{i=1}^{4} e_{i2}^2 = 1$, the sums of squared loadings of Y_1 and Y_2 are λ_1 and λ_2, which are the variances of Y_1 and Y_2, respectively. Using this, we normalized the squared loadings to unity sum, that is, $\hat{\rho}_{ji}^2 = \rho_{ji}^2/\lambda_i$. Finally, θ_i is constructed, $\theta_i = \lambda_i/(\lambda_1 + \lambda_2)$, where i =1 and 2, to measure the proportion of explained variance in the data when considering only the first

two principal components. θ_1 and θ_2 are the weights assigned to the respective principal components for aggregation. Hence, the composite index is

$$Index = (\hat{\rho}_{11}^2 * \theta_1 + \hat{\rho}_{12}^2 * \theta_2)X_1 + (\hat{\rho}_{21}^2 * \theta_1 + \hat{\rho}_{22}^2 * \theta_{i2})X_2 + (\hat{\rho}_{31}^2 * \theta_1 + \hat{\rho}_{32}^2 * \theta_2)X_3 + (\hat{\rho}_{41}^2 * \theta_1 + \hat{\rho}_{42}^2 * \theta_2)X_4" \quad (2.7)$$

(Huh and Park 2017).

2.8 Data Analysis and Results from Principal Component Analysis

Before I applied principal component analysis, I had to determine whether or not the individual indicators and all of the sub-indices were "consistent" to be aggregated. To do so, I perform Bartlett's test of sphericity, which reveals whether the correlation matrix is an identity matrix. If it is, it would indicate that the factor model is inappropriate. The value of the t-statistic in this case should be below the 0.05 significance level, and the data—that is, individual variables and sub-indices—satisfy this criterion (Table A.5). I also estimate both the Cronbach's alpha coefficient and Kaiser-Meyer-Olkin's (KMO) measure of sampling adequacy (MSA).

I estimate the Cronbach's alpha coefficient to test for the internal consistency of the indicators and sub-indices. The coefficient "assesses the degree of the correlations among a set of variables and is used... to evaluate how well a set of [indicators or] sub-indices measures a single unidimensional object" (Groh and Wich 2009, Nardo et al. 2008). Table A.5 presents the estimated Cronbach's alpha coefficients, which shows that all coefficients are above 0.78 and most have values higher than 0.90.

Similar to Copenhagen Economics (2016), I am also "interested in grouping indicators that reflect a common aspect of the investment climate together (indicators that are highly correlated). Some of the variables may influence... [the investment climate] through more than one mechanism, and the grouping of the variables could therefore be made in several ways." To assess the extent to which the grouping is statistically appropriate, I use the Kaiser-Meyer-Olkin's measure of sampling adequacy. The goal "of the test is to determine whether the indicators in the same sub-index share the same statistical properties and have enough in common to be grouped together" (Copenhagen Economic 2016). Table A.6 reports the results, which support the *overall* suitability of my data.

I should note that the data consistency analysis reveals that omitting some indicators could improve the results *statistically*, as their individual KMO scores fall below the 0.5 threshold. However, in carrying out the statistical analysis, my goal is not necessarily to reduce the data, but rather to examine the dataset's underlying structure. These indicators are considered to be important for the overall attractiveness of a country for investment. Therefore, based on the existing literature, I follow the "economic rationale" and preserve them.

To derive the optimum number of components, it is necessary to analyze the eigenvalues. For the Investment Attractiveness Index and its four sub-indices, the scree test, proposed by Cattell (1966), was employed to extract

components. Finally, varimax "[r]otation of the factor loadings reassesses the intended structure of the index and sub-indices, allowing me to estimate adequate weights for each of the individual indicators and sub-indices" (Konig and Ohr 2013). Tables A.7 through A.10 show the results from using principal component analysis and the final weights for aggregation. The ranks from the equal weighting scheme do not differ significantly from those derived from principal component analysis (Tables A.11 and A.12).

2.9 Overview of the Empirical Results

2.9.1 Overall Investment Attractiveness Index

The Investment Attractiveness Index below (in Tables 2.2 and 2.3 and Figure 2.2) presents country rankings and index scores for current EU Member States (excluding Cyprus and Malta) and EFTA states (excluding Liechtenstein) for the years 2006 and 2016. This section presents a brief overview of the results. The next chapter will carry out an economic analysis in which the Index will be used to examine if the investment climate affects economic performance in European countries.

Table 2.2 Investment Attractiveness Index and Its Sub-Indices (2016)

2016	Overall Investment Attractiveness		Political and Institutional Environment		Economic Environment		Business Environment		Knowledge, Innovation, and Labor Market Environment	
	Rank with PCA Weights	Score with PCA Weights	Rank with PCA Weights	Score with PCA Weights	Rank with PCA Weights	Score with PCA Weights	Rank with PCA Weights	Score with PCA Weights	Rank with PCA Weights	Score with PCA Weights
Switzerland	1	82.58	1	95.87	1	69.59	4	76.65	1	85.90
Sweden	2	76.88	3	92.89	6	61.41	3	78.40	4	72.42
Finland	3	76.75	2	95.10	11	57.57	8	70.85	2	80.23
Netherlands	4	75.95	6	90.87	5	63.49	6	73.95	3	73.36
Norway	5	73.77	4	92.65	3	63.79	12	65.50	7	70.95
UK	6	72.86	9	81.51	9	59.96	1	81.38	10	67.01
Ireland	7	72.83	8	81.83	8	60.04	2	80.77	9	67.09
Denmark	8	70.90	7	81.92	14	55.06	7	73.00	6	71.32
Germany	9	70.65	10	79.80	2	67.09	11	66.20	8	68.61
Luxembourg	10	70.15	5	91.89	12	56.86	5	74.27	14	55.41
Austria	11	65.85	12	76.63	13	55.53	10	66.41	12	63.19
Belgium	12	65.41	13	71.26	15	51.62	13	64.52	5	72.26
Iceland	13	60.52	11	78.51	18	48.48	18	47.54	11	64.94
Estonia*	14	59.93	14	67.89	17	49.10	9	68.68	15	52.78
France	15	57.74	15	61.24	4	63.51	16	49.14	13	57.35
Czech Rep*	16	50.60	17	46.90	10	57.79	15	55.93	16	43.06
Portugal	17	46.75	16	49.10	22	44.91	14	56.46	19	36.63
Spain	18	45.25	19	44.85	7	60.52	20	44.65	20	32.95
Lithuania*	19	44.07	18	45.13	16	49.26	21	40.90	18	41.50
Slovenia*	20	40.92	20	44.42	26	39.32	24	38.01	17	41.51
Latvia*	21	39.74	21	39.35	24	41.35	17	49.10	21	29.78
Slovak Rep*	22	37.40	22	35.15	19	47.27	19	45.53	24	23.32
Poland*	23	36.67	23	34.76	20	47.14	22	40.11	22	26.22
Italy	24	32.04	24	26.40	21	45.57	25	34.81	23	23.41
Romania*	25	27.80	25	20.23	23	41.81	23	39.57	29	12.14
Bulgaria*	26	25.15	29	11.34	25	40.40	26	33.12	25	18.46
Croatia*	27	25.00	26	19.44	27	38.24	29	26.01	26	18.21
Greece	28	23.92	27	16.30	29	33.44	27	30.00	27	17.67
Hungary*	29	23.25	28	13.45	28	37.50	28	29.27	28	15.15

Source: Author's own calculations.
Note: * denotes Central and Eastern European (CEE) country.

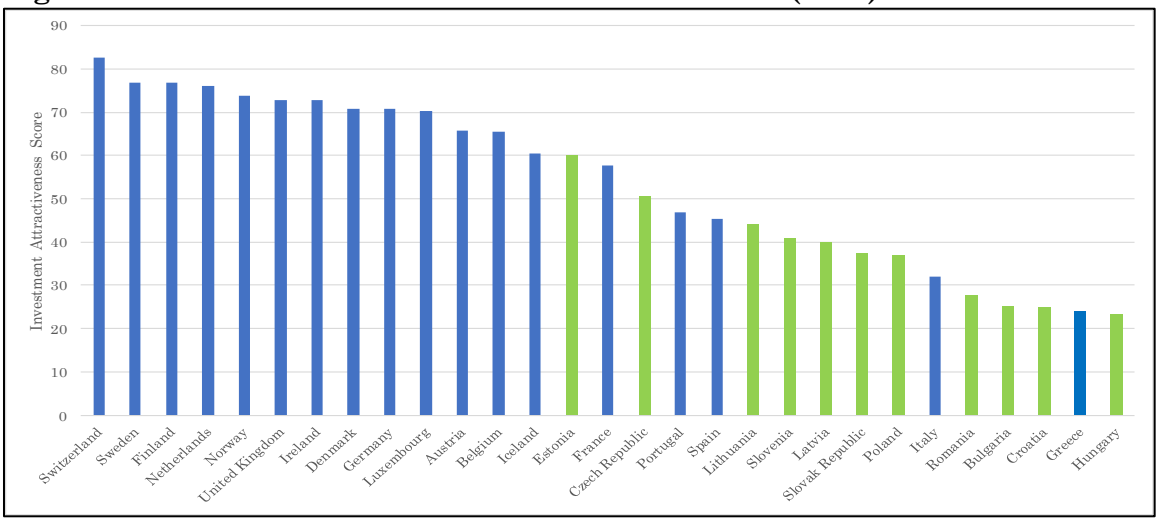
Table 2.3 Investment Attractiveness Index and Its Sub-Indices (2006)

2006	Overall Investment Attractiveness		Political and Institutional Environment		Economic Environment		Business Environment		Knowledge, Innovation, and Labor Market Environment	
	Rank with PCA Weights	Score with PCA Weights	Rank with PCA Weights	Score with PCA Weights	Rank with PCA Weights	Score with PCA Weights	Rank with PCA Weights	Score with PCA Weights	Rank with PCA Weights	Score with PCA Weights
Finland	1	79.10	2	93.81	4	62.58	3	76.52	1	81.85
Denmark	2	78.97	1	96.08	8	60.01	1	83.70	4	74.75
UK	3	74.13	9	83.84	5	62.23	2	79.37	5	70.38
Switzerland	4	73.92	4	89.33	2	63.59	12	61.82	2	79.27
Sweden	5	71.71	7	85.10	10	57.59	8	66.32	3	76.22
Germany	6	71.39	6	85.76	1	67.92	9	63.80	6	67.34
Netherlands	7	69.30	5	88.12	7	60.05	7	66.97	10	61.20
Iceland	8	67.95	3	90.22	13	56.09	13	56.77	7	66.99
Austria	9	67.49	11	82.55	16	54.81	5	72.42	12	59.42
Ireland	10	66.85	12	81.96	15	55.50	4	72.69	13	56.70
Norway	11	64.40	8	83.90	9	59.45	19	48.28	8	64.57
France	12	61.46	13	68.99	3	63.18	17	51.88	9	61.34
Luxembourg	13	61.09	10	83.48	18	51.24	6	67.80	17	41.55
Belgium	14	58.27	14	63.85	17	52.22	14	55.91	11	60.40
Estonia*	15	57.14	16	55.94	11	56.77	10	63.66	14	52.61
Czech Rep*	16	48.74	22	38.76	14	55.54	15	53.79	15	47.76
Slovak Rep*	17	47.46	20	40.59	12	56.14	11	61.97	23	32.92
Spain	18	46.46	18	48.16	6	60.11	20	44.68	21	34.09
Hungary*	19	46.33	17	48.66	25	41.78	16	53.49	18	41.46
Portugal	20	46.17	15	57.95	22	44.97	18	48.30	22	33.59
Slovenia*	21	43.81	19	45.43	20	45.93	22	40.61	16	43.28
Latvia*	22	40.50	24	33.91	19	48.61	21	44.37	20	36.07
Lithuania*	23	38.55	25	32.94	21	45.08	23	36.53	19	40.08
Greece	24	32.77	21	39.86	29	36.24	25	32.89	26	22.50
Poland*	25	31.37	26	22.02	23	44.97	27	29.82	24	29.79
Italy	26	30.42	23	34.69	24	43.36	28	24.89	28	19.65
Croatia*	27	27.11	27	12.28	26	40.06	24	34.24	25	23.45
Romania*	28	24.04	29	4.94	27	39.93	26	31.46	27	21.68
Bulgaria*	29	18.64	28	7.02	28	38.51	29	16.42	29	14.25

Source: Author's own calculations.
Note: * denotes Central and Eastern European (CEE) country.

The results show that, in 2016, Switzerland was the most attractive country for investment, with a score of 82.58. It was followed closely by Sweden with a score of 76.88. At the top of the index are also Finland and the Netherlands, receiving an only marginally lower score than Sweden. Among the Central and Eastern European countries, Estonia, the Czech Republic, and Lithuania have the most attractive climates for investment. Estonia in fact ranks higher than France. Estonia does particularly well in terms of its business environment, while the Czech Republic does especially well in terms of its economic environment.

Figure 2.2 Overall Investment Attractiveness Index (2016)



Source: Author's own calculations.

Italy and Greece are the EU-15 Member States that have the least attractive climates for investment.[11] Six Central and Eastern European

[11] EU-15 refers to the 15 Member States of the European Union as of 2003, before the accession of Cyprus, Malta, and 11 Central and Eastern European countries in 2004, 2007, and 2013. The 15 Member States are Belgium, Denmark, Germany, Ireland, Greece, Spain, France, Italy, Luxembourg, Netherlands, Austria, Portugal, Finland, Sweden, and the UK.

countries receive higher scores than Italy, and both Italy and Greece score relative poorly in terms of their business environment.

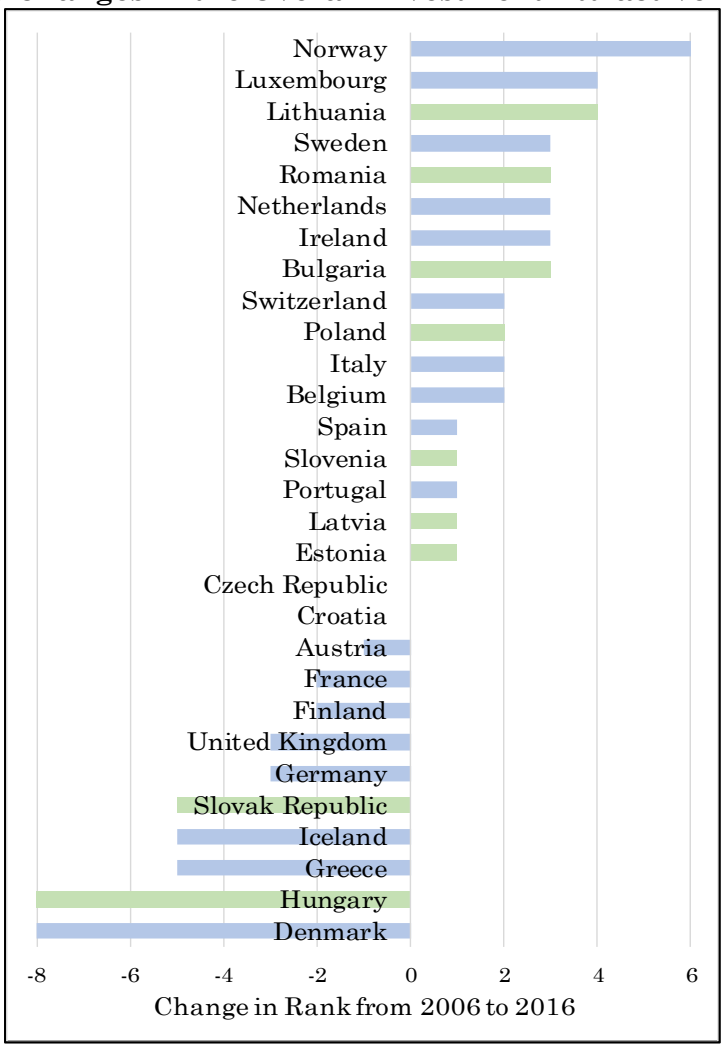
Hungary and the three newest EU Member States—Croatia, Bulgaria, and Romania—have the lowest Index scores among the 29 countries analyzed here, with Hungary having the least attractive investment climate. The results indicate that the surge of investment—both foreign and domestic—that these countries have experienced during the past decade might be "driven mainly by a domestic market that is attractive enough to compensate for an unattractive investment climate" (Copenhagen Economics 2016).

Relative to other countries, seven Central and Eastern European countries have increased their attractiveness for investment over the period 2006-2016 (Figure 2.3). The two countries that have moved up the most in the Index are Lithuania and Bulgaria. Of the 29 countries covered by the Index, Lithuania was ranked 23rd in 2006 and 19th in 2016, while Bulgaria moved up in the rankings from 29th in 2006 to 26th in 2016.

The investment climate in Hungary and the Slovak Republic have deteriorated significantly over the last decade. However, Hungary has fallen the most places in the ranking, moving down from rank 19 in 2006 to rank 29 in 2016. This is due mainly to the decline in Hungary's regional economic "competitiveness" in recent years. Unpredictable "tax and regulatory policies have favored national and government-linked companies" (U.S. Department of State 2017). In addition, according to the European Commission, bankruptcy

proceedings are increasingly seen as unfriendly to remediation. Moreover, its strong anti-migrant rhetoric and actions are likely having a negative impact on the attractiveness of the country for investment.

Figure 2.3 Changes in the Overall Investment Attractiveness Index



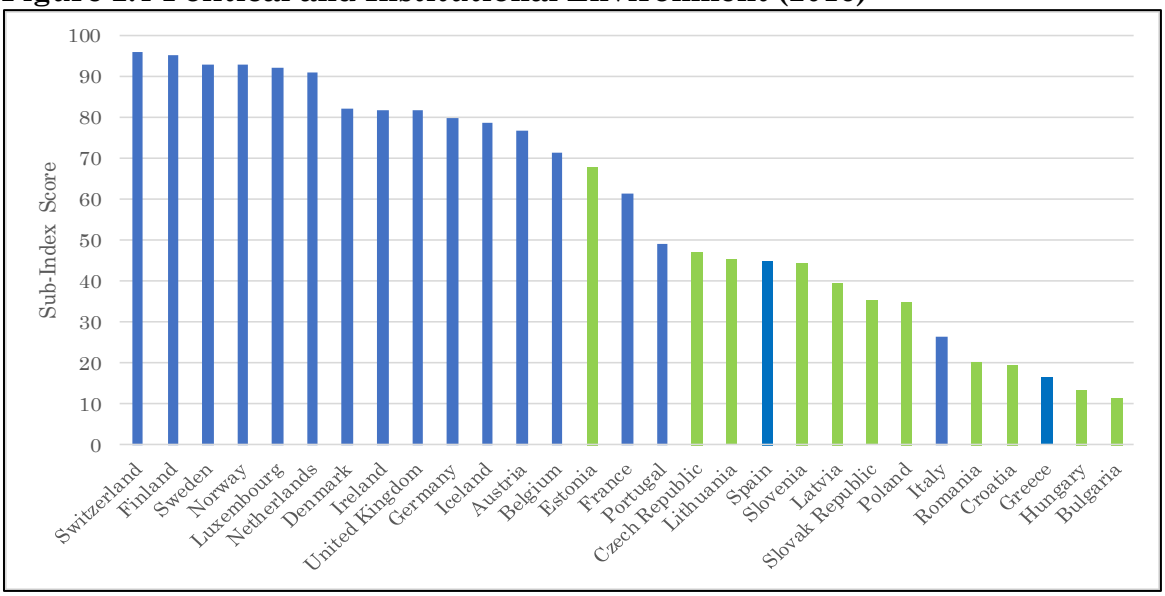
Source: Author's own calculations.

2.9.2 Political and Institutional Environment Sub-Index

Switzerland, Finland, Sweden, and Norway receive high scores in the political and institutional environment sub-index (*Figure 2.4*). This performance is driven primarily by strong adherence to the rule of law, low

levels of corruption, transparent and accountable public sectors, effective regulatory frameworks, and strong property rights protection.

Figure 2.4 Political and Institutional Environment (2016)



Source: Author's own calculations.

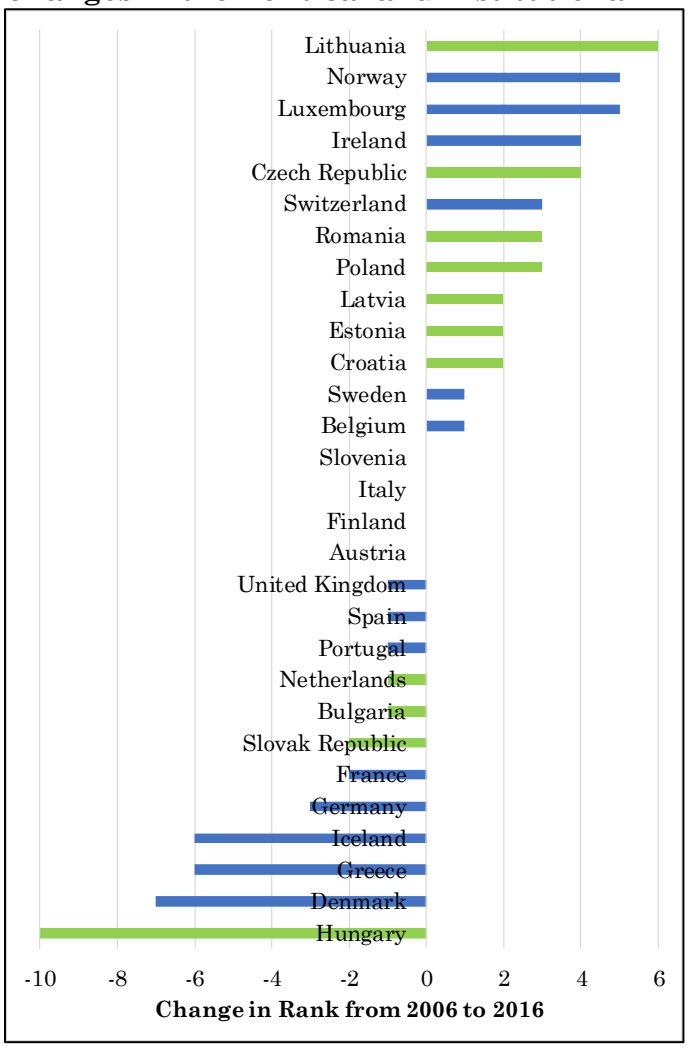
Estonia is the Central and Eastern European country with the most attractive political and institutional environment, which reflects its sound policies and regulations, high level of transparency in policymaking, and strong protection of property rights. The Czech Republic and Lithuania also perform relatively well, but their scores in all of the indicators included in this sub-index are significantly lower than those of Estonia (both in absolute and relative terms).

Hungary and Bulgaria are the two countries with the lowest scores in this sub-index, but Croatia, Greece, and Romania also receive significantly low scores. Their performance reflects relatively low level of transparency, burdensome regulations, widespread corruption, and weak property rights protection.

Relative to other countries, seven Central and Eastern European countries have improved their political and institutional environments over the period 2006-2016 (Figure 2.5). The two countries in Europe that have significantly moved up in the rankings in this dimension are Lithuania and the Czech Republic.

Of the 29 economies covered by the sub-index, Lithuania was ranked 25th in 2006 and 18th in 2016, while the Czech Republic was ranked 22nd in 2006 and 17th in 2016. In both countries, improvements in absolute and relative scores are seen across six of the eight underlying indicators. Lithuania reports significantly better scores in several indicators: transparency of policymaking, control of corruption, and regulatory quality. In the Czech Republic, however, the regulatory environment has deteriorated and the burden of complying with government regulations has increased. This reflects a downward trend that started after the global financial crisis. Finally, even though in 2016 Luxembourg reports lower relative scores in three indicators (rule of law, voice and accountability, and regulatory quality), significant improvements in all the other indicators were sufficient to move it up seven places in the rankings.

Figure 2.5 Changes in the Political and Institutional Environment



Source: Author's own calculations.

It is important to note that in Romania, we can observe relative improvements since 2006 in all of the eight underlying indicators of this sub-index, and significant improvements in absolute terms were registered in six scores as well. However, this was not enough to significantly boost its overall relative position in the rankings.

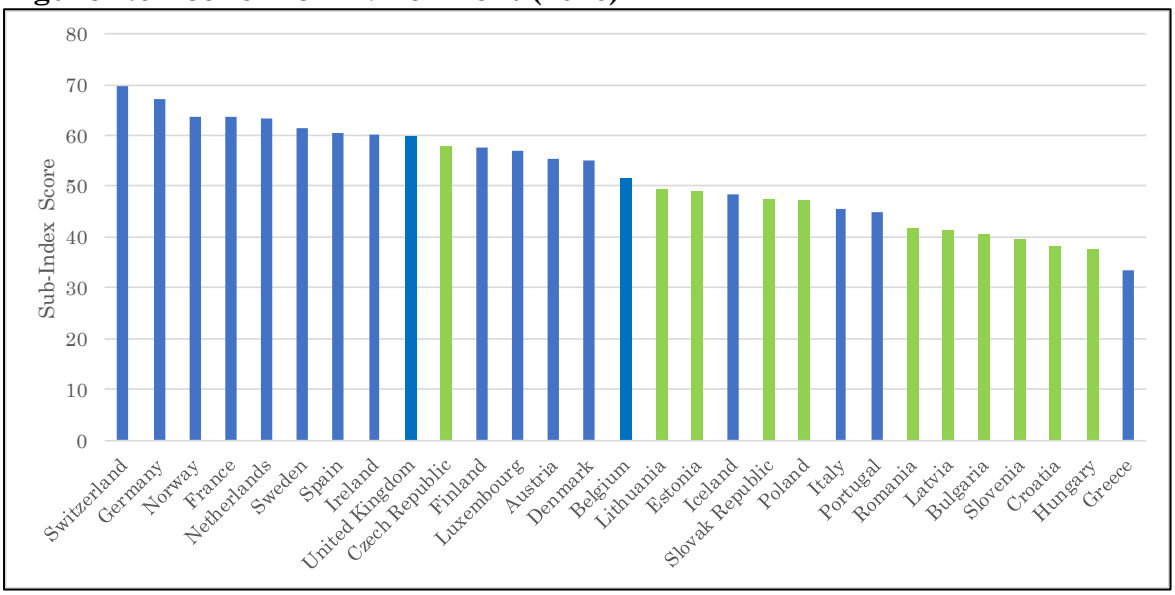
Hungary has moved down the most in the rankings, which fell from number 17 in 2006 to number 29 in 2016. As it was discussed before, this is mainly due to the political situation, an increase in the burden of government

regulation, and a deterioration in how transparent and effective government policymaking and regulations are perceived to be. Germany, Denmark, Greece, and Iceland all record significant drops in their rankings in this dimension. Hungary, Iceland, and Denmark report lower absolute and relative scores in all of the indicators included in this sub-index. Germany's performance deteriorates in all but two of the eight indicators in 2016 when compared to 2006. Only control of corruption and regulatory quality saw improvements in both relative and absolute terms.

2.9.3 Economic Environment Sub-Index

The sub-index assessing the economic environment of individual countries shows that there are marked differences between the EU-15 countries and those of Central and Eastern Europe (Figure 2.6). Switzerland and Germany are at the top, whereas Greece is the worst performer in this category (Greece ranks lower than six Central and Eastern European countries). Among the top 15 performers, the Czech Republic is the only Central and Eastern European country with a score high enough to rank it number 10 in this domain.

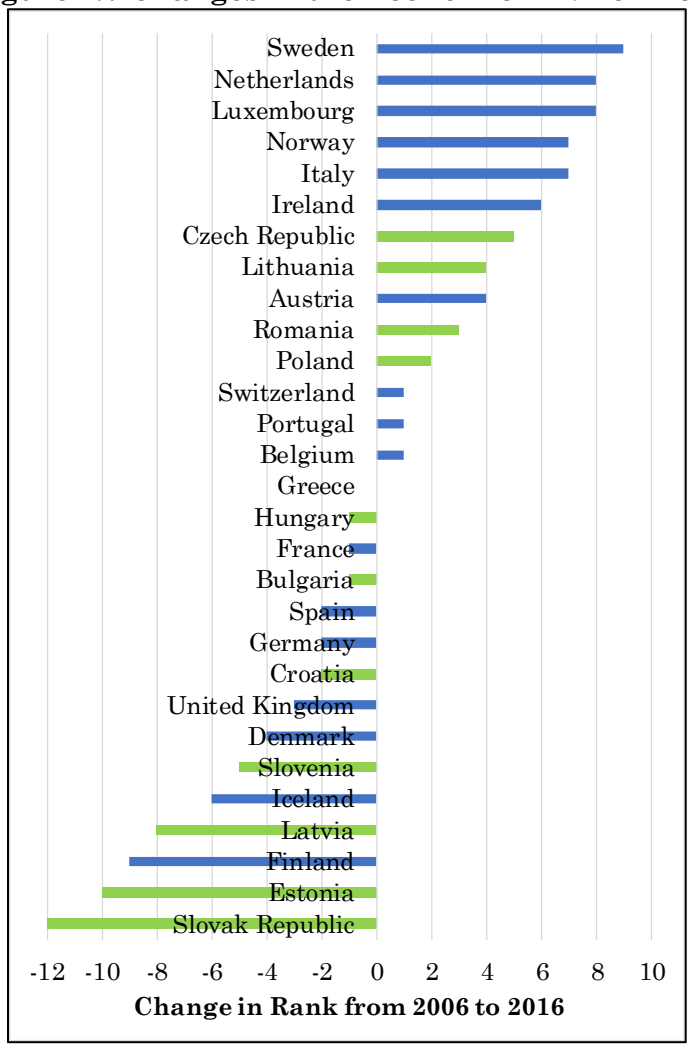
Figure 2.6 Economic Environment (2016)



Source: Author's own calculations.

Since 2006, Ireland, Luxembourg, and Norway have managed to significantly improve their economic environment relative to that of other countries (Figure 2.7). They moved up from 15th, 18th, and 9th place to 8th, 12th, and 3rd place respectively in 2016. In addition, five Central and Eastern European countries rank higher in 2016 than they did in 2006, including Romania and Bulgaria. Most of these two countries' absolute and relative scores in this domain were higher in 2016.

Figure 2.7 Changes in the Economic Environment



Source: Author's own calculations.

Ireland reports higher scores in most indicators. Although the budget balance—as a percentage of GDP—has gone from a surplus (1.1 percent) in 2006 to a deficit (1.6 percent) in 2016, it has come down significantly since 2011, when it registered a deficit of 32.2 percent. Domestic investment is lower in Ireland today than in 2006, but it shows an upward trend since 2011. Also, Luxembourg registers significant improvements in many of the indicators included in the economic environment dimension. However, its rise in the

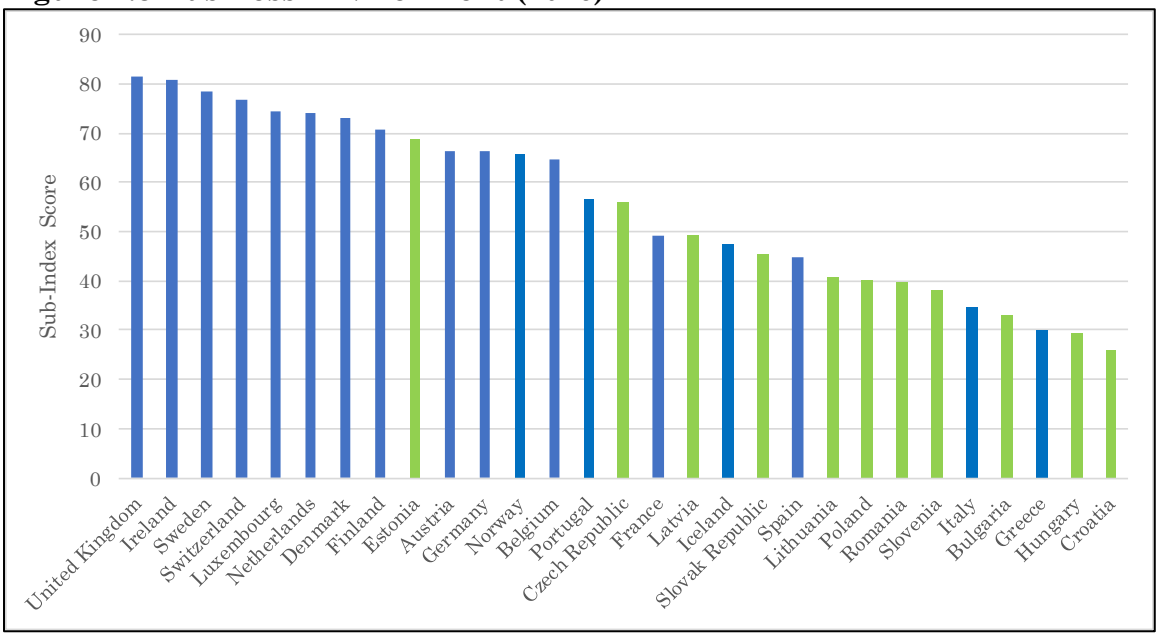
rankings can be attributed mainly to its relative improvements in technology readiness, budget balance, and domestic investment.

Although the Slovak Republic scores higher in some of the indicators included in this dimension, the relative deterioration of most of its scores has brought it from 12th place in 2006 to 19th place in 2016. Also, its real per capita GDP (in purchasing power parity [PPP] terms) was lower in 2016 than in 2006, but the unemployment rate has come down from an average of 16 percent in the mid-2000s to an average of 11 percent in recent years.

2.9.4 Business Environment Sub-Index

The United Kingdom, Ireland, Sweden, and Switzerland receive very high scores in the business environment sub-index (*Figure 2.8*). This performance is driven mainly by the ease of doing and operating businesses, well-developed and deep clusters, and an effective regulatory framework that governs domestic and foreign competition.

Figure 2.8 Business Environment (2016)



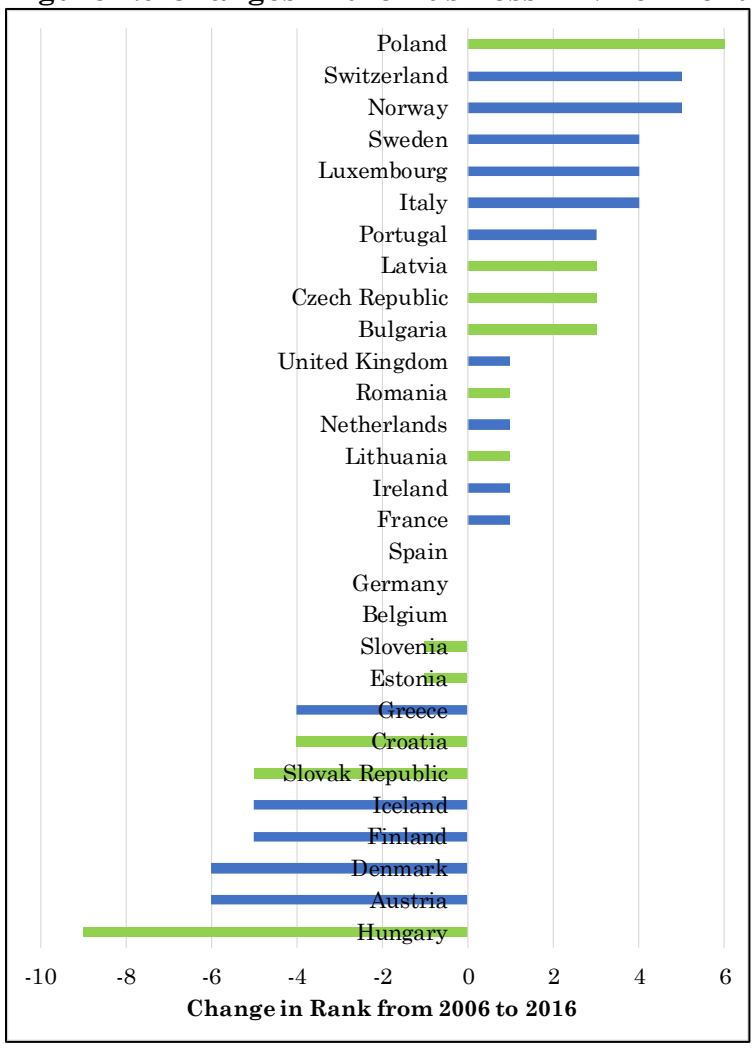
Source: Author's own calculations.

Estonia is the best Central and Eastern European performer in this dimension, ranking higher than Austria, Germany and Norway. It has recorded higher absolute and relative scores since 2006 in all but two indicators. Businesses, however, perceive increases in non-tariff barriers and burdensome foreign invesment rules. The Czech Republic and Latvia also perform relatively well. Italy and Greece are the worse EU-15 performers, ranking lower than most Central and Eastern European countries.

Compared to other countries, Switzerland, Norway, Sweden, and Poland rank significantly higher in 2016 than they did in 2006 (Figure 2.9). Switzerland has made significant improvements in all of the indicators included in this dimension—both in absolute and relative term—when compared to 2006. In particular, the cost, procedures, and days required to start a business have all come down. Norway has also made similar

improvements in these three indicators. However, investors perceive an increase in the burden of customs procedures, as well as concerns related rules and regulations related to foreign investment. (Inward foreign direct investment flows to Norway decreased in 2016, both as a share of its GDP and of world foreign direct investment.)

Figure 2.9 Changes in the Business Environment



Source: Author's own calculations.

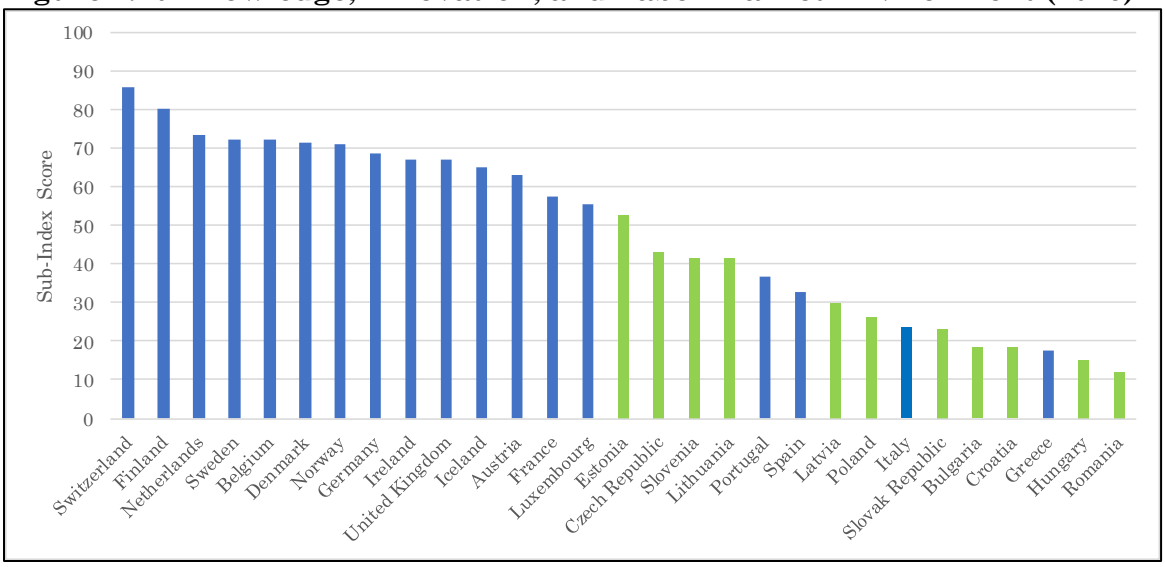
The two countries that have fallen the most in the rankings are the Slovak Republic and Hungary, moving down from 11th and 16th place in 2006 to 19th and 28th place in 2016, respectively. Although almost all of Hungary's

2016 scores—absolute and relative—are significantly lower, the country has made some improvements: the cost, procedures, and days to start a business have all decreased since 2006. The Slovak Republic also reports higher scores in these three areas, and investors see improvements in cluster developments, ease of access to loans, and intensity of local competition. However, the Slovak Republic registers significantly lower scores in all other indicators—both in absolute and relative terms.

2.9.5 Knowledge, Innovation, and Labor Market Environment Sub-Index

Switzerland's high quality education system and scientific research gives it the highest score in the Knowledge, Innovation, and Labor Market Environment sub-index (Figure 2.10). It is followed closely by Finland. Again, the best performer in the Central and Eastern European region is Estonia, followed by the Czech Republic, Slovenia, and Lithuania. While its relative position has deteriorated somewhat since 2006, Estonia reports higher absolute scores in 2016 compared to 2006, in nine of the ten indicators included in this dimension.

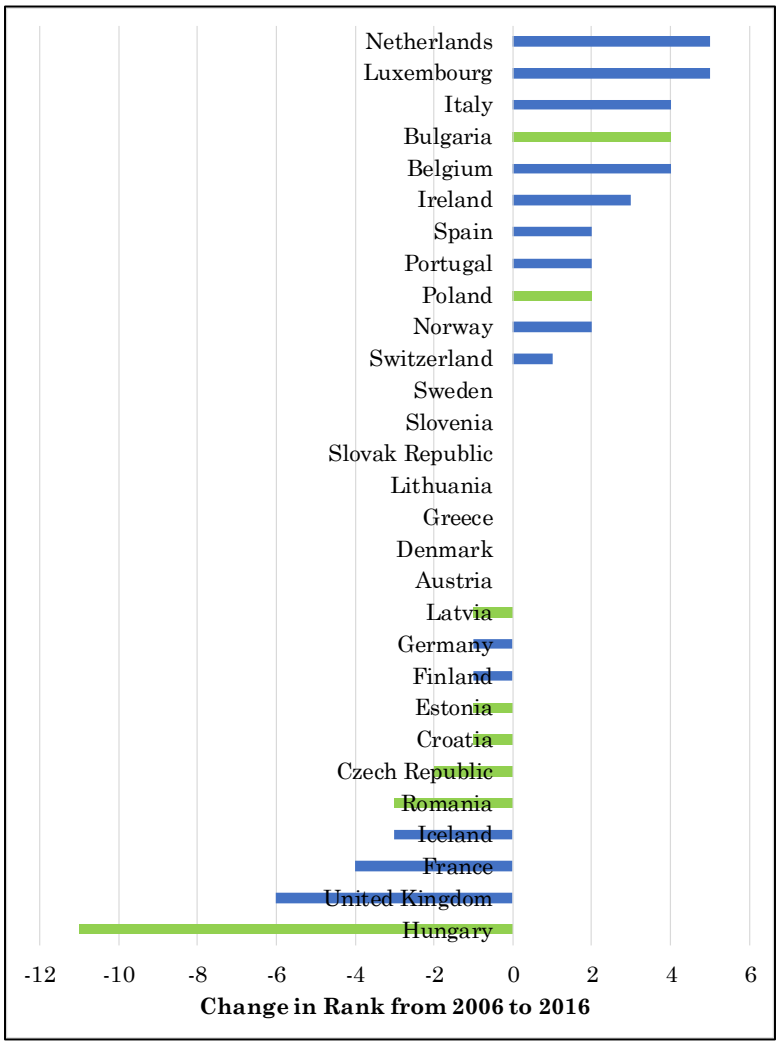
Figure 2.10 Knowledge, Innovation, and Labor Market Environment (2016)



Source: Author's own calculations.

When compared to other countries, Luxembourg and the Netherlands made significant improvements in this dimension, although Luxembourg reports lower labor productivity and a decrease in R&D expenditures as a percentage of GDP (Figure 2.11). The Netherlands and Belgium report higher absolute scores in all the underlying indicators, and higher relative scores in most of the sub-index's indicators.

Figure 2.11 Changes in the Knowledge, Innovation, and Labor Market Environment



Source: Author's own calculations.

In this dimension, Bulgaria is the Central and Eastern European country that moves up the most in the rankings. This reflects both absolute and relative improvements in the quality of education, tertiary education enrollment rates, on-the-job training programs, higher expenditures in R&D, a rise in labor productivity, and higher female participation in the labor force. Businesses also perceive improvements in the quality of scientific research and better overall industry-university collaboration.

The two countries that have fallen the most in the rankings are Hungary and the United Kingdom. Although Hungary is spending more on R&D as a percentage of GDP, it reports lower scores—absolute and relative—in all the other indicators. Despite reporting higher absolute scores in six out of the ten indicators, the relative position of the United Kingdom in this dimension has deteriorated significantly since 2006. In particular, when compared to other countries, its tertiary education enrollment rate has fallen, female labor force participation is lower, and investors view less favorably the country's on-the-job training programs and the extent to which employee productivity is linked to employee compensation.

2.10 Summary

In recent decades, scholars, and policymakers have come to realize that measuring multiple dimensions of the investment climate is key to understanding its components, benchmarking success, and catalyzing improvement. Traditional measures of the business environment, such as the rule of law, regulatory quality, ease of starting a business, and access to credit, for example, fail to capture the overall attractiveness of a country for investment. More importantly, they cannot assess the capacity of a country to realize the benefits of investment, particularly the contributions it can make to the economic and social well-being and development of a country. The lack of a broad and comprehensive composite indicator that is capable of capturing various dimensions of an attractive investment climate and that focuses

exclusively on Europe, however, prevents us from understanding the dynamics between these dimensions and measure improvements at the European level.

To fill this gap, this dissertation proposes an index for Europe—the Investment Attractiveness Index—that can quantify country performance on a wide range of aspects that are relevant for creating and maintaining an enabling environment for private sector development. The Index enables an assessment of both absolute and relative country performance compared to other European countries. It also identifies strengths and weaknesses in their investment climates, which enables the comprehensive and systematic measurement of developments over time.

The Investment Attractiveness Index aggregates 41 indicators that cover four broad dimensions: political, economic, business, and social. The 41 indicators may not be exhaustive, but they represent important components of an attractive investment climate across these four dimensions. Two sets of indices have been created: four dimensional sub-indices and an overall investment attractiveness index. All composite indicators were calculated by linearly weight-aggregating their components, with weights determined by principal component analysis.

In the overall rankings for 2016, Switzerland emerges as the most attractive country for investment, followed closely by Sweden and Finland. Estonia and the Czech Republic stand out as the two most attractive countries in Central and Eastern Europe. The least attractive countries in Europe are

Greece and Hungary, with Hungary falling significantly in all the rankings when compared to 2006.

It is worth noting that the impact of the global financial and economic crises does not seem to have affected overall trends (positive or negative) in the investment climates of most countries. When I analyze the attractiveness of countries by period, trends prior to 2009 are generally similar to those that we observe in recent years (after 2013). For instance, Ireland and Portugal—two countries that were severely affected by the crises—were improving their investment climates prior to 2009. Conditions deteriorated during the crises, but since 2013, they have resumed their positive trends. (The absolute and relative scores of many of the indicators that make up their investment climates have increased.). Similarly, conditions in Hungary and Slovakia, which were deteriorating prior to the crises, have continued to do so in recent years. While this analysis reveals trends in overall conditions, it is very difficult—if not impossible—to conclude with any degree of certainty the extent to which the crises affected the various dimensions of these countries' investment climates.

The next chapter employs the Investment Attractiveness Index to study how investment affects GDP and to address one of the key questions that this dissertation attempts to answer: Does the investment climate matter for economic performance?

Chapter 2A

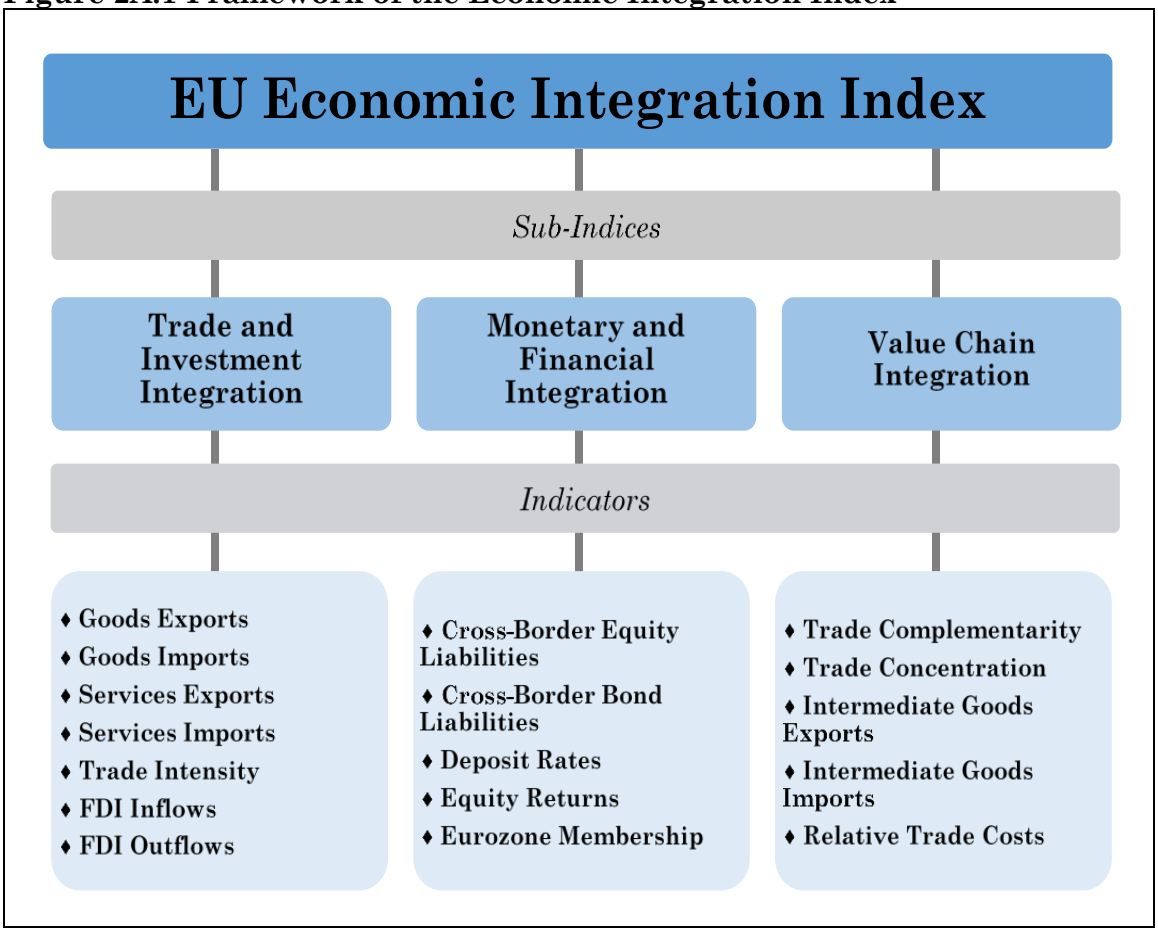
Measuring Economic Integration in the European Union

2A. EU Economic Integration Index

Using the methodology outlined in Section 2.6 and 2.7 of Chapter 2, this section develops a European Union (EU) Economic Integration Index (EEI). Similar to my approach with the Investment Attractiveness Index, I conceptualize "economic integration" as a multidimensional construct and as a framework for understanding how various economic factors affect economic integration in the EU (Figure 2A.1). As a construct, it is comprised of a number of dimensions. As a framework, it recognizes that economic integration is affected by the interplay of various economic trends and developments. These include, for example, exports, imports, inward and outward foreign direct investment, and financial transactions within the EU

Despite the academic and policy interest in European integration, recent empirical work has focused rather narrowly on the political dimension of this process. The broad consensus among policymakers is that integration has been beneficial—politically, socially, and economically. Yet, comparatively little has been done to measure the extent to which European countries have become economically interdependent, determine if and how greater integration affects economic performance, or compare relative levels of trade, monetary, and financial integration.

Figure 2A.1 Framework of the Economic Integration Index



This section seeks to fill this gap by developing a composite indicator that focus exclusively on the economic aspects of EU integration. The Economic

Integration Index is mostly a quantitative assessment of macroeconomic factors that shape and determine economic integration in the EU. While the focus of the dissertation continues to be on Central and Eastern European countries, the Index covers 27 EU economies (Table 2A.1). Due to data limitations, Croatia was not included in this study.

Table 2A.1 Countries Included in the Economic Integration Index

Austria	Germany	Netherlands
Belgium	Greece	Poland*
Bulgaria*	Hungary*	Portugal
Cyprus	Ireland	Romania*
Czech Republic*	Italy	Slovak Republic*
Denmark	Latvia*	Slovenia*
Estonia*	Lithuania*	Spain
Finland	Luxembourg	Sweden
France	Malta	United Kingdom

Note: * denotes the 10 formerly communist countries of Central and Eastern Europe (CEE) that now belong to the European Union (EU). Croatia was excluded due to data limitations. All countries listed here belong to the EU.

Three dimensions of economic integration are analyzed. These are: (1) Trade and Investment Integration, (2) Monetary and Financial Integration, and (3) Value Chain Integration. The three sub-indices comprise a total of 17 indicators (Table 2A.3). The scores from the Index and sub-indices range from 0 to 100: higher scores indicate greater levels of economic integration relative to other EU member states. The overall Index scores is the weighted sum of the country's three sub-indices scores, which in turn is the weighted sum of all the indicators that make up each sub-index. I calculate the Index for the 2006-2016 period to demonstrate developments over time. The scores and ranks for 2006 and 2016 are presented in Table 2A.2 and Figures 2A.2 through 2A.5. Overall integration scores by country groups are depicted in Figure 2A.6.

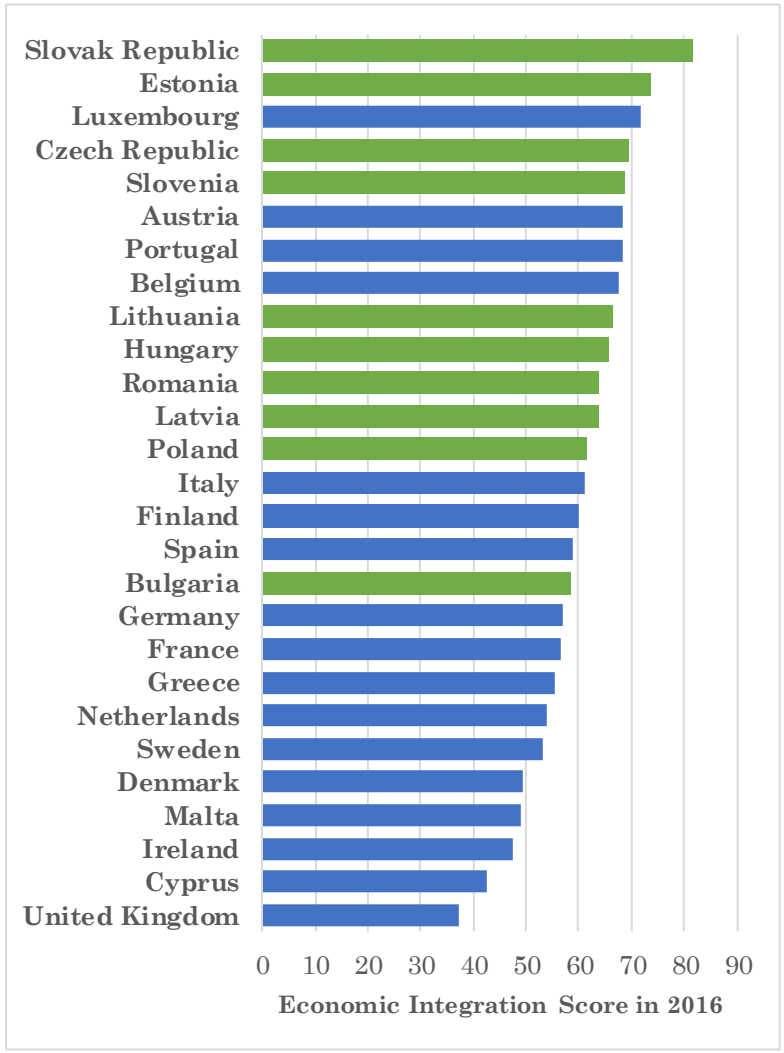
The Economic Integration Index will be used to assess if there is any correlation between higher levels of economic integration—as measured by the Index—and higher GDP levels or growth rates in EU member states. Together with the Investment Attractiveness Index, I include the Economic Integration Index in the econometric analysis of Chapter 3 to study the relationship between the investment climate, economic integration, and economic performance in the EU.

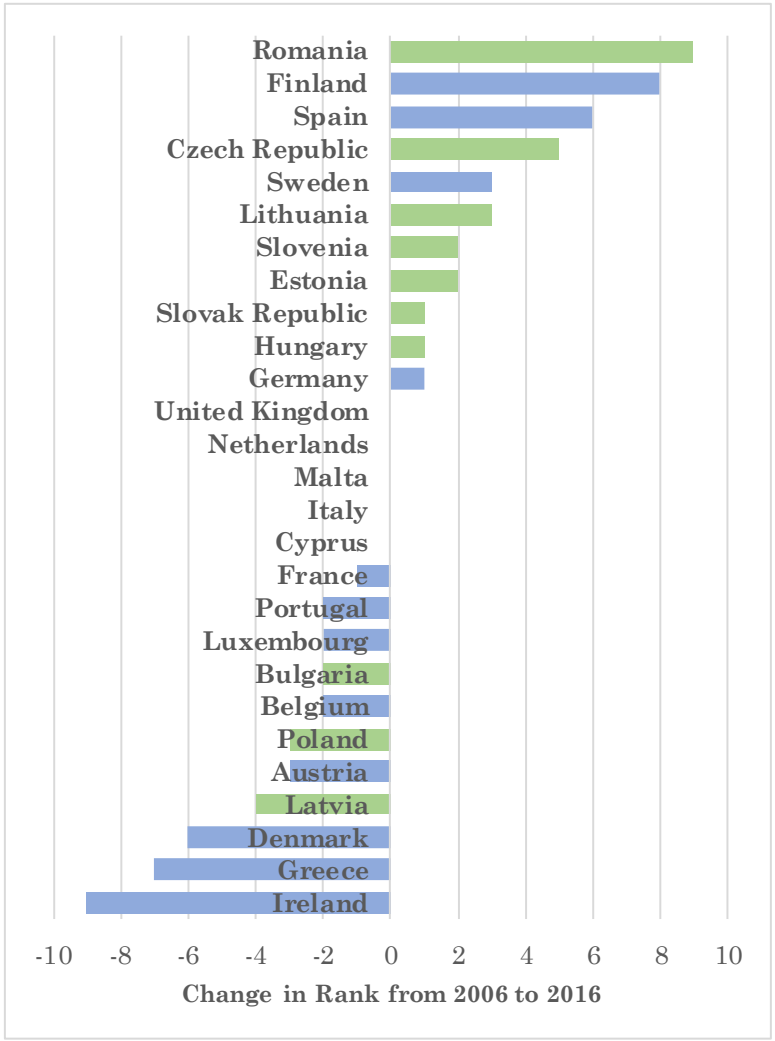
Table 2A.2 Results from the EU Economic Integration Index and Its Sub-Indices (2006 and 2016)

	EU Economic Integration Index				Trade and Investment Integration Sub-Index				Monetary and Financial Integration Sub-Index				Value Chain Integration Sub-Index			
	2006		**2016**		2006		**2016**		2006		**2016**		2006		**2016**	
	Rank	Score	**Rank**	**Score**	Rank	Score	**Rank**	**Score**	Rank	Score	**Rank**	**Score**	Rank	Score	**Rank**	**Score**
Slovak Rep*	2	72.74	**1**	**81.60**	2	76.95	**1**	**90.68**	4	81.93	**1**	**87.38**	7	59.34	**1**	**66.75**
Estonia*	4	68.17	**2**	**73.74**	8	68.61	**3**	**82.30**	8	78.09	**2**	**86.86**	8	57.80	**11**	**52.06**
Luxembourg	1	73.50	**3**	**71.81**	1	80.30	**8**	**72.09**	6	79.02	**7**	**82.18**	5	61.18	**5**	**61.17**
Czech Rep*	9	64.58	**4**	**69.60**	6	70.95	**2**	**82.89**	22	61.49	**20**	**60.79**	4	61.30	**2**	**65.14**
Slovenia*	7	65.35	**5**	**68.55**	10	64.37	**13**	**65.65**	11	75.66	**11**	**75.73**	9	56.03	**3**	**64.29**
Austria	3	69.80	**6**	**68.20**	5	71.81	**9**	**68.41**	10	76.72	**6**	**82.19**	6	60.87	**8**	**54.02**
Portugal	5	68.16	**7**	**68.19**	3	75.26	**7**	**73.06**	1	89.10	**3**	**85.87**	26	40.11	**22**	**45.63**
Belgium	6	66.55	**8**	**67.54**	9	66.06	**10**	**68.36**	3	82.05	**8**	**81.53**	15	51.54	**10**	**52.73**
Lithuania*	12	60.74	**9**	**66.60**	12	61.89	**12**	**67.18**	16	71.55	**4**	**83.35**	18	48.77	**15**	**49.28**
Hungary*	11	61.80	**10**	**65.64**	7	69.44	**4**	**80.17**	25	50.42	**23**	**53.46**	1	65.54	**4**	**63.28**
Romania*	20	55.40	**11**	**63.98**	14	56.73	**6**	**77.21**	24	55.17	**22**	**55.69**	10	54.31	**6**	**59.03**
Latvia*	8	64.89	**12**	**63.75**	11	62.89	**11**	**67.29**	9	77.49	**14**	**73.89**	11	54.28	**12**	**50.08**
Poland*	10	64.33	**13**	**61.56**	4	73.11	**5**	**79.42**	23	56.03	**26**	**46.74**	2	63.83	**7**	**58.52**
Italy	14	58.61	**14**	**61.17**	23	41.73	**19**	**52.35**	2	82.47	**5**	**82.75**	13	51.62	**18**	**48.41**
Finland	23	53.19	**15**	**60.08**	25	35.51	**16**	**55.78**	12	75.63	**13**	**75.44**	19	48.44	**17**	**49.03**
Spain	22	53.44	**16**	**58.90**	19	47.13	**17**	**53.58**	17	70.67	**12**	**75.72**	23	42.51	**21**	**47.41**
Bulgaria*	15	58.26	**17**	**58.47**	18	47.53	**14**	**61.99**	20	64.52	**19**	**63.65**	3	62.73	**13**	**49.77**
Germany	19	55.96	**18**	**57.06**	21	43.05	**20**	**48.24**	15	72.64	**16**	**70.19**	12	52.21	**9**	**52.76**
France	18	56.07	**19**	**56.74**	16	52.34	**18**	**53.09**	14	73.45	**15**	**71.78**	24	42.42	**23**	**45.35**
Greece	13	59.22	**20**	**55.46**	15	53.55	**23**	**41.32**	7	78.79	**9**	**77.33**	22	45.32	**20**	**47.72**
Netherlands	21	55.31	**21**	**53.76**	20	43.09	**21**	**44.74**	13	75.60	**17**	**67.36**	20	47.23	**16**	**49.17**
Sweden	25	50.51	**22**	**53.22**	17	50.42	**15**	**60.32**	26	49.51	**25**	**49.74**	14	51.61	**14**	**49.61**
Denmark	17	56.07	**23**	**49.36**	13	59.44	**22**	**44.48**	21	62.07	**21**	**58.43**	21	46.70	**24**	**45.16**
Malta	24	50.83	**24**	**48.87**	26	35.16	**25**	**32.74**	18	67.86	**18**	**66.13**	17	49.47	**19**	**47.73**
Ireland	16	56.38	**25**	**47.61**	24	39.31	**27**	**24.06**	5	80.18	**10**	**76.44**	16	49.66	**26**	**42.34**
Cyprus	26	49.50	**26**	**42.73**	22	42.82	**24**	**34.52**	19	65.17	**24**	**51.58**	25	40.50	**27**	**42.09**
UK	27	35.25	**27**	**37.31**	27	27.08	**26**	**29.54**	27	40.57	**27**	**38.96**	27	38.10	**25**	**43.41**

Source: Author's own calculations.
Note: * denotes Central and Eastern European (CEE) country.

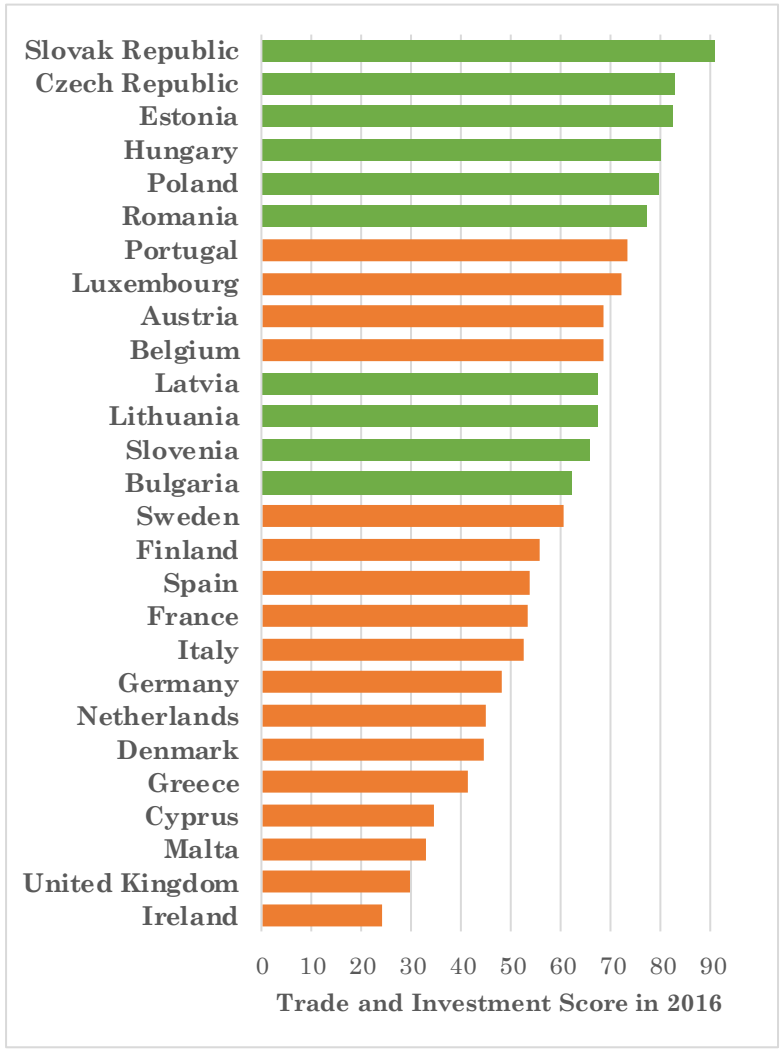
Figure 2A.2 Overall Economic Integration Index

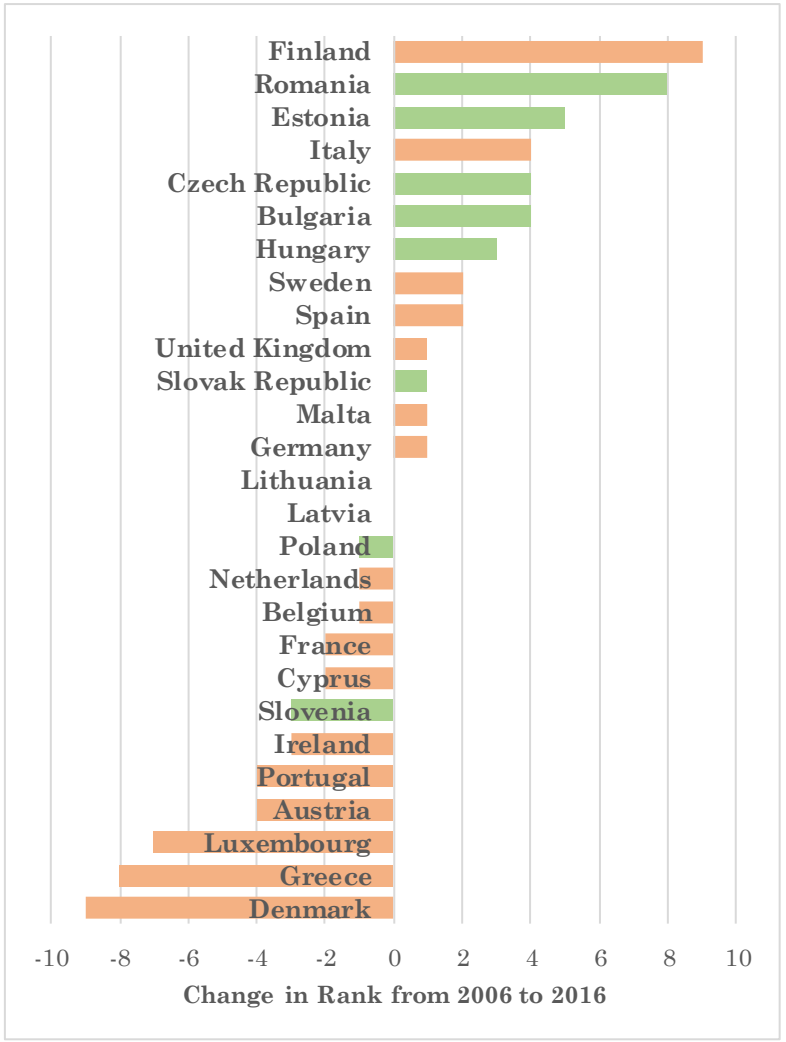




Source: Author's own calculations.

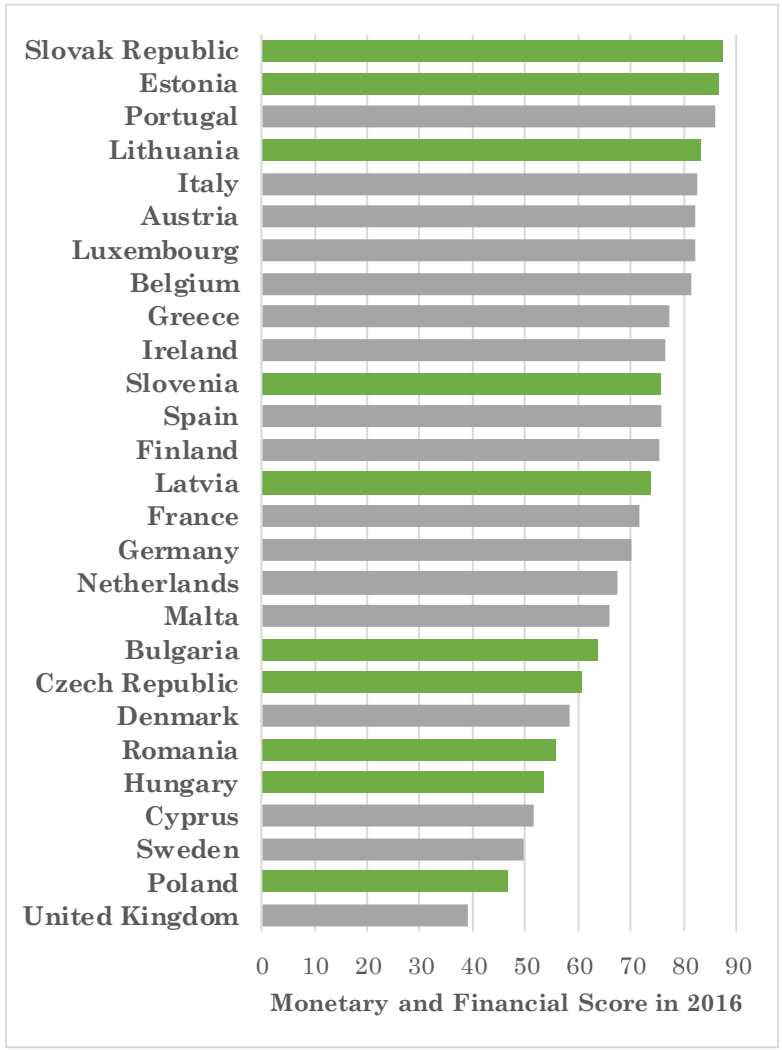
Figure 2A.3 Trade and Investment Integration (Sub-Index 1)

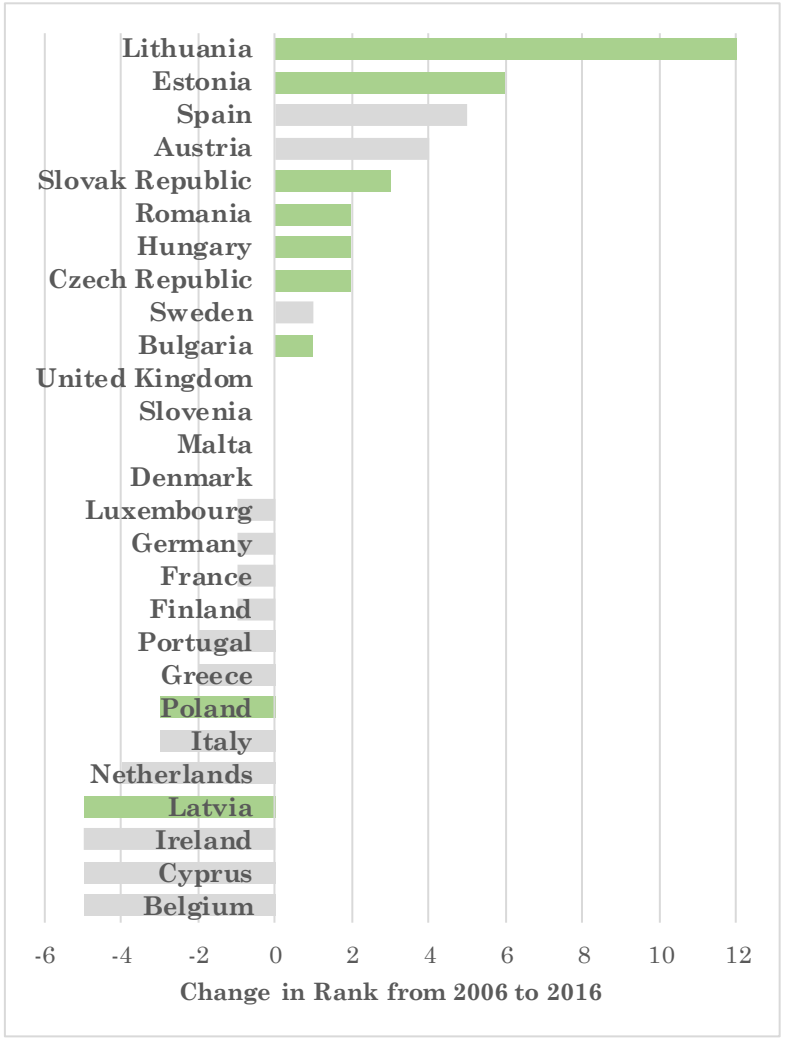




Source: Author's own calculations.

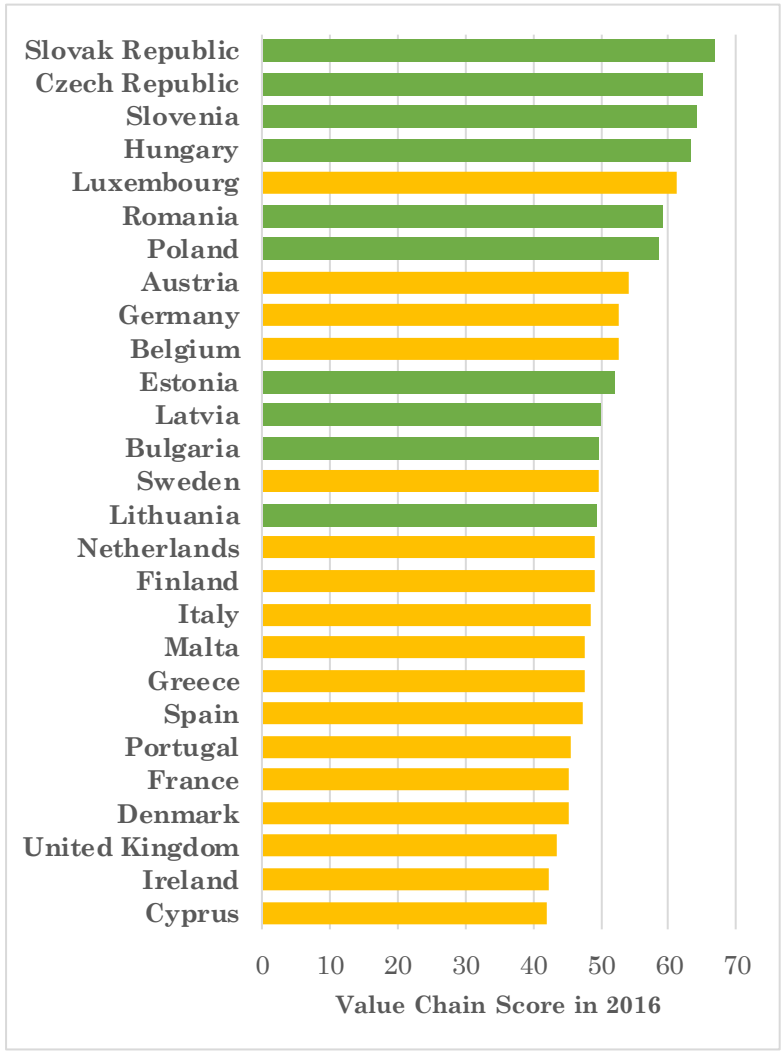
Figure 2A.4 Monetary and Financial Integration (Sub-Index 2)

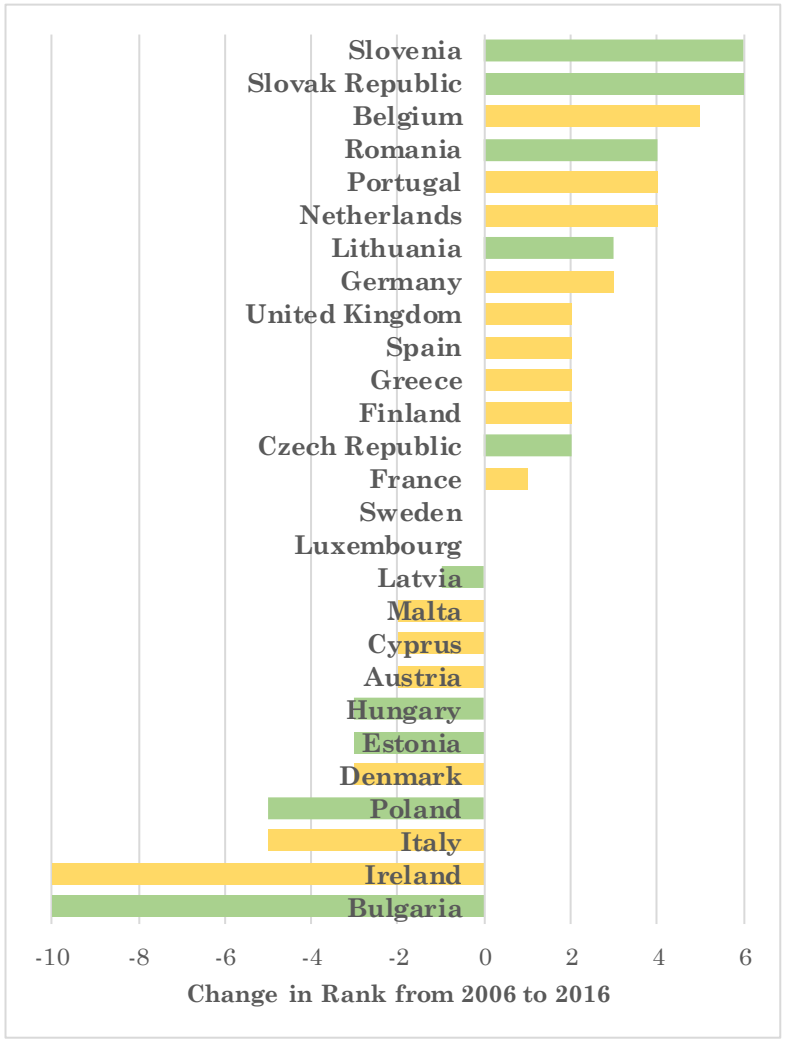




Source: Author's own calculations.

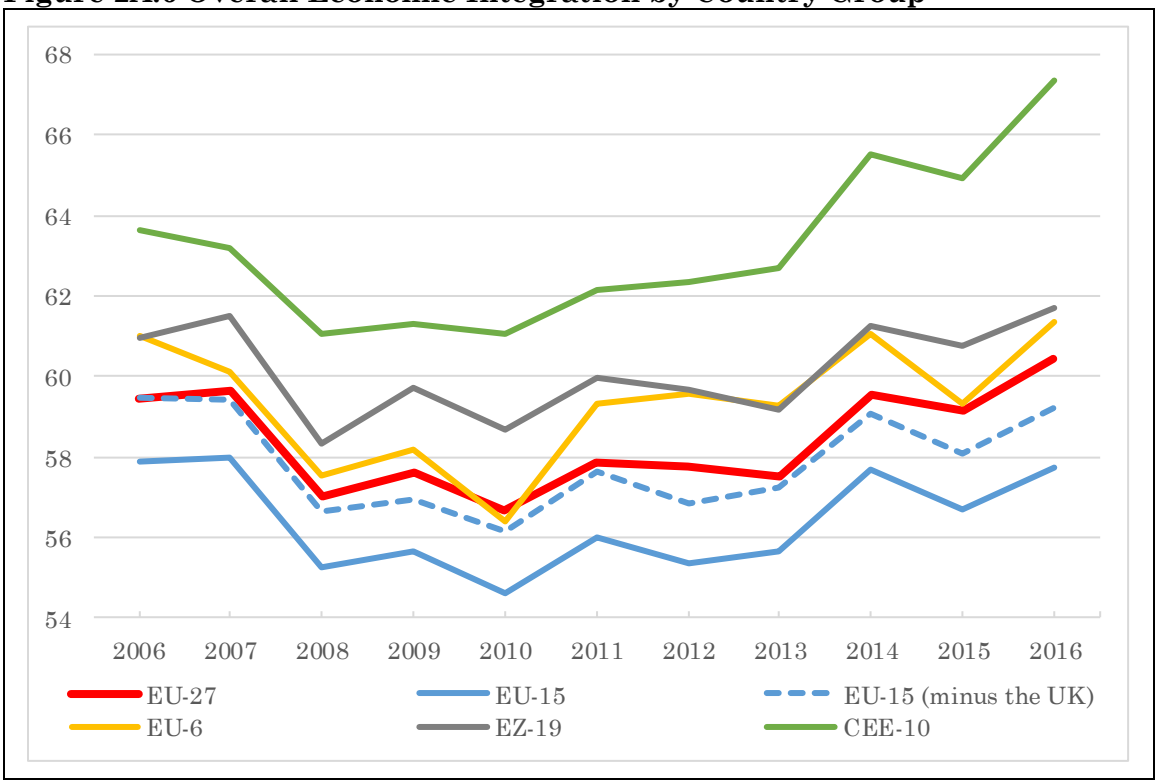
Figure 2A.5 Value Chain Integration (Sub-Index 3)





Source: Author's own calculations.

Figure 2A.6 Overall Economic Integration by Country Group



Source: Author's own calculations.

Notes: **EU-27:** Belgium, Bulgaria, Czech Republic, Denmark, Germany, Estonia, Ireland, Greece, Spain, France, Italy, Cyprus, Latvia, Lithuania, Luxembourg, Hungary, Malta, Netherlands, Austria, Poland, Portugal, Romania, Slovenia, Slovakia, Finland, Sweden, and the UK.
EU-15: Belgium, Denmark, Germany, Ireland, Greece, Spain, France, Italy, Luxembourg, Netherlands, Austria, Portugal, Finland, Sweden, and the UK.
EU-6: Belgium, Germany, France, Italy, Luxembourg, and Netherlands.
EZ-19: Eurozone (Belgium, Germany, Estonia, Ireland, Greece, Spain, France, Italy, Cyprus, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Austria, Portugal, Slovenia, Slovakia, and Finland).
CEE-10: Bulgaria, Czech Republic, Estonia, Latvia, Lithuania, Hungary, Poland, Romania, Slovenia, and Slovakia.

Table 2A.3 EU Economic Integration Index: Indicators and Data Sources

Sub-Index	Indicator	Description	Sources
Trade and Investment Integration	**Goods Exports**	Goods exports to the EU as a share of total goods exports.	Eurostat, World Bank's World Development Indicators, International Monetary Fund's Direction of Trade Statistics
	Goods Imports	Goods imports from the EU as a share of total goods imports.	Eurostat, World Bank's World Development Indicators, International Monetary Fund's Direction of Trade Statistics
	Services Exports	Services exports to the EU as a share of total services exports.	Eurostat, World Bank's World Development Indicators, International Monetary Fund's Direction of Trade Statistics
	Services Imports	Services imports from the EU as a share of total services imports.	Eurostat, World Bank's World Development Indicators, International Monetary Fund's Direction of Trade Statistics
	Trade Intensity	Intra-EU trade intensity index. (Calculated using the Asian Development Bank's methodology.)	Eurostat, World Bank's World Development Indicators, International Monetary Fund's Direction of Trade Statistics
	FDI Inflows	Foreign direct investment (FDI) inflows from the EU as a share of total FDI inflows.	Eurostat, United Nations Conference on Trade and Development's UNCTADstat
	FDI Outflows	Foreign direct investment (FDI) outflows to the EU as a share of total FDI outflows.	Eurostat, United Nations Conference on Trade and Development's UNCTADstat
Monetary and Financial Integration	**Cross Border Equity Liabilities**	Proportion of intra-EU cross-border equity liabilities to total cross-border equity liabilities.	Asian Development Bank's Regional Cooperation and Integration Database
	Cross-Border Bond Liabilities	Intra-EU cross-border bond liabilities as a share of total cross-border bond liabilities.	Asian Development Bank's Regional Cooperation and Integration Database
	Deposit Rates	Pair-wise dispersion of deposit rates averaged across the EU relative to the dispersion averaged globally.	Asian Development Bank's Regional Cooperation and Integration Database
	Equity Returns	Pair-wise correlation of equity returns averaged across the EU minus the correlation averaged globally.	Asian Development Bank's Regional Cooperation and Integration Database
	Eurozone Membership	Indicator that equals 1 if country has adopted the euro, 0.5 if it belongs to the EMU but has not adopted the euro, and 0 otherwise.	Author using information from the European Commission and the European Central Bank
Value Chain Integration	**Trade Complementarity**	Ratio between average trade complementarity index over EU trading partners and average trade complementarity index over all trading partners.	Eurostat, World Bank's World Development Indicators, International Monetary Fund's Direction of Trade Statistics, Asian Development Bank's Regional Cooperation and Integration Database
	Trade Concentration	Ratio between average trade concentration index over EU trading partners and average trade concentration index over all trading partners.	Eurostat, World Bank's World Development Indicators, International Monetary Fund's Direction of Trade Statistics, Asian Development Bank's Regional Cooperation and Integration Database
	Intermediate Goods Exports	Intermediate goods exports to the EU as a share of total goods exports to the EU.	United Nations' Commodity Trade Database, Asian Development Bank's Regional Cooperation and Integration Database
	Intermediate Goods Imports	Intermediate goods imports from the EU as a share of total goods imports from the EU.	United Nations' Commodity Trade Database, Asian Development Bank's Regional Cooperation and Integration Database
	Relative Trade Cost	Ratio between average trade cost over EU trading partners and the averaged trade cost over all trading partners.	United Nations Economic and Social Commission for Asia and the Pacific's Trade Costs Database, Asian Development Bank's Regional Cooperation and Integration Database

Chapter 3

Investment and Economic Performance in Europe: Do the Investment Climate and Economic Integration Matter?

3.1 Introduction

In this chapter, I will assess empirically the role of foreign and domestic investment—as well as that of exports—in the economic performance of 31 European countries. A look at these and other factors that affect economic growth could provide critical insights to those who aspire to achieve macroeconomic stability or spark growth today, particularly through trade and private sector development. In addition, using the Investment Attractiveness Index and European Economic Integration Index built in Chapter 2, I will investigate how the investment climate and economic integration affect the economies of these countries. The focus of the chapter is on Central and Eastern Europe.

Europe's former communist countries have undergone a dramatic political and economic transformation over the last 29 years. While there is considerable variation in performance among this group, their average growth and progress have been remarkable. Nevertheless, a nearly decade-long global recession has brought to the forefront of academic and policy debates the question of how to stimulate economic growth in today's highly interconnected global economy. States seeking membership to the European Union (EU), developing states with newly liberalized economies, and even well-established economies attempting to overcome the depressing effects of aging populations and expensive social safety nets can all benefit from reinvigorated economic growth.

3.1.1 Background

During the 1990s, many international economic and development agencies encouraged transition economies to adopt policies that would boost foreign investment and exports. In turn, increased investment and trade would, by contemporary reckoning, foster economic growth and development, and help improve the integration of these previously isolated countries in the global economy. Moreover, these policy prescriptions were part of broader strategy aimed at macroeconomic stability, privatization, and trade and investment liberalization. While some formerly communist countries followed a radical approach to institutional and policy reforms, others undertook gradual programs.

The transition process was particularly successful in many countries of Central and Eastern Europe. In contrast to the economies of the Commonwealth of Independent States (CIS), most Central and Eastern European countries benefitted from strong progress in political and economic integration with Western Europe. The increasing political integration was mainly driven by the prospect of joining the EU, which eleven of these countries succeeded in doing in 2004, 2007, and 2013. Economic integration, on the other hand, was established through an increasing amount of trade and capital flows. Many developing countries in the 1980s and 1990s "adopted outward-oriented strategies as a way to enhance production efficiency and increase the transmission of technology from developed countries" (Vasquez Galan 2009). In this respect, a crucial role has been attributed to foreign investment and exports. Although all these countries reintegrated successfully into the world economy (and increasingly into the EU), and most achieved sustainable improvements in the living standards of its citizens, they have nevertheless recorded heterogeneous growth and development paths.

3.1.2 Liberalization in the Post-Cold War Era

The nexus between investment, trade openness, and economic growth has been the subject of debate and controversy among scholars and policymakers over the last few decades. Particularly after the collapse of the Soviet Union, the explosion of foreign capital flows, combined with the widespread belief that trade and investment liberalization are beneficial for

growth, triggered a large body of research that sought to identify the determinants of economic growth and development in formerly communist countries. These events continue to motivate researchers to explore and understand the role of public policies in stimulating growth, trade, and foreign investment, as well as the channels through which exports and foreign investment impact economic output. Although there seems to be a consensus among policymakers that economic liberalization positively affects economic growth, the literature on trade and investment liberalization is extensive but inconclusive about its effects. Many studies find that investment (particularly foreign investment) and exports generally have a positive impact on GDP. Nevertheless, the results are not always statistically significant.

3.1.3 Motivation

The aim of this chapter to provide empirical evidence about how investment—foreign and domestic, exports, the investment climate, and economic integration affect economic output in European countries. While I carry out an analysis of 31 countries, the focus is on 11 Central and Eastern European countries between 1995 and 2016 using yearly data and panel data econometric methods. The next chapter, Chapter 4, attempts to determine if there is any sort of "causal" relationship between domestic and foreign investment, exports, and economic output using time series techniques. To my knowledge, no single study has carried out such an analysis for all eleven countries individually.

The questions that this chapter will attempt to answer are: *Do investment (foreign and domestic) and exports positively and significantly affect economic performance in European countries? Does the investment climate matter for economic performance? Is greater economic integration within Europe associated with higher GDP levels and growth rates? What economic variables affect economic performance in Europe? Do these variables affect the economies of Western Europe differently than those of Central and Eastern Europe?*

Central and Eastern European is a region of particular interest for examining the impact of investment and trade liberalization for a number of reasons. In particular, foreign investment in the region has been significant and continues to grow. When "[c]ompared to other regions of the world, [Central and] Eastern Europe stands out as a region in transition" (Zuhlke 2009). Also, the endeavor for EU accession in other Eastern and Southeastern European countries has triggered additional and significant reform dynamics that affect economic performance. Finally, there are open research questions regarding the relationship between investment and trade liberalization and economic performance in this region.

It is worth noting that it is challenging to isolate the specific effects of foreign and domestic investment and exports on GDP. However, while investment and exports alone are not the ultimate drivers of economic growth, they are believed to be important means for generating it, especially in

transition countries. This presumption is the focal point of the present analysis. Also, as foreign investment is considered to be a vehicle for capital and technology transfer, and inflows to the transition countries have been high, it is hypothesized that foreign investment has contributed positively and significantly to the economic performance of countries in Europe, and to a greater extent, to that of Central and Eastern European countries.

The following section (Section 3.2) provides an overview of the relationship between foreign investment and economic performance and between exports and economic performance. Section 3.3 discusses the importance of institutions and how the investment climate and economic integration are thought to positively impact economic performance. Section 3.4 presents a simple data analysis from period averages, while Sections 3.5 and 3.6 carry out the panel data analyses. The last section (Section 3.8) summarizes the main findings of this chapter and discusses the policy implications.

3.2 Economic Liberalization

The theoretical and policy assumption has been that trade liberalization—particularly through higher exports—contributes positively to output growth. Theories of international trade contend that countries that open up to trade are better off than those that remain closed. This is mainly due to specialization: countries produce those goods in which they have a comparative advantage. Engaging in the international marketplace enables

countries to allocate resources more effectively and efficiently and increase consumption (direct effects of—or static gains from—international trade) (Vasquez Galan 2006). For instance, export-led growth (ELG) is one of the most widely debated economic "models" or strategies. It holds that when countries liberalize, the export sector not only becomes one of the main drivers of economic growth, but also generates positive externalities in other sectors of the economy. These externalities or spillovers include host countries' access to—and capability to effectively adopt—new technologies, ability to take advantage of economies of scale, stimulate and foster domestic competition, and improve human capital (both directly and indirectly).

Specifically, trade liberalization increases the size of the market, which provides opportunities for the international fragmentation of the value chain (i.e., division of labor). This can induce dynamic productivity effects via "learning-by-doing" and other gains from specialization. In addition, openness to the international exchange of products and services may affect micro-level innovation activities, and hence the aggregate growth rate by changing the competitive environment of firms. Trade furthermore fosters the long-run technological efficiency of firms, sectors, and nations by enabling knowledge spillovers from abroad.

As noted by Vasquez Galan (2006) "[a]nother effect of economic liberalization is through foreign capital in the form of direct and indirect (speculative) investment." In this chapter, I only focus on foreign direct

investment. However, FDI and multinational enterprises (MNE) should not only be considered as a pure allocative phenomenon. Similar to trade, FDI can create a number of positive externalities or spillovers in host countries. FDI is thought to be an important source of innovation and new technologies, and can create opportunities for "learning-by-doing" and promote the adoption of new or better management practices. This is not an "automatic" process. Findings from various studies suggest that in order to take advantage of the positive externalities of FDI, certain pre-conditions are required, including a minimum stock of human capital to ensure that the host country has appropriate absorptive capabilities (e.g. see Borensztein et al. 1995). The following sub-section provides and overview of the literature on foreign investment and economic performance.

3.2.1 FDI and Economic Performance: A Brief Overview of the Literature

FDI into transition economies has increased significantly since the early 1990s. This trend reflects governments' adherence to neoclassical economic principles and goals that hold that inflows of non-debt capital promote economic development in recipient countries primarily by enhancing productivity. In addition to providing direct capital financing, FDI can create spillovers that promote sustainable economic growth in host economies.

There seems to be a consensus among policymakers that foreign investment generally affects economic growth positively. While the literature

this topic is extensive, it nevertheless remains inconclusive about its overall effects. Many studies have found that foreign investment and economic growth are positively correlated. However, the results are not always significant. As noted by Tuluce and Dogan (2014), foreign direct investment "is a composite bundle of capital stocks, know-how, and technology, its impact on economic growth is expected to be manifold." (See also Dunning 1992, Balasubramanyam et al 1996, and de Mello 1997).

Carkovic and Levine (2002) try to determine the effect of foreign direct investment on economic growth using data from 72 developing and developed countries between 1960 and 1995. Their study employs two databases to test the hypothesis that foreign investment affects economic growth. The authors construct a panel dataset by averaging the data for each country over seven five-year periods. After controlling for economic conditions, schooling, financial development, and openness to international trade, the authors find that foreign investment does not have a robust, positive effect on economic output. Various sample specifications in which only certain countries are included do not alter their initial findings, leading the authors to conclude that "there is not robust, causal link running from FDI to economic growth" (Carkovic and Levine 2002).

Other studies highlight the importance of host country characteristics in allowing the absorption of the benefits of foreign investment. Balasubramanyam et al (1996) study the link between foreign investment and

economic growth in developing countries by exploring how this type of investment affects countries that pursue export-promoting policies differently than those that adopt import-substituting policies. Their results show that effect of foreign investment on growth is stronger in export-promoting countries. Blomstrom et al (1992), however, find that foreign investment has indeed a positive and significant effect on economic growth, but primarily on higher-income developing countries. Their results imply that economies may have to pass a certain income threshold in order to benefit from foreign investment.

Borensztein et al (1998) conduct a study of 69 developed and developing countries over two decades: between 1970 and 1979 and between 1980 and 1989. When extending the Romer (1990) model and varying its specifications, the authors consistently find that foreign investment exerts a positive and significant impact on growth in recipient countries. However, their main finding is that education and foreign investment display "complementary effects." A specific threshold level of human capital is required (which they measure "as the average years of secondary schooling for each country's male population") in order for foreign investment to have a positive and significant effect on a country's economic growth (Aleksynska, Gaisford, and Kerr 2003). The impact of foreign investment on host economies, therefore, varies depending on the level of human capital development. Thus, the more educated

a country's workforce is, the better equipped a country might be to benefit from foreign investment.

Along these lines, de Mello (1997) finds evidence indicating that the existence of certain institutional arrangements determine how attractive a country is to foreign capital investment, particularly intellectual property rights protection and incentives for foreign investors. In another study, de Mello (1999) tries to estimate the effects of foreign investment on growth by controlling for a number of economic and social factors. The author analyzes a dataset of 32 developing and developed countries over the 1970-1990 period. He concludes that the impact of foreign investment on economic growth tends to be more significant in non-OECD countries than in those countries with already developed industries.

Because these studies show that foreign investment tends to promote growth only under certain conditions, a number of researchers have also explored how different types of foreign investment affect growth. For instance, Nunnenkamp and Spatz (2003) have studied multinational corporations' motives to invest outside of their home countries. They identify three objectives: (1) resource-seeking objectives (key resources, such as oil), (2) efficiency-seeking objectives (comparative advantage, such as lower labor costs), and (3) market-seeking objectives (access to local markets, such as telecommunications or banking industry). These three different objectives roughly correspond to foreign investment in the primary, manufacturing, and

services sectors. Because the goals (and means to achieve them) differ, each type of foreign investment is likely to impact growth differently.

Finally, Alfaro (2003) explores the link between sectoral foreign direct investment and economic growth using a panel dataset of 47 developing countries. The study finds that while total foreign investment has had an ambiguous impact on economic growth, foreign investment in the manufacturing sector has indeed had a positive and significant effect on growth. In addition, foreign investment in the primary sector has had a significant but negative impact on growth, while the growth effect of foreign investment in the services sector has been negative but insignificant.

Wang (2009) reaches similar conclusions in an analysis based on a "data set that consists of both total and disaggregated FDI data for 12 Asian economies over the period of 1987 to 1997." Her "results show that FDI in different sectors does have different impacts on host country's economic growth. Aggregating different types of FDI together could blur the actual growth effect of FDI and generate mixed results" (Wang 2009). The results of her study indicate that total FDI indeed has a positive and significant effect on growth. Nevertheless, while manufacturing FDI has a greater positive effect on growth, non-manufacturing FDI has a negative effect, albeit not statistically significant.

Most studies in the literature have focused primarily on developing countries, and few studies deal specifically with the EU and its transition

economies (those of Central and Eastern Europe and the Baltic States). As noted by Neuhaus (2005), these former communist countries still have unique institutional and developmental features that make them "interesting cases" for studying the relationship or links between foreign investment and economic growth. In addition, many countries in the sample, particularly those in South-Eastern Europe, are considered by some to be "outside" mainstream research. Therefore, this chapter will attempt to determine the extent to which foreign investment has contributed to economic growth in European countries, with a particular focus on 11 economies formerly belonging to the Soviet bloc. Unfortunately, disaggregated data on foreign investment is not available for all of these countries, nor for the entire time-period that the sample covers. The analysis will also attempt to determine the extent to which the investment climate and economic integration affects economic performance in these countries.

3.3 Institutions and Policies: The Investment Climate and Economic Integration

Why can some countries reap the benefits of international trade and investment more effectively than others? To try to answer this question, I turn to "institutions" and "policies." Generally speaking, these two terms refer to the "rules of the game" or the framework under which economic actors make decisions and take actions to implement them—that is, the investment climate (see below). Indicators to assess institutional quality and effectiveness have

been developed by international governmental and nongovernmental organizations—particularly the World Bank, the European Bank for Reconstruction and Development, Transparency International, and the Heritage Foundation—using subjective data (e.g., how citizens, international investors, and multinational corporations perceive them). Despite disagreements regarding their reliability, empirical studies using these indicators have consistently shown that institutions generally matter for output growth and economic development.[12] However, most studies have focused on general relationships, established statistically for various groups of Central and Eastern European countries. And none, to my knowledge, has carried out a systematic assessment that focuses exclusively on Europe and its transition economies now belonging to the European Union.

The transition process from a socialist, centrally planned economy to a market-based economy resulted in an array of countries that are very different in terms of economic growth, export performance, and investment attractiveness. Therefore, devoting the necessary attention to country specific factors is essential if our goal is to understand the channels through which economic, political, and social institutions have affected the economies of individual countries in this region (as well as their absorptive capacity to

[12] It is worth noting that the economic literature has attributed growth and FDI inflows in the Central European region to institutional and policy reforms, and to the prospect of EU membership. Moreover, the OECD (2009) has acknowledged that FDI has been "a key driver of… [these countries'] economic integration" into Western Europe and that it "can provide financial stability, promote economic development, and enhance the well-being of societies" so long as the right institutional and policy frameworks are in place.

capture spillovers from international investment and trade). The results of the econometric analyses in this chapter and in Chapter 4 might enable me to offer valuable lessons and put forward specific policy options and recommendations with the greatest potential to generate economic growth, not only in countries already "in" Europe, but also in other regions in transition, particularly those of Southeastern Europe and Central Asia with aspirations of greater economic and political ties with the EU.

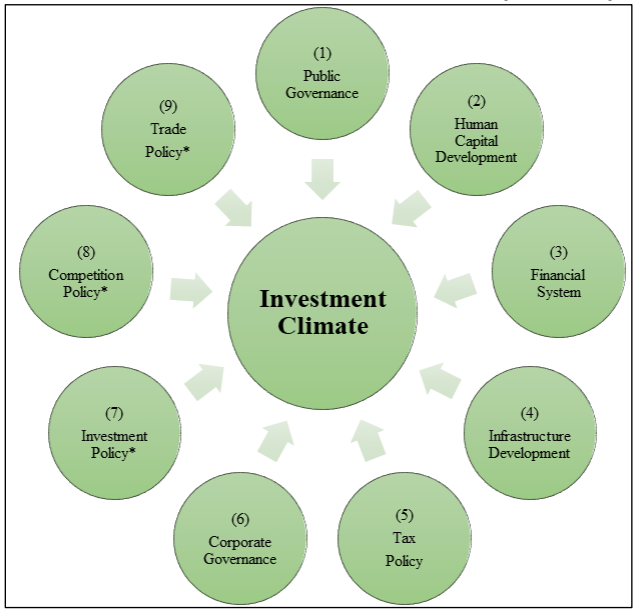
3.3.1 Investment Climate

Since the early 1980s, Douglass C. North and Mancur L. Olson, among other scholars, have highlighted the link between institutions and economic growth and development. North (1981) defines institutions as "the humanly devised constraints that shape human interaction. In consequence they structure incentives in human exchange, whether political, social, or economic." As such, institutions and government policies create an environment that allows and encourages individuals to engage in growth-enhancing activities and invest their time and resources in fruitful activities.

When it comes to the role of public policy in attracting—and taking advantage of—investment, the literature has generally focused on a limited number of factors. And even if often referred to theoretically, they are not necessarily analyzed in depth or systematically. In his discussion of the possibilities and limits of policies, Zuhlke (2009) notes that "public policy issues that are discussed most frequently include the tax policies, investment

incentives, and trade policies. Other determinants have usually been seen as less important" to attract investment. However, this dissertation attempts to take into account or analyze—to the extent that it is possible—a broader set of investment climate determinants, most of which can be influenced by host governments (Figure 3.1).

Figure 3.1 The Investment Climate: Key Policy Areas



Because there are no indicators that score or rate each of these policy areas, I developed in Chapter 2 an index that ranks countries in terms of their "investment attractiveness." (Another index was also built to determine their level of economic integration within Europe.) It is important to note that not all the factors that affect investment or economic integration are directly measurable.

As described in Chapter 2, the "investment climate"[13] is conceptualized in this dissertation both as a multidimensional construct and as a framework for understanding how a wide range of policy and non-policy factors relate to each other and affect the investment climate. Along the lines of the Policy Framework for Development, this study attempts to do so "while also bringing out the critical importance of public governance" (OECD 2015). As a construct, it is comprised of a political, economic, business, and social dimension. As a framework, it recognizes that the interplay of numerous policy factors affect the investment climate. These include public governance, human capital and innovative capacity development, the financial system, physical and digital infrastructure development, tax policy, corporate governance, investment policy, competition policy, and trade policy. Thus, this dissertation presents an "operational definition" by looking at important characteristics or drivers of an attractive investment environment, which are found in the literature.

In addition to "macroeconomic stability, political predictability... and upholding the rule of law, which are pre-conditions for sustainable development," an attractive or enabling environment for investment "provides opportunities for all investors: public and private, large and small, and foreign and domestic" (OECD 2015). It is an environment that

> "helps to mobilize capital, skills, technology and intermediate inputs to allow firms to expand. It helps to channel resources to more productive uses, and,

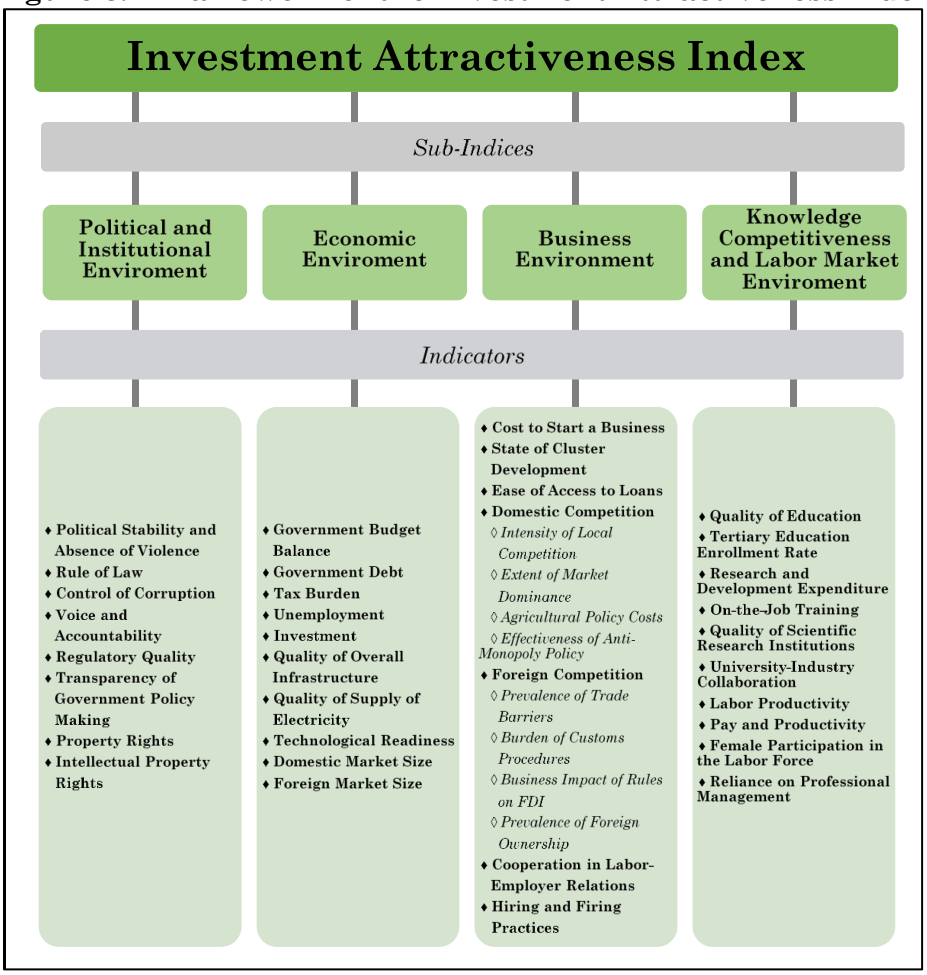
[13] In its 2005 *World Development Report*, the World Bank defines the investment climate as the "factors that shape the opportunities and incentives for firms to invest productively, create jobs, and expand."

> through competitive pressure and the discipline imposed by shareholders and creditors, ensures that all firms strive to improve their efficiency and allows inefficient ones to exit. It should allow enterprises to invest productively and profitably, but it is not just about reducing the cost of doing business and raising corporate profitability. It should also ensure that investment brings about the highest possible economic and social impact" (OECD 2015).

As such, it is extremely difficult to pinpoint a single theoretical definition of an "attractive" investment climate.

The elements that make up the Investment Attractiveness Index developed in Chapter 2 are grouped under four sets of factors, which I refer to as dimensions or sub-indices: (1) Political and Institutional Environment, (2) Economic Environment, (3) Business Environment, and (4) Knowledge, Innovation, and Labor Market Environment. The links between these sub-indices, "which themselves are composed of a number of... [indicators,] are complex, mutually interacting and multi-directional, so that each of the indicators is both a cause of change in others and an outcome of the influences of the latter" (UNCTAD 2005 and 2007). Figure 3.2 presents the conceptual framework of the Investment Attractiveness Index.

Figure 3.2 Framework of the Investment Attractiveness Index



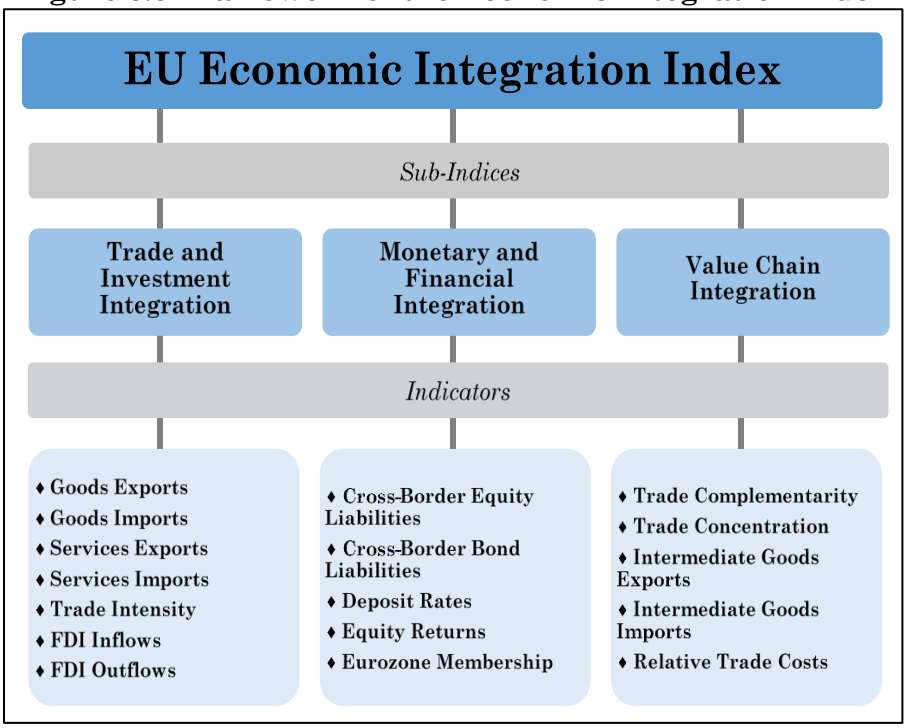
3.3.2 Economic Integration

Deeper economic integration is thought to help expand markets, "maximize the efficiency of resource allocation, and [boost] productivity and investment opportunities, all serving stronger economies" (Huh and Park 2017). Through these channels, greater economic integration can affect economic performance, while producing "important noneconomic benefits through greater security and political stability and sociocultural harmonization" (Huh and Park 2017). This chapter employs the European Economic Integration Index developed in Chapter 2 to test the hypothesis that

greater economic integration has been associated with higher levels of GDP in Europe.

The constituent elements of the European Investment Attractiveness Index developed in Chapter 2 are grouped under three dimensions or sub-indices: (1) Trade and Investment Integration; (2) Monetary and Financial Integration; and (3) Value Chain Integration. The three sub-indices comprise a total of 17 indicators. The links and dynamics between these sub-indices, which are composed of a number of individual indicators, are again highly complex. European economic integration is a multidimensional process, and thus not necessarily easy to quantify with a composite indicator. Nevertheless, the Economic Integration Index distils information captured by many of the macroeconomic variables that affect economic integration in Europe, thereby providing a powerful snapshot of 27 EU economies over a recent 11-year period. Figure 3.3 presents the conceptual framework of the European Economic Integration Index.

Figure 3.3 Framework of the Economic Integration Index



3.4 Simple Data Analysis from Period Averages

Before carrying out the econometric panel estimations in Sections 3.5 and 3.6, this section takes a closer look at the underlying panel data, which might reveal meaningful trends. More precisely, by calculating the period averages of real per capital foreign investment, domestic investment, exports, and government consumption, as well as of inflation and unemployment for each country and relating them to the Investment Attractiveness Index and European Economic Integration Index. I will perform a "trivial" analysis for the entire sample of countries and for Central and Eastern European countries in particular. This analysis might give a preliminary idea about the different relationships between various macroeconomic variables and the scores of the investment attractiveness and economic integration indices across the

countries. The analysis is trivial in the sense that each comparison between an index score and a per capita variable does not control for the effects of other macroeconomic variables.

The analysis in this section looks at period averages, which might reveal some tendencies in these relationships. I will provide a "snapshot" of each country has performed, on average, relative to others. Unlike the econometric analysis of the next section (which may cover longer time periods, starting in the 1970s for some Western European countries), here I calculate the data averages for an 11-year period (2006 to 2016). This is the time span covered by both the Investment Attractiveness Index and the European Economic Integration Index.

3.4.1 Gross Domestic Product

Figure 3.4 illustrates the relationship between average real GDP per capita and average Investment Attractiveness Index scores between 2006 and 2016 across all countries, and separately across those of Central and Eastern Europe. The figure indicates that higher investment attractiveness scores are associated with higher per capita incomes. The relationship is also strong among CEE countries. The slope coefficient from an OLS regression is highly significant and suggests that an increase in the investment attractiveness score by one point would bring in, on average, an extra US$1,016 (3.2%) of income per person when considering all countries together. For CEE as a

group, a similar increase would bring in an additional US$385 (2.6%) of income per person.

When it comes to economic integration, Figure 3.5 seems to indicate that there is no relationship between the scores of the European Economic Integration Index and per capita GDP. However, when I look at the Central and Eastern European countries, there is a strong positive and significant relationship between how economically integrated a country is within Europe and its per capita GDP. The slope coefficient from an OLS regression is highly significant and suggests that an increase in the economic integration score by one point would bring in, on average, an extra US$504 (3.4%) of income per person in Central and Eastern European countries.

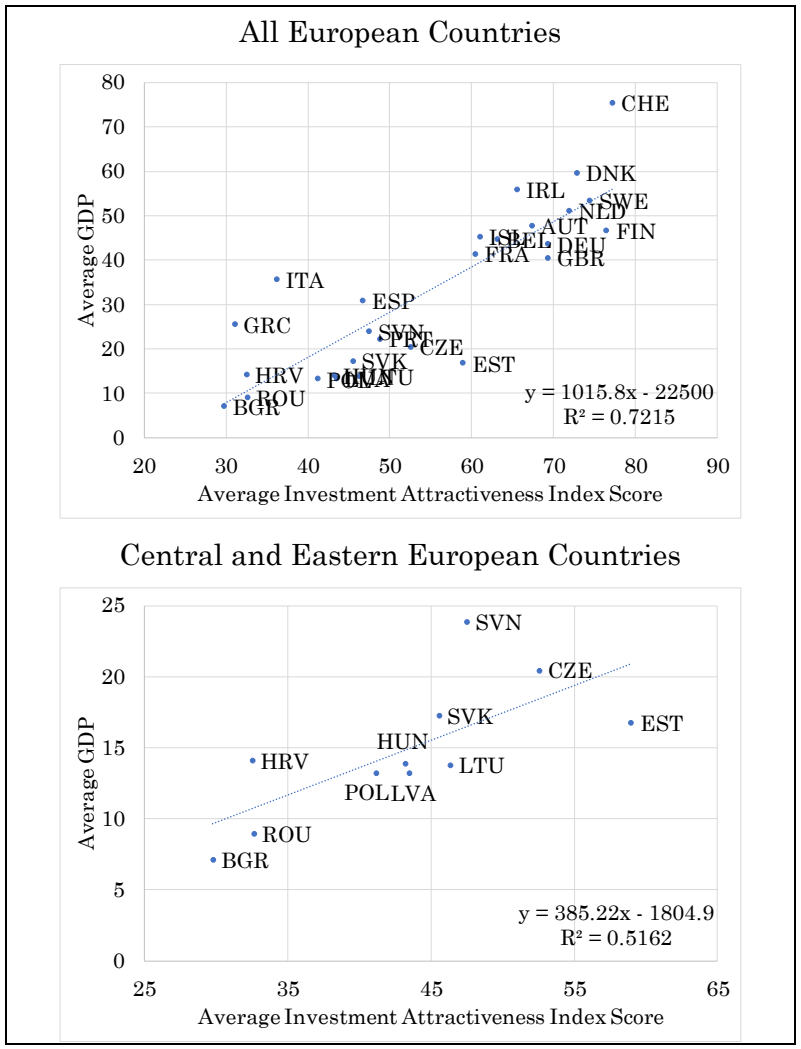
3.4.2 Investment

Figures 3.6 and 3.8 show that there is a strong and positive relationship between real per capita inward FDI stock, domestic investment, and investment attractiveness for all countries, but particularly for those of Central and Eastern Europe. The figures indicate that higher investment attractiveness scores are associated with higher per capita investment. The relationship is even stronger among the Central and Eastern European economies. The slope coefficients from OLS regressions are highly significant and suggest that an increase in the investment attractiveness score by one point would bring in, on average, an extra US$2,249 (3.3%) of inward FDI stock

per person and an extra US$209 (4.0%) in domestic investment per person when considering all countries together.

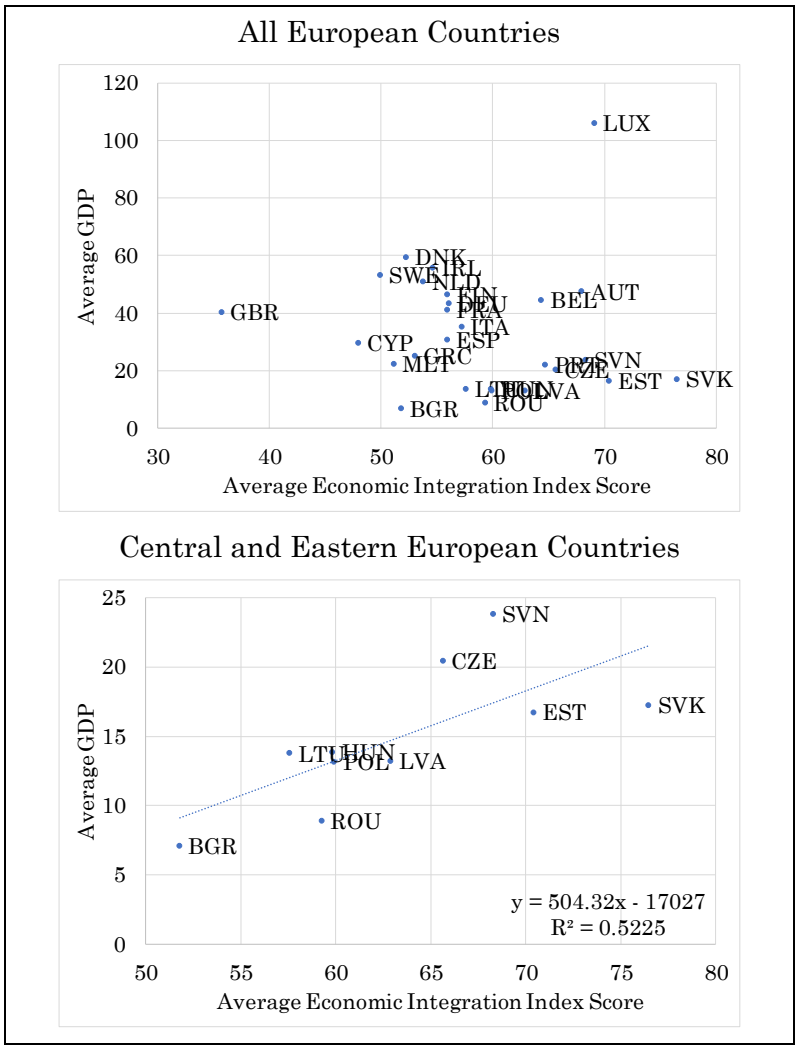
The level of economic integration does not seem to be correlated with foreign or domestic investment (Figure 3.7 and 3.9), at least when looking at all the countries together. However, for Central and Eastern European countries, this relationship is positive and statistically significant. The slope coefficients from OLS regressions are highly significant and suggest that a one-point increase in the economic integration score could bring in, on average, an extra US$351 (3.9%) of domestic investment and US$132 (4.2%) of foreign investment per person in Central and Eastern European countries.

Figure 3.4 GDP and the Investment Climate
(2006-2016, per capita, in thousands of constant 2010 US$)



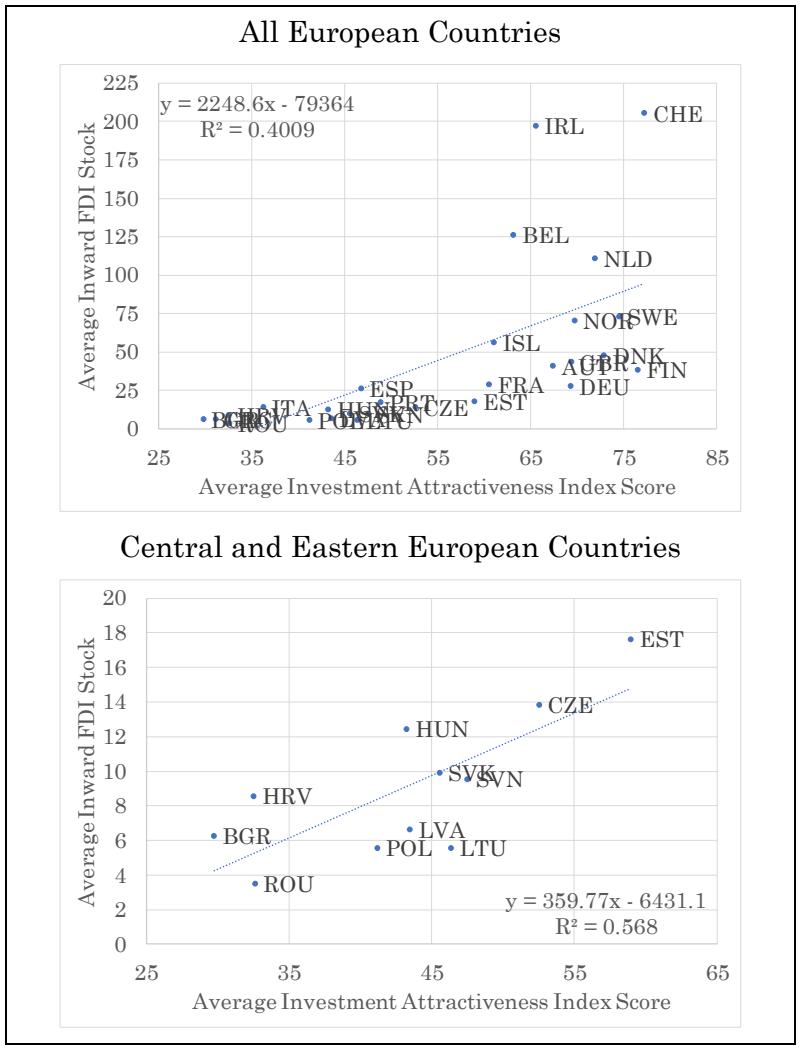
Source: Author's own calculations.

Figure 3.5 GDP and Economic Integration
(2006-2016, per capita, in thousands of constant 2010 US$)



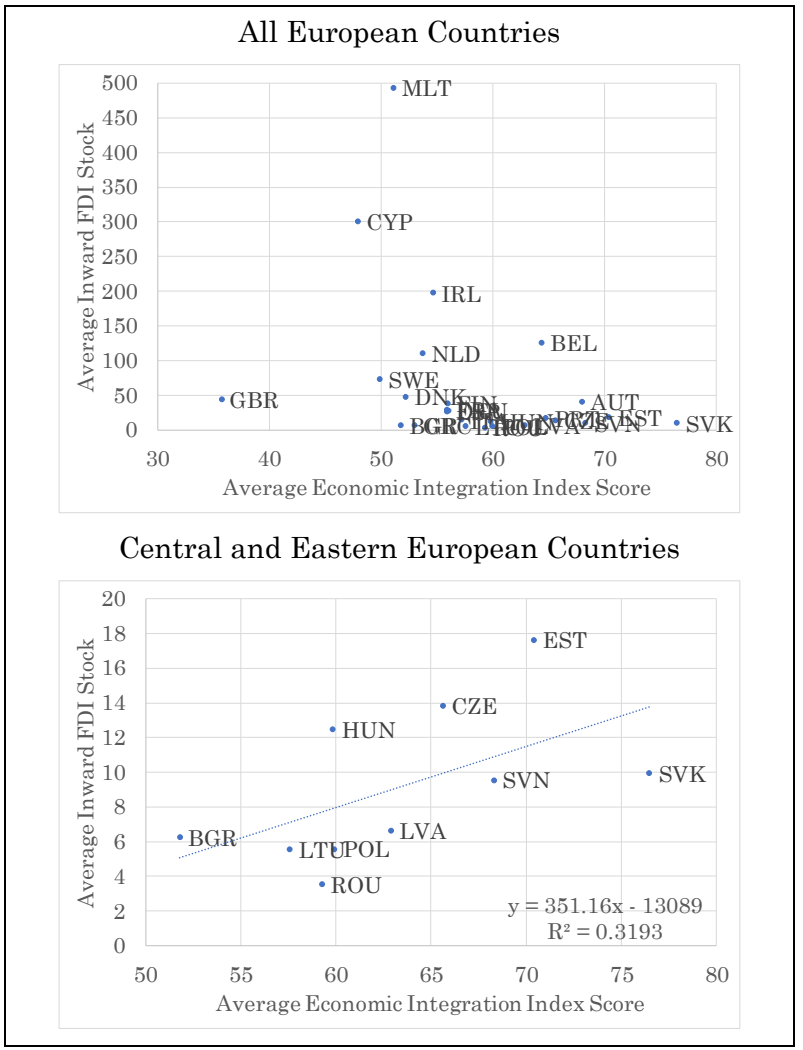
Source: Author's own calculations.

Figure 3.6 FDI and the Investment Climate
(2006-2016, per capita, in thousands of constant 2010 US$)



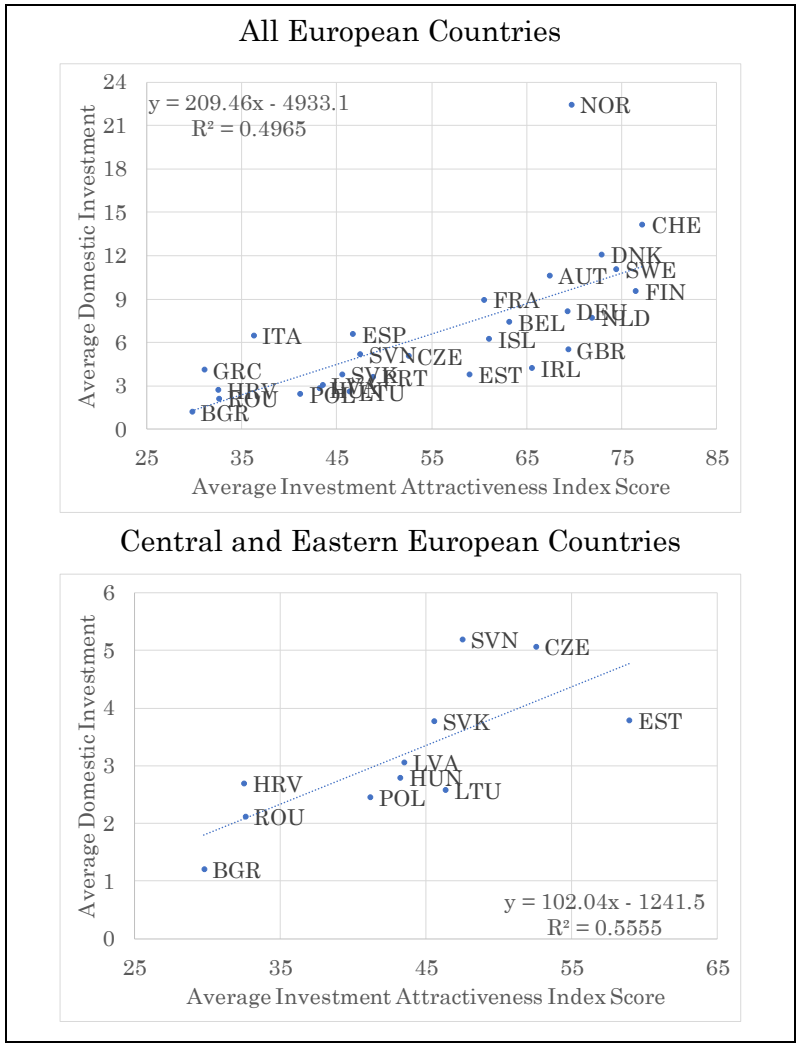
Source: Author's own calculations.

Figure 3.7 FDI and Economic Integration
(2006-2016, per capita, in thousands of constant 2010 US$)



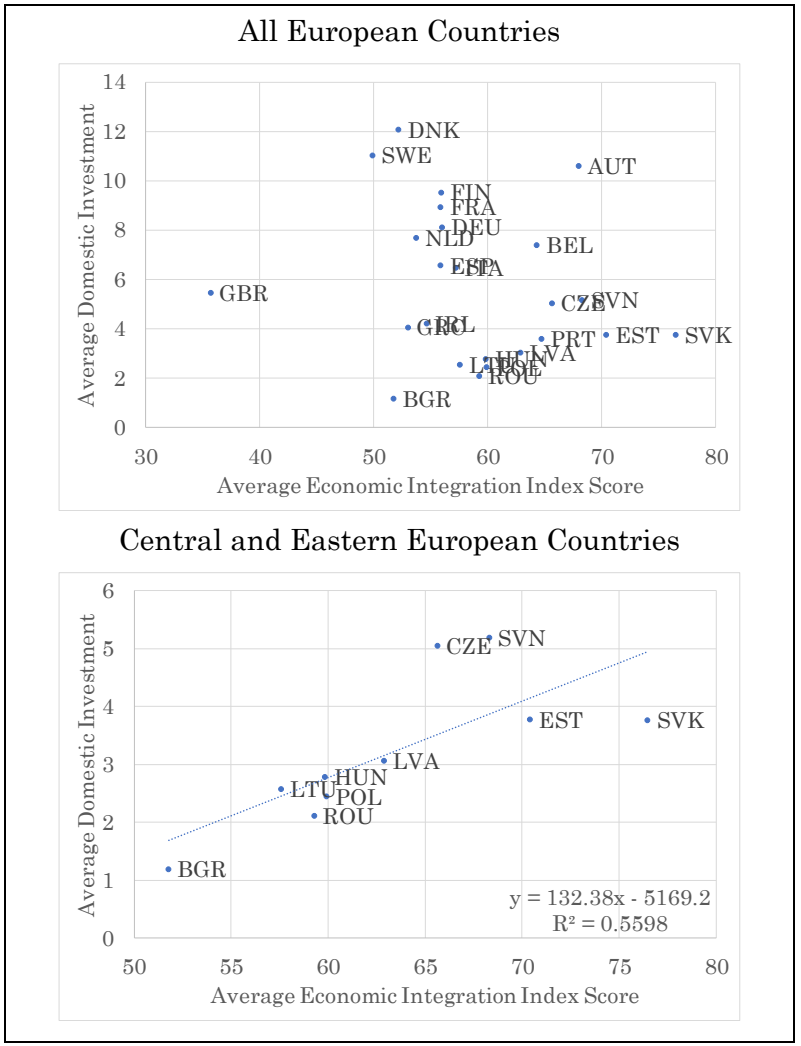
Source: Author's own calculations.

Figure 3.8 Domestic Investment and the Investment Climate (2006-2016, per capita, in thousands of constant 2010 US$)



Source: Author's own calculations.

Figure 3.9 Domestic Investment and Economic Integration (2006-2016, per capita, in thousands of constant 2010 US$)



Source: Author's own calculations.

3.4.3 Exports

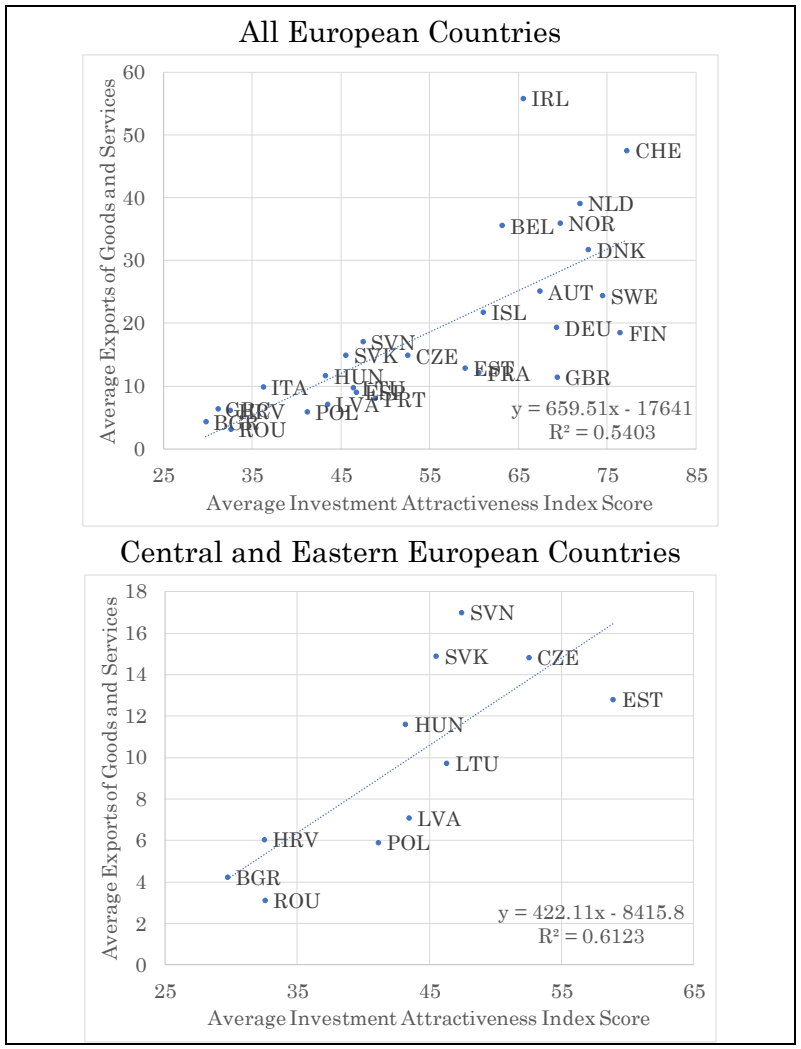
The cross-section data reveals a strong and positive relationship between exports and the investment climate (Figure 3.10). The OLS regressions indicate that a one-point increase in the investment attractiveness score could generate, on average, US$660 (3.5%) of exports per person for all countries in the sample, and US$422 (4.3%) for those in Central and Eastern Europe. When it comes to the level of economic integration, its relationship with exports is only significant for CEE countries (Figure 3.11). The OLS regression suggests that a one-point increase in the economic integration score could generate, on average, an additional US$512 (5.3%) in exports per person in these countries.

3.4.4 Government Consumption

The data show a clear positive relationship between investment attractiveness scores and government consumption (Figure 3.12). This may suggest that countries with better investment climates are better positioned to spend resources on their populations than those with attractive climates. The slope coefficient from an OLS regression is highly significant and suggests that a one-point increase in the investment attractiveness score could generate, on average, an extra US$253 (3.5%) of government spending per person when considering all countries together. For Central and Eastern Europe as a group, such an increase could generate, on average, an additional US$81 (2.9%) of government spending per person.

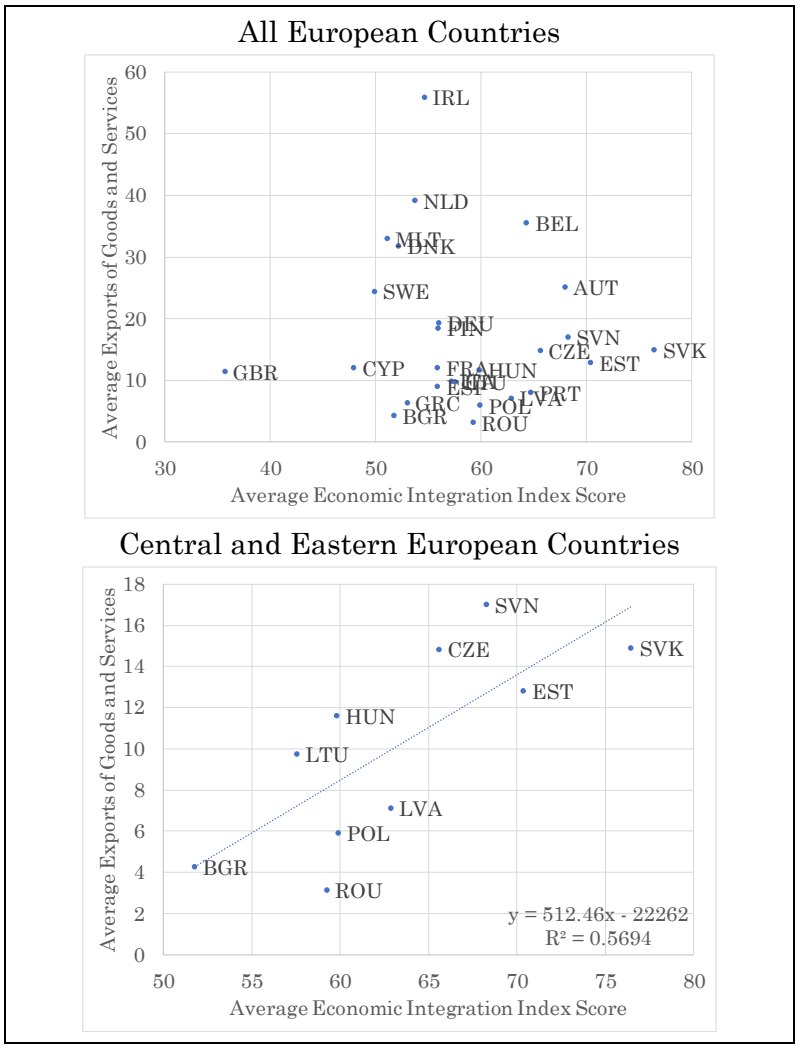
When looking at all the countries in the sample together, the data does not show a clear relationship between the level of economic integration and per capital government spending (Figure 13). However, the slope coefficient from the OLS regression for this group is highly significant and suggests that a one-point increase in the economic integration score could generate, on average, an extra US$105 (3.8%) of government spending per person.

Figure 3.10 Exports and the Investment Climate
(2006-2016, per capita, in thousands of constant 2010 US$)



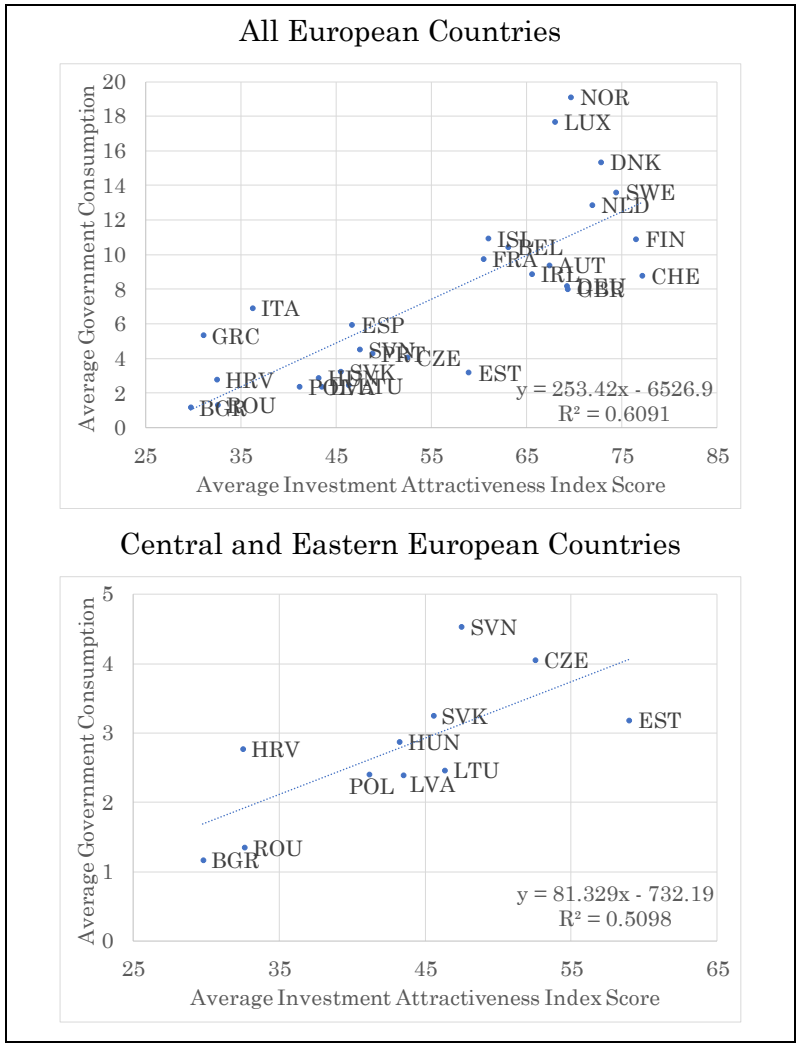
Source: Author's own calculations.

Figure 3.11 Exports and Economic Integration
(2006-2016, per capita, in thousands of constant 2010 US$)



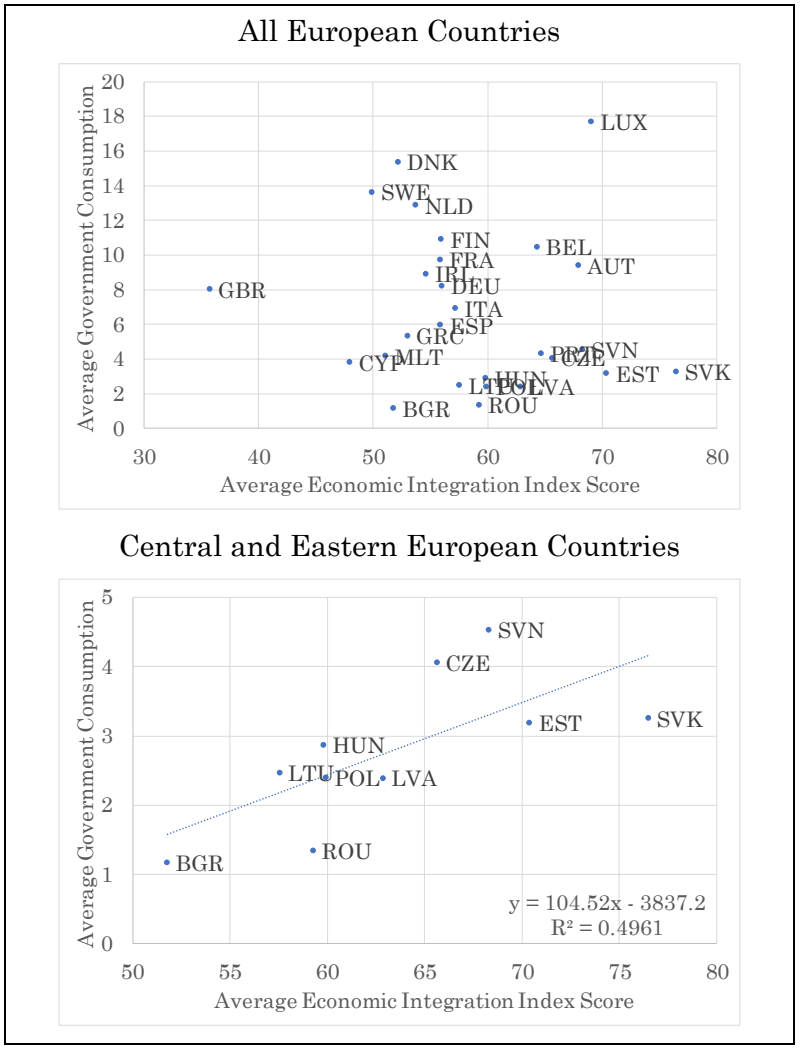
Source: Author's own calculations.

Figure 3.12 Government Size and the Investment Climate (2006-2016, per capita, in thousands of constant 2010 US$)



Source: Author's own calculations.

Figure 3.13 Government Size and Economic Integration (2006-2016, per capita, in thousands of constant 2010 US$)



Source: Author's own calculations.

3.4.5 Inflation

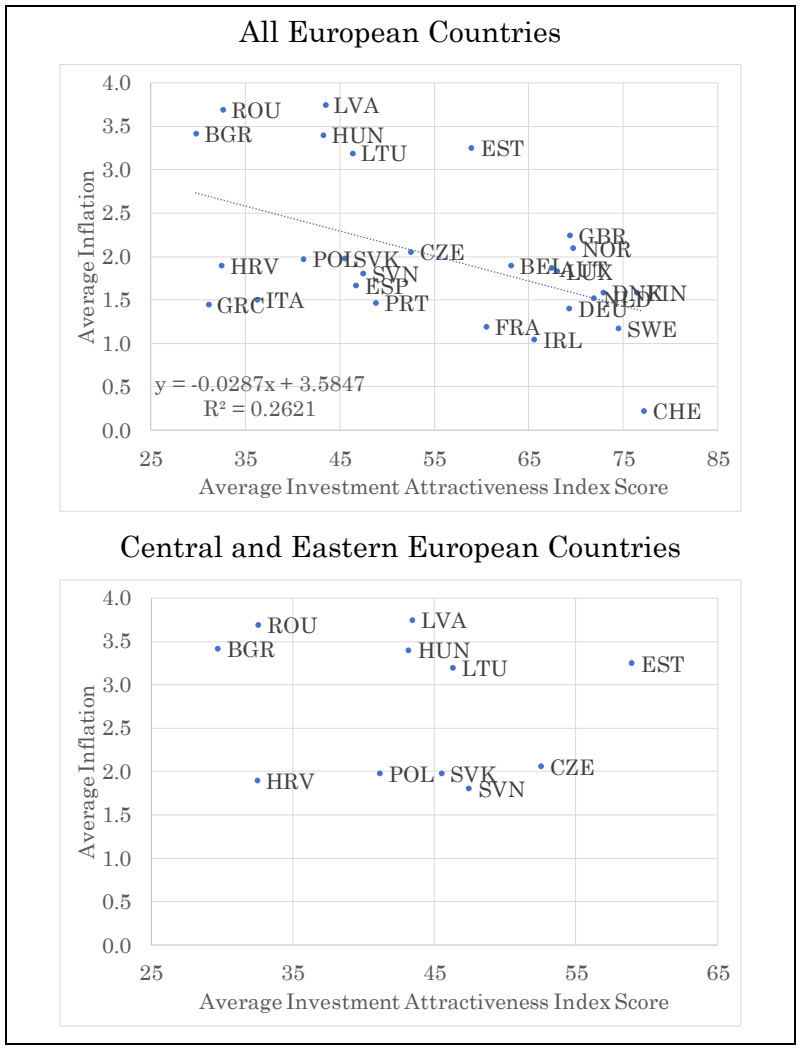
Figure 3.14 shows that higher investment attractiveness scores are associated with lower inflation rates. However, this relation is significant but not strong and only applies when looking at the group as a whole. The relationship does not seem to exist among countries in Central and Eastern Europe. The OLS regression for all the countries in the sample indicates that a one-point increase in the investment attractiveness score could lower inflation, on average, by 0.03 percentage point. When it comes to the level of economic integration, relationship between economic integration and inflation is only significant for Central and Eastern European countries (Figure 3.15). The OLS regression suggests that a one-point increase in the economic integration score could lower inflation, on average, by 0.06 percentage point in these countries.

3.4.6 Unemployment

Figure 3.16 and 3.17 show the relationship between average inflation and average scores of the Investment Attractiveness and Economic Integration Indices across all countries, as well as in Central and Eastern European countries specifically. The figure indicates that for the group as a whole, higher investment attractiveness scores are associated with lower unemployment. Nevertheless, there does not seem to be a relationship between economic integration scores and unemployment. Among CEE countries, there is no relationship between the indices and unemployment. The slope coefficient from

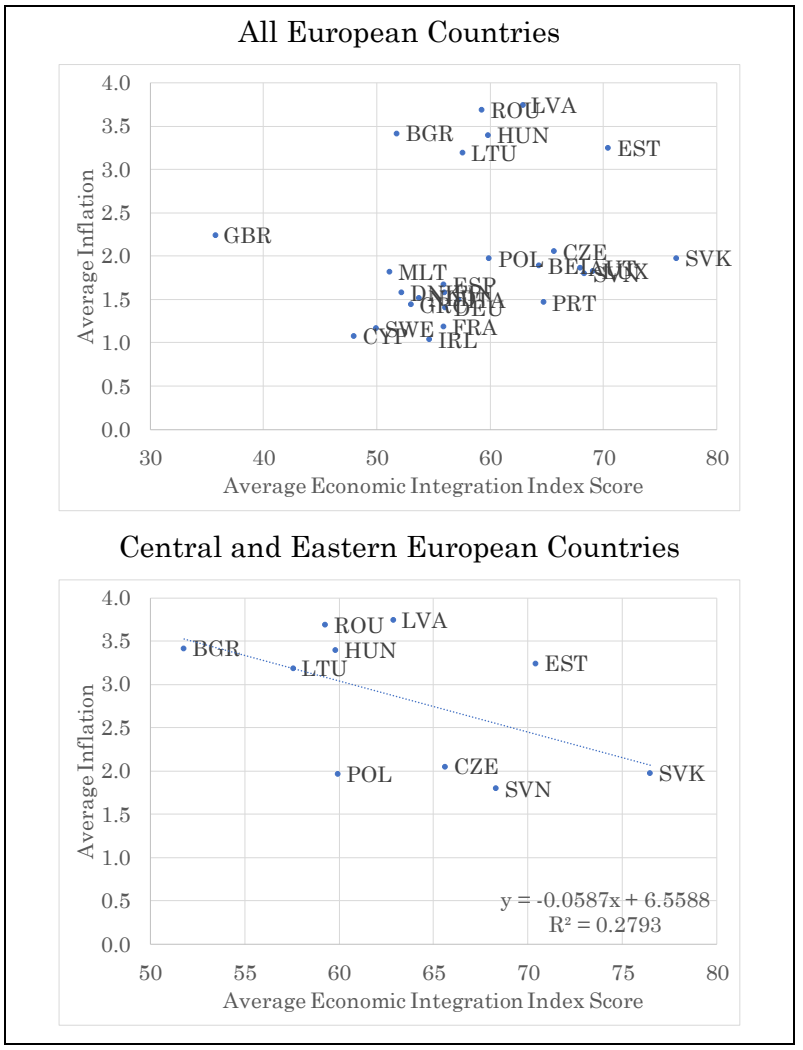
an OLS regression for the entire group is highly significant and suggests that an increase in the investment attractiveness score by one point would bring unemployment down, on average, by 0.14 percentage point.

Figure 3.14 Inflation and the Investment Climate
(2006-2016, percent)



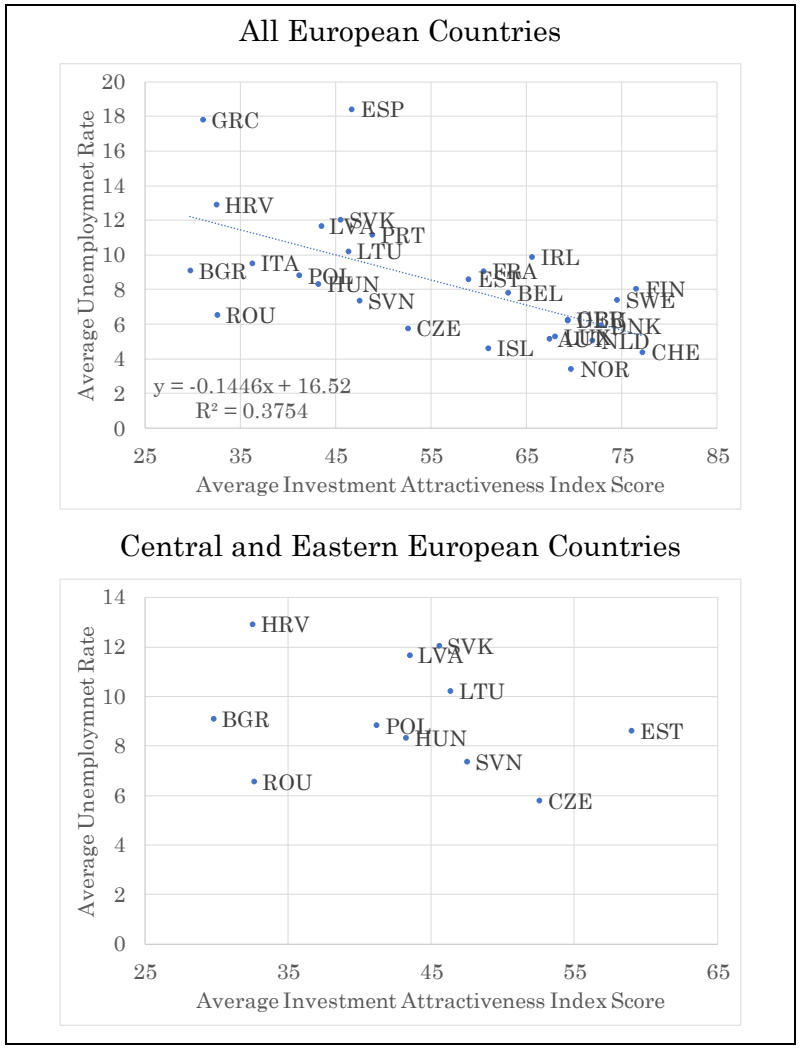
Source: Author's own calculations.

Figure 3.15 Inflation and Economic Integration
(2006-2016, percent)



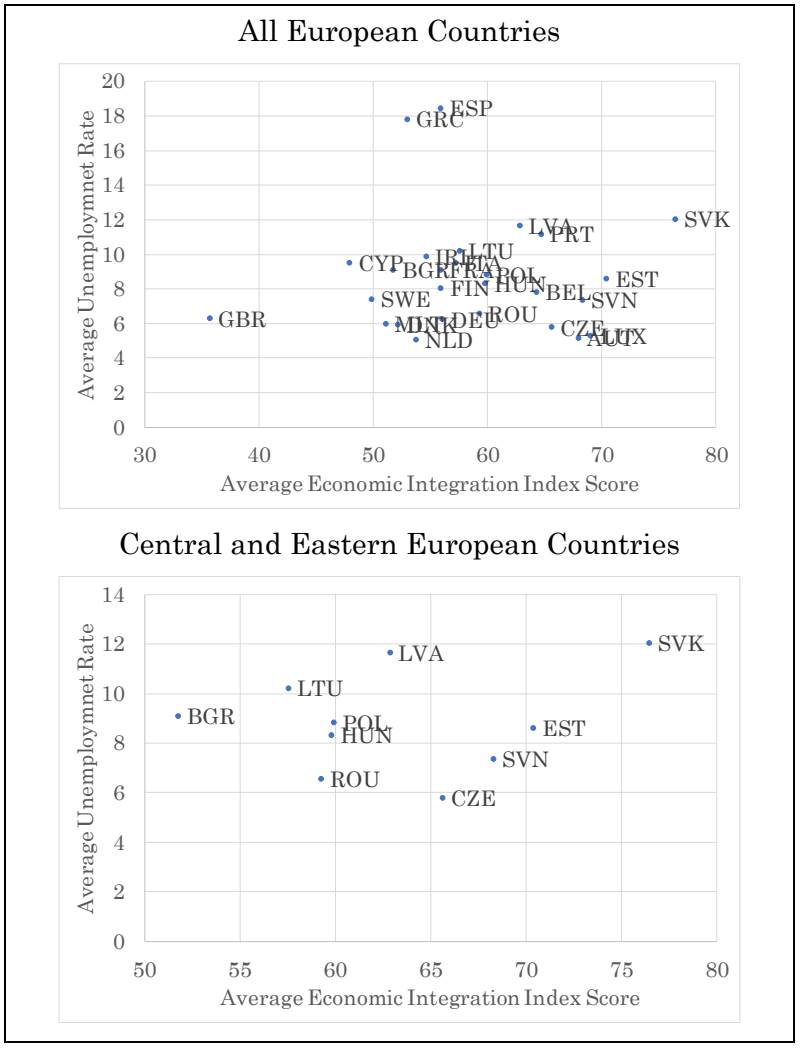
Source: Author's own calculations.

Figure 3.16 Unemployment and the Investment Climate (2006-2016, percent)



Source: Author's own calculations.

Figure 3.17 Unemployment and Economic Integration (2006-2016, percent)



Source: Author's own calculations.

3.5 Basic Panel Data Analysis

3.5.1 Theoretical Framework

In this section, I will test the hypothesis that economic growth in Europe—but especially in Central and Eastern Europe—has been stimulated by the economic liberalization of foreign investment and trade of the 1990s and early 2000s. However, we should not assume that this effect has occurred directly. As Vasquez Galan (2006) note, "[i]t is possible that... [foreign investment] has [had] a positive impact on output growth [through] its spillover effects on the economy. Equally, exports are expected to improve growth by exploiting comparative advantages and labor productivity." As such, it is not always feasible to isolate the specific effects of foreign investment and exports on economic growth, as they are interconnected.

To generate an equation linking economic performance and foreign investment, the study takes the standard production function F, with foreign investment incorporated as a factor of production, during time t. Using standard notation, this basic augmented production function can be written as follows:

$$Y = F(L, DI, FDI, IAI, EII, X) \tag{3.1}$$

where Y is GDP in real terms, L is labor input, DI is the domestically owned capital stock, FDI is stock of foreign-owned capital, IAI is the Investment Attractiveness Index score, and EEI is the European Economic Integration

Index score. The rationale for including FDI into the production function is similar to that of including exports, as foreign investment is likely "to result in a higher rate of technological innovation and dynamic learning from abroad" (Balasubramanyam et al 1996). Decomposing capital into domestic and foreign owned allows the researcher to isolate the effects of foreign capital from that of domestic capital.

I expect DI, FDI, IAI, and EEI to have a positive impact on economic growth. Therefore, I posit that:

$$\frac{\partial Y}{\partial DI} > 0, \frac{\partial Y}{\partial FDI} > 0, \frac{\partial Y}{\partial IAI} > 0, \text{ and } \frac{\partial Y}{\partial EEI} > 0$$

Assuming that (1) follows a log-linear form, taking logs and first difference generates the following modified production function, which describes the determinants of the growth rate of GDP:

$$y = \alpha l + \beta di + \varphi fdi + \lambda iai + \varpi eii \qquad (3.2)$$

where the lower case letters l, di, fdi, ic, and eu denote the growth rate of the individual variables and the parameters α, β, φ, λ, and ϖ are the output elasticities of labor, domestic investment, foreign investment, investment attractiveness, and economic integration. This equation will inform the econometric framework discussed below.

3.5.2 Testable Hypothesis

Based on the theoretical framework presented above, I will test the hypothesis that foreign investment has a positive effect on GDP. Specifically,

the null hypothesis is that foreign investment does not have a significant and positive impact on economic growth, while the alternative hypothesis is that foreign investment has a positive and significant impact. The exact mechanism through which foreign investment affects growth will not be examined here, primarily due to data limitations.

In addition, the study will also test the hypothesis that foreign investment affects economic performance in Central and Eastern European countries differently than in Western European countries. Because of the lack of available, reliable, and disaggregated data for most transition economies in Europe, the present study will not attempt to replicate the sort of analyses that some authors have employed to assess the relationship between policies, institutions, foreign investment, and economic growth in many Asian, African, and Latin American countries. Instead, countries will be categorized into two subgroups: 20 Western European countries, which includes Malta and Cyprus (EUROPE-20) and 11 Central and Eastern European countries (CEE-11). Thus, the study will also test the hypothesis that foreign investment has a larger effect on economic growth in Central and Eastern European countries than on the growth of Western European countries.

3.5.3 Data

To carry out an empirical investigation of how foreign investment impacts economic output in Europe, various measures of economic performance and conditions are required. Data on foreign investment and

other macroeconomic indicators, institutional quality, economic integration, and others are necessary to do the analysis, and I used a number of data sources to build the panel dataset.

This section of the study focuses on the period from 1970 to 2017 for most countries—except when analyzing the effects of investment attractiveness and economic integration, for which the period of analysis is from 2006 to 2016. This most recent period is selected because much of data used to calculate the indices for the investment climate and economic integration, particularly for Central and Eastern European countries, are not available prior to 2006. In addition, as of the end of 2019, data on foreign investment for many countries is only available through 2017. While there some observations for 2018 for Western European countries, this is not the case for many countries in Central and Eastern Europe. Therefore, observations beyond 2017 will not be included in the analysis.

Investment is the main explanatory variable of interest in this study. All the variables used here are measured in constant 2010 US dollars, and expressed in logs. Macdougald (2011) succinctly describes the implications of data limitations for the study:

> "The robustness of any empirical analysis depends on the quality of the data available and this study is no exception. All data sources utilized in this investigation contain aggregated country level data. As this study investigates aggregate country-level phenomena, data that has been combined for each country and year is appropriate. There is undoubtedly measurement error in these data but, as these are the primary

sources for cross-country panel studies in the economic literature, we rely on the assumption that the errors are random and not systemic and therefore do not introduce bias into the samples" (Macdougald 2011).

I relied on four primary sources for data. They include the United Nations' UNCTADstat, World Bank's World Development Indicators (WDI), Organisation for Economic Co-operation and Development (OECD), and European Commission (Eurostat). The panel, built from these data sources, covers 29 to 31 countries in Europe. Descriptive statistics of the full sample is provided in Table 3.1.

Table 3.1 Summary Statistics

Variable	*Mean*	*Std. Dev.*	*Min*	*Max*
rGDP	11.31	0.69	9.91	12.58
rFDI	11.32	0.70	10.00	12.49
rDI	10.65	0.67	9.03	11.86
$rEXP_{goods\ and\ services}$	11.03	0.61	9.62	12.24
$rEXP_{goods}$	10.85	0.70	9.09	12.16
$rEXP_{services}$	10.50	0.56	9.23	11.56
rGOVT	10.60	0.71	9.18	11.87
INFL	0.88	0.20	0.35	1.44
IAI	3.97	0.30	3.22	4.39
EEI	4.06	0.16	3.49	4.40

Source: Author's own calculations.

The use of panel data has a number of advantages that cross-sectional or time-series data do not offer. First, even though cross-sectional regression analyses have "the advantage of focusing on the long-run trends of economic growth, panel data" can remedy some of the problems associated with heterogeneity in the micro units by allowing the researcher to "control for omitted variables that are persistent over time" (Ding and Knight 2008). Second, panel data gives "more informative data, more variability, less

collinearity among the variables, more degrees of freedom and more efficiency" (Baltagi 2008). Third, it allows the researcher to carry out a better analysis of the dynamics of adjustment. Finally, panel data allows us to "alleviate measurement error and endogeneity biases by using lags of the regressors as instruments" if necessary (Temple 1999: 129).

The dependent variable here is real GDP, while the key independent variables are real FDI stock and real domestic investment. We use real values for all variables in order to account for inflation, as panel dataset covers a period of 11 to 58 years. The analysis will include the following control variables: exports, government expenditures, and inflation. The control variables discussed here have been identified in the literature as being determinants of economic growth, and they are therefore included in the regressions.

3.5.4 Econometric Framework

This section describes the econometric model that will be used to examine the relationship between foreign investment and GDP. The basic ordinary least squares (OLS) regression with fixed effects can be specified as:

$$rGDP_{i,t} = ß_0 + ß1rFDIi_{,t} + ß_2rDI_{i,t} + \eta_i + \varepsilon_{i,t} \qquad (3.3)$$

where the dependent variable, *rGDP*, is real GDP, *rFDI* is the log of real inward FDI stock, *rDI* is the log of real domestic investment, η is a country specific effect, and ε is the error term. The subscripts i and t refer to country

and time respectively. Because "there is an unobservable fixed effect which captures country-specific heterogeneity," employing the fixed effects method reduces omitted variable bias and controls for the effects of time-invariant characteristics across the countries in this sample (Abaid 2013).

In order to account for political, economic, and other differences across the countries considered here, the study controls for a number of other growth determinants: real exports (*rEXP*), real government expenditures (*rGOVT*), inflation (*INFL*), investment climate (*IAI*), and economic integration (*EEI*). Similar to Carkovic and Levine (2002)'s study, I use "time dummies to account for period-specific effects, though these are omitted from the equations" and tables (Carkovic and Levine 2002). We can rewrite equation (3) as:

$$rGDP_{i,t} = \beta_0 + \beta_{1r}FDI_{i,t} + \beta_{2r}DI_{i,t} + \beta_{3r}EXP_{i,t} + \beta_{4r}GOVT_{i,t} + \beta_5 INFL_{i,t} + \beta_6 IAI_{i,t} + \beta_7 EEI_{i,t} + \eta_i + \varepsilon_{i,t} \quad (3.4)$$

I expect FDI to have a positive and significant impact on economic growth. Thus, the coefficient of interest is β_1. If β_1 is significantly greater than zero, then I can conclude that foreign investment does indeed contribute positively to economic growth in the countries in this sample. I am also interested in determining if FDI affects economic performance differently in Central and Eastern European economies.

3.5.5 Empirical Estimation and Results

The following section first presents the results of the tests that check for the stationarity of the variables and potential multicollinearity issues. Sections 3.5.6 discusses the regression results.

Stationarity Check

Before proceeding with the empirical analysis, I check the variables in the dataset for stationary to ensure that the regressions are not spurious. Similar to Li and Liu (2005), this analysis employs the Levin-Lin-Chu test, and it uses the Akaike Information Criteria (AIC) for choosing the number of lags in the augmented Dickey–Fuller (ADF) regression for the unit root test. The results are presented in Table 3.2. The p-values show that all the variables are stationary, which allows us to go forward with the regression analysis without any transformation and ensures that the regression results are reliable and not spurious.

Table 3.2 Levin-Lin-Chu Unit Root Test

Variable	*t-statistic (adjusted)*	*p-value*
rGDP	-3.6761	0.0001***
rFDI	-7.4800	0.0000***
rDI	-7.3515	0.0000***
$rEXP_{goods\ and\ services}$	-7.0605	0.0000***
$rEXP_{goods}$	-3.6483	0.0001***
$rEXP_{services}$	-24.0617	0.0090***
rGOVT	-2.4331	0.0075***
INFL	-9.3633	0.0000***
IAI	-8.1814	0.0000***
EEI	-6.9470	0.0000***
H_0: Panels contain unit roots	Number of panels: 31	
H_a: Panels are stationary		

Source: Author's own calculations using STATA 15.
Note: The "panel Levin-Lin-Chu unit root test with a null hypothesis that the variable in question contains a unit root is performed on all key variables" above (Klassen 2016). Lag length is chosen automatically according to the Akaike Information Criterion (AIC). Statistical significance at the 1 percent levels is denoted by "***".

Tests for Autocorrelation and Heteroskedasticity

The estimated model outlined here should satisfy the following conditions: (1) no autocorrelation, (2) no heteroskedasticity, (3) no multicollinearity, (4) no correlation between the error terms and the key independent and control variables, and (5) error terms have a mean of zero. Employing a fixed effects model addresses potential violations to conditions (4) and (5). In addition, as described above, there are no multicollinearity concerns that would prevent us from carrying out the regression analyses proposed here. This subsection will test the first two assumption: no autocorrelation and no heteroskedasticity.

To test for autocorrelation, I use the Wooldridge test. The null hypothesis is that there is no first order serial correlation. Here, the test yields a p-value of 0.0000, which indicates that the panel data contains serial correlation and that we can thus reject the null hypothesis (Table 3.3).

Table 3.3 Wooldridge Test

H_0: no first-order autocorrelation		
Test Summary	F-statistic	p-value
	105.774	0.0000***

Note: Statistical significance at the 1 percent level is denoted by "***".

I also perform a modified Wald test for "groupwise heteroskedasticity" in a fixed effects regression model. It tests the null hypothesis of homoscedasticity. The test yields a p-value of 0.000, which leads us to reject the null hypothesis and indicates the presence of heteroskedasticity (Table 3.4).

Table 3.4 Modified Wald Test for Groupwise Heteroskedasticity

H_0: homoscedasticity		
Test Summary	χ2-statistic	p-value
	4011.78	0.0000***

Note: Statistical significance at the 1 percent level is denoted by "***".

Therefore, in order to carry out the regression analyses and overcome these issues, this study will use Hoechle (2007)'s method, which corrects for both autocorrelation and heteroskedasticity in panel data by running fixed effects regressions with Driscoll and Kraay (1998) standard errors. The assumption with this approach is that the error structure is heteroscedastic, autocorrelated, and possibly correlated between the panels (Hoechle 2007: 6).

3.5.6 Discussion

To examine thoroughly the links between foreign and domestic investment, economic integration, and economic performance in Europe, several different specifications have been estimated to ensure the overall robustness of the findings. The results of the regression analyses using fixed effect (FE) are presented in Table 3.5, while the results from the ordinary least squares (OLS) and random effect (RE) methods are presented in Appendix B. The following discussion focuses only on the results derived from the FE estimations with Driscoll and Kraay standard errors.

Table 3.5 shows that the exogenous components of foreign and domestic investment exert a reliable and positive impact on economic growth in all twelve specifications tested. β_1 ranges from 0.033 to 0.180, while β_2 ranges from 0.027 to 0.126. The results reveal that foreign (and domestic) investment and

economic output are positively linked when I control for exports, government consumption, inflation, the investment climate, and economic integration. The link is also statistically significant. Inflation has a negative and statistically significant coefficient, which indicates that higher rates are associated with lower levels of GDP across the sample.

Particularly surprising, when exports of goods and services are included in the regression—both together and separately, the size of the coefficients of foreign and domestic investment, while remaining positive and significant, are much smaller than in the benchmark regression (FE1). These results indicate that for European countries in general, exports have a greater impact on GDP than foreign and domestic investment. Also noteworthy is that both the scores of the Investment Attractiveness Index and European Economic Integration Index enter the regressions significantly. When both are included, the size of the investment attractiveness (IAI) coefficient is almost twice as large as that of the coefficient of economic integration (EEI).

The results in Table 3.5 suggest that the investment climate matters for economic growth in Europe. A 10 percent increase in the investment attractiveness score could increase GDP, on average, by 0.5 to 1.2 percent. Economic integration also seems to affect economic growth positively. In three out of the five regressions in which I include the economic integration score, I found that its coefficient is positive and statistically significant. A 10 percent

increase in the economic integration score has the potential to increase GDP, on average, by 1.0 to 1.2 percent.

Table 3.5 Gross Domestic Product and Foreign Direct Investment: Fixed Effects (All)
Dependent Variable: Real GDP (1970-2016)

	(FE1)	(FE2)	(FE3)	(FE4)	(FE5)	(FE6)	(FE7)	(FE8)	(FE9)	(FE10)	(FE11)	(FE12)
rFDI	0.171***	0.072***	0.074***	0.049***	0.171***	0.164***	0.091**	0.193***	0.127***	0.073***	0.029	0.088***
	0.008	0.011	0.011	0.010	0.008	0.024	0.037	0.027	0.016	0.014	0.016	0.018
rDI	0.158***	0.094***	0.108***	0.077***	0.098***	0.096***	0.088***	0.094***	0.086***	0.037***	0.022**	0.039***
	0.033	0.018	0.020	0.021	0.017	0.018	0.016	0.018	0.016	0.010	0.007	0.011
$rEXP_{goods\ and\ services}$		0.308***							0.147***	0.189***	0.222***	0.181***
		0.020							0.014	0.008	0.009	0.012
$rEXP_{goods}$			0.194***									
			0.022									
$rEXP_{services}$			0.105***									
			0.021									
rGOVT				0.647***						0.319***	0.348***	0.306***
				0.042						0.022	0.023	0.024
INFL					-0.113***					-0.075***	-0.089***	-0.070***
					0.013					0.005	0.006	0.008
IAI						0.109***		0.113***	0.117***	0.046***		0.045***
						0.017		0.019	0.021	0.009		0.009
EEI							0.123***	0.123***	0.095***		-0.014	0.015
							0.030	0.028	0.015		0.009	0.010
Constant	7.805***	6.191***	6.217***	3.107***	8.501***	8.095***	8.948***	7.317***	6.594***	4.558***	4.791***	4.554***
	0.328	0.211	0.206	0.356	0.177	0.346	0.663	0.453	0.306	0.245	0.160	0.201
Observations	900	836	836	900	746	306	271	263	263	306	271	263
Countries	31	31	31	31	31	29	26	25	25	29	26	25
R^2	0.812	0.910	0.900	0.920	0.827	0.581	0.403	0.671	0.752	0.891	0.851	0.897

Note: Driscoll-Kraay standard errors in parentheses, * p<0.10, ** p<0.05, *** p<0.01.

Table 3.6 Gross Domestic Product and Foreign Direct Investment: Fixed Effects (EUROPE-20)
Dependent Variable: Real GDP (1970-2016)

	(FE1)	(FE2)	(FE3)	(FE4)	(FE5)	(FE6)	(FE7)	(FE8)	(FE9)	(FE10)	(FE11)	(FE12)
rFDI	0.180***	0.087***	0.092***	0.033***	0.173***	0.140***	0.065*	0.171***	0.142***	0.075***	0.026	0.099***
	0.005	0.009	0.009	0.010	0.012	0.020	0.030	0.023	0.019	0.017	0.017	0.020
rDI	0.126***	0.074***	0.078***	0.046*	0.069***	0.080***	0.070***	0.076***	0.074***	0.027**	0.012	0.031**
	0.040	0.024	0.023	0.024	0.018	0.022	0.019	0.022	0.022	0.012	0.007	0.014
$rEXP_{goods\ and\ services}$		0.289***							0.106***	0.203***	0.252***	0.188***
		0.029							0.022	0.018	0.031	0.019
$rEXP_{goods}$			0.120***									
			0.037									
$rEXP_{services}$			0.141***									
			0.022									
rGOVT				0.699***						0.337***	0.373***	0.313***
				0.039						0.033	0.019	0.033
INFL					-0.119***					-0.078***	-0.096***	-0.071***
					0.016					0.006	0.010	0.006
IAI						0.134***		0.143***	0.148***	0.070***		0.067***
						0.029		0.031	0.027	0.018		0.016
EEI							0.081**	0.084**	0.087***		-0.004	0.031***
							0.033	0.030	0.023		0.019	0.009
Constant	8.201***	6.588***	6.904***	3.114***	8.973***	8.667***	9.906***	8.061***	7.181***	4.297***	4.420***	4.336***
	0.446	0.352	0.358	0.381	0.271	0.346	0.509	0.456	0.251	0.580	0.486	0.519
Observations	631	567	567	631	479	185	161	153	153	185	161	153
Countries	20	20	20	20	20	18	16	15	15	18	16	15
R^2	0.812	0.906	0.905	0.935	0.806	0.603	0.349	0.704	0.736	0.884	0.804	0.895

Note: Driscoll-Kraay standard errors in parentheses, * p<0.10, ** p<0.05, *** p<0.01.

Table 3.7 Gross Domestic Product and Foreign Direct Investment: Fixed Effects (CEE-11)
Dependent Variable: Real GDP (1970-2016)

	(FE1)	(FE2)	(FE3)	(FE4)	(FE5)	(FE6)	(FE7)	(FE8)	(FE9)	(FE10)	(FE11)	(FE12)
rFDI	0.139***	0.044**	0.041**	0.066***	0.154***	0.227***	0.245***	0.225***	0.081**	0.041**	0.048**	0.044**
	0.024	0.018	0.018	0.020	0.021	0.056	0.057	0.048	0.033	0.016	0.017	0.019
rDI	0.271***	0.163***	0.178***	0.154***	0.209***	0.125***	0.138***	0.125***	0.109***	0.058***	0.056***	0.057***
	0.048	0.020	0.020	0.029	0.043	0.015	0.017	0.016	0.009	0.013	0.014	0.012
$rEXP_{goods\ and\ services}$		0.311***							0.184***	0.195***	0.196***	0.195***
		0.031							0.020	0.011	0.014	0.013
$rEXP_{goods}$			0.267***									
			0.025									
$rEXP_{services}$			0.033									
			0.022									
rGOVT				0.586***						0.317***	0.337***	0.318***
				0.087						0.017	0.020	0.023
INFL					-0.067					-0.065***	-0.070***	-0.062***
					0.041					0.005	0.006	0.007
IAI						0.081***		0.093***	0.097***	0.033***		0.032**
						0.012		0.011	0.016	0.008		0.010
EEI							0.126***	0.140***	0.089***		-0.009	0.002
							0.038	0.037	0.017		0.012	0.014
Constant	6.650***	5.454***	5.490***	2.670***	7.188***	6.905***	6.373***	6.315***	6.239***	4.518***	4.407***	4.464***
	0.332	0.191	0.220	0.802	0.284	0.600	0.647	0.554	0.398	0.296	0.280	0.293
Observations	269	269	269	269	267	121	110	110	110	121	110	110
Countries	11	11	11	11	11	11	10	10	10	11	10	10
R^2	0.842	0.934	0.928	0.907	0.866	0.599	0.628	0.674	0.795	0.913	0.911	0.916

Note: Driscoll-Kraay standard errors in parentheses, * p<0.10, ** p<0.05, *** p<0.01.

Regression Results by Country Group

In order to explore whether foreign and domestic investment, the investment climate, and economic integration impact the economies of Western European countries differently than those of Central and Eastern Europe, the sample was divided into two groups: EUROPE-20 and CEE-11. Tables 3.6 and 3.7 present the result of running regressions (FE1) through (FE12) for EUROPE-20 and CEE-11, respectively. Similarly to the regressions estimated with the full sample (in Table 3.5), all of the variables of interest have a positive and statistically significant impact on economic output.

The impact of domestic investment is significantly more pronounced when focusing on CEE countries. GDP tends to have a much higher sensitivity to domestic investment and exports (total and of goods only) for this group than for the EUROPE-20 and full samples. Surprisingly, European economic integration seems to have a greater impact on GDP than the investment climate for the newest members of the EU (CEE-11), while the opposite seems to be the case for the oldest ones. A 10 percent increase in the investment attractiveness score increases GDP by 0.7 to 1.5 percent in Western European countries and by 0.3 and 1.0 percent in Central and Eastern European countries. A similar increase in the economic integration score leads to a 0.3 to 0.9 percent increase in GDP for Western European countries and a 0.9 to 1.3 percent increase for countries in Central and Eastern Europe. The results suggest that for both sets of countries, economic integration does not matter

when I account for government spending and inflation. In addition, economic integration does not seem to be significant in Central and Eastern European countries when government spending, inflation, and the investment climate are all taken into account.

Overall, the estimates from this simple regression analysis indicate that higher investment (domestic and foreign), the investment attractiveness scores, and economic integration scores are positively associated with higher levels of GDP in a "typical" European country. Moreover, the impact of these variables differs for Central and Eastern European countries. The following subsection briefly discusses some of the steps taken to test the robustness of these initial results.

Robustness Checks

A number of additional regressions were run for this study. Time dummies were added to account for differences in growth that result from external shocks common to all countries in the sample, such as the abrupt end of Soviet economic assistance in the early 1990s, effects of commodity booms, and the global financial crisis that started in 2008. Also, countries with extreme values of investment, economic growth, and exports were thought to be obscuring the results of these initial estimations. Therefore, outliers were excluded since they do not reflect the "normal" economic performance or investment levels experienced by the "average" country in the sample. Finally, for further robustness, regression analyses were performed excluding

observations that lay one standard deviation from the mean. Rerunning the regressions using alternative specifications in order to take into account these concerns reaffirmed the robustness of the analysis' initial results.

3.6. Dynamic Panel Data Analysis

3.6.1 Pooled Mean Group Estimation

As an alternative to using cross-section fixed effects to study the long-run effects of investment on economic output, this section employs a relatively new dynamic panel econometric technique—the (pooled) mean group (PMG) estimator—to assess the impact of investment, both domestic and foreign, on economic output. The technique has three variants (see Pesaran and Smith 1995 and Pesaran, Shin, and Smith 1997, 1999): the mean group (MG) estimator ("which separately estimates both short-run and long-run parameters for each cross-sectional unit and then averages them"), the pooled mean group (PMG) estimator ("which restricts the long-run parameters to be the same across units but allows" for different adjustment coefficients and error variances across units), and the dynamic fixed effect (DFE) option (which assumes "homogeneous slope parameters") (Wako 2017). Given that data for Central and Eastern European countries is rather limited, the MG and DFE estimators might not deliver results that are significant for country-specific estimations.[14] As a result, I will use the PMG estimator to carry out the

[14] The PMG estimator "is suitable for dynamic heterogenous panels when total pooling is not appropriate (DFE), or total averaging is not possible (MG) because either the countries show

empirical analysis. As far as I know, no single study has employed this method to analyze the impact of investment on economic growth in the 31 European countries studied here.[15] The goal of this section is to use as much of the data available as possible. Because of methodological requirements (e.g., long time periods), the indices developed in Chapter 2 will not be included in the analysis below, as they only cover an 11-year period.

3.6.2 Model Specification

In line with Blackburne and Frank (2007), I set up the long-run output function as follows:

$$rGDP_{i,t} = \theta_{0t} + \theta_{1t} rFDI_{i,t} + \theta_{2t} rDI_{i,t} + \theta_{3t} X_{i,t} + \mu_i + \epsilon_{i,t} \quad (3.5)$$

where the number of countries i = 1, 2, 3, …, N; the number of years t = 1, 2, 3, …, T; $rGDP_{i,t}$ is the log of real GDP; $rFDI_{i,t}$ is the log of real inward FDI stock; $rDI_{i,t}$ is the log of real domestic investment; and $X_{i,t}$ a vector of control variables. If I assume that the underlying series are nonstationary and integrated of order one, I cab reparametrize (5) into an autoregressive distributed lag relationship—ARDL (1,1,1):

$$\begin{aligned} rGDP_{i,t} = {} & \delta_{10i} rFDI_{i,t} + \delta_{11i} rFDI_{i,t-1} + \delta_{20} rDI_{i,t} + \delta_{21} rDI_{i,t-1} + \\ & \delta_{30i} X_{i,t} + \delta_{31i} X_{i,t-1} + \lambda_i rGDP_{i,t-1} \mu_i + \epsilon_{i,t} \end{aligned} \quad (3.6)$$

some signs of homogeneity in the parameters, or country-specific estimations would suffer from an insufficient number of time series observations" (Neuhaus 2005).

[15] Neuhaus (2005), whose research strategy and methodology I follow closely in this section, used PMG to analyze the impact of foreign investment on the economic growth of 13 Central and Eastern European and Western Balkans transition economies from the early 1990s to 2002.

I then reparametrize equation (6) into the following error correction model:

$$\Delta rGDP_{i,t} = \phi_i\left(rGDP_{i,t-1} - \theta_{0i} - \theta_{1i}rFDI_{i,t} - \theta_{2i}rDI_{i,t} - \theta_{3i}X_{i,t}\right) + \delta_{11i}\Delta rFDI_{i,t} + \delta_{21i}\Delta rDI_{i,t} + \delta_{31i}\Delta X_{i,t} + \epsilon_{i,t} \quad (3.7)$$

The error-correction speed of adjustment parameter, ϕ_i, and the long-run coefficients, $\theta_{1i}, \theta_{2i}, and\ \theta_{3i}$, are of interest in this study. Including θ_{0i} "allows a nonzero mean of the cointegrating relationship" (Blackburne and Frank 2007). I expect ϕ_i to be negative, as I hypothesize that the variables exhibit a return to long-run equilibrium. In this set up, a one-percent increase in one of the exogenous variables increases the long-run value of GDP by θ percent. In other words, the θs describe the long-run income elasticities of the exogenous variables.

3.6.3 Basic Regression Results

I begin by presenting the results of the PMG estimation. The primary focus of my analysis is on the common long-run coefficients. I want to find how in the long run—on average across all countries—an increase in inward FDI stock leads to an increase in economic output. Of similar interest will be the long-run effect of domestic investment on GDP. Other variables will only be used to help me test the robustness of the FDI and DI coefficients. Besides "the common long-run coefficients, the PMG estimation also delivers the results for the country-specific convergence parameters" (Neuhaus 2005) However, this section discusses convergence coefficients averages. Section 3.6.4 presents more details regarding country-specific PMG results.

3.6.3.1 Regression Results for All Countries

The results of the regressions for all countries in the study are given in Table 3.8. The first column (PMG1) states the results from a regression where GDP is explained by foreign and domestic investment and conditional convergence. All regressions show highly significant coefficients and the expected signs. The error-correction speed of adjustment parameter is around -0.16 and the estimated coefficient of foreign and domestic investment are 0.13 and 0.33, respectively. A one-time increase in the stock of inward FDI by 10 percent increases GDP in the long run by more than 1.3 percent, while a similar increase in domestic investment increases GDP by 3.3 percent. The impact of foreign investment on GDP is rather small when compared to that of domestic investment (long-run coefficients). In fact, the domestic investment's income elasticity is 2.5 times higher than that of foreign investment.

PMG1 is the basic or benchmark regression model that I will use for most of the analysis in this section. In this model, GDP is explained by FDI and DI. To test the robustness of the coefficients, I add several control variables to the model one at the time to ensure that the model has sufficient number of degrees of freedom. I begin by adding with exports, followed by government consumption, inflation, and unemployment.

Column two (PMG2) of Table 3.8 shows the results of the benchmark regression extended by adding exports of goods and services. The long-run coefficient of FDI decreases by half, from 0.13 to 0.065. Domestic investment

now also has an income elasticity that is somewhat lower than that of the benchmark model. Furthermore, the error correction term increased significantly, from -0.16 in the benchmark regression to -0.25. This means that the time to convergence decreases significantly. The coefficient of exports is highly significant and positive, which indicates that exports contribute positively to GDP. Thus, the inclusion of exports into the regression model broadly confirms the significance of foreign investment's long-run coefficient. These results do not vary in any meaningful way when I substitute total exports (goods plus services) by exports of goods and exports of services separately in the model (PMG3, PMG4, and PMG5).

According to column six (PMG6) of Table 3.8, adding government consumption in the regression also seems to support the results of the benchmark regression. All the regression coefficients of foreign and domestic investment, as well as the convergence parameter reach levels similar to those of the benchmark model. Foreign investment's long run coefficient is around 0.11 and of domestic investment is 0.28. The error correction coefficient is -0.18. In addition, the government consumption's coefficient is positive and highly significant in its effects on economic output. The overall results so far suggest taht the models point to an average error correction coefficient of around -0.20, a foreign investment coefficient of between 0.06 and 0.13, and a domestic investment coefficient of between 0.25 and 0.33.

This does not change much when I include inflation and unemployment in the model as additional alternative control variables (PMG7 and PMG8 in Table 3.8). The long-run coefficient of FDI is between 0.12 to 0.15 and that of domestic investment is between 0.21 and 0.36. On average, the error correction coefficient fluctuates around -0.17, slightly higher than in the benchmark model.

In general, the PMG results for the entire sample of European countries reveals that the regression coefficients are highly robust. The long-run coefficients of foreign investment ranges from 0.06 to 0.15, and of domestic investment from 0.21 and 0.36. In addition, the error correction coefficient is between -015 and -0.18. The fact that the sign and the significance of the coefficients do not change significantly when various variables are included confirms the strength of the benchmark model. This is an indication of its explanatory power and its ability to explain GDP through domestic and forieng investment.

Table 3.8 Gross Domestic Product and Foreign Direct Investment: PMG Estimation (All)
Dependent Variable: Real GDP (1970-2016)

	PMG1	PMG2	PMG3	PMG4	PMG5	PMG6	PMG7	PMG8
Error Correction Term	-0.156***	-0.250***	-0.214***	-0.178***	-0.243***	-0.180***	-0.179***	-0.152***
	0.024	0.035	0.033	0.026	0.034	0.028	0.026	0.022
rFDI	0.131***	0.065***	0.060***	0.074***	0.056***	0.111***	0.152***	0.120***
	0.004	0.005	0.005	0.007	0.005	0.008	0.006	0.006
rDI	0.332***	0.248***	0.274***	0.303***	0.254***	0.276***	0.206***	0.355***
	0.020	0.011	0.011	0.015	0.011	0.021	0.022	0.021
$rEXP_{goods\ and\ services}$		0.247***						
		0.012						
$rEXP_{goods}$			0.222***		0.187***			
			0.011		0.011			
$rEXP_{services}$				0.203***	0.073***			
				0.016	0.011			
rGOVT						0.129***		
						0.044		
INFL							-0.075***	
							0.017	
UR								-0.006***
								0.002
Intercept	0.991***	1.311***	1.138***	0.920***	1.259***	1.045***	1.339***	0.947***
	0.148	0.176	0.169	0.132	0.172	0.158	0.189	0.138
Countries	31	31	31	31	31	31	31	31
Observations	1178	1178	1178	1178	1178	1178	1178	1178
Observations Per Country (Min)	21	21	21	21	21	21	21	21
Observations Per Country (Max)	47	47	47	47	47	47	47	47
Log Likelihood	2926.8	2799.4	2936.9	2744.9	2799.9	2928.0	2415.9	2789.7

Notes: The entries in the upper part of the table provide the estimation results for the regression coefficients. Standard errors of the coefficients are shown in parenthesis. ***, **, * denote the significance of the coefficients at the 1, 5, and 10 percent levels, respectively.

3.6.3.2 Regression Results by Group

One of the major intended contributions of this dissertation is its focus on European countries, particularly on those of Central and Eastern Europe that are now part of the EU. In this section, I group countries into two sub-sets, namely the Western European countries, including Cyprus and Malta (EUROPE-20) and the Central and Eastern European ones (CEE-11). I estimate equations PMG1 through PMG12 for both subsets of countries. I begin by examining the variables of interest. When I compare the results here—Table 3.9 (EUROPE-20) and Table 3.10 (CEE-11)—with those of the overall sample (Table 3.8), I can identify a number of differences.

First, GDP tends to have higher sensitivity to foreign and domestic investment in Central and Easter European countries than for the entire sample when I estimate the benchmark regression (PMG1). Second, the GDP responsiveness of investment is slightly less pronounced in Central and Eastern Europe than for the full sample when I incorporate exports—total exports and exports of goods and exports of services separately. This suggests that exports—particularly exports of goods—are important for Central and Eastern European countries. A 10 percent increase in exports of goods has the potential to increase GDP, on average, by 2.2 percent in countries of this region, compared to the 1.2 percent increase that would result in Western European countries. Third, the results in Tables 3.9 and 3.10 suggest that government spending does not seem to matter for either sub-set of countries

when I analyze them separately. Finally, inflation is not significant for Western European countries as suggested by PMG7 (Table 3.9), while unemployment is significant (PMG8). The opposite seems to be the case for Central and Eastern European countries (Table 3.10): inflation "matters" for GDP (PMG7), but unemployment does not (PMG8).

Table 3.9 Gross Domestic Product and Foreign Direct Investment: PMG Estimation (EUROPE-20)
Dependent Variable: Real GDP (1970-2016)

	PMG1	PMG2	PMG3	PMG4	PMG5	PMG6	PMG7	PMG8
Error Correction Term	-0.120***	-0.188***	-0.132***	-0.157***	-0.178***	-0.137***	-0.145***	-0.060***
	0.031	0.042	0.032	0.036	0.041	0.036	0.037	0.020
rFDI	0.134***	0.088***	0.083***	0.098***	0.090***	0.117***	0.117***	0.052***
	0.005	0.007	0.009	0.007	0.007	0.011	0.006	0.014
rDI	0.300***	0.238***	0.278***	0.272***	0.247***	0.267***	0.280***	0.449***
	0.023	0.014	0.018	0.018	0.014	0.029	0.028	0.038
$rEXP_{goods\ and\ services}$		0.188***						
		0.016						
$rEXP_{goods}$			0.172***		0.123***			
			0.018		0.018			
$rEXP_{services}$				0.138***	0.054***			
				0.016	0.015			
rGOVT						0.104		
						0.064		
INFL							-0.005	
							0.019	
UR								-0.057***
								0.006
Intercept	0.826***	1.121***	0.780***	0.968***	1.073***	0.866***	1.063***	0.376
	0.211	0.246	0.185	0.217	0.242	0.221	0.275	0.123
Countries	20	20	20	20	20	20	20	20
Observations	899	899	899	899	899	899	899	899
Observations Per Country (Min)	21	21	21	21	21	21	21	21
Observations Per Country (Max)	47	47	47	47	47	47	47	47
Log Likelihood	2147.2	1968.0	2106.5	1944.6	1962.1	2148.1	1635.8	2087.7

Notes: The entries in the upper part of the table provide the estimation results for the regression coefficients. Standard errors of the coefficients are shown in parenthesis. ***, **, * denote the significance of the coefficients at the 1, 5, and 10 percent levels, respectively.

Table 3.10 Gross Domestic Product and Foreign Direct Investment: PMG Estimation (CEE-11)
Dependent Variable: Real GDP (1970-2016)

	PMG1	PMG2	PMG3	PMG4	PMG5	PMG6	PMG7	PMG8
Error Correction Term	-0.234***	-0.404***	-0.392***	-0.301***	-0.411***	-0.249***	-0.258***	-0.233***
	0.037	0.044	0.042	0.051	0.041	0.035	0.038	0.031
rFDI	0.165***	0.041***	0.042***	0.109***	0.034***	0.148***	0.186***	0.151***
	0.013	0.007	0.007	0.012	0.006	0.019	0.010	0.016
rDI	0.359***	0.226***	0.246***	0.295***	0.227***	0.338***	0.231***	0.360***
	0.030	0.014	0.013	0.018	0.013	0.039	0.031	0.032
$rEXP_{goods\ and\ services}$		0.301***						
		0.014						
$rEXP_{goods}$			0.255***		0.222***			
			0.012		0.013			
$rEXP_{services}$				0.226***	0.081***			
				0.020	0.014			
rGOVT						0.086		
						0.109		
INFL							-0.135***	
							0.024	
UR								-0.001
								0.003
Intercept	1.279***	1.996***	2.059***	1.340***	2.082***	1.241***	1.720***	1.309***
	0.190	0.213	0.220	0.213	0.205	0.166	0.241	0.167
Countries	11	11	11	11	11	11	11	11
Observations	279	279	279	279	279	279	279	279
Observations Per Country (Min)	22	22	22	22	22	22	22	22
Observations Per Country (Max)	37	37	37	37	37	37	37	37
Log Likelihood	783.7	839.7	839.9	814.5	852.6	783.8	793.5	709.1

Notes: The entries in the upper part of the table provide the estimation results for the regression coefficients. Standard errors of the coefficients are shown in parenthesis. ***, **, * denote the significance of the coefficients at the 1, 5, and 10 percent levels, respectively

3.7.3.3 Implied Income Shares

Using the estimated regression coefficients, I can calculate here the size of the input factors' income shares:

$$\alpha = \frac{\widehat{\beta_1}}{1 + \widehat{\beta_1} + \widehat{\beta_2}} \tag{3.8}$$

$$\beta = \frac{\widehat{\beta_2}}{1 + \widehat{\beta_1} + \widehat{\beta_2}} \tag{3.9}$$

The income shares for each PMG estimation models (estimated using the entire sample) are presented in Table 3.11. The "robustness of the regression coefficients is reflected in the low variation of the implied income shares" (Neuhaus 2005). The income share of foreign capital owners is, on average, around 7 percent and that of domestic capital owners is approximately 20 percent.[16] In other words, total capital income totals approximately 27 percent of GDP, compared to that of labor, which amounts to 73 percent of GDP.

[16] Neuhaus (2005) finds that the average income share of foreign capital owners is around 7 percent, while that of domestic capital owners is approximately 26 percent.

Table 3.11 Income Shares of the Input Factors to Production

	Domestic Capital (α)	Foreign Capital (β)	Total Capital ($\alpha + \beta$)	Labor ($1 - \alpha - \beta$)
PMG1	0.23	0.09	0.32	0.68
PMG2	0.19	0.05	0.24	0.76
PMG3	0.21	0.04	0.25	0.75
PMG4	0.22	0.05	0.27	0.73
PMG5	0.19	0.04	0.24	0.76
PMG6	0.20	0.08	0.28	0.72
PMG7	0.15	0.11	0.26	0.74
PMG8	0.24	0.08	0.32	0.68
Average	0.20	0.07	0.27	0.73

Source: Author's own calculations using STATA 15.
Notes: PMG1 to PMG8 indicate the different PMG estimation models according to Table 8.

3.6.4 Country-Specific Regression Results

The PMG "estimator is a composite of common long-run coefficients and country-specific error correction coefficients ('adjustment coefficients')" (Neuhaus 2005). Above, the analysis focused on the common long-run coefficients. I also examined and averaged error correction coefficient results. This sub-section examines the PMG results for each country and the speeds of adjustment. The analysis covers the entire sample, and I limit it to the benchmark regression (PMG1) with foreign and domestic investment. The overall regression results are presented in Table 3.12.

Table 3.12 Pooled Mean Group Estimation: Country-Specific Results

	Error Correction	Short Run DI	Short Run FDI
All Countries	-0.156***	0.052***	0.020***
Austria	-0.141*	0.047*	0.018*
Belgium	-0.019	0.006	0.003
Bulgaria	-0.123**	0.041**	0.016**
Croatia	-0.315***	0.105***	0.041***
Cyprus	0.076***	0.025**	0.010***
Czech Republic	-0.233***	0.077***	0.031***
Denmark	0.018	0.006	0.002
Estonia	-0.289***	0.096***	0.038***
Finland	-0.396***	0.131***	0.052***
France	-0.175***	0.058***	0.023***
Germany	-0.132***	0.044***	0.017***
Greece	-0.140***	0.047***	0.018***
Hungary	-0.170***	0.056***	0.022***
Iceland	-0.271***	0.090***	0.036***
Ireland	-0.002	0.001	0.000
Italy	-0.359***	0.119***	0.047***
Latvia	-0.368***	0.122***	0.048***
Lithuania	-0.322***	0.107***	0.042***
Luxembourg	-0.044**	0.015**	0.006**
Malta	-0.011	0.004	0.001
Netherlands	-0.010	0.003	0.001
Norway	-0.062**	0.021**	0.008**
Poland	-0.092***	0.031***	0.012***
Portugal	-0.100***	0.033***	0.013***
Romania	-0.356***	0.118***	0.047**
Slovak Republic	-0.117**	0.039**	0.015**
Slovenia	-0.191***	0.063***	0.025***
Spain	-0.306***	0.102***	0.040***
Sweden	-0.106	0.035	0.014
Switzerland	-0.049	0.016	0.006
United Kingdom	-0.034	0.011	0.004

Source: Author's own calculations using STATA 15.

Notes: The first column provides the PMG estimation results for the country-specific error correction coefficients. In columns two and three, the short-run coefficients are the product of the estimated long-run coefficients and country-specific error correction coefficients. ***, **, and * denote the significance of the coefficients at the 1, 5, and 10 percent levels.

The results indicate that the PMG estimation delivers results that are significant for 22 out of the 31 countries. This is significant, given the restrictions placed by the PMG estimator—which, in the long run treat all countries as equal—and the reliability of data for some of the countries included here. All coefficients, with the exceptions of those from the regressions of Cyprus, Denmark, Ireland, Malta, the Netherlands, Sweden, Switzerland, and the United Kingdom have the expected signs. Broadly speaking, the results for the country-specific regressions suggests that the model may be appropriate for the analysis.

The error correction coefficient is negative and significant for 22 countries, and it lies between -0.40 and -0.04. Finland, Latvia, Italy, and Romania show the shortest periods of convergence, while Luxembourg, Norway, and Poland show the longest. It is worth noting that the shorter the convergence period, the stronger the impact on the economy from a change in one of the explanatory variables. The results suggests that increasing domestic investment by one percent at time t increases GDP growth by an average of 0.05 percent in the same period. For each country, the short-run income elasticity of domestic investment is lies between 0.001 and 0.12. Similar to the results that we obtain for the error correction coefficient, Finland, Latvia, Italy, and Romania have the largest income elasticities, while Luxembourg, Norway, and Poland have the smallest.

The results above are in line with those obtained for the short-run impacts of foreign investment on GDP. Increasing foreign investment by one percent at time *t* increases the GDP growth rate by an average 0.02 percent in the same period. The income elasticity lies between 0.01 and 0.05. Outliers are Finland, Latvia, Italy, and Lithuania. On the whole, the regression output shows coefficients that are highly significant and a number of countries for which there is not much variation in the regression coefficients. We can conclude from the error correction coefficient and the short-run coefficients of domestic and foreign investment that the countries of Central and Eastern Europe are very different.

3.7 Summary and Policy Implications

The major goal of this chapter was to assess empirically whether investment (foreign and domestic), the investment climate, and economic integration have a positive and statistically significant effect on economic output in European countries, and particularly in those of Central and Eastern Europe. The lack of available and reliable data for many of these countries prevented the use of standard econometric techniques for output regressions, such as general method of moments (GMM) and two-stage least squares (2SLS).

Using a sample of 31 countries, this chapter studies the effects of foreign and domestic investment, the investment climate, and economic integration on GDP. GDP is the dependent variable in all regressions, while inward FDI

stock, domestic investment, exports, government consumption, inflation, unemployment, and scores from the Investment Attractiveness and European Economic Integration Indices developed in Chapter 2 are used as the key independent variables. In line with the prevailing literature, it tests the hypothesis that these variables have a positive and statistically significant effect on the economies of this region.

The study estimates and runs a model using fixed effects to control for omitted variable bias, and it checks the results for their robustness for different specifications. Moreover, it makes use of a dynamic panel estimation method—the Pooled Mean Group (PMG) estimator—to carry out additional empirical analyses. Both methods—FE and PMG—provided strong statistical evidence that investment, together with the investment climate and economic integration, has a significant positive effect on economic output. Results were tested in a number of model specifications, especially against the inclusion of other explanatory variables. In all estimations, the regression coefficients on FDI, DI, IAI, and EEI turned out to be positive and highly significant.

I find that increases in investment, improvements in the investment climate, and greater levels of economic integration among European countries are generally associated with higher levels of economic output. Had it not been for the limited and often unreliable data available on investment for many of the countries in the sample, the findings may have been strengthened substantially, as this additional data could have helped to account for some of

the extreme values of growth and levels of per capita GDP, and foreign and domestic investment in the dataset. Nevertheless, the results are significant and consistent with the findings of other analyses examining the link between GDP, investment, and exports.

The primary policy implication of the results presented here is that governments should design policies and initiatives that attract both foreign and domestic investment, as it may continue to enhance economic growth. In addition, as the coefficient of domestic investment is higher than the coefficient of foreign investment in almost all of the regressions ran here, the findings suggest that developing an environment that fosters private sector development and encourages domestic investment is a more effective policy than primarily targeting foreign investors—that is, if stimulating economic growth is the ultimate objective. However, further research that accounts for both country-specific factors and sectors is necessary. Studies that analyze the effectiveness of investment by sector, for instance, have the potential to help governments design policies that target and channel investment to those sectors of the economy that have the greatest potential to generate economic growth (OECD 2016).

Designing effective programs and incentives, however, is a challenging task, particularly in many of the economies in transition analyzed here. Even almost 30 years after the collapse of the Soviet Union, they continue to face numerous political, economic, and cultural challenges. As Blomstrom et al

(2003) suggests, "the incentives should ideally not be of an ex ante type that is granted and paid out prior to the investment, but should instead promote those activities that create a potential for spillovers. In particular, they include education, training, and R&D activities, as well as linkages between foreign and local firms." Therefore, investment policies should be carefully developed and implemented. Otherwise, their adoption could ultimately create market distortions (as in the case of poorly designed or targeted tax breaks and duty exemptions for businesses and multinational enterprises) or inefficiencies (as in the case of economies unable to absorb appropriately the positive spillover effects created by foreign investment) that reduce a country's overall economic welfare.

The impact of the some of these key variables on GDP will be further assessed by accounting for the possibility of a bidirectional relation between GDP, foreign and domestic investment, and exports. The next chapter, Chapter 4, estimates vector autoregressive models and applies Toda and Yamamoto (1995)'s causality testing approach on the 11 Central and Eastern European countries of this sample. Given the lack of available data, the time period analyzed will start in the mid-1990s.

Chapter 4

"Causal" Relationship Between Foreign Direct Investment, Exports, and Economic Performance in Central and Eastern Europe

4.1 Introduction

The objective of this chapter is to examine the "causal" relationship –if any—between foreign direct investment (FDI), exports, and economic growth in Central and Eastern Europe over the past three decades. It is important to note that there are numerous issues surrounding the formulation of causality, as direction may depend on the frequency of observations and type of data analyzed, as well as on the statistical tests used, which cannot always be adjusted to yield accurate inferences (Bhargava 2008). This is especially true when dealing with short time series. (For many of the CEE countries analyzed here, there is simply no data prior to the mid-1990s.) The goal of this Chapter,

therefore, is not to establish "true" causality, but rather to capture potential trends and likely links. It is not necessary for this policy exercise to answer "the question of whether the analysis has [in fact] uncovered a [true] causal structure" (Adams et al. 2003). While there are challenges that limit the scope for analysis and policy prescriptions, the exercise can nevertheless be helpful and might reveal some of the relationships that motivate the analysis.

The nexus between foreign investment (and exports) and economic output has been the subject of much debate and controversy in recent decades. Particularly after the collapse of the Soviet Union, the explosion of foreign capital stocks, combined with the widespread belief that trade and investment liberalization are beneficial for development, triggered a large body of research on the determinants of economic growth in formerly communist countries. Although there seems to be a consensus among policymakers that foreign investment and exports are important drivers of economic growth, the empirical literature examining their relationship reveals mixed and inconclusive results on the direction of "causality," especially when it comes to foreign investment. While many studies find that foreign investment has a positive and statistically significant impact on economic growth,[17] there are

[17] For instance, Alfaro et al 2004; Blomström et al 1996; Borensztein et al 1998; Chang 2010; De Gregorio 1992; de Mello 1999; Fortanier 2008; Johnson 2006; Lensink and Morrissey 2006; Li et al 2007; Luiz and de Mello 1999; Mody and Wang 1997; Nair-Reichert and Weinhold 2001; Neto et al 2008; Wacker 2011; and Wacker et al 2013.

others that reveal that foreign investment does not have a positive or significant effect on growth, or that its effects are in fact negative.[18]

Many of these studies analyze the impact of foreign investment and export performance on growth and development using panel or cross-sectional econometric techniques, and those that analyze their effects employing time-series techniques focus on one or few countries at a time. However, econometric problems accompany cross-country studies, which can "have serious consequences as far as the appropriateness of the derived conclusions" (Podkaminer 2013). Pooling together "qualitatively different" countries (Central and Eastern European countries, former Soviet republics, and even China, Mongolia and Vietnam) "increase[s] the size of the 'sample of observations' and thus formally creates scope for estimation of more parameters… than would be possible otherwise. But the genuine value of eventual findings from such exercises" can be questionable (Podkaminer 2013). Failing to complement cross-country studies with single-country studies may lead to misleading or inadequate policy recommendations.

This chapter seeks to overcome some of these problems by estimating bivariate vector autoregressive (VAR) models and applying Toda and Yamamoto (1995)'s causality testing approach to individual countries. It contributes to the existing literature by focusing on the formerly communist countries that now belong in the European Union (EU). To my knowledge, no

[18] For instance, Carkovic and Levine 2002; Grilli and Milesi-Ferretti 1995; Haddad and Harrison 1993; Javorcik 2004; Mencinger 2003; and Saltz 1992.

study has carried out a causality analysis for all of all of these countries in a systematic way. Specifically, I will examine the "causal" relationship—if any—between foreign investment and gross domestic product (GDP) and between exports and GDP in eleven Central and Eastern European countries during the period 1990-2016. The justification for choosing this time period stems from the availability of data. Understanding the "causal" link between foreign investment, exports, and growth has important policy implications. A unidirectional link going from FDI (exports) to GDP would support the FDI-led (export-led) growth hypothesis that foreign investment (exports) promotes economic growth and development in host countries (Zhang 2012). On the other hand, a link running from GDP to foreign investment (exports) would indicate that economic growth may be necessary to attract and benefit from foreign investment (higher exports). If the "causal" process is bidirectional, then foreign investment (exports) and GDP have a mutually reinforcing relationship.

The remainder of the chapter is organized as follows: Sections 4.2 and 4.3 describe the methodology and data. The chapter then goes on to analyze the data and present the results in Sections 4.4 and 4.5. Section 4.6 expands the bivariate model and tries to determine if there is a "causal" relationship between foreign and domestic investment, exports, and GDP in the Czech Republic—one of the most economically developed countries in Central and

Eastern Europe. The last section (Section 4.7) concludes and discusses the policy implications.

4.2 Methodology

The methodology that I follow here is a clear departure from what other studies have employed when looking at the nexus between GDP and foreign investment and between GDP and exports nexuses in transition economies.[19] As noted by Zang (2012), Granger's conventional causality test is valid only when a vector autoregressive (VAR) model is estimated "for stationary or trend stationary variables, as the Wald tests for causality follow a standard chi-squared" asymptotic distribution (Zang 2012). If the series are found to be integrated of order one but not cointegrated, then a VAR model in first differences should be estimated (Dolado and Lutkepohl 1996). If the series are found "to be integrated of order one and... cointegrated of order one, then an error correction model (ECM) should be specified" (Zang 2012). (See Toda and Yamamoto 1995). Finally, if the series are not integrated of order one, or if thet are integrated of different orders, then an analysis of the long-run relationship between the variables is generally not carried out. However, this approach can be problematic. The unit root tests required before estimating a VAR "to test the null hypothesis of stationarity have low power against the alternative hypothesis of stationarity or trend stationarity" (Zang 2012, Toda and

[19] As noted above, there are numerous issues surrounding the formulation of causality, and the goal of the analysis here is not to establish "true" causality, but rather to capture potential trends and likely links.

Yamamoto 1995, Chowdhury and Mavrotas 2003). Moreover, Johansen's test of cointegrating rank is not necessarily reliable for small sample series like the ones in this study. Thus, size distortions and pre-test bias are likely to affect the results.

To overcome these problems, Toda and Yamamoto (1995) propose an approach to test for causality using a modified Wald test. This approach fits a standard VAR in levels, irrespective of whether the variables are stationary, integrated, or cointegrated. The basic idea is to "artificially augment" the correct VAR order, k, by the maximum potential order of integration of the variables, d_{max}. Thus, the VAR model is not estimated with its "true" lag order k, but with $k+d_{max}$ lags. They then apply the conventional Wald test on the first k coefficient matrices using the standard chi-squared statistic. In addition, they ignored the coefficient matrices of the last d_{max} lagged vectors in the model (Caporale and Pittis 1999; Rambaldi and Doran 1996; Zapata and Rambaldi 1997). The application of Toda and Yamamoto (1995)'s "procedure ensures that the usual test statistic for Granger causality has standard asymptotic distribution and valid inferences can be carried out" (Abu-qarn 2010). In line with their approach, I represent the GDP and FDI and the GDP and exports models using the following VAR models:

$$GDP_t = \alpha_1 + \sum_{i=1}^{k+dmax} \beta_{1i} rGDP_{t-i} + \sum_{i=1}^{k+dmax} \delta_{1i} Z_{t-i} + \varepsilon_{1t} \quad (4.1)$$

$$Z_t = \alpha_2 + \sum_{i=1}^{k+dmax} \beta_{2i} Z_{t-i} + \sum_{i=1}^{k+dmax} \delta_{2i} rGDP_{t-i} + \varepsilon_{1t} \quad (4.2)$$

where rGDP is the natural logarithm of real per capita GDP and Z is *s*FDI (inward FDI stock as a percentage of GDP), *f*FDI (inward FDI flows as a percentage of GDP), or EXP (exports of goods and services as a percentage of GDP), ε is the white noise error term, t is year, k is the optimal lag order, and d_{max} is the maximum order of integration of both GDP and Z. From equation (1), "Z does not Granger cause GDP" if H_0: $\beta_{1i} = 0$ against H_1: $\beta_{1i} \neq 0$, and in equation (2), "GDP does not Granger cause Z" if H_0: $\beta_{2i} = 0$ against H_1: $\beta_{2i} \neq 0$, where $i \leq k$.

While this methodology has advantages (in particular, its applicability regardless of whether the series are stationary, integrated, or cointegrated), it is worth noting that the approach has some important limitations. Yamada and Toda (1998) state that the "approach has advantages in terms of size stability, but... [that it may] be inefficient in terms of low estimation power (Zang 2012). In the outline of their methodology, Toda and Yamamoto (1995) note that this "inefficiency depends on the specific model estimated," and it might be large if the "VAR system has many variables" and few lags, or small if the VAR system has few variables and many lags (Zang 2012). Kuzozumi and Yamamoto (2000) also discuss other limitations, including the possibility

of small sample bias. Nevertheless, given the underlying properties of the time-series data in this study, the advantages of Toda and Yamamoto (1995)'s approach is likely to outweigh any potential disadvantages.

4.3 Data

This study employs yearly data that covers the 1990-2016 period to determine if there is any sort of "causal" relationship between GDP, foreign investment, and exports. Data comes from the United Nations' UNCTADstat, the World Bank's World Development Indicators, the Vienna Institute for International Studies' "wiiw Annual and FDI Databases," and national central banks and statistical offices. Tables C.1 and C.2 in Appendix C present the summary statistics. We should keep in mind that all data, but particularly for many transition economies, are exposed to measurement errors. Because of reliability concerns, all annual data have been cross-checked to ensure its consistency using at least two sources.

The sample consists of eleven Central and Eastern European countries: Bulgaria, Croatia, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovakia, and Slovenia. The four variables analyzed are: real per capita GDP (*r*GDP), inward FDI stock as a share of GDP (*s*FDI), inward FDI flows as a share of GDP (*f*FDI), and exports of goods and services also as a share of GDP (EXP).

4.4 Data Analysis

The Toda and Yamamoto (1995) methodology described above involves two steps. First, I determine the maximum order of integration, d_{max}, as well as the appropriate lag structure of the VAR, k. Second, I apply the standard Wald test to the first k VAR coefficient matrices to conduct inferences on Granger causality.

4.4.1 Unit Root Tests

I employ the augmented Dickey–Fuller (ADF) test (1979) and the Phillips–Perron (PP) test (1988) to determine the order of integration of the series for each of the eleven countries covered here. The details of the unit root tests are presented in Appendix C (Tables C.1 and C.2). Table 4.1 reports the summary of the results.

Table 4.1 Summary of Unit Root Test Results

Country	*r*GDP	*s*FDI	*f*FDI	EXP
Bulgaria	I(1)	I(2)	I(2)	I(1)
Croatia	I(2)	I(1)	I(1)	I(1)
Czech Republic	I(1)	I(1)	I(1)	I(1)
Estonia	I(2)	I(1)	I(1)	I(1)
Hungary	I(2)	I(1)	I(1)	I(1)
Latvia	I(1)	I(1)	I(1)	I(1)
Lithuania	I(1)	I(1)	I(1)	I(1)
Poland	I(1)	I(1)	I(1)	I(1)
Romania	I(1)	I(1)	I(1)	I(1)
Slovakia	I(2)	I(2)	I(1)	I(1)
Slovenia	I(1)	I(1)	I(0)	I(1)

Source: Author's own calculations using STATA 15.
Note: GDP=natural log of real per capita GDP; *s*FDI=inward FDI stock as a percentage of GDP; *f*FDI=inward FDI flows as a percentage of GDP; EXP=exports of goods and services as a share of GDP.

Both tests suggest that we cannot reject the null hypothesis of a unit root test for level series, except for Slovenia's *f*FDI series, which is stationary

at levels. Also, we cannot reject the null hypothesis for many first-differenced series. I determine the lag structure using the Akaike Information Criterion (AIC). The results from the unit root tests indicate that all the series are integrated of order one for only five countries' data series (Czech Republic, Latvia, Lithuania, Poland, and Romania). Thus, the maximum order of integration for any given VAR is one or two.

4.4.2 Optimal Lag Selection

In the next step, I determine the optimal lag length for the system of equations that I am going to estimate. To start, I set the maximum lag length in the lag-selection tests to four (using the Akaike Information Criterion). Table 4.2 presents the optimal lag length and the maximum order of integration for all the models.

Table 4.2 Optimal Lag Length and Maximum Order of Integration

Country	GDP and *s*FDI		GDP and *f*FDI		GDP and EXP	
	Optimal Lag *k* AIC	Max Order of Integration *d*	Optimal Lag *k* AIC	Max Order of Integration *d*	Optimal Lag *k* AIC	Max Order of Integration *d*
Bulgaria	2	2	1	2	1	1
Croatia	3	2	2	2	2	2
Czech Republic	2	1	1	1	1	1
Estonia	2	2	1	2	3	2
Hungary	2	2	2	2	2	2
Latvia	2	1	2	1	3	1
Lithuania	2	1	1	1	2	1
Poland	1	1	1	1	1	1
Romania	1	1	1	1	1	1
Slovakia	2	2	1	2	2	2
Slovenia	1	1	1	1	2	1

Source: Author's own calculations using STATA 15.
Notes: GDP=natural log of real per capita GDP; *s*FDI=inward FDI stock as a percentage of GDP; *f*FDI=inward FDI flows as a percentage of GDP; EXP=exports of goods and services as a share of GDP; AIC=Akaike Information Criterion.

4.4.3 VAR Diagnostic Tests

Most causality time-series studies fail to perform or report model diagnostic tests. However, here I (1) check the mathematical stability of all VAR models, (2) employ the "skewness statistic, kurtosis statistic, and the Jarque-Bera statistic tests for normally distributed disturbances after VAR" in line with Zang (2012), and (3) test for serial correlation after VAR with the Lagrange Multiplier (LM) test. Details of the diagnostic tests are in the appendix (Tables C.6–C.8). It is important to note that most but not all of the VARs estimated passed the normality test. None of the residuals were found to be serially correlated when estimating the VARs, and all models proved to be mathematically stable.

4.5 Empirical Results

Tabls 4.3 shows the results from the "causality" tests, while Table 4.4 summarizes the relationships revealed by the analysis between inward FDI stock and GDP, inward FDI flows and GDP, and exports and GDP using annual data.

The "causality" test results (Table 1.1) indicate unidirectional "causality" from GDP to inward FDI stock in one country (Latvia), unidirectional causality from inward FDI stock to GDP in five countries (Estonia, Hungary, Lithuania, Romania, and Slovenia), bidirectional "causality" in three countries (Bulgaria, Croatia, and Slovakia), and no "causal" relationship in two countries (Czech Republic and Poland). When it

comes to the relationship between inward FDI flows and GDP, the "causal" link seem to run from GDP to inward FDI flows in three countries (Croatia, Hungary, and Lithuania), from inward FDI flows to GDP (reverse "causality") in two countries (Bulgaria and Latvia), and no evidence of "causality" is found in six countries (Czech Republic, Estonia, Poland, Romania, Slovakia, and Slovenia). Finally, the results show a "causal" link from exports to GDP in two countries (Estonia and Poland) and bidirectional "causality" in two countries (Croatia and Latvia). No "causality" is found between exports and GDP in seven countries (Bulgaria, Czech Republic, Hungary, Lithuania, Romania, Slovakia, and Slovenia).

Table 4.3 "Causality" Tests Results

Country	GDP→*s*FDI	*s*FDI→GDP	GDP→*f*FDI	*f*FDI→GDP	GDP→EXP	EXP→GDP
Bulgaria	24.08*** (0.0000)	6.94** (0.0312)	2.88 (0.2366)	12.47*** (0.0020)	1.13 (0.2882)	0.71 (0.3991)
Croatia	6.56* (0.0874)	236.73*** (0.0000)	4.79* (0.0910)	0.71 (0.7005)	60.4*** (0.0000)	10.63*** (0.0049)
Czech Republic	2.95 (0.2291)	1.73 (0.422)	0.16 (0.6934)	0.15 (0.6951)	0.81 (0.3671)	0.3 (0.5859)
Estonia	2.99 (0.2241)	76.24*** (0.0000)	0.35 (0.5553)	1.16 (0.2825)	10.3 (0.0356)	9.36* (0.0527)
Hungary	1.16 (0.5597)	8.33** (0.0155)	5.5* (0.0638)	0.83 (0.6617)	0.81 (0.6671)	0.25 (0.8825)
Latvia	6.42** (0.0403)	0.98 (0.6125)	3.22 (0.2000)	25.18*** (0.0000)	23.58*** (0.0000)	8.21** (0.0418)
Lithuania	2.37 (0.3054)	33.89*** (0.0000)	3.39* (0.0655)	0.41 (0.5218)	2.88 (0.2368)	0.91 (0.6344)
Poland	0.33 (0.5632)	0.01 (0.9259)	1.25 (0.2628)	0 (0.9819)	0.51 (0.4742)	2.95* (0.0858)
Romania	1.79 (0.1807)	3.05* (0.0809)	0.04 (0.8493)	0 (0.9988)	1.37 (0.2416)	0.51 (0.4743)
Slovakia	5.22* (0.0735)	10.81*** (0.0045)	0.47 (0.4953)	0.12 (0.7249)	0.04 (0.9795)	3.34 (0.1884)
Slovenia	0.08 (0.7797)	10.92*** (0.0010)	0.43 (0.5098)	0.25 (0.6150)	4 (0.1356)	1.61 (0.4469)

Source: Author's own calculations using STATA 15.
Note: The number in parenthesis shows the Wald Chi-square significance level. ***, **, * denote rejection of null hypothesis of non-causality at 1%, 5%, and 10% level of significance respectively.

Table 4.4 Summary of "Causality" Tests Results

GDP and inward FDI stock	GDP → *s*FDI	Latvia
	*s*FDI → GDP	Estonia, Hungary, Lithuania, Romania, Slovenia
	GDP ↔ *s*FDI	Bulgaria, Croatia, Slovakia
	"No Causality"	Czech Republic, Poland
GDP and inward FDI flows	GDP → *f*FDI	Croatia, Hungary, Lithuania
	*f*FDI → GDP	Bulgaria, Latvia
	GDP ↔ *f*FDI	none
	"No Causality"	Czech Republic, Estonia, Poland, Romania, Slovakia, Slovenia
GDP and exports	GDP → EXP	none
	EXP → GDP	Estonia, Poland
	GDP ↔ EXP	Croatia, Latvia
	"No Causality"	Bulgaria, Czech Republic, Hungary, Lithuania, Romania. Slovakia, Slovenia

Source: Author's own calculations using STATA 15.

4.6 Czech Republic: A Case Study

This section examines the "causal" link between foreign and domestic investment, exports, and economic output in the Czech Republic using the same time series techniques described in Section 4.2. The Czech Republic is considered to be among one of the most successful transition economies in Central and Eastern Europe. As shown in Chapter 2, it has one of the most attractive investment climates in the region (see the Investment Attractiveness Index developed in Chapter 2), and it does relatively well in terms of its economic environment (Figure 4.1). In addition, its exports of goods and services and inward FDI stock have increased significantly since they early 1990s (Figure 4.2).

This section proposes seven different theoretical frameworks to test the relationship between both foreign and domestic investment, exports, and GDP.

$$GDP = f(sFDI) \tag{4.3}$$

$$GDP = f(DI) \tag{4.4}$$

$$GDP = f(EXP) \tag{4.5}$$

$$GDP = f(sFDI, EXP) \tag{4.6}$$

$$GDP = f(sFDI, DI) \tag{4.7}$$

$$GDP = f(DI, EXP) \tag{4.8}$$

$$GDP = f(sFDI, DI, EXP) \tag{4.9}$$

As stated above, the modified version of the Granger causality test proposed by Toda and Yamamoto (1995) and Dolado and Lutkepohl (1996) requires that I determine the optimal lag length structure (k) of the VAR and the maximum order of integration (d_{max}) of the variables in the model. Unit root tests were carried out to determined d_{max} (Table C.5) and k was determined by minimizing the values of the Akaike's Information Criterion (AIC) (Table 4.5).

Figure 4.1. The Investment Attractiveness of the Czech Republic

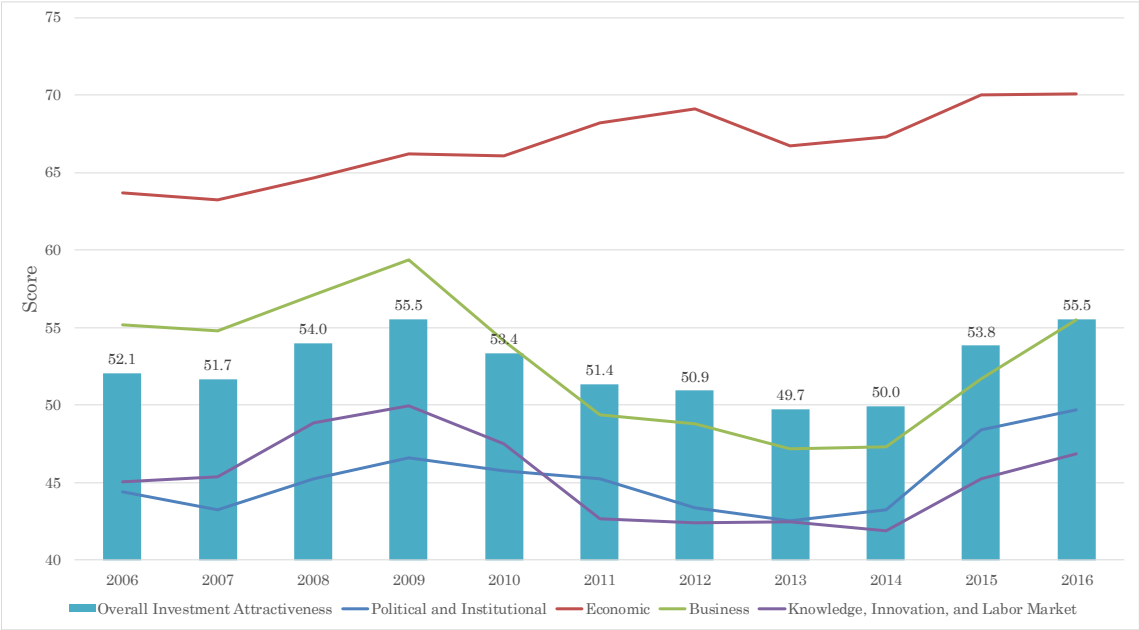


Figure 4.2. Exports and Investment in the Czech Republic

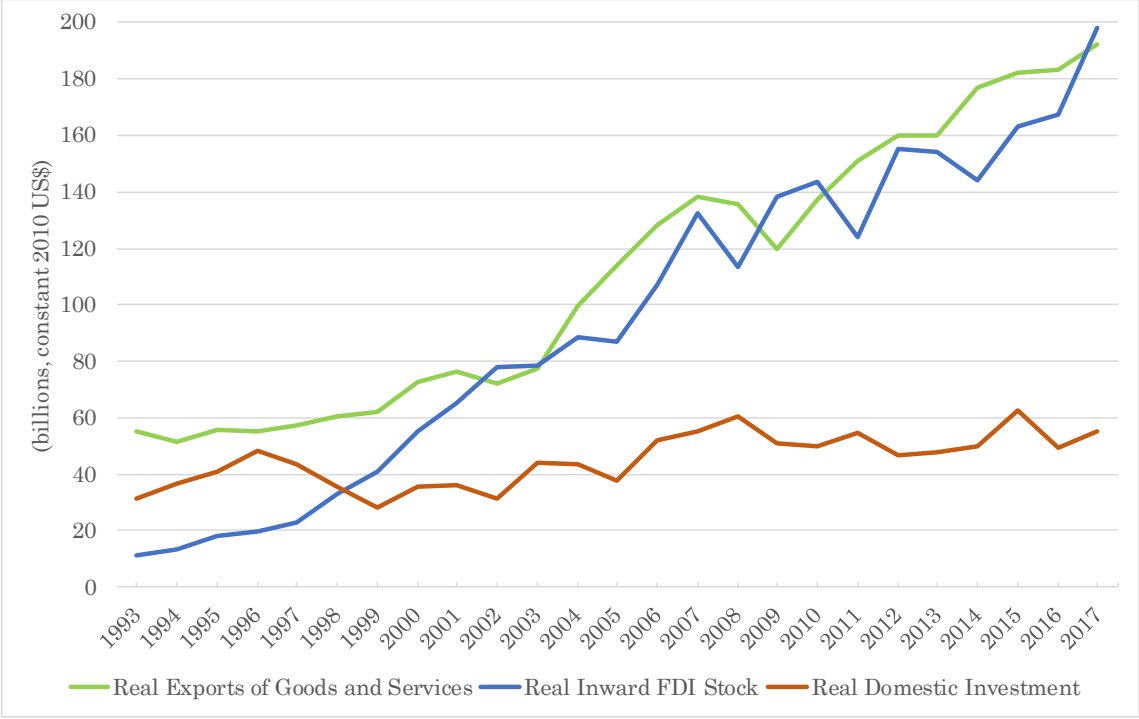


Table 4.5: Summary of Diagnostic Tests for the Czech Republic

Model	Optimal Lag k (AIC)	Max Order of Integration d_{max}	Normality Tests			LM Test
			S	K	JB	
GDP = *f*(sFDI)	1	1	■	■	■	■
GDP = *f*(DI)	1	1	■	■	■	■
GDP = *f*(EXP)	2	1	■	■	■	■
GDP = *f*(sFDI, EXP)	2	1	■	■	■	■
GDP = *f*(sFDI, DI)	1	1	■	■	■	■
GDP = *f*(DI, EXP)	2	1	■	■	■	■
GDP = *f*(sFDI, DI, EXP)	1	1	■	■	■	■

Source: Author's own calculations using STATA 15.
Notes: (1) GDP= log of real GDP; *s*FDI=log of real inward FDI stock; DI=log of real domestic investment; EXP=log of real exports of goods and services; AIC=Akaike Information Criterion.
(2) Normality tests include the skewness statistic (S), kurtosis statistic (K), and the Jarque-Bera statistic (JB) tests. ■ indicates that the disturbances after VAR are normally distributed at the 1 percent level.
(3) LM is the Lagrange-Multiplier test. ■ indicates that the residuals after VAR are not autocorrelated at the 1 percent level.

I then apply the standard Wald tests on the first k VAR coefficient matrix included in following equations:

Model 1

$$GDP_t = \alpha_1 + \sum_{i=1}^{k+dmax} \beta_{1i} GDP_{t-i} + \sum_{i=1}^{k+dmax} \delta_{1i} sFDI_{t-i} + \varepsilon_{1t} \quad (4.10)$$

$$sFDI_t = \alpha_2 + \sum_{i=1}^{k+dmax} \beta_{2i} GDP_{t-i} + \sum_{i=1}^{k+dmax} \delta_{2i} sFDI_{t-i} + \varepsilon_{1t} \quad (4.11)$$

Model 2

$$GDP_t = \alpha_1 + \sum_{i=1}^{k+dmax} \beta_{1i} GDP_{t-i} + \sum_{i=1}^{k+dmax} \delta_{1i} DI_{t-i} + \varepsilon_{1t} \quad (4.12)$$

$$DI_t = \alpha_2 + \sum_{i=1}^{k+dmax} \beta_{2i} GDP_{t-i} + \sum_{i=1}^{k+dmax} \delta_{2i} DI_{t-i} + \varepsilon_{1t} \quad (4.13)$$

Model 3

$$GDP_t = \alpha_1 + \sum_{i=1}^{k+dmax} \beta_{1i} GDP_{t-i} + \sum_{i=1}^{k+dmax} \delta_{1i} EXP_{t-i} + \varepsilon_{1t} \quad (4.14)$$

$$EXP_t = \alpha_2 + \sum_{i=1}^{k+dmax} \beta_{2i} GDP_{t-i} + \sum_{i=1}^{k+dmax} \delta_{2i} EXP_{t-i} + \varepsilon_{1t} \quad (4.15)$$

Model 4

$$GDP_t = \alpha_1 + \sum_{i=1}^{k+dmax} \beta_{1i} GDP_{t-i} + \sum_{i=1}^{k+dmax} \delta_{1i} sFDI_{t-i} + \sum_{i=1}^{k+dmax} \gamma_{1i} EXP_{t-i} + \varepsilon_{1t} \quad (4.16)$$

$$sFDI_t = \alpha_2 + \sum_{i=1}^{k+dmax} \beta_{2i} GDP_{t-i} + \sum_{i=1}^{k+dmax} \delta_{2i} sFDI_{t-i} + \sum_{i=1}^{k+dmax} \gamma_{1i} EXP_{t-i} + \varepsilon_{1t} \quad (4.17)$$

$$EXP_t = \alpha_2 + \sum_{i=1}^{k+dmax} \beta_{2i} GDP_{t-i} + \sum_{i=1}^{k+dmax} \delta_{2i} sFDI_{t-i} + \sum_{i=1}^{k+dmax} \gamma_{1i} EXP_{t-i} + \varepsilon_{1t} \quad (4.18)$$

Model 5

$$GDP_t = \alpha_1 + \sum_{i=1}^{k+dmax} \beta_{1i} GDP_{t-i} + \sum_{i=1}^{k+dmax} \delta_{1i} sFDI_{t-i} + \sum_{i=1}^{k+dmax} \gamma_{1i} DI_{t-i} + \varepsilon_{1t} \quad (4.19)$$

$$sFDI_t = \alpha_2 + \sum_{i=1}^{k+dmax} \beta_{2i} GDP_{t-i} + \sum_{i=1}^{k+dmax} \delta_{2i} sFDI_{t-i} + \sum_{i=1}^{k+dmax} \gamma_{1i} DI_{t-i} + \varepsilon_{1t} \quad (4.20)$$

$$DI_t = \alpha_2 + \sum_{i=1}^{k+dmax} \beta_{2i} GDP_{t-i} + \sum_{i=1}^{k+dmax} \delta_{2i} sFDI_{t-i} + \sum_{i=1}^{k+dmax} \gamma_{1i} DI_{t-i} + \varepsilon_{1t} \quad (4.21)$$

Model 6

$$GDP_t = \alpha_1 + \sum_{i=1}^{k+dmax} \beta_{1i} GDP_{t-i} + \sum_{i=1}^{k+dmax} \delta_{1i} DI_{t-i} + \sum_{i=1}^{k+dmax} \gamma_{1i} EXP_{t-i} + \varepsilon_{1t} \quad (4.22)$$

$$DI_t = \alpha_2 + \sum_{i=1}^{k+dmax} \beta_{2i} GDP_{t-i} + \sum_{i=1}^{k+dmax} \delta_{2i} DI_{t-i} + \sum_{i=1}^{k+dmax} \gamma_{1i} EXP_{t-i} + \varepsilon_{1t} \quad (4.23)$$

$$EXP_t = \alpha_2 + \sum_{i=1}^{k+dmax} \beta_{2i} GDP_{t-i} + \sum_{i=1}^{k+dmax} \delta_{2i} DI_{t-i} + \sum_{i=1}^{k+dmax} \gamma_{1i} EXP_{t-i} + \varepsilon_{1t} \quad (4.24)$$

Model 7

$$GDP_t = \alpha_1 + \sum_{i=1}^{k+dmax} \beta_{1i} GDP_{t-i} + \sum_{i=1}^{k+dmax} \delta_{1i} sFDI_{t-i} + \sum_{i=1}^{k+dmax} \gamma_{1i} DI_{t-i} + \sum_{i=1}^{k+dmax} \gamma_{1i} EXP_{t-i} + \varepsilon_{1t} \quad (4.25)$$

$$sFDI_t = \alpha_1 + \sum_{i=1}^{k+dmax} \beta_{1i} GDP_{t-i} + \sum_{i=1}^{k+dmax} \delta_{1i} sFDI_{t-i} + \sum_{i=1}^{k+dmax} \gamma_{1i} DI_{t-i} + \sum_{i=1}^{k+dmax} \gamma_{1i} EXP_{t-i} + \varepsilon_{1t} \quad (4.26)$$

$$DI_t = \alpha_1 + \sum_{i=1}^{k+dmax} \beta_{1i} GDP_{t-i} + \sum_{i=1}^{k+dmax} \delta_{1i} sFDI_{t-i} + \sum_{i=1}^{k+dmax} \gamma_{1i} DI_{t-i} + \sum_{i=1}^{k+dmax} \gamma_{1i} EXP_{t-i} + \varepsilon_{1t} \quad (4.27)$$

$$EXP_t = \alpha_1 + \sum_{i=1}^{k+dmax} \beta_{1i} GDP_{t-i} + \sum_{i=1}^{k+dmax} \delta_{1i} sFDI_{t-i} + \sum_{i=1}^{k+dmax} \gamma_{1i} DI_{t-i} + \sum_{i=1}^{k+dmax} \gamma_{1i} EXP_{t-i} + \varepsilon_{1t} \quad (4.28)$$

Table 4.6 presents the results from the modified Wald test. While the analysis did not find any "causal" relationship between foreign investment and GDP or between exports and GDP in the Czech Republic, there seems to be a "causal" relationship between domestic investment and GDP. The results from the bivariate model (Model 2) suggest the existence of a bidirectional "causal" relationship. Model 5 and 6 also find bidirectional "causality," which is affected indirectly by foreign investment and exports, respectively. Model 7 only finds significant "causality" flowing from GDP to domestic investment, which is

affected indirectly by both exports and foreign investment. In addition, the results also suggest unidirectional "causality" from domestic investment to exports, conditional on GDP (Model 6), as well as a unidirectional "causality" from domestic investment to foreign investment, conditional on exports and GDP (Model 7).

The findings seem to reflect the importance of fostering an environment that is attractive for investment, both domestic and foreign, and that ensures that the capabilities exist to realize its benefits. In addition, the findings here seem to support those from the panel data analysis from Chapter 2. There, I found that the impact of domestic investment on GDP, particularly in Central and Eastern European countries, is greater than that of foreign investment. In terms of policy implications, the results suggests that in the absence of complementary policies, foreign investment or exports alone will most likely fail to stimulate economic growth in the Czech Republic. While the government could continue to attract foreign investment, a more effective strategy might be improving the various dimensions of the Czech investment climate, while facilitating the creation of linkages between domestic and foreign investors. This might be a path through which the domestic sector can contribute to upgrading and diversifying the Czech production base, help narrow the skills, technological, productivity, and income gaps with Western European countries, and better integrate into European and global supply chains.

Table 4.6 "Causality" Test Results for the Czech Republic

Hypothesis	Result
Model 1	
sFDI → GDP	1.9025
	(0.168)
GDP → sFDI	0.30921
	(0.578)
Model 2	
DI → GDP	5.7334**
	(0.017)
GDP → DI	4.9081**
	(0.027)
Model 3	
EXP → GDP	3.5591
	(0.169)
GDP → EXP	0.10301
	(0.950)
Model 4	
sFDI → GDP	1.9891
	(0.370)
EXP → GDP	0.93484
	(0.627)
GDP → sFDI	1.0152
	(0.602)
EXP → sFDI	2.4642
	(0.292)
GDP → EXP	0.95161
	(0.621)
sFDI → EXP	0.36863
	(0.832)
Model 5	
sFDI → GDP	0.38339
	(0.536)
DI → GDP	4.7035**
	(0.030)
GDP → sFDI	0.02252
	(0.881)
DI → sFDI	2.4413
	(0.118)
GDP → DI	9.4872***
	(0.002)
sFDI → DI	1.7394
	(0.187)

Source: Author's own calculations using STATA 15.
Note: The number in parenthesis shows the Wald Chi-square significance level. ***, **, * denote rejection of null hypothesis of non-causality at 1%, 5%, and 10% level of significance respectively.

Table 4.6 (Continued) "Causality" Test Results for the Czech Republic

Hypothesis	Result
Model 6	
DI → GDP	9.958***
	(0.007)
EXP → GDP	3.4627
	(0.177)
GDP → DI	7.6111**
	(0.022)
EXP → DI	2.5538
	(0.279)
GDP → EXP	2.2668
	(0.322)
DI → EXP	6.2221**
	(0.045)
Model 7	
sFDI → GDP	0.61582
	(0.433)
DI → GDP	1.3005
	(0.254)
EXP → GDP	1.0208
	(0.312)
GDP → sFDI	0.19602
	(0.658)
DI → sFDI	3.1071*
	(0.078)
EXP → sFDI	0.02174
	(0.883)
GDP → DI	10.305***
	(0.001)
sFDI → DI	1.5935
	(0.207)
EXP → DI	2.686
	(0.101)
GDP → EXP	0.14202
	(0.706)
sFDI → EXP	0.66171
	(0.416)
DI → EXP	0.65467
	(0.418)

Source: Author's own calculations using STATA 15.
Note: The number in parenthesis shows the Wald Chi-square significance level. ***, **, * denote rejection of null hypothesis of non-causality at 1%, 5%, and 10% level of significance respectively.

Table 4.7: Summary of Test Results for the Czech Republic

Model	
[2] GDP = *f*(DI)	GDP ↔ DI
[5] GDP = *f*(sFDI, DI)	GDP ↔ DI
[6] GDP = *f*(DI, EXP)	GDP ↔ DI DI → EXP
[7] GDP = *f*(sFDI, DI, EXP)	DI → sFDI GDP → DI

4.7 Conclusion and Policy Implications

In this chapter, I attempt to identify—and tests for—the direction of "causality" between GDP and foreign investment and between GDP and exports in eleven transition economies in Central and Eastern Europe over the 1990-2016 period. The results, based on the Granger causality test developed by Toda and Yamamoto (1995), reveal that "causality" patterns among foreign investment, exports, and GDP differ significantly across countries. The findings suggest that, in most countries, there is a reinforcing relationship between foreign investment and GDP. In only three countries I was able to identify a unidirectional link between foreign investment and GDP. More surprisingly, however, are the results from the analysis of the relationship between GDP and exports. For most countries, the results indicate that there is no "causal" link between exports and GDP. In the case of the Czech Republic, the analysis reveals that there might be a reinforcing relationship between economic performance and domestic investment, even when accounting for

foreign investment and foreign investment and exports. In addition, some of the results from the "causality" analysis seem to suggest that there is a unidirectional link going from domestic investment to foreign investment, and from domestic investment to exports. In other words, higher levels of domestic investment might help to both attract foreign investment and boost exports.

The overall findings challenge the validity of policy guidelines that emphasize attracting FDI and boosting exports for development under the assumption that "FDI causes growth" or "exports cause growth." More emphasis should be put on the overall role of economic growth in increasing FDI and exports, and how to benefit from them—as well as to the role of human capital, infrastructure, governance, and trade, investment, and competition policies. As emphasized by Gorg and Greenway (2004), "general policies aimed at altering the fundamentals are more important than specific policies aimed at attracting particular investments" or boosting exports.

The findings also suggest that more country analysis at the individual level are needed, as the "causality" between foreign investment (or exports) and GDP is country-specific. Collecting more reliable and disaggregated data, for longer time-periods, and employing other time-series methodologies to detect "causality" may enable us to reach conclusions and craft policy recommendations that are more robust regarding trade and investment. We cannot rule out, however, that the lack of evidence for the growth enhancing effects of foreign investment and exports for many of the Central and Eastern

European countries in this analysis is due to the bivariate nature of the VAR models and lack of degrees of freedom in the time-series framework. Hence, the results motivate further future analysis in which various channels of the GDP-FDI and GDP-exports nexuses can be investigated and other variables—perhaps disaggregated by industry—included for a much longer time period.

Appendix A

Table A.1 Indicators and Data Sources (Sub-Index 1)

Political and Institutional Environment			
Indicator	**Units**	**Source**	**Notes**
Political Stability and Absence of Violence	Score	World Bank, Worldwide Governance Indicators	Measures perceptions of the likelihood of political instability and/or politically-motivated violence, including terrorism. Ranges from approximately -2.5 (weak) to 2.5 (strong).
Rule of Law	Score	World Bank, Worldwide Governance Indicators	Measures perceptions of the extent to which a country's citizens have confidence in and abide by the rules of society, and in particular the quality of contract enforcement, the police, and the courts. Ranges from approximately -2.5 (weak) to 2.5 (strong).
Control of Corruption	Score	World Bank, Worldwide Governance Indicators	Measures perceptions of the extent to which public power is exercised for private gain, including both petty and grand forms of corruption, as well as "capture" of the state by elites and private interests. Ranges from approximately -2.5 (weak) to 2.5 (strong).
Voice and Accountability	Score	World Bank, Worldwide Governance Indicators	Measures perceptions of the extent to which a country's citizens are able to participate in selecting their government, as well as freedom of expression, freedom of association, and a free media. Ranges from approximately -2.5 (weak) to 2.5 (strong).
Regulatory Quality	Score	World Bank, Worldwide Governance Indicators	Measures perceptions of the ability of the government to formulate and implement sound policies and regulations that permit and promote private sector development. Ranges from approximately -2.5 (weak) to 2.5 (strong).
Transparency of Government Policy Making	Score	World Economic Forum, Executive Opinion Survey	Assesses how difficult or easy it is for businesses to obtain information about changes in government policies and regulations affecting their activities. Ranges from 1 (extremely difficult) to 7 (extremely easy).
Property Rights	Score	World Economic Forum, Executive Opinion Survey	Assesses the extent to which property rights, including financial assets, are protected. Ranges from 1 (not at all protected) to 7 (protected to a great extent).
Intellectual Property Rights	Score	World Economic Forum, Executive Opinion Survey	Assesses the extent to which intellectual property rights are protected. Ranges from 1 (not at all protected) to 7 (protected to a great extent).

Table A.2 Indicators and Data Sources (Sub-Index 2)

Economic Environment			
Indicator	**Units**	**Source**	**Notes**
Government Budget Balance	Percent	International Monetary Fund, *World Economic Outlook* Database; World Bank, World Development Indicators	General government revenue minus total expenditures, as a percentage of GDP.
Government Debt	Percent	International Monetary Fund, *World Economic Outlook* Database; International Monetary Fund *Article IV Consultation Staff Reports*; World Bank, World Development Indicators	Gross general government debt, as a percentage of GDP.
Tax Burden	Percent	Heritage Foundation	Measures the tax burden imposed by government on individuals and corporations. It includes direct taxes, in terms of the top marginal tax rates on individual and corporate incomes, and overall taxes, including all forms of direct and indirect taxation at all levels of government, as a percentage of GDP.
Unemployment Rate	Percent	International Labour Organization, ILOSTAT Database	Unemployment, total (% of total labor force) (modeled ILO estimate), 3-year-average.
Gross Capital Formation	Percent	World Bank, World Development Indicators	Gross capital formation (formerly gross domestic investment) consists of outlays on additions to an economy's fixed assets plus net changes in the level of inventories, as a percentage of GDP.
Quality of Overall Infrastructure	Score	World Economic Forum, Executive Opinion Survey	Assesses the general state of transport, communications, and energy infrastructure. Ranges from 1 (extremely underdeveloped—among the worst in the world) to 7 (extensive and efficient—among the best in the world).
Quality of Supply of Electricity	Score	World Economic Forum, Executive Opinion Survey	Assesses the reliability of electricity supply (lack of interruptions and voltage fluctuations). Ranges from 1 (extremely unreliable) to 7 (extremely reliable).
Technological Readiness	Index	World Economic Forum, Executive Opinion Survey; International Telecommunications Union, *ITU World Telecommunication/ICT Indicators*	Index is an average of the following components: availability of latest technologies (extent to which the latest technologies are available); firm-level technology absorption (extent to which business adopt the latest technologies); foreign direct investment and technology transfer (extent to which FDI brings new technology into a country); internet users (percentage of individuals using the internet); fixed-broadband internet subscriptions (subscriptions per 100 population); internet bandwidth (international internet bandwidth—kb/s—per internet user); mobile-broadband subscriptions (active subscriptions per 100 population). Index on a 0 (lowest) to 7 (best) scale.

Table A.2 (Continued) Indicators and Data Sources (Sub-Index 2)

Economic Environment			
Indicator	**Units**	**Source**	**Notes**
Domestic Market Size	Index	Author's own calculations using WEF methodology; World Trade Organization, Online Statistics Database; International Monetary Fund, *World Economic Outlook* Database; World Bank, World Development Indicators	Sum of GDP (PPP constant 2011 international $) plus value of imports of goods and services (as a percentage of GDP), minus the value of exports of goods and services (as a percentage of GDP).
Foreign Market Size	Index	Author's own calculations using WEF methodology; World Trade Organization, Online Statistics Database; International Monetary Fund, *World Economic Outlook* Database; World Bank, World Development Indicators	Value of exports of goods and services (as a percentage of GDP).

Table A.3 Indicators and Data Sources (Sub-Index 3)

Business Environment			
Indicator	**Units**	**Source**	**Notes**
Cost to Start a Business	Percent	World Bank/International Finance Corporation, Doing Business	Cost is recorded as a percentage of the economy's income per capita. It includes all official fees and fees for legal or professional services if such services are required by law or commonly used in practice.
State of Cluster Development	Score	World Economic Forum, Executive Opinion Survey	Assesses how widespread well-developed and deep clusters are in a country (geographic concentrations of firms, suppliers, producers of related products and services, and specialized institutions in a particular field). Ranges from 1 (nonexistent) to 7 (widespread in many fields).
Ease of Access to Loans	Score	World Economic Forum, Executive Opinion Survey	Assesses how easy it is for businesses to obtain a bank loan. Ranges from 1 (extremely difficult) to 7 (extremely easy).
Intensity of Local Competition	Score	World Economic Forum, Executive Opinion Survey	Assess the intensity of competition in the local economy. Ranges from 1 (not intense at all) to 7 (extremely intense).
Extent of Market Dominance	Score	World Economic Forum, Executive Opinion Survey	Characterizes corporate activity. Ranges from 1 (dominated by a few business groups) to 7 (spread among many firms).
Agricultural Policy Costs	Score	World Economic Forum, Executive Opinion Survey	Assesses a country's agricultural policy. Ranges from 1 (excessively burdensome for the economy) to 7 (balances well the interests of taxpayers, consumers, and producers).
Effectiveness of Anti-Monopoly Policy	Score	World Economic Forum, Executive Opinion Survey	Assesses the effectiveness of anti-monopoly policies at ensuring fair competition. Ranges from 1 (not effective at all) to 7 (extremely effective).
Prevalence of Trade Barriers	Score	World Economic Forum, Executive Opinion Survey	Assesses the extent to which non-tariff barriers limit the ability of imported goods to compete in the domestic market. Ranges from 1 (strongly limit) to 7 (do not limit at all).
Burden of Customs Procedures	Score	World Economic Forum, Executive Opinion Survey	Assesses the efficiency of custom procedures. Ranges from 1 (extremely inefficient) to 7 (extremely efficient).
Business Impact of Rules on FDI	Score	World Economic Forum, Executive Opinion Survey	Assesses how restrictive the rules and regulations are on foreign direct investment. Ranges from 1 (extremely restrictive) to 7 (not restrictive at all)
Prevalence of Foreign Ownership	Score	World Economic Forum, Executive Opinion Survey	Assesses how prevalent is foreign ownership of companies. Ranges from 1 (extremely rare) to 7 (extremely prevalent)
Cooperation in Labor-Employer Relations	Score	World Economic Forum, Executive Opinion Survey	Characterizes labor-employer relations. Ranges from 1 (generally confrontational) to 7 (generally cooperative).
Hiring and Firing Practices	Score	World Economic Forum, Executive Opinion Survey	Assesses the extent to which regulations allow flexible hiring and firing of workers. Ranges from 1 (regulations do not allow at all flexible hiring and firing of workers) to 7 (regulations allow to a great extent flexible hiring and firing of workers).

Table A.4 Indicators and Data Sources (Sub-Index 4)

Knowledge Competitiveness and Labor Market Environment			
Indicator	**Units**	**Source**	**Notes**
Quality of Education	Score	World Economic Forum, Executive Opinion Survey	Assesses how well the education system meets the needs of a competitive economy. Ranges from 1 (extremely poor—among the worst in the world) to 7 (extremely good—among the best in the world).
Tertiary Education Enrollment Rate	Percent	UNESCO Institute for Statistics, Data Centre; World Economic Forum	Ratio of total tertiary enrollment, regardless of age, to the population of the age group that officially corresponds to the tertiary education level.
Research and Development Expenditure	Percent	World Bank, World Development Indicators	Current and capital expenditures (both public and private) on basic research, applied research, and experimental development, as a percentage of GDP.
On-the-Job Training	Index	World Economic Forum, Executive Opinion Survey	Index is an average of the following two components: local availability of specialized training services and extent of staff training (extent to which companies invest in training and employee development). Index on a 0 (lowest) to 7 (best) scale.
Quality of Scientific Research Institutions	Score	World Economic Forum, Executive Opinion Survey	Assesses the quality of scientific research institutions. Ranges from 1 (extremely poor—among the worst in the world) to 7 (extremely good—among the best in the world).
University-Industry Collaboration	Score	World Economic Forum, Executive Opinion Survey	Assesses the extent to which businesses and universities collaborate on research and development. Ranges from 1 (do not collaborate at all) to 7 (collaborate extensively).
Labor Productivity	USD	World Bank, World Development Indicators	GDP per person employed represents labor productivity and it is obtained by dividing gross domestic product by total employment in the economy. GDP per person employed (constant 2011 PPP $).
Pay and Productivity	Score	World Economic Forum, Executive Opinion Survey	Assesses the extent to which pay is related to employee productivity. Ranges from 1 (pay not at all related to employee productivity) to 7 (pay related to a great extent to employee productivity).
Female Participation in the Labor Force	Percent	International Labor Organization, *Key Indicators of the Labor Markets*	Ratio of women to men in the labor force.
Reliance on Professional Management	Score	World Economic Forum, Executive Opinion Survey	Assesses the extent to which senior management positions in companies are held by professional mangers chosen for merit and qualifications. Ranges from 1 (usually relatives or friends without regard to merit) to 7 (mostly professional managers chosen for merit and qualifications).

Table A.5 Consistency Analysis of the Data

Composite Indicator	Cronbach's Alpha (Measure of Internal Consistency)		Bartlett's Test of Sphericity	
	2006	2016	2006	2016
Sub-Index 1: Political and Institutional Environment	0.9796	0.9768	0.000	0.000
Sub-Index 2: Economic Environment	0.8453	0.7821	0.000	0.000
Sub-Index 3: Business Environment	0.911	0.9169	0.000	0.000
Sub-Index 4: Knowledge, Innovation, and Labor Market Environment	0.9015	0.935	0.000	0.000
Investment Attractiveness Index	0.9061	0.9061	0.000	0.000

Source: Author's own calculations using STATA 15.

Table A.6 Kaiser-Meyer-Olkin Measure of Sampling Adequacy Results

Variable	KMO Score	
	2006	2016
Sub-Index 1: Political and Institutional Environment		
Political Stability and Absence of Violence	0.8568	0.6669
Rule of Law	0.9174	0.8647
Control of Corruption	0.8874	0.8664
Voice and Accountability	0.9141	0.8393
Regulatory Quality	0.941	0.9472
Transparency of Government Policy Making	0.9098	0.7555
Property Rights	0.8871	0.7221
Intellectual Property Rights	0.8886	0.8901
Overall	0.902	0.8214
Sub-Index 2: Economic Environment		
Government Budget Balance	0.6953	0.7991
Government Debt	0.6457	0.731
Tax Burden	0.8181	0.839
Unemployment Rate	0.8579	0.8266
Gross Capital Formation	0.7987	0.7006
Quality of Overall Infrastructure	0.7794	0.7696
Quality of Supply of Electricity	0.7269	0.7416
Technological Readiness	0.7982	0.8204
Domestic Market Size	0.6421	0.6013
Foreign Market Size	0.6256	0.5801
Overall	0.7324	0.7389
Sub-Index 3: Business Environment		
Cost to Start a Business	0.6865	0.6132
State of Cluster Development	0.721	0.9027
Ease of Access to Loans	0.858	0.8032
Intensity of Local Competition	0.7966	0.6545
Extent of Market Dominance	0.7505	0.7908
Agricultural Policy Costs	0.8092	0.8721
Effectiveness of Anti-Monopoly Policy	0.7208	0.8006
Prevalence of Trade Barriers	0.7781	0.709
Burden of Customs Procedures	0.8599	0.7923
Business Impact of Rules on FDI	0.7679	0.7329
Prevalence of Foreign Ownership	0.7585	0.6884
Cooperation in Labor-Employer Relations	0.7622	0.8407
Hiring and Firing Practices	0.3542	0.5932
Overall	0.7642	0.7773
Sub-Index 4: Knowledge, Innovation, and Labor Market Environment		
Quality of Education	0.9121	0.8092
Tertiary Education Enrollment Rate	0.5561	0.1758
Research and Development Expenditure	0.8331	0.8234
On-the-Job Training	0.9113	0.8692
Quality of Scientific Research Institutions	0.8953	0.8651
University-Industry Collaboration	0.8399	0.9392
Labor Productivity	0.5461	0.7898
Pay and Productivity	0.3436	0.8776
Female Participation in the Labor Force	0.7373	0.8231
Reliance on Professional Management	0.8548	0.8619
Overall	0.8172	0.84
Investment Attractiveness Index		
Sub-Index 1: Political and Institutional Environment	0.8074	0.7159
Sub-Index 2: Economic Environment	0.8908	0.9715
Sub-Index 3: Business Environment	0.8884	0.8681
Sub-Index 4: Knowledge, Innovation, and Labor Market Environment	0.8049	0.7743
Overall	0.8435	0.814

Source: Author's own calculations using STATA 15.

Table A.7 Principal Components Analysis (2016)

Component (2016)	Initial Eigenvalues			Eigenvalues of Rotated Extracted Components		
	Eigenvalue	Proportion	Cumulative	Eigenvalue	Proportion	Cumulative
Sub-Index 1: Political and Institutional Environment						
1	6.92295	0.8654	0.8654	6.92295	0.8654	0.8654
2	0.651358	0.0814	0.9468			
3	0.154932	0.0194	0.9662			
4	0.103019	0.0129	0.979			
5	0.084595	0.0106	0.9896			
6	0.045507	0.0057	0.9953			
7	0.032092	0.004	0.9993			
8	0.005544	0.0007	1			
Sub-Index 2: Economic Environment						
1	3.62629	0.3626	0.3626	3.12911	0.3129	0.3129
2	2.93433	0.2934	0.6561	2.7824	0.2782	0.5912
3	1.44015	0.144	0.8001	2.08926	0.2089	0.8001
4	0.609167	0.0609	0.861			
5	0.465904	0.0466	0.9076			
6	0.32785	0.0328	0.9404			
7	0.246827	0.0247	0.9651			
8	0.163807	0.0164	0.9814			
9	0.113409	0.0113	0.9928			
10	0.072266	0.0072	1			
Sub-Index 3: Business Environment						
1	6.79171	0.5224	0.5224	4.00646	0.3082	0.3082
2	1.49209	0.1148	0.6372	3.41832	0.2629	0.5711
3	1.25951	0.0969	0.7341	2.11854	0.163	0.7341
4	0.867624	0.0667	0.8008			
5	0.797857	0.0614	0.8622			
6	0.713962	0.0549	0.9171			
7	0.298876	0.023	0.9401			
8	0.244823	0.0188	0.959			
9	0.174412	0.0134	0.9724			
10	0.128917	0.0099	0.9823			
11	0.105803	0.0081	0.9904			
12	0.08667	0.0067	0.9971			
13	0.037738	0.0029	1			
Sub-Index 4: Knowledge, Innovation, and Labor Market Environment						
1	6.62895	0.6629	0.6629	6.62231	0.6622	0.6622
2	1.45911	0.1459	0.8088	1.46575	0.1466	0.8088
3	0.666889	0.0667	0.8755			
4	0.434455	0.0434	0.9189			
5	0.363048	0.0363	0.9552			
6	0.243833	0.0244	0.9796			
7	0.070756	0.0071	0.9867			
8	0.060713	0.0061	0.9928			
9	0.048496	0.0048	0.9976			
10	0.023751	0.0024	1			

Table A.7 (Continued) Principal Components Analysis (2016)

Component (2016)	Initial Eigenvalues			Eigenvalues of Rotated Extracted Components		
	Eigenvalue	Proportion	Cumulative	Eigenvalue	Proportion	Cumulative
Investment Attractiveness Index						
1	3.59655	0.8991	0.8991	3.59655	0.8991	0.8991
2	0.244275	0.0611	0.9602			
3	0.13092	0.0327	0.9929			
4	0.028251	0.0071	1			

Source: Author's own calculations using STATA 15. See *Tables A3.1–A3.4* for data sources.
Notes: "Proportion" and "Cumulative" columns report the fractions and cumulated fractions of total variation in the data accounted for by each principal component. The analysis follows Nardo, Saisana, Saltelli, and Tarantola (2005) and employs orthogonal varimax rotation (with Kaiser normalization) in order to minimize the number of indicators that have a high loading on the same factor.

Table A.8 Factor Loadings Based on PCA and Weights for Aggregation (2016)

Variable (2016)	Rotated Factor Loadings			Rotated Squared Factor Loadings			Weights
	Factor 1	Factor 2	Factor 3	Factor 1	Factor 2	Factor 3	
Sub-Index 1: Political and Institutional Environment							
Political Stability and Absence of Violence	0.649631			0.42202			0.060956
Rule of Law	0.974315			0.949289			0.137114
Control of Corruption	0.97563			0.951855			0.137484
Voice and Accountability	0.951687			0.905708			0.130819
Regulatory Quality	0.94011			0.883807			0.127656
Transparency of Government Policy Making	0.971684			0.944169			0.136374
Property Rights	0.972999			0.946728			0.136744
Intellectual Property Rights	0.959054			0.919785			0.132852
Sub-Index 2: Economic Environment							
Government Budget Balance	0.135146	0.745119	-0.16406	0.018264	0.555203	0.026914	0.075043
Government Debt	-0.18273	0.855544	-0.16189	0.03339	0.731956	0.026208	0.098938
Tax Burden	-0.75356	0.278565	-0.22144	0.567858	0.077598	0.049035	0.086806
Unemployment Rate	-0.10561	-0.84387	-0.11838	0.011152	0.712113	0.014014	0.092154
Gross Capital Formation	-0.03892	0.800832	0.243121	0.001514	0.641332	0.059108	0.087738
Quality of Overall Infrastructure	0.942485	-0.05171	-0.14714	0.888279	0.002674	0.021652	0.114068
Quality of Supply of Electricity	0.926388	0.082402	0.004336	0.858195	0.00679	1.88E-05	0.108118
Technological Readiness	0.866068	0.209174	-0.02876	0.750073	0.043754	0.000827	0.099325
Domestic Market Size	-0.00301	-0.06038	0.959619	9.04E-06	0.003646	0.920869	0.115558
Foreign Market Size	-0.01521	0.085071	0.985203	0.000231	0.007237	0.970625	0.122253
Sub-Index 3: Business Environment							
Cost to Start a Business	0.521621	0.457965	-0.69618	0.272088	0.209732	0.48466	0.101271
State of Cluster Development	0.129905	0.351655	0.592106	0.016875	0.123661	0.350589	0.051462
Ease of Access to Loans	0.062651	0.658383	0.054582	0.003925	0.433468	0.002979	0.046143
Intensity of Local Competition	0.381908	-0.29286	0.669394	0.145854	0.085768	0.448088	0.071222
Extent of Market Dominance	-0.07106	0.251816	0.830374	0.005049	0.063411	0.689522	0.079423
Agricultural Policy Costs	0.700565	0.158633	0.173498	0.490791	0.025164	0.030102	0.057217
Effectiveness of Anti-Monopoly Policy	0.328265	0.546156	0.241762	0.107758	0.298287	0.058449	0.048671
Prevalence of Trade Barriers	1.083474	-0.504	-0.11062	1.173916	0.254018	0.012237	0.150905
Burden of Customs Procedures	0.579067	0.447427	-0.08762	0.335319	0.20019	0.007678	0.056917
Business Impact of Rules on FDI	0.883513	0.089485	-0.08209	0.780594	0.008008	0.006739	0.083338
Prevalence of Foreign Ownership	0.709772	0.018858	0.108582	0.503777	0.000356	0.01179	0.05406
Cooperation in Labor-Employer Relations	0.1243	0.839387	0.018485	0.015451	0.70457	0.000342	0.075482
Hiring and Firing Practices	-0.39412	1.005785	-0.12416	0.155329	1.011604	0.015415	0.12389
Sub-Index 4: Knowledge, Innovation, and Labor Market Environment							
Quality of Education	0.947263	0.13487		0.897307	0.01819		0.11319
Tertiary Education Enrollment Rate	-0.07231	0.826774		0.005229	0.683556		0.08516
Research and Development Expenditure	0.807528	0.22785		0.652102	0.051916		0.087043
On-the-Job Training	0.982776	-0.01913		0.965848	0.000366		0.119461
Quality of Scientific Research Institutions	0.940058	-0.01271		0.883708	0.000162		0.10928
University-Industry Collaboration	0.965019	-0.03705		0.931262	0.001372		0.115309
Labor Productivity	0.6014	-0.63537		0.361682	0.40369		0.094629
Pay and Productivity	0.854878	-0.03717		0.730817	0.001381		0.090527
Female Participation in the Labor Force	0.51442	0.549528		0.264628	0.301981		0.070054
Reliance on Professional Management	0.964247	-0.0563		0.929773	0.003169		0.115347

Table A.8 (Continued) Factor Loadings Based on PCA and Weights for Aggregation (2016)

Variable (2016)	Rotated Factor Loadings			Rotated Squared Factor Loadings			Weights
	Factor 1	Factor 2	Factor 3	Factor 1	Factor 2	Factor 3	
Investment Attractiveness Index							
Sub-Index 1	0.97952			0.95946			0.266777
Sub-Index 2	0.900817			0.811472			0.225629
Sub-Index 3	0.945194			0.893392			0.248407
Sub-Index 4	0.965486			0.932164			0.259187

Source: Author's own calculations using STATA 15. See *Tables A3.1–A3.4* for data sources.
Notes: The analysis follows Nardo, Saisana, Saltelli, and Tarantola (2005) and employs orthogonal varimax rotation (with Kaiser normalization) in order to minimize the number of indicators that have a high loading on the same factor.

Table A.9 Principal Components Analysis (2006)

Component (2006)	Initial Eigenvalues			Eigenvalues of Rotated Extracted Components		
	Eigenvalue	Proportion	Cumulative	Eigenvalue	Proportion	Cumulative
Sub-Index 1: Political and Institutional Environment						
1	7.00839	0.876	0.876	7.00839	0.876	0.876
2	0.547126	0.0684	0.9444			
3	0.174158	0.0218	0.9662			
4	0.111653	0.014	0.9802			
5	0.063877	0.008	0.9882			
6	0.043963	0.0055	0.9936			
7	0.031793	0.004	0.9976			
8	0.019039	0.0024	1			
Sub-Index 2: Economic Environment						
1	4.36103	0.4361	0.4361	3.69317	0.3693	0.3693
2	2.90064	0.2901	0.7262	3.56849	0.3568	0.7262
3	0.711883	0.0712	0.7974			
4	0.627979	0.0628	0.8602			
5	0.55615	0.0556	0.9158			
6	0.39378	0.0394	0.9551			
7	0.226478	0.0226	0.9778			
8	0.101367	0.0101	0.9879			
9	0.078325	0.0078	0.9958			
10	0.042373	0.0042	1			
Sub-Index 3: Business Environment						
1	6.92551	0.5327	0.5327	4.05921	0.3122	0.3122
2	1.78002	0.1369	0.6697	3.24586	0.2497	0.5619
3	1.38247	0.1063	0.776	2.78293	0.2141	0.776
4	0.819803	0.0631	0.8391			
5	0.60791	0.0468	0.8858			
6	0.412561	0.0317	0.9176			
7	0.287501	0.0221	0.9397			
8	0.253936	0.0195	0.9592			
9	0.202321	0.0156	0.9748			
10	0.142746	0.011	0.9858			
11	0.090378	0.007	0.9927			
12	0.066554	0.0051	0.9978			
13	0.028294	0.0022	1			
Sub-Index 4: Knowledge, Innovation, and Labor Market Environment						
1	5.77515	0.5775	0.5775	5.72279	0.5723	0.5723
2	1.66552	0.1666	0.7441	1.7071	0.1707	0.743
3	1.21174	0.1212	0.8652	1.22252	0.1223	0.8652
4	0.463475	0.0463	0.9116			
5	0.345511	0.0346	0.9461			
6	0.227379	0.0227	0.9689			
7	0.127385	0.0127	0.9816			
8	0.095684	0.0096	0.9912			
9	0.052033	0.0052	0.9964			
10	0.03612	0.0036	1			

Table A.9 (Continued) Principal Components Analysis (2006)

Component (2006)	Initial Eigenvalues			Eigenvalues of Rotated Extracted Components		
	Eigenvalue	Proportion	Cumulative	Eigenvalue	Proportion	Cumulative
Investment Attractiveness Index						
1	3.48476	0.8712	0.8712	3.48476	0.8712	0.8712
2	0.253167	0.0633	0.9345			
3	0.169921	0.0425	0.977			
4	0.092151	0.023	1			

Source: Author's own calculations using STATA 15. See *Tables A3.1–A3.4* for data sources.
Notes: "Proportion" and "Cumulative" columns report the fractions and cumulated fractions of total variation in the data accounted for by each principal component. The analysis follows Nardo, Saisana, Saltelli, and Tarantola (2005) and employs orthogonal varimax rotation (with Kaiser normalization) in order to minimize the number of indicators that have a high loading on the same factor.

Table A.10 Factor Loadings Based on PCA and Weights for Aggregation (2006)

Variable (2006)	Rotated Factor Loadings			Rotated Squared Factor Loading			Weights
	Factor 1	Factor 2	Factor 3	Factor 1	Factor 2	Factor 3	
Sub-Index 1: Political and Institutional Environment							
Political Stability and Absence of Violence	0.727223			0.528854			0.075452
Rule of Law	0.984015			0.968285			0.138145
Control of Corruption	0.972367			0.945497			0.134894
Voice and Accountability	0.97422			0.949104			0.135409
Regulatory Quality	0.926303			0.858037			0.122416
Transparency of Government Policy Making	0.951453			0.905262			0.129154
Property Rights	0.966543			0.934204			0.133283
Intellectual Property Rights	0.95913			0.91993			0.131247
Sub-Index 2: Economic Environment							
Government Budget Balance	0.614387	0.469994		0.377472	0.220895		0.082395
Government Debt	0.100893	0.803411		0.010179	0.645469		0.090283
Tax Burden	-0.52464	0.559157		0.275248	0.312657		0.080955
Unemployment Rate	-0.75794	-0.2265		0.574478	0.051301		0.08617
Gross Capital Formation	-0.14855	0.769408		0.022068	0.591989		0.084556
Quality of Overall Infrastructure	0.86806	-0.17096		0.753528	0.029227		0.107785
Quality of Supply of Electricity	0.864601	-0.16624		0.747535	0.027634		0.106741
Technological Readiness	0.95723	0.038725		0.916289	0.0015		0.126379
Domestic Market Size	-0.12818	-0.92601		0.016431	0.857494		0.120339
Foreign Market Size	-0.00269	-0.91146		7.24E-06	0.830767		0.114398
Sub-Index 3: Business Environment							
Cost to Start a Business	0.387638	-0.24898	0.573531	0.150263	0.061993	0.328938	0.053646
State of Cluster Development	0.986219	-0.32645	-0.0714	0.972628	0.106573	0.005098	0.107482
Ease of Access to Loans	0.380384	0.05567	0.575366	0.144692	0.003099	0.331046	0.047465
Intensity of Local Competition	0.930612	0.054229	-0.08208	0.866039	0.002941	0.006736	0.086806
Extent of Market Dominance	0.761978	0.056571	0.153809	0.58061	0.0032	0.023657	0.060216
Agricultural Policy Costs	-0.25748	1.05161	-0.02085	0.066298	1.105883	0.000435	0.116237
Effectiveness of Anti-Monopoly Policy	0.742233	0.190252	0.116274	0.55091	0.036196	0.01352	0.059538
Prevalence of Trade Barriers	0.050369	0.953061	-0.37051	0.002537	0.908325	0.137278	0.103898
Burden of Customs Procedures	0.476286	0.250426	0.353995	0.226849	0.062713	0.125312	0.041125
Business Impact of Rules on FDI	0.093887	0.691825	0.285931	0.008815	0.478622	0.081757	0.056422
Prevalence of Foreign Ownership	0.236128	0.65291	0.099259	0.055757	0.426291	0.009852	0.04876
Cooperation in Labor-Employer Relations	-0.0405	0.206827	0.825097	0.00164	0.042777	0.680786	0.071887
Hiring and Firing Practices	-0.65761	-0.08396	1.01911	0.432456	0.007049	1.038586	0.146517
Sub-Index 4: Knowledge, Innovation, and Labor Market Environment							
Quality of Education	0.887041	0.143199	0.118197	0.786842	0.020506	0.01397	0.094922
Tertiary Education Enrollment Rate	0.20645	0.573972	-0.70653	0.042622	0.329444	0.499181	0.100692
Research and Development Expenditure	0.893261	-0.01842	-0.09299	0.797915	0.000339	0.008647	0.093255
On-the-Job Training	0.987515	-0.12896	-0.00111	0.975185	0.01663	1.22E-06	0.114626
Quality of Scientific Research Institutions	0.906896	0.082705	-0.02057	0.822461	0.00684	0.000423	0.095893
University-Industry Collaboration	0.956655	0.044162	-0.05517	0.915189	0.00195	0.003044	0.106348
Labor Productivity	0.554281	-0.79609	0.029853	0.307227	0.633755	0.000891	0.108854
Pay and Productivity	0.083728	0.431165	0.825608	0.00701	0.185903	0.681629	0.101073
Female Participation in the Labor Force	0.406919	0.707372	0.094535	0.165583	0.500375	0.008937	0.077999
Reliance on Professional Management	0.950196	-0.10688	0.076181	0.902872	0.011423	0.005804	0.106338

Table A.10 (Continued) Factor Loadings Based on PCA and Weights for Aggregation (2006)

Variable (2006)	Rotated Factor Loadings			Rotated Squared Factor Loading			Weights
	Factor 1	Factor 2	Factor 3	Factor 1	Factor 2	Factor 3	
Investment Attractiveness Index							
Sub-Index 1	0.94999			0.90248			0.258994
Sub-Index 2	0.907428			0.823425			0.236307
Sub-Index 3	0.920868			0.847999			0.243359
Sub-Index 4	0.954283			0.910656			0.26134

Source: Author's own calculations using STATA 15. See *Tables A3.1–A3.4* for data sources.
Notes: The analysis follows Nardo, Saisana, Saltelli, and Tarantola (2005) and employs orthogonal varimax rotation (with Kaiser normalization) in order to minimize the number of indicators that have a high loading on the same factor.

Table A.11 IAI Ranks Using PCA and Equal Weights (2016)

2016	Overall Investment Attractiveness		Political and Institutional Environment		Economic Environment		Business Environment		Knowledge, Innovation, and Labor Market Environment	
	Rank with PCA Weights	Score with Equal Weights	Rank with PCA Weights	Score with Equal Weights	Rank with PCA Weights	Score with Equal Weights	Rank with PCA Weights	Score with Equal Weights	Rank with PCA Weights	Score with Equal Weights
Switzerland	1	1	1	1	1	1	4	5	1	1
Sweden	2	2	3	5	6	6	3	2	4	3
Finland	3	3	2	2	11	12	8	8	2	2
Netherlands	4	4	6	6	5	4	6	6	3	5
Norway	5	5	4	4	3	2	12	10	7	6
United Kingdom	6	7	9	11	9	11	1	1	10	11
Ireland	7	6	8	7	8	7	2	3	9	10
Denmark	8	10	7	8	14	14	7	7	6	4
Germany	9	9	10	10	2	3	11	9	8	8
Luxembourg	10	8	5	3	12	10	5	4	14	14
Austria	11	11	12	12	13	13	10	11	12	12
Belgium	12	12	13	13	15	18	13	13	5	7
Iceland	13	13	11	9	18	17	18	19	11	9
Estonia*	14	14	14	14	17	15	9	12	15	15
France	15	15	15	15	4	5	16	15	13	13
Czech Republic*	16	16	17	17	10	9	15	14	16	17
Portugal	17	17	16	16	22	22	14	16	19	19
Spain	18	18	19	20	7	8	20	20	20	20
Lithuania*	19	19	18	19	16	16	21	22	18	18
Slovenia*	20	20	20	18	26	26	24	23	17	16
Latvia*	21	21	21	21	24	24	17	18	21	21
Slovak Republic*	22	22	22	22	19	19	19	17	24	23
Poland*	23	23	23	23	20	20	22	21	22	22
Italy	24	24	24	24	21	21	25	24	23	24
Romania*	25	25	25	26	23	23	23	25	29	29
Bulgaria*	26	26	29	29	25	25	26	26	25	25
Croatia*	27	27	26	25	27	27	29	29	26	26
Greece	28	29	27	28	29	29	27	28	27	27
Hungary*	29	28	28	27	28	28	28	27	28	28

Source: Author's own calculations.
Note: * denotes Central and Eastern European (CEE) country.

Table A.12 IAI Ranks Using PCA and Equal Weights (2006)

2006	Overall Investment Attractiveness		Political and Institutional Environment		Economic Environment		Business Environment		Knowledge, Innovation, and Labor Market Environment	
	Rank with PCA Weights	Score with Equal Weights	Rank with PCA Weights	Score with Equal Weights	Rank with PCA Weights	Score with Equal Weights	Rank with PCA Weights	Score with Equal Weights	Rank with PCA Weights	Score with Equal Weights
Finland	1	1	2	2	4	3	3	3	1	1
Denmark	2	2	1	1	8	10	1	1	4	4
United Kingdom	3	4	9	10	5	8	2	2	5	5
Switzerland	4	3	4	4	2	2	12	10	2	2
Sweden	5	5	7	6	10	15	8	6	3	3
Germany	6	6	6	7	1	1	9	9	6	7
Netherlands	7	7	5	5	7	12	7	7	10	10
Iceland	8	8	3	3	13	11	13	14	7	6
Austria	9	10	11	12	16	17	5	5	12	12
Ireland	10	9	12	11	15	13	4	4	13	13
Norway	11	11	8	9	9	9	19	15	8	8
France	12	13	13	13	3	4	17	16	9	9
Luxembourg	13	12	10	8	18	18	6	8	17	19
Belgium	14	14	14	14	17	19	14	13	11	11
Estonia*	15	15	16	16	11	5	10	11	14	14
Czech Republic*	16	16	22	21	14	14	15	17	15	15
Slovak Republic*	17	17	20	20	12	7	11	12	23	23
Spain	18	19	18	19	6	6	20	20	21	22
Hungary*	19	20	17	17	25	27	16	18	18	17
Portugal	20	18	15	15	22	23	18	19	22	21
Slovenia*	21	21	19	18	20	21	22	22	16	16
Latvia*	22	22	24	23	19	16	21	21	20	20
Lithuania*	23	23	25	25	21	20	23	23	19	18
Greece	24	24	21	22	29	29	25	24	26	27
Poland*	25	25	26	26	23	22	27	27	24	24
Italy	26	26	23	24	24	28	28	28	28	28
Croatia*	27	27	27	27	26	25	24	25	25	25
Romania*	28	28	29	29	27	26	26	26	27	26
Bulgaria*	29	29	28	28	28	24	29	29	29	29

Source: Author's own calculations.
Note: * denotes Central and Eastern European (CEE) country.

Appendix B

Table B.1 Gross Domestic Product and Foreign Direct Investment: Ordinary Least Squares (All)
Dependent Variable: Real GDP (2006-2016)

	(OLS1)	(OLS2)	(OLS3)	(OLS4)	(OLS5)	(OLS6)	(OLS7)	(OLS8)	(OLS9)	(OLS10)	(OLS11)	(OLS12)
rFDI	0.218***	0.095***	0.015	0.064***	0.232***	0.346***	0.206***	0.335***	0.159***	0.103***	-0.009	0.036***
	(0.029)	(0.026)	(0.055)	(0.010)	(0.030)	(0.026)	(0.034)	(0.031)	(0.025)	(0.008)	(0.013)	(0.009)
rDI	0.755***	0.584***	0.556***	0.227***	0.751***	0.652***	0.769***	0.654***	0.551***	0.219***	0.164***	0.162***
	(0.025)	(0.023)	(0.023)	(0.021)	(0.029)	(0.021)	(0.033)	(0.026)	(0.029)	(0.023)	(0.020)	(0.014)
$rEXP_{goods\ and\ services}$		0.341***							0.332***	0.107***	0.111***	0.113***
		(0.044)							(0.043)	(0.010)	(0.032)	(0.014)
$rEXP_{goods}$			0.147***									
			(0.033)									
$rEXP_{services}$			0.333***									
			(0.081)									
rGOVT				0.691***						0.587***	0.716***	0.692***
				(0.021)						(0.032)	(0.038)	(0.021)
INFL					0.203***					-0.018	0.064***	-0.003
					(0.015)					(0.014)	(0.019)	(0.010)
IAI						-0.199***		-0.193***	-0.184***	-0.131***		-0.126***
						(0.022)		(0.027)	(0.022)	(0.006)		(0.007)
EEI							-0.126**	-0.157***	-0.248***		-0.084**	-0.061**
							(0.041)	(0.033)	(0.047)		(0.029)	(0.021)
Constant	0.867***	0.311***	0.175	0.867***	0.571***	1.319***	1.367***	2.039***	1.768***	0.963***	1.153***	1.341***
	(0.096)	(0.082)	(0.100)	(0.030)	(0.060)	(0.068)	(0.207)	(0.189)	(0.175)	(0.037)	(0.117)	(0.107)
Observations	314	314	314	314	314	306	271	263	263	306	271	263
Countries	30	30	30	30	30	29	26	25	25	29	26	25
R^2	0.967	0.974	0.977	0.992	0.971	0.978	0.964	0.977	0.981	0.994	0.994	0.996

Note: Driscoll-Kraay standard errors in parentheses, * p<0.10, ** p<0.05, *** p<0.01.

Table B.2 Gross Domestic Product and Foreign Direct Investment: Fixed Effects (All)
Dependent Variable: Real GDP (2006-2016)

	(FE1)	(FE2)	(FE3)	(FE4)	(FE5)	(FE6)	(FE7)	(FE8)	(FE9)	(FE10)	(FE11)	(FE12)
rFDI	0.080**	0.033*	0.031**	0.051	0.104***	0.164***	0.091**	0.193***	0.127***	0.073***	0.029	0.088***
	(0.031)	(0.017)	(0.013)	(0.030)	(0.031)	(0.024)	(0.037)	(0.027)	(0.016)	(0.014)	(0.016)	(0.018)
rDI	0.092***	0.087***	0.084***	0.063***	0.057***	0.096***	0.088***	0.094***	0.086***	0.037***	0.022**	0.039***
	(0.016)	(0.012)	(0.011)	(0.013)	(0.011)	(0.018)	(0.016)	(0.018)	(0.016)	(0.010)	(0.007)	(0.011)
$rEXP_{goods\ and\ services}$		0.200***							0.147***	0.189***	0.222***	0.181***
		(0.037)							(0.014)	(0.008)	(0.009)	(0.012)
$rEXP_{goods}$			0.015									
			(0.030)									
$rEXP_{services}$			0.181***									
			(0.033)									
rGOVT				0.413***						0.319***	0.348***	0.306***
				(0.044)						(0.022)	(0.023)	(0.024)
INFL					-0.087***					-0.075***	-0.089***	-0.070***
					(0.016)					(0.005)	(0.006)	(0.008)
IAI						0.109***		0.113***	0.117***	0.046***		0.045***
						(0.017)		(0.019)	(0.021)	(0.009)		(0.009)
EEI							0.123***	0.123***	0.095***		-0.014	0.015
							(0.030)	(0.028)	(0.015)		(0.009)	(0.010)
Constant	9.492***	7.858***	8.070***	5.716***	9.678***	8.095***	8.948***	7.317***	6.594***	4.558***	4.791***	4.554***
	(0.503)	(0.616)	(0.491)	(0.638)	(0.423)	(0.346)	(0.663)	(0.453)	(0.306)	(0.245)	(0.160)	(0.201)
Observations	314	314	314	314	314	306	271	263	263	306	271	263
Countries	30	30	30	30	30	29	26	25	25	29	26	25
R^2	0.353	0.536	0.570	0.553	0.485	0.581	0.403	0.671	0.752	0.891	0.851	0.897

Note: Driscoll-Kraay standard errors in parentheses, * p<0.10, ** p<0.05, *** p<0.01.

Table B.4 Gross Domestic Product and Foreign Direct Investment: Random Effects (All)
Dependent Variable: Real GDP (2006-2016)

	(RE1)	(RE2)	(RE3)	(RE4)	(RE5)	(RE6)	(RE7)	(RE8)	(RE9)	(RE10)	(RE11)	(RE12)
rFDI	0.252***	0.069**	0.071**	0.053	0.247***	0.390***	0.265***	0.424***	0.240***	0.062***	0.008	0.062***
	(0.026)	(0.030)	(0.029)	(0.031)	(0.028)	(0.026)	(0.024)	(0.032)	(0.050)	(0.017)	(0.014)	(0.014)
rDI	0.222***	0.149***	0.159***	0.058***	0.187***	0.204***	0.226***	0.202***	0.161***	0.040**	0.019*	0.038**
	(0.035)	(0.024)	(0.026)	(0.015)	(0.034)	(0.043)	(0.039)	(0.043)	(0.037)	(0.014)	(0.009)	(0.013)
$rEXP_{goods\ and\ services}$		0.440***							0.290***	0.215***	0.253***	0.213***
		(0.043)							(0.039)	(0.014)	(0.013)	(0.017)
$rEXP_{goods}$			0.218***									
			(0.040)									
$rEXP_{services}$			0.228***									
			(0.039)									
rGOVT				0.812***						0.589***	0.645***	0.612***
				(0.037)						(0.026)	(0.026)	(0.026)
INFL					-0.050					-0.070***	-0.073***	-0.065***
					(0.033)					(0.015)	(0.012)	(0.017)
IAI						0.011		0.011	0.042*	0.005		-0.004
						(0.023)		(0.033)	(0.023)	(0.019)		(0.023)
EEI							0.094	0.088**	0.039		-0.059***	-0.035***
							(0.056)	(0.036)	(0.023)		(0.013)	(0.009)
Constant	6.145***	4.125***	4.091***	1.499***	6.615***	4.753***	5.602***	4.056***	3.436***	1.618***	1.704***	1.604***
	(0.631)	(0.563	(0.576)	(0.134)	(0.565)	(0.546)	(0.736)	(0.480)	(0.515)	(0.195)	(0.202)	(0.126)
Observations	314	314	314	314	314	306	271	263	263	306	271	263
Countries	30	30	30	30	30	29	26	25	25	29	26	25
R^2	0.936	0.958	0.962	0.990	0.923	0.934	0.928	0.926	0.936	0.987	0.989	0.987

Note: Driscoll-Kraay standard errors in parentheses, * p<0.10, ** p<0.05, *** p<0.01.

Table B.5 Gross Domestic Product and Foreign Direct Investment: Panel-Corrected Standard Errors (All)
Dependent Variable: Real GDP (2006-2016)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
rFDI	0.320***	0.067*	0.074*	0.047***	0.320***	0.522***	0.322***	0.498***	0.207***	0.044***	-0.007	0.029
	0.073	0.038	0.042	0.017	0.071	0.055	0.065	0.060	0.045	0.012	0.011	0.018
rDI	0.609***	0.295***	0.283***	0.057**	0.615***	0.429***	0.625***	0.464***	0.356***	0.040**	0.024*	0.034**
	0.089	0.059	0.057	0.025	0.085	0.060	0.084	0.070	0.072	0.020	0.013	0.016
$rEXP_{goods\ and\ services}$		0.660***							0.494***	0.210***	0.177***	0.183***
		0.067							0.088	0.023	0.032	0.035
$rEXP_{goods}$			0.341***									
			0.043									
$rEXP_{services}$			0.326***									
			0.059									
rGOVT				0.872***						0.729***	0.787***	0.763***
				0.033						0.021	0.029	0.023
INFL					0.199***					-0.068***	-0.024	-0.060**
					0.054					0.021	0.030	0.024
IAI						-0.281***		-0.278***	-0.253***	-0.113***		-0.119***
						0.030		0.033	0.022	0.015		0.013
EEI							0.078	-0.053	-0.166***		-0.039**	-0.033*
							0.092	0.043	0.043		0.019	0.018
Constant	1.257***	0.168	0.364***	0.929***	1.021***	2.023***	0.758	2.140***	1.448***	0.869***	1.019***	1.184***
	0.256	0.143	0.116	0.090	0.296	0.181	0.619	0.323	0.227	0.056	0.131	0.142
Observations	314	314	314	314	314	306	271	263	263	306	271	263
Countries	30	30	30	30	30	29	26	25	25	29	26	25
R^2	0.996	0.998	0.998	0.999	0.996	0.998	0.995	0.998	0.998	0.999	0.999	0.999

Note: Standard errors in parentheses, * p<0.10, ** p<0.05, *** p<0.01.

Table B.6 Gross Domestic Product and Foreign Direct Investment: Ordinary Least Squares (EUROPE-20)
Dependent Variable: Real GDP (2006-2016)

	(OLS1)	(OLS2)	(OLS3)	(OLS4)	(OLS5)	(OLS6)	(OLS7)	(OLS8)	(OLS9)	(OLS10)	(OLS11)	(OLS12)
rFDI	0.184***	-0.050	-0.033	0.098***	0.191***	0.331***	0.177***	0.324***	0.044	0.117***	-0.007	0.016
	0.042	0.056	0.065	0.009	0.040	0.021	0.055	0.033	0.038	0.018	0.014	0.020
rDI	0.778***	0.534***	0.557***	0.203***	0.768***	0.644***	0.790***	0.629***	0.492***	0.226***	0.139***	0.157***
	0.025	0.030	0.027	0.021	0.028	0.015	0.029	0.017	0.036	0.034	0.016	0.024
$rEXP_{goods\ and\ services}$		0.505***							0.469***	0.131***	0.149***	0.192***
		0.075							0.081	0.019	0.037	0.025
$rEXP_{goods}$			0.197***									
			0.043									
$rEXP_{services}$			0.287**									
			0.094									
rGOVT				0.706***						0.548***	0.710***	0.653***
				0.024						0.055	0.034	0.040
INFL					0.210***					-0.031**	0.099***	0.019
					0.018					0.012	0.024	0.022
IAI						-0.287***		-0.275***	-0.263***	-0.168***		-0.132***
						0.029		0.019	0.015	0.029		0.022
EEI							-0.101**	-0.235***	-0.316***		-0.066*	-0.079***
							0.044	0.026	0.039		0.033	0.021
Constant	1.028***	0.711***	0.676***	0.564***	0.867***	1.959***	1.387**	3.106***	2.823***	1.054***	0.920***	1.248***
	0.262	0.135	0.093	0.031	0.187	0.250	0.473	0.253	0.101	0.168	0.156	0.230
Observations	193	193	193	193	193	185	161	153	153	185	161	153
Countries	19	19	19	19	19	18	16	15	15	18	16	15
R^2	0.950	0.966	0.968	0.988	0.956	0.969	0.932	0.953	0.965	0.991	0.990	0.990

Note: Driscoll-Kraay standard errors in parentheses, * p<0.10, ** p<0.05, *** p<0.01.

Table B.7 Gross Domestic Product and Foreign Direct Investment: Fixed Effects (EUROPE-20)
Dependent Variable: Real GDP (2006-2016)

	(FE1)	(FE2)	(FE3)	(FE4)	(FE5)	(FE6)	(FE7)	(FE8)	(FE9)	(FE10)	(FE11)	(FE12)
rFDI	0.057*	0.031	0.031*	0.035	0.082**	0.140***	0.065*	0.171***	0.142***	0.075***	0.026	0.099***
	0.028	0.018	0.017	0.031	0.029	0.020	0.030	0.023	0.019	0.017	0.017	0.020
rDI	0.076***	0.074***	0.063***	0.048***	0.049**	0.080***	0.070***	0.076***	0.074***	0.027**	0.012	0.031**
	0.019	0.018	0.014	0.015	0.015	0.022	0.019	0.022	0.022	0.012	0.007	0.014
$rEXP_{goods\ and\ services}$		0.156***							0.106***	0.203***	0.252***	0.188***
		0.043							0.022	0.018	0.031	0.019
$rEXP_{goods}$			-0.066******									
			0.020									
$rEXP_{services}$			0.168									
			0.028									
rGOVT				0.370***						0.337***	0.373***	0.313***
				0.047						0.033	0.019	0.033
INFL					-0.081***					-0.078***	-0.096***	-0.071***
					0.016					0.006	0.010	0.006
IAI						0.134***		0.143***	0.148***	0.070***		0.067***
						0.029		0.031	0.027	0.018		0.016
EEI							0.081**	0.084**	0.087***		-0.004	0.031***
							0.033	0.030	0.023		0.019	0.009
Constant	10.190***	8.731***	9.543***	6.670***	10.248***	8.667***	9.906***	8.061***	7.181***	4.297***	4.420***	4.336***
	0.518	0.764	0.676	0.505	0.483	0.346	0.509	0.456	0.251	0.580	0.486	0.519
Observations	193	193	193	193	193	185	161	153	153	185	161	153
Countries	19	19	19	19	19	18	16	15	15	18	16	15
R^2	0.328	0.415	0.516	0.519	0.462	0.603	0.349	0.704	0.736	0.884	0.804	0.895

Note: Driscoll-Kraay standard errors in parentheses, * p<0.10, ** p<0.05, *** p<0.01.

Table B.8 Gross Domestic Product and Foreign Direct Investment: Random Effects (EUROPE-20)
Dependent Variable: Real GDP (2006-2016)

	(RE1)	(RE2)	(RE3)	(RE4)	(RE5)	(RE6)	(RE7)	(RE8)	(RE9)	(RE10)	(RE11)	(RE12)
rFDI	0.150***	0.013	0.032	0.033	0.151***	0.298***	0.131***	0.291***	0.158***	0.054**	0.000	0.058**
	0.018	0.024	0.022	0.038	0.022	0.025	0.025	0.027	0.049	0.022	0.016	0.022
rDI	0.177***	0.124***	0.135***	0.036**	0.146***	0.182***	0.157***	0.163**	0.141**	0.021	0.006	0.024
	0.036	0.026	0.031	0.014	0.034	0.053	0.041	0.054	0.049	0.019	0.008	0.020
$rEXP_{goods\ and\ services}$		0.534***							0.355***	0.264***	0.313***	0.259***
		0.068							0.091	0.013	0.021	0.015
$rEXP_{goods}$			0.243***									
			0.054									
$rEXP_{services}$			0.210***									
			0.033									
rGOVT				0.824***						0.567***	0.628***	0.579***
				0.058						0.055	0.064	0.071
INFL					-0.047					-0.086***	-0.083***	-0.074***
					0.037					0.006	0.011	0.006
IAI						-0.024		-0.009	0.012	0.026		0.021
						0.053		0.076	0.077	0.038		0.045
EEI							0.074	0.080	0.080		-0.036*	-0.003
							0.145	0.079	0.052		0.017	0.009
Constant	7.943***	4.078***	4.816***	1.837***	8.296***	6.302***	8.130***	6.267***	3.938***	1.554***	1.385***	1.434**
	0.491	0.618	0.695	0.310	0.442	0.567	1.012	0.484	0.734	0.419	0.420	0.642
Observations	193	193	193	193	193	185	161	153	153	185	161	153
Countries	19	19	19	19	19	18	16	15	15	18	16	15
R^2	0.920	0.941	0.942	0.984	0.894	0.906	0.886	0.824	0.843	0.973	0.976	0.955

Note: Driscoll-Kraay standard errors in parentheses, * p<0.10, ** p<0.05, *** p<0.01.

Table B.9 Gross Domestic Product and Foreign Direct Investment: Ordinary Least Squares (CEE-11)
Dependent Variable: Real GDP (2006-2016)

	(OLS1)	(OLS2)	(OLS3)	(OLS4)	(OLS5)	(OLS6)	(OLS7)	(OLS8)	(OLS9)	(OLS10)	(OLS11)	(OLS12)
rFDI	0.342***	0.223***	0.086	0.019	0.314***	0.329***	0.324***	0.323***	0.084	-0.011	0.020	0.000
	0.074	0.063	0.055	0.028	0.068	0.061	0.074	0.066	0.053	0.029	0.041	0.035
rDI	0.638***	0.563***	0.512***	0.166***	0.688***	0.644***	0.654***	0.647***	0.518***	0.162***	0.178***	0.157***
	0.062	0.050	0.064	0.052	0.069	0.053	0.065	0.061	0.033	0.027	0.051	0.021
$rEXP_{goods\ and\ services}$		0.209***							0.392***	0.076***	-0.034	0.018
		0.024							0.039	0.016	0.035	0.014
$rEXP_{goods}$			0.144***									
			0.024									
$rEXP_{services}$			0.323***									
			0.061									
rGOVT				0.808***						0.757***	0.824***	0.803***
				0.060						0.049	0.055	0.044
INFL					0.200***					-0.046**	0.023	-0.019
					0.027					0.017	0.019	0.015
IAI						-0.132*		-0.132	-0.174*	-0.128***		-0.131***
						0.062		0.093	0.081	0.008		0.016
EEI							-0.170**	-0.040	-0.141*		-0.128***	-0.020
							0.069	0.058	0.076		0.029	0.048
Constant	0.732***	0.551***	0.001	0.796***	0.338***	1.320***	1.466***	1.509***	1.758***	1.386***	1.374***	1.527***
	0.179	0.159	0.257	0.035	0.087	0.183	0.227	0.230	0.337	0.082	0.144	0.163
Observations	121	121	121	121	121	121	110	110	110	121	110	110
Countries	11	11	11	11	11	11	10	10	10	11	10	10
R^2	0.958	0.962	0.967	0.991	0.963	0.963	0.961	0.964	0.976	0.994	0.993	0.995

Note: Driscoll-Kraay standard errors in parentheses, * p<0.10, ** p<0.05, *** p<0.01.

Table B.10 Gross Domestic Product and Foreign Direct Investment: Fixed Effects (CEE-11)
Dependent Variable: Real GDP (2006-2016)

	(FE1)	(FE2)	(FE3)	(FE4)	(FE5)	(FE6)	(FE7)	(FE8)	(FE9)	(FE10)	(FE11)	(FE12)
rFDI	0.244***	0.097**	0.078**	0.174***	0.246***	0.227***	0.245***	0.225***	0.081**	0.041**	0.048**	0.044**
	0.064	0.032	0.029	0.025	0.051	0.056	0.057	0.048	0.033	0.016	0.017	0.019
rDI	0.138***	0.124***	0.126***	0.113***	0.089***	0.125***	0.138***	0.125***	0.109***	0.058***	0.056***	0.057***
	0.016	0.011	0.014	0.017	0.011	0.015	0.017	0.016	0.009	0.013	0.014	0.012
$rEXP_{goods\ and\ services}$		0.194***							0.184***	0.195***	0.196***	0.195***
		0.034							0.020	0.011	0.014	0.013
$rEXP_{goods}$			0.068*									
			0.033									
$rEXP_{services}$			0.164***									
			0.036									
rGOVT				0.434***						0.317***	0.337***	0.318***
				0.047						0.017	0.020	0.023
INFL					-0.073***					-0.065***	-0.070***	-0.062***
					0.016					0.005	0.006	0.007
IAI						0.081***		0.093***	0.097***	0.033***		0.032**
						0.012		0.011	0.016	0.008		0.010
EEI							0.126***	0.140***	0.089***		-0.009	0.002
							0.038	0.037	0.017		0.012	0.014
Constant	6.897***	6.531***	6.428***	3.488***	7.434***	6.905***	6.373***	6.315***	6.239***	4.518***	4.407***	4.464***
	0.651	0.491	0.388	0.613	0.485	0.600	0.647	0.554	0.398	0.296	0.280	0.293
Observations	121	121	121	121	121	121	110	110	110	121	110	110
Countries	11	11	11	11	11	11	10	10	10	11	10	10
R^2	0.564	0.720	0.758	0.729	0.629	0.599	0.628	0.674	0.795	0.913	0.911	0.916

Note: Driscoll-Kraay standard errors in parentheses, * p<0.10, ** p<0.05, *** p<0.01.

Table B.11 Gross Domestic Product and Foreign Direct Investment: Random Effects (CEE-11)
Dependent Variable: Real GDP (2006-2016)

	(RE1)	(RE2)	(RE3)	(RE4)	(RE5)	(RE6)	(RE7)	(RE8)	(RE9)	(RE10)	(RE11)	(RE12)
rFDI	0.408***	0.191***	0.159**	0.170***	0.400***	0.427***	0.444***	0.415***	0.244***	0.059**	0.058*	0.059*
	0.058	0.058	0.064	0.015	0.055	0.054	0.046	0.048	0.056	0.024	0.028	0.030
rDI	0.200***	0.162***	0.159***	0.117***	0.175***	0.209***	0.212***	0.199***	0.177***	0.076***	0.069***	0.069***
	0.036	0.023	0.021	0.018	0.027	0.032	0.039	0.035	0.023	0.012	0.013	0.014
$rEXP_{goods\ and\ services}$		0.215***							0.212***	0.179***	0.189***	0.189***
		0.036							0.045	0.020	0.029	0.029
$rEXP_{goods}$			0.094**									
			0.038									
$rEXP_{services}$			0.154***									
			0.025									
rGOVT				0.645***						0.542***	0.544***	0.561***
				0.036						0.033	0.034	0.035
INFL					-0.031					-0.049***	-0.052***	-0.055***
					0.021					0.014	0.011	0.015
IAI						-0.009		0.006	0.011	-0.007		-0.018
						0.050		0.041	0.044	0.020		0.022
EEI							0.084***	0.091***	0.032		-0.033**	-0.040***
							0.020	0.019	0.042		0.013	0.012
Constant	4.506***	4.921***	5.037***	1.346***	4.881***	4.247***	3.658***	4.050***	4.055***	2.139***	2.226***	2.134***
	0.744	0.729	0.633	0.384	0.592	0.794	0.603	0.727	0.808	0.413	0.402	0.387
Observations	121	121	121	121	121	121	110	110	110	121	110	110
Countries	11	11	11	11	11	11	10	10	10	11	10	10
R^2	0.929	0.946	0.954	0.987	0.923	0.930	0.925	0.923	0.942	0.983	0.983	0.985

Note: Driscoll-Kraay standard errors in parentheses, * p<0.10, ** p<0.05, *** p<0.01.

Table B.12 Gross Domestic Product and Foreign Direct Investment: Panel-Corrected Standard Errors (All)
Dependent Variable: Real GDP (1970-2017)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
rFDI	0.268***	-0.036**	-0.017	0.029***	0.319***	0.522***	0.322***	0.498***	0.207***	0.044***	-0.007	0.029*
	0.021	0.018	0.020	0.008	0.025	0.042	0.047	0.048	0.044	0.015	0.010	0.016
rDI	0.547***	0.254***	0.249***	0.033***	0.494***	0.429***	0.625***	0.464***	0.356***	0.040**	0.024*	0.034**
	0.034	0.032	0.031	0.007	0.037	0.057	0.068	0.064	0.072	0.017	0.012	0.015
$rEXP_{goods\ and\ services}$		0.790***							0.494***	0.210***	0.177***	0.183***
		0.041							0.095	0.021	0.027	0.028
$rEXP_{goods}$			0.458***									
			0.033									
$rEXP_{services}$			0.310***									
			0.041									
rGOVT				0.904***						0.729***	0.787***	0.763***
				0.012						0.019	0.024	0.022
INFL					0.138***					-0.068***	-0.024	-0.060***
					0.043					0.015	0.022	0.019
IAI						-0.281***		-0.278***	-0.253***	-0.113***		-0.119***
						0.029		0.030	0.023	0.015		0.014
EEI							0.078	-0.053	-0.166***		-0.039**	-0.033*
							0.089	0.046	0.052		0.019	0.019
Constant	2.589***	0.384**	0.718***	1.075***	2.438***	2.023***	0.758	2.140***	1.448***	0.869***	1.019***	1.184***
	0.282	0.168	0.184	0.066	0.304	0.247	0.529	0.300	0.240	0.057	0.119	0.138
Observations	900	836	836	900	746	306	271	263	263	306	271	263
Countries	31	31	31	31	31	29	26	25	25	29	26	25
R^2	0.992	0.997	0.997	0.999	0.993	0.998	0.995	0.998	0.998	0.998	0.998	0.998

Note: Standard errors in parentheses, * p<0.10, ** p<0.05, *** p<0.01.

Table B.13 Gross Domestic Product and Foreign Direct Investment: Fixed Effects (All)
Dependent Variable: Real GDP (1970-2016)

	(FE1)	(FE2)	(FE3)	(FE4)	(FE5)	(FE6)	(FE7)	(FE8)	(FE9)	(FE10)	(FE11)	(FE12)
rFDI	0.171***	0.072***	0.074***	0.049***	0.171***	0.164***	0.091**	0.193***	0.127***	0.073***	0.029	0.088***
	0.008	0.011	0.011	0.010	0.008	0.024	0.037	0.027	0.016	0.014	0.016	0.018
rDI	0.158***	0.094***	0.108***	0.077***	0.098***	0.096***	0.088***	0.094***	0.086***	0.037***	0.022**	0.039***
	0.033	0.018	0.020	0.021	0.017	0.018	0.016	0.018	0.016	0.010	0.007	0.011
$rEXP_{goods\ and\ services}$		0.308***							0.147***	0.189***	0.222***	0.181***
		0.020							0.014	0.008	0.009	0.012
$rEXP_{goods}$			0.194***									
			0.022									
$rEXP_{services}$			0.105***									
			0.021									
rGOVT				0.647***						0.319***	0.348***	0.306***
				0.042						0.022	0.023	0.024
INFL					-0.113***					-0.075***	-0.089***	-0.070***
					0.013					0.005	0.006	0.008
IAI						0.109***		0.113***	0.117***	0.046***		0.045***
						0.017		0.019	0.021	0.009		0.009
EEI							0.123***	0.123***	0.095***		-0.014	0.015
							0.030	0.028	0.015		0.009	0.010
Constant	7.805***	6.191***	6.217***	3.107***	8.501***	8.095***	8.948***	7.317***	6.594***	4.558***	4.791***	4.554***
	0.328	0.211	0.206	0.356	0.177	0.346	0.663	0.453	0.306	0.245	0.160	0.201
Observations	900	836	836	900	746	306	271	263	263	306	271	263
Countries	31	31	31	31	31	29	26	25	25	29	26	25
R^2	0.812	0.910	0.900	0.920	0.827	0.581	0.403	0.671	0.752	0.891	0.851	0.897

Note: Driscoll-Kraay standard errors in parentheses, * p<0.10, ** p<0.05, *** p<0.01.

Table B.14 Gross Domestic Product and Foreign Direct Investment: Fixed Effects (EUROPE-20)
Dependent Variable: Real GDP (1970-2016)

	(FE1)	(FE2)	(FE3)	(FE4)	(FE5)	(FE6)	(FE7)	(FE8)	(FE9)	(FE10)	(FE11)	(FE12)
rFDI	0.180***	0.087***	0.092***	0.033***	0.173***	0.140***	0.065*	0.171***	0.142***	0.075***	0.026	0.099***
	0.005	0.009	0.009	0.010	0.012	0.020	0.030	0.023	0.019	0.017	0.017	0.020
rDI	0.126***	0.074***	0.078***	0.046*	0.069***	0.080***	0.070***	0.076***	0.074***	0.027**	0.012	0.031**
	0.040	0.024	0.023	0.024	0.018	0.022	0.019	0.022	0.022	0.012	0.007	0.014
$rEXP_{goods\ and\ services}$		0.289***							0.106***	0.203***	0.252***	0.188***
		0.029							0.022	0.018	0.031	0.019
$rEXP_{goods}$			0.120***									
			0.037									
$rEXP_{services}$			0.141***									
			0.022									
rGOVT				0.699***						0.337***	0.373***	0.313***
				0.039						0.033	0.019	0.033
INFL					-0.119***					-0.078***	-0.096***	-0.071***
					0.016					0.006	0.010	0.006
IAI						0.134***		0.143***	0.148***	0.070***		0.067***
						0.029		0.031	0.027	0.018		0.016
EEI							0.081**	0.084**	0.087***		-0.004	0.031***
							0.033	0.030	0.023		0.019	0.009
Constant	8.201***	6.588***	6.904***	3.114***	8.973***	8.667***	9.906***	8.061***	7.181***	4.297***	4.420***	4.336***
	0.446	0.352	0.358	0.381	0.271	0.346	0.509	0.456	0.251	0.580	0.486	0.519
Observations	631	567	567	631	479	185	161	153	153	185	161	153
Countries	20	20	20	20	20	18	16	15	15	18	16	15
R^2	0.812	0.906	0.905	0.935	0.806	0.603	0.349	0.704	0.736	0.884	0.804	0.895

Note: Driscoll-Kraay standard errors in parentheses, * p<0.10, ** p<0.05, *** p<0.01.

Table B.15 Gross Domestic Product and Foreign Direct Investment: Fixed Effects (CEE-11)
Dependent Variable: Real GDP (1970-2016)

	(FE1)	(FE2)	(FE3)	(FE4)	(FE5)	(FE6)	(FE7)	(FE8)	(FE9)	(FE10)	(FE11)	(FE12)
rFDI	0.139***	0.044**	0.041**	0.066***	0.154***	0.227***	0.245***	0.225***	0.081**	0.041**	0.048**	0.044**
	0.024	0.018	0.018	0.020	0.021	0.056	0.057	0.048	0.033	0.016	0.017	0.019
rDI	0.271***	0.163***	0.178***	0.154***	0.209***	0.125***	0.138***	0.125***	0.109***	0.058***	0.056***	0.057***
	0.048	0.020	0.020	0.029	0.043	0.015	0.017	0.016	0.009	0.013	0.014	0.012
$rEXP_{goods\ and\ services}$		0.311***							0.184***	0.195***	0.196***	0.195***
		0.031							0.020	0.011	0.014	0.013
$rEXP_{goods}$			0.267***									
			0.025									
$rEXP_{services}$			0.033									
			0.022									
rGOVT				0.586***						0.317***	0.337***	0.318***
				0.087						0.017	0.020	0.023
INFL					-0.067					-0.065***	-0.070***	-0.062***
					0.041					0.005	0.006	0.007
IAI						0.081***		0.093***	0.097***	0.033***		0.032**
						0.012		0.011	0.016	0.008		0.010
EEI							0.126***	0.140***	0.089***		-0.009	0.002
							0.038	0.037	0.017		0.012	0.014
Constant	6.650***	5.454***	5.490***	2.670***	7.188***	6.905***	6.373***	6.315***	6.239***	4.518***	4.407***	4.464***
	0.332	0.191	0.220	0.802	0.284	0.600	0.647	0.554	0.398	0.296	0.280	0.293
Observations	269	269	269	269	267	121	110	110	110	121	110	110
Countries	11	11	11	11	11	11	10	10	10	11	10	10
R^2	0.842	0.934	0.928	0.907	0.866	0.599	0.628	0.674	0.795	0.913	0.911	0.916

Note: Driscoll-Kraay standard errors in parentheses, * p<0.10, ** p<0.05, *** p<0.01.

Table B.16 Gross Domestic Product and Foreign Direct Investment: PMG Estimation (All)
Dependent Variable: Real GDP (1970-2016)

	PMG1	PMG2	PMG3	PMG4	PMG5	PMG6	PMG7	PMG8
Error Correction Term	-0.156***	-0.250***	-0.214***	-0.178***	-0.243***	-0.180***	-0.179***	-0.152***
	0.024	0.035	0.033	0.026	0.034	0.028	0.026	0.022
rFDI	0.131***	0.065***	0.060***	0.074***	0.056***	0.111***	0.152***	0.120***
	0.004	0.005	0.005	0.007	0.005	0.008	0.006	0.006
rDI	0.332***	0.248***	0.274***	0.303***	0.254***	0.276***	0.206***	0.355***
	0.020	0.011	0.011	0.015	0.011	0.021	0.022	0.021
$rEXP_{goods\ and\ services}$		0.247***						
		0.012						
$rEXP_{goods}$			0.222***		0.187***			
			0.011		0.011			
$rEXP_{services}$				0.203***	0.073***			
				0.016	0.011			
rGOVT						0.129***		
						0.044		
INFL							-0.075***	
							0.017	
UR								-0.006***
								0.002
Intercept	0.991***	1.311***	1.138***	0.920***	1.259***	1.045***	1.339***	0.947***
	0.148	0.176	0.169	0.132	0.172	0.158	0.189	0.138
Countries	31	31	31	31	31	31	31	31
Observations	1178	1178	1178	1178	1178	1178	1178	1178
Observations Per Country (Min)	21	21	21	21	21	21	21	21
Observations Per Country (Max)	47	47	47	47	47	47	47	47
Log Likelihood	2926.8	2799.4	2936.9	2744.9	2799.9	2928.0	2415.9	2789.7

Notes: The entries in the upper part of the table provide the estimation results for the regression coefficients. Standard errors of the coefficients are shown in parenthesis. ***, **, * denote the significance of the coefficients at the 1, 5, and 10 percent levels, respectively.

Table B.17 Gross Domestic Product and Foreign Direct Investment: PMG Estimation (EUROPE-20)
Dependent Variable: Real GDP (1970-2016)

	PMG1	PMG2	PMG3	PMG4	PMG5	PMG6	PMG7	PMG8
Error Correction Term	-0.120***	-0.188***	-0.132***	-0.157***	-0.178***	-0.137***	-0.145***	-0.060***
	0.031	0.042	0.032	0.036	0.041	0.036	0.037	0.020
rFDI	0.134***	0.088***	0.083***	0.098***	0.090***	0.117***	0.117***	0.052***
	0.005	0.007	0.009	0.007	0.007	0.011	0.006	0.014
rDI	0.300***	0.238***	0.278***	0.272***	0.247***	0.267***	0.280***	0.449***
	0.023	0.014	0.018	0.018	0.014	0.029	0.028	0.038
$rEXP_{goods\ and\ services}$		0.188***						
		0.016						
$rEXP_{goods}$			0.172***		0.123***			
			0.018		0.018			
$rEXP_{services}$				0.138***	0.054***			
				0.016	0.015			
rGOVT						0.104		
						0.064		
INFL							-0.005	
							0.019	
UR								-0.057***
								0.006
Intercept	0.826***	1.121***	0.780***	0.968***	1.073***	0.866***	1.063***	0.376
	0.211	0.246	0.185	0.217	0.242	0.221	0.275	0.123
Countries	20	20	20	20	20	20	20	20
Observations	899	899	899	899	899	899	899	899
Observations Per Country (Min)	21	21	21	21	21	21	21	21
Observations Per Country (Max)	47	47	47	47	47	47	47	47
Log Likelihood	2147.2	1968.0	2106.5	1944.6	1962.1	2148.1	1635.8	2087.7

Notes: The entries in the upper part of the table provide the estimation results for the regression coefficients. Standard errors of the coefficients are shown in parenthesis. ***, **, * denote the significance of the coefficients at the 1, 5, and 10 percent levels, respectively.

Table B.18 Gross Domestic Product and Foreign Direct Investment: PMG Estimation (CEE-11)
Dependent Variable: Real GDP (1970-2016)

	PMG1	PMG2	PMG3	PMG4	PMG5	PMG6	PMG7	PMG8
Error Correction Term	-0.234***	-0.404***	-0.392***	-0.301***	-0.411***	-0.249***	-0.258***	-0.233***
	0.037	0.044	0.042	0.051	0.041	0.035	0.038	0.031
rFDI	0.165***	0.041***	0.042***	0.109***	0.034***	0.148***	0.186***	0.151***
	0.013	0.007	0.007	0.012	0.006	0.019	0.010	0.016
rDI	0.359***	0.226***	0.246***	0.295***	0.227***	0.338***	0.231***	0.360***
	0.030	0.014	0.013	0.018	0.013	0.039	0.031	0.032
$rEXP_{goods\ and\ services}$		0.301***						
		0.014						
$rEXP_{goods}$			0.255***		0.222***			
			0.012		0.013			
$rEXP_{services}$				0.226***	0.081***			
				0.020	0.014			
rGOVT						0.086		
						0.109		
INFL							-0.135***	
							0.024	
UR								-0.001
								0.003
Intercept	1.279***	1.996***	2.059***	1.340***	2.082***	1.241***	1.720***	1.309***
	0.190	0.213	0.220	0.213	0.205	0.166	0.241	0.167
Countries	11	11	11	11	11	11	11	11
Observations	279	279	279	279	279	279	279	279
Observations Per Country (Min)	22	22	22	22	22	22	22	22
Observations Per Country (Max)	37	37	37	37	37	37	37	37
Log Likelihood	783.7	839.7	839.9	814.5	852.6	783.8	793.5	709.1

Notes: The entries in the upper part of the table provide the estimation results for the regression coefficients. Standard errors of the coefficients are shown in parenthesis. ***, **, * denote the significance of the coefficients at the 1, 5, and 10 percent levels, respectively.

Appendix C

Table C.1 Summary Statistics for Yearly Data

Country	Variable	Obs	Mean	Min	Max	Std Dev
Bulgaria	GDP	26	8.253739	7.81041	8.709281	0.305604
	*s*FDI	26	44.45326	0.734895	91.56523	36.937
	*f*FDI	26	6.747627	0.369524	27.89528	7.052067
	EXP	26	48.40197	33.90856	65.01241	10.02914
Croatia	GDP	22	9.1394	8.786388	9.350389	0.171668
	*s*FDI	22	33.89576	1.682029	69.67799	21.29524
	*f*FDI	22	3.946524	0.456479	8.196407	2.129389
	EXP	22	38.11934	27.61176	49.66073	5.826253
Czech Republic	GDP	27	9.401632	8.995547	9.712756	0.233626
	*s*FDI	27	37.76292	0.197742	64.08532	21.8093
	*f*FDI	27	3.859715	0.206515	10.35253	2.851169
	EXP	27	57.70874	38.31683	82.54569	13.73738
Estonia	GDP	24	9.135022	8.547077	9.520201	0.334903
	*s*FDI	24	58.76124	14.49421	87.08579	25.55713
	*f*FDI	24	7.21433	0.057473	20.48694	4.120511
	EXP	24	69.86351	57.39547	86.53975	9.071477
Hungary	GDP	27	9.048692	8.72788	9.335357	0.206976
	*s*FDI	27	48.37424	1.623226	79.28648	23.36082
	*f*FDI	27	4.429494	0.94104	10.30033	2.500303
	EXP	27	61.82604	26.40859	90.21258	21.18005
Latvia	GDP	25	8.799221	8.096889	9.306312	0.409004
	*s*FDI	25	30.59109	2.730296	55.61099	15.71813
	*f*FDI	25	3.800615	0.360439	8.004042	2.130137
	EXP	25	46.9424	34.56687	72.17579	11.61127
Lithuania	GDP	25	8.842111	8.200157	9.39732	0.395475
	*s*FDI	25	24.16556	1.113743	36.38457	12.09632
	*f*FDI	25	2.800907	0.142789	8.233769	2.113594
	EXP	25	55.46512	23.35428	84.06246	17.42181
Poland	GDP	27	8.828525	8.212959	9.328383	0.35666
	*s*FDI	27	22.47661	0.170522	42.68848	14.563
	*f*FDI	27	2.718399	0.151095	5.544707	1.350738
	EXP	27	33.37307	22.09465	52.25985	9.414856
Romania	GDP	26	8.475045	8.051826	8.93416	0.298031
	*s*FDI	26	22.77615	0.143178	43.33039	16.00741
	*f*FDI	26	3.039554	0.137588	9.206593	2.433942
	EXP	26	31.27213	17.60288	41.38616	6.294412
Slovakia	GDP	23	9.196154	8.689833	9.58269	0.279382
	*s*FDI	23	38.33687	5.637071	57.46602	19.62194
	*f*FDI	23	3.813149	-0.61341	16.71414	4.073669
	EXP	23	70.79553	46.65712	94.62454	16.22447
Slovenia	GDP	24	9.61895	9.128999	9.864855	0.211092
	*s*FDI	24	18.82682	7.846877	32.03936	7.329515
	*f*FDI	24	1.592803	-0.94713	6.872851	1.569521
	EXP	24	59.89858	44.14772	77.65407	10.9974

Source: Author's own calculations using STATA 15.
Note: GDP=natural log of real per capita GDP; *s*FDI=inward FDI stock as a percentage of GDP; *f*FDI=inward FDI flows as a percentage of GDP; EXP=exports of goods and services as a share of GDP.

Table C.2 Summary Statistics for Quarterly Data

Country	Variable	Obs	Mean	Min	Max	Std Dev
Bulgaria	GDP	101	8.251404	7.810165	8.709281	0.297585
	*s*FDI	101	44.54516	0.734895	91.56523	36.2489
	*f*FDI	101	6.939007	0.335817	27.89528	6.91866
	EXP	101	48.25614	33.78183	65.12962	9.682042
Croatia	GDP	85	9.142813	8.786388	9.352227	0.163156
	*s*FDI	85	34.03746	1.682029	69.67799	20.45054
	*f*FDI	85	4.004799	0.456479	8.238092	1.989451
	EXP	85	38.1192	27.61176	49.66073	5.389313
Czech Republic	GDP	105	9.400842	8.995547	9.712756	0.22842
	*s*FDI	105	37.95702	0.197742	64.08532	21.11564
	*f*FDI	105	3.906451	0.206515	10.55885	2.690692
	EXP	105	57.60507	38.31683	82.65196	13.35827
Estonia	GDP	93	9.138186	8.544286	9.520201	0.322623
	*s*FDI	93	59.02353	14.49421	87.08579	24.55782
	*f*FDI	93	7.210426	0.057473	20.48694	3.871392
	EXP	93	69.79573	57.19738	87.20558	8.87634
Hungary	GDP	105	9.047861	8.726645	9.335357	0.202107
	*s*FDI	105	48.79701	1.623226	79.90321	22.48465
	*f*FDI	105	4.517364	0.94104	10.30033	2.313605
	EXP	105	61.88188	26.31216	90.30104	20.56257
Latvia	GDP	97	8.799697	8.096889	9.306312	0.398153
	*s*FDI	97	30.66576	2.730296	55.61099	15.03929
	*f*FDI	97	3.890463	0.253443	8.013913	1.984709
	EXP	97	46.3583	34.56687	72.4064	11.00349
Lithuania	GDP	97	8.838865	8.200157	9.39732	0.386572
	*s*FDI	97	24.35714	1.113743	36.49951	11.58976
	*f*FDI	97	2.896795	0.142789	8.233769	1.957595
	EXP	97	55.96628	23.35428	84.06246	16.10726
Poland	GDP	105	8.82878	8.212959	9.328383	0.345776
	*s*FDI	105	22.51544	0.170522	42.95678	14.05843
	*f*FDI	105	2.7592	0.151095	5.544707	1.267364
	EXP	105	33.1399	22.09465	52.25985	9.101009
Romania	GDP	101	8.473644	8.050192	8.93416	0.288686
	*s*FDI	101	22.8314	0.143178	43.33039	15.57392
	*f*FDI	101	3.089329	0.137588	9.206593	2.358927
	EXP	101	31.37267	17.60288	41.38616	5.782324
Slovakia	GDP	89	9.198367	8.689833	9.58269	0.266106
	*s*FDI	89	38.71872	5.637071	57.46602	19.09585
	*f*FDI	89	3.917106	-0.86072	16.71414	3.84307
	EXP	89	70.56844	46.10006	94.62454	15.80808
Slovenia	GDP	93	9.623442	9.128999	9.86584	0.199465
	*s*FDI	93	18.79039	7.846877	32.03936	6.950072
	*f*FDI	93	1.592501	-0.99237	6.872851	1.450976
	EXP	93	59.65746	44.14772	77.65407	10.70229

Source: Author's own calculations using STATA 15.
Note: GDP=natural log of real per capita GDP; *s*FDI=inward FDI stock as a percentage of GDP; *f*FDI=inward FDI flows as a percentage of GDP; EXP=exports of goods and services as a share of GDP.

Table C.3 Unit Root Tests (Quarterly Data)

Country	Variable	Level					First Difference				
		ADF			PP		ADF			PP	
		Constant	Constant & Trend	Lag (SBIC)	Constant	Constant & Trend	Constant	Constant & Trend	Lag (SBIC)	Constant	Constant & Trend
Bulgaria (Q)	GDP	-0.932	-2.353	4	0.341	-2.701	-3.342**	-3.241*	3	-3.847***	-3.789**
	*s*FDI	-1.404	-1.906	5	-0.619	-0.967	-2.041	-2.033	5	-1.880	-1.902
	*f*FDI	-1.135	-0.636	5	-1.587	-1.360	-4.429***	-4.770***	4	-2.707*	-2.816
	EXP	-1.206	-2.162	4	-0.987	-1.782	-4.242***	-4.238***	5	-3.957***	-3.991**
Croatia (Q)	GDP	-1.776	-1.419	4	-2.824*	-1.120	-3.009**	-3.062	4	-2.187	-2.356
	*s*FDI	-1.157	-1.160	6	-1.216	-1.932	-4.466***	-4.525***	5	-3.657***	-3.657**
	*f*FDI	-2.478	-2.587	5	-2.461	-2.537	-3.545***	-3.471**	4	-3.530**	-3.442*
	EXP	-0.355	-1.494	6	-0.595	-1.567	-4.398***	-4.378***	4	-3.147**	-3.152*
Czech Republic (Q)	GDP	-1.401	-1.942	5	-0.344	-2.128	-3.773***	-3.861**	4	-3.683***	-3.611**
	*s*FDI	-1.625	-0.887	4	-1.658	-0.899	-3.342**	-3.666**	3	-3.756***	-3.915**
	*f*FDI	-1.433	-1.575	6	-2.542	-2.619	-5.353***	-5.323***	5	-3.895***	-3.851**
	EXP	0.002	-2.231	5	-0.329	-1.635	-4.016***	-4.201***	4	-3.099**	-3.171**
Estonia (Q)	GDP	-1.985	-0.977	5	-1.595	-0.969	-4.066***	-4.477***	4	-2.706	-2.894
	*s*FDI	-1.559	-1.670	5	-1.472	-1.327	-3.496**	-3.656**	4	-3.276**	-3.299*
	*f*FDI	-2.614*	-2.627	4	-2.232	-2.311	-3.027**	-2.974	3	-4.179***	-4.157***
	EXP	-0.731	-1.485	5	-1.238	-1.701	-3.480**	-3.532**	5	-3.369**	-3.396**
Hungary (Q)	GDP	-1.231	-1.622	5	-0.007	-1.682	-3.159**	-3.149	4	-3.067	-2.964
	*s*FDI	-3.082**	-0.118	6	-2.309	-1.009	-4.251***	-5.473***	5	-3.762***	-3.971**
	*f*FDI	-1.964	-2.829	4	-2.419	-3.404*	-3.924***	-3.839**	3	-4.220***	-4.170***
	EXP	-1.059	-2.306	6	-0.756	-2.174	-3.733***	-3.751**	5	-3.243**	-3.242*
Latvia (Q)	GDP	-1.076	-1.129	5	-0.730	-1.163	-3.561***	-3.641**	4	-3.735***	-3.830**
	*s*FDI	-1.373	-2.210	6	-1.098	-1.977	-3.782***	-3.898**	5	-3.319**	-3.375*
	*f*FDI	-1.436	-2.006	5	-2.236	-2.517	-4.134***	-4.239***	5	-3.555***	-3.636**
	EXP	-0.224	-1.982	5	-2.095	-3.564**	-6.465***	-6.057***	4	-2.777*	-3.154*
Lithuania (Q)	GDP	-0.884	-1.622	5	0.191	-3.047	-4.615***	-4.580***	4	-3.626***	-3.457**
	*s*FDI	-2.372	-0.187	6	-1.964	-1.345	-4.200***	-4.950***	5	-3.794***	-3.867**
	*f*FDI	-2.419	-2.582	4	-2.406	-2.436	-4.368***	-4.723***	5	-3.814***	-3.872**
	EXP	-0.458	-2.368	5	-2.351	-2.775	-4.984***	-4.934***	4	-5.461***	-5.412***
Poland (Q)	GDP	-1.694	-2.225	5	-0.651	-1.373	-2.824	-3.118*	4	-4.074***	-4.177***
	*s*FDI	-1.037	-2.704	4	-0.925	-2.310	-3.481**	-3.499**	3	-4.059***	-4.050***
	*f*FDI	-2.612*	-2.437	6	-2.706	-2.561	-5.150***	-5.403***	5	-3.852***	-3.886**
	EXP	1.729	-3.128	5	1.773	-3.879**	-3.346**	-4.342***	4	-4.178***	-4.288***

Table C.3 (Continued): Unit Root Tests (Quarterly Data)

Country	Variable	Level					First Difference				
		ADF			PP		ADF			PP	
		Constant	Constant & Trend	Lag (SBIC)	Constant	Constant & Trend	Constant	Constant & Trend	Lag (SBIC)	Constant	Constant & Trend
Romania (Q)	GDP	-0.511	-1.852	6	0.082	-2.135	-3.767***	-3.722**	5	-3.161**	-3.156*
	*s*FDI	-1.138	-0.994	6	-0.848	-1.466	-3.783***	-3.899**	5	-3.629***	-3.645**
	*f*FDI	-2.562	-2.505	4	-1.833	-1.679	-2.578	-2.606	3	-4.055***	-4.070***
	EXP	-1.661	-2.567	5	-1.838	-2.532	-3.285**	-3.237*	4	-4.731***	-4.650***
Slovak Republic (Q)	GDP	-1.094	-1.199	5	-1.709	-1.580	-3.944***	-4.027**	4	-2.782	-2.872
	*s*FDI	-2.078	-0.138	4	-2.267	1.305	-1.613	-2.663	3	-2.350	-3.099
	*f*FDI	-2.224	-2.650	4	-1.789	-2.055	-2.618*	-2.731	3	-4.175***	-4.197***
	EXP	-0.299	-2.600	5	-0.119	-2.650	-4.162***	-4.125***	4	-3.079**	-3.090
Slovenia (Q)	GDP	-1.895	-1.060	5	-3.830***	-1.857	-4.218***	-4.089***	4	-3.089**	-3.663**
	*s*FDI	-0.119	-1.763	6	-0.182	-2.300	-4.613***	-4.593***	5	-3.775***	-3.784**
	*f*FDI	-3.456**	-3.457**	4	-2.870*	-2.910	-5.507***	-5.464***	5	-3.936***	-3.919**
	EXP	-0.148	-2.147	5	-0.228	-2.825	-5.594***	-5.265***	4	-3.555***	-3.771**

Source: Author's own calculations using STATA 15.
Note: ***, **, and * denote the rejection of the null hypothesis of unit roots at the 1%, 5%, and 10% significance levels.

Table C.5 Unit Root Tests (Yearly Data)

Country	Variable	Level					First Difference				
		ADF			PP		ADF			PP	
		Constant	Constant & Trend	Lag (AIC)	Constant	Constant & Trend	Constant	Constant & Trend	Lag (AIC)	Constant	Constant & Trend
Bulgaria (Y)	GDP	-0.329	-1.940	1	0.166	-2.911	-5.131***	-4.962***	0	-5.146***	-4.971***
	*s*FDI	-1.525	-2.155	2	-0.689	-1.510	-1.598	-1.517	1	-1.997	-1.916
	*f*FDI	-1.559	-1.134	2	-1.793	-1.565	-2.274	-2.512	2	-3.132**	-3.179
	EXP	-0.802	-1.805	1	-1.156	-2.014	-5.757***	-5.823***	0	-5.752***	-5.837***
Croatia (Y)	GDP	-1.482	-1.121	2	-2.362	-1.223	-2.385	-2.412	1	-2.225	-2.432
	*s*FDI	-1.187	-1.813	1	-1.163	-2.288	-5.502***	-5.424***	0	-5.696***	-5.653***
	*f*FDI	-2.195	-2.256	1	-2.996*	-2.955	-2.861*	-2.958	1	-5.915***	-6.005***
	EXP	-0.429	-1.980	1	-0.677	-1.856	-3.773***	-3.723**	0	-3.749**	-3.695**
Czech Republic (Y)	GDP	-1.563	-2.483	1	-0.442	-2.525	-4.366***	-4.313***	0	-4.386***	-4.389***
	*s*FDI	-1.776	-0.715	1	-1.664	-1.170	-3.382**	-3.587*	1	-5.888***	-6.306***
	*f*FDI	-2.158	-2.243	1	-3.096**	-3.102	-5.547***	-5.555***	1	-7.842***	-7.873***
	EXP	-0.139	-2.653	2	-0.533	-1.796	-3.548**	-3.819**	1	-3.519**	-3.616**
Estonia (Y)	GDP	-2.153	-1.402	3	-1.465	-1.236	-2.387	-3.039	2	-3.018**	-3.251*
	*s*FDI	-1.308	-1.694	1	-1.416	-1.575	-4.024***	-4.056***	0	-4.017***	-4.033***
	*f*FDI	-1.627	-1.652	2	-3.061**	-3.115	-3.659**	-3.685**	1	-8.327***	-8.249***
	EXP	-1.517	-2.342	1	-1.437	-1.887	-4.179***	-4.163**	0	-4.163***	-4.146**
Hungary (Y)	GDP	-1.451	-1.991	2	-0.208	-1.963	-2.847*	-2.839	1	-3.469**	-3.318*
	*s*FDI	-2.659*	-0.531	2	-2.546	-0.995	-5.931***	-6.827***	0	-5.966***	-7.250***
	*f*FDI	-1.545	-3.007	2	-3.224**	-4.356**	-3.816***	-3.818**	1	-9.291***	-9.341***
	EXP	-0.888	-3.175	1	-0.752	-2.501	-4.039***	-3.958**	0	-3.991***	-3.899**
Latvia (Y)	GDP	-1.527	-1.689	3	-0.735	-1.558	-3.328**	-3.459*	1	-4.100***	-4.315**
	*s*FDI	-1.358	-2.721	1	-1.062	-2.249	-4.453***	-4.455***	0	-4.437***	-4.440***
	*f*FDI	-3.019**	-3.637**	1	-2.774*	-2.979	-4.906***	-4.971***	0	-4.939***	-5.024***
	EXP	-2.496	-5.450***	1	-2.300	-4.013**	-3.097**	-3.439*	0	-2.953*	-3.363*
Lithuania (Y)	GDP	-1.129	-2.461	1	-0.023	-3.324*	-4.475***	-4.223**	0	-4.628***	-4.417**
	*s*FDI	-1.528	-1.032	1	-2.072	-1.391	-5.379***	-5.588***	0	-5.446***	-5.806***
	*f*FDI	-2.504	-2.540	1	-2.970*	-2.889	-5.885***	-5.912***	0	-6.087***	-6.222***
	EXP	-1.001	-5.147***	1	-2.750*	-3.603**	-10.034***	-10.545***	0	-8.753***	-9.524***
Poland (Y)	GDP	-2.092	-1.972	1	-0.633	-1.819	-4.774***	-5.096***	0	-4.743***	-5.227***
	*s*FDI	-1.090	-1.998	2	-0.890	-3.231	-3.694**	-3.690**	1	-8.127***	-8.065***
	*f*FDI	-3.006**	-2.780	1	-3.101**	-2.875	-6.191***	-6.238***	0	-6.508***	-6.694***
	EXP	1.412	-2.276	1	1.587	-4.137**	-5.725***	-6.460***	0	-5.896***	-6.851***

Table C.5 (Continued): Unit Root Tests (Yearly Data)

Country	Variable	Level					First Difference				
		ADF			PP		ADF			PP	
		Constant	Constant & Trend	Lag (AIC)	Constant	Constant & Trend	Constant	Constant & Trend	Lag (AIC)	Constant	Constant & Trend
Romania (Y)	GDP	-0.384	-2.542	1	-0.016	-2.353	-3.788***	-3.699**	0	-3.740**	-3.648**
	*s*FDI	-0.945	-1.643	1	-0.826	-1.787	-4.789***	-4.764***	0	-4.789***	-4.768***
	*f*FDI	-2.152	-1.960	3	-2.134	-1.972	-6.095***	-6.124***	0	-5.984***	-6.022***
	EXP	-0.492	-1.881	1	-1.912	-2.954	-6.674***	-6.525***	0	-6.373***	-6.257***
Slovak Republic (Y)	GDP	-1.061	-2.284	1	-1.500	-1.924	-3.246**	-3.268*	0	-3.179**	-3.211
	*s*FDI	-2.825	-0.500	4	-1.842	0.583	-0.739	-2.562	3	-2.283	-3.438*
	*f*FDI	-1.120	-1.833	3	-2.390	-2.572	-2.859*	-2.997	1	-7.597***	-7.989***
	EXP	-0.589	-3.495*	1	-0.295	-2.899	-3.753***	-3.689**	0	-3.714**	-3.643**
Slovenia (Y)	GDP	-3.797***	-2.488	1	-3.872***	-1.850	-3.520**	-4.724***	0	-3.504**	-4.727***
	*s*FDI	-0.126	-2.505	1	-0.056	-2.834	-5.552***	-5.455***	0	-5.720***	-5.604***
	*f*FDI	-3.960***	-3.941**	0	-3.922***	-3.906**	-4.182***	-4.043**	2	-7.442***	-7.230***
	EXP	-0.425	-5.461***	1	-0.338	-3.272*	-4.323***	-4.659***	0	-4.311***	-4.662***

Source: Author's own calculations using STATA 15.
Note: ***, **, and * denote the rejection of the null hypothesis of unit roots at the 1%, 5%, and 10% significance levels.

Table C.6 Unit Root Tests for the Czech Republic (Yearly Data)

Variable	Level					First Difference				
	ADF			PP		ADF			PP	
	Constant	Constant & Trend	Lag (AIC)	Constant	Constant & Trend	Constant	Constant & Trend	Lag (AIC)	Constant	Constant & Trend
GDP	-0.222	-1.999	2	-0.751	-1.869	-3.270**	-3.106	1	-3.020**	-2.949
sFDI	-3.050**	-1.416	2	-3.821***	-1.464	-1.404	-2.442	3	-4.592***	-6.227***
DI	-1.763	-2.659	1	-2.223	-3.096	-5.803***	-5.647***	0	-6.079***	-5.884***
EXP	-0.757	-2.420	1	-.0232	-2.546	-4.340***	-4.221**	0	-4.338***	-4.212**

Source: Author's own calculations using STATA 15.
Note: ***, **, and * denote the rejection of the null hypothesis of unit roots at the 1%, 5%, and 10% significance levels.

Table C.7 Summary of Diagnostic Tests for Model 1 (GDP and *s*FDI)

	Optimal Lag *k*		Max Order of Integration *d*		Normality Test		LM Test		Stability Test	
	SBIC	AIC								
Country	Q	Y	Q	Y	Q	Y	Q	Y	Q	Y
Bulgaria	4	2	2	2		■	■	■	■	■
Croatia	3	3	2	2		■		■	■	■
Czech Republic	4	2	1	1			■	■	■	■
Estonia	4	2	2	2		■	■	■	■	■
Hungary	4	2	2	2		■	■	■	■	■
Latvia	5	2	2	1		■	■	■	■	■
Lithuania	5	2	1	1			■	■	■	■
Poland	4	1	2	1			■	■	■	■
Romania	4	1	2	1		■	■	■	■	■
Slovakia	4	2	2	2		■		■	■	■
Slovenia	4	1	1	1		■	■	■	■	■

Source: Author's own calculations using STATA 15.

Notes: (1) GDP=natural log of real per capita GDP; *s*FDI=inward FDI stock as a percentage of GDP; *f*FDI=inward FDI flows as a percentage of GDP; EXP=exports of goods and services as a share of GDP; Q=quarterly data; Y=yearly data; SBIC=Schwarz's Bayesian Information Criterion; AIC=Akaike Information Criterion.

(2) Normality tests include the skewness statistic, kurtosis statistic, and the Jarque-Bera statistic tests. ■ indicates that the disturbances after VAR are normally distributed.

(3) LM is the Lagrange-Multiplier test. ■ indicates that the residuals after VAR are not autocorrelated.

(4) In stability test, ■ indicates that the VAR model satisfies the stability condition, i.e. the absolute value of the roots is not higher than one.

Table C.8 Summary of Diagnostic Tests for Model 2 (GDP and *f*FDI)

	Optimal Lag *k*		Max Order of Integration *d*		Normality Test		LM Test		Stability Test	
	SBIC	AIC								
Country	Q	Y	Q	Y	Q	Y	Q	Y	Q	Y
Bulgaria	4	1	1	2		■	■	■	■	■
Croatia	4	2	2	2		■	■	■	■	■
Czech Republic	4	1	1	1			■	■	■	■
Estonia	4	1	2	2			■	■	■	■
Hungary	4	2	2	2				■	■	■
Latvia	4	2	2	1	■	■	■	■	■	■
Lithuania	4	1	1	1			■	■	■	■
Poland	4	1	2	1			■	■	■	■
Romania	5	1	2	1			■	■	■	■
Slovakia	5	1	2	2			■	■	■	■
Slovenia	4	1	1	1			■	■	■	■

Source: Author's own calculations using STATA 15.

Notes: (1) GDP=natural log of real per capita GDP; *s*FDI=inward FDI stock as a percentage of GDP; *f*FDI=inward FDI flows as a percentage of GDP; EXP=exports of goods and services as a share of GDP; Q=quarterly data; Y=yearly data; SBIC=Schwarz's Bayesian Information Criterion; AIC=Akaike Information Criterion.

(2) Normality tests include the skewness statistic, kurtosis statistic, and the Jarque-Bera statistic tests. ■ indicates that the disturbances after VAR are normally distributed.

(3) LM is the Lagrange-Multiplier test. ■ indicates that the residuals after VAR are not autocorrelated.

(4) In stability test, ■ indicates that the VAR model satisfies the stability condition, i.e. the absolute value of the roots is not higher than one.

Table C.9 Summary of Diagnostic Tests for Model 3 (GDP and EXP)

	Optimal Lag *k*		Max Order of Integration *d*		Normality Test		LM Test		Stability Test	
	SBIC	AIC								
Country	Q	Y	Q	Y	Q	Y	Q	Y	Q	Y
Bulgaria	4	1	1	1		■	■	■	■	■
Croatia	3	2	2	2		■		■	■	■
Czech Republic	4	1	1	1			■	■	■	■
Estonia	4	3	2	2		■	■	■	■	■
Hungary	3	2	2	2			■	■	■	■
Latvia	5	3	2	1		■	■	■	■	■
Lithuania	5	2	1	1			■	■	■	■
Poland	4	1	2	1			■	■	■	■
Romania	4	1	2	1		■	■	■	■	■
Slovakia	4	2	2	2		■	■	■	■	■
Slovenia	4	2	1	1		■	■	■	■	■

Source: Author's own calculations using STATA 15.

Notes: (1) GDP=natural log of real per capita GDP; *s*FDI=inward FDI stock as a percentage of GDP; *f*FDI=inward FDI flows as a percentage of GDP; EXP=exports of goods and services as a share of GDP; Q=quarterly data; Y=yearly data; SBIC=Schwarz's Bayesian Information Criterion; AIC=Akaike Information Criterion.

(2) Normality tests include the skewness statistic, kurtosis statistic, and the Jarque-Bera statistic tests. ■ indicates that the disturbances after VAR are normally distributed.

(3) LM is the Lagrange-Multiplier test. ■ indicates that the residuals after VAR are not autocorrelated.

(4) In stability test, ■ indicates that the VAR model satisfies the stability condition, i.e. the absolute value of the roots is not higher than one.

Table C.10 "Causality" Tests Results (Quarterly Data)

Country	GDP→*s*FDI	*s*FDI→GDP	GDP→*f*FDI	*f*FDI→GDP	GDP→EXP	EXP→GDP
Bulgaria	13.96*** (0.0074)	2.42 (0.6584)	2.16 (0.7058)	11.07** (0.0258)	2 (0.7357)	3.51 (0.4758)
Croatia	21.52*** (0.0001)	37.84*** (0.0000)	13.8*** (0.0032)	1.67 (0.7960)	100.75 (0.0000)***	4.04 (0.2570)
Czech Republic	3.01 (0.5553)	6.89 (0.1420)	1.47 (0.8326)	1.89 (0.7557)	3.22 (0.5210)	1.04 (0.9037)
Estonia	11.7** (0.0392)	21.72*** (0.0006)	0.71 (0.9506)	1.7 (0.7916)	1801.36 (0.0000)***	7.85 (0.0973)*
Hungary	467.74*** (0.0000)	11.3** (0.0234)	56.8*** (0.0000)	0.67 (0.955)	42.85 (0.0000)***	0.83 (0.8427)
Latvia	17.6*** (0.0035)	2.4 (0.7908)	21.2*** (0.0007)	28.7*** (0.0000)	3.9 (0.5633)	7.45 (0.1895)
Lithuania	12.31** (0.0307)	37.28*** (0.0000)	2.78 (0.5949)	0.22 (0.9945)	13.74** (0.0173)	5.64 (0.3426)
Poland	586.79*** (0.0000)	0.16 (0.9968)	133.56*** (0.0000)	0.58 (0.9647)	1137.98*** (0.0000)	6.77 (0.1486)
Romania	0.54 (0.9696)	3.86 (0.4254)	7.17 (0.2081)	4.61 (0.4655)	4.59 (0.3315)	4.97 (0.2905)
Slovakia	8823.88*** (0.0000)	15.82*** (0.0033)	1701.51*** (0.0000)	1.03 (0.9602)	3.41 (0.3332)	3.8 (0.4337)
Slovenia	4.42 (0.3520)	15.93*** (0.0031)	1.26 (0.8677)	0.67 (0.9549)	3.71 (0.4471)	5.77 (0.2173)

Source: Author's own calculations using STATA 15.

Note: The number in parenthesis shows the Wald Chi-square significance level. ***, **, * denote rejection of null hypothesis of non-causality at 1%, 5%, and 10% level of significance respectively.

Table C.11 "Causality" Tests Results (Quarterly Data)

GDP and inward FDI stock	GDP → *s*FDI	Bulgaria, Latvia, Poland
	*s*FDI → GDP	Slovenia
	GDP ↔ *s*FDI	Croatia, Estonia, Hungary, Lithuania, Slovakia
	"No Causality"	Czech Republic, Romania
GDP and inward FDI flows	GDP → *f*FDI	Croatia, Hungary, Poland, Slovakia
	*f*FDI → GDP	Bulgaria
	GDP ↔ *f*FDI	Latvia
	"No Causality"	Czech Republic, Estonia, Lithuania, Romania, Slovenia
GDP and exports	GDP → EXP	Croatia, Hungary, Lithuania, Poland
	EXP → GDP	none
	GDP ↔ EXP	Estonia
	"No Causality"	Bulgaria, Czech Republic, Latvia, Romania, Slovakia, Slovenia

Source: Author's own calculations using STATA 15.

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