The Economic Effects of the EU Eastern Enlargement on Border Regions in the Old Member States*

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Abstract

This paper evaluates the effect of the EU Eastern enlargement in May 2004 on the Gross Domestic Product (GDP) of border regions in the old member states. The effect is identified with the Synthetic Control Method (SCM) that allows the evaluation of the enlargement effect in a causal way. Results show that on average, no significant enlargement effect can be observed. The average effect, however, hides the fact that border regions are differently affected by the enlargement. The heterogeneous enlargement payoffs seem to be driven by the regional economic performance prior to the enlargement, the regional industrial structure and the regional endowment with physical infrastructure.

Keywords: Border Regions, Economic Integration, EU Enlargement, Synthetic Control Method

JEL Classification: F15, R10, R11

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1 Introduction

About a decade ago, in May 2004, eight Eastern European countries joined the European Union in the largest expansion to date. The enlargement and the concomitant implementation of the Acquis Communautaire in these countries led – with some transitional agreements – to free movement of goods, services, capital and labor between the EU-15 and its Eastern neighbors. The enlargement round in 2004 significantly increased the market size of the common market; however, it differed from previous enlargement rounds, as the wealth gap between old and new member states was more distinct. The Gross National Income (GNI) per capita measured in purchasing power parties of the new member states, for instance, amounted to merely 40% of that of the old member states, i.e. the EU-15, in 2006 (Baas and Brücker, 2010). Because of the large discrepancy in wages and socioeconomic conditions, the enlargement came not only with hopes, but also with fears about a depression of wages, increasing unemployment and, consequently, economic stagnation in the old member states (Rippl *et al.*, 2005). Particularly in regions located on the border to the new member states, businesses and employees feared increased price competition from the East, fueled by the presumption that the geographic position on the border to the new member states made these regions particularly vulnerable to competitors from the new member states (see Forster, 2007 and Trettin, 2010 for Germany). In contrast to public concerns, regional economic and geographic theories suggest that border regions ceteris paribus profit from the enlargement due to their spatial proximity to the new member states and their privileged access to the new markets (see, for example, Brülhart, 2011; Brülhart *et al.*, 2004; Niebuhr and Stiller, 2002 for an overview).

Despite these theoretical contributions, empirical evidence on the question of the economic consequences of the EU Eastern enlargement for border regions in the old member states is scarce. The majority of empirical studies that assess the consequences of the enlargement round focus on the EU-wide impact or on economic effects on the country level in both old (see, for example, Baas and Brücker, 2010 and Dauth *et al.*, 2014) and new (see, for example, Elsner, 2013a and 2013b) member states. Few address the peculiarities of border regions, even though they were assumed to be focal points in the integration process (European Commission, 2001; Resmini, 2003). The few studies that do emphasize on the enlargement effects in border regions in the old member states predominantly focus on selected border regions and investigate the factors that facilitate or hinder cross-border cooperation (see, for example, Knippschild, 2011; Krätke, 2002; Krätke and Borst, 2007; Leick, 2010; Xheneti *et al.*, 2013). While these studies provide initial empirical evidence on the behavioral strategies of regional economic actors, their exter-

nal and internal validity is comparatively low: firstly, they only investigate the consequences of the enlargement in selected border regions, which prohibits general conclusions on all border regions; and secondly, the studies do not consider the counterfactual situation, i.e. the situation had the EU Eastern enlargement not taken place.

This paper aims to contribute to the literature by identifying the economic effect of the EU Eastern enlargement on border regions in the old member states in a causal way. It does so by applying the Synthetic Control Method (SCM) that was introduced by Abadie and Gardeazabal (2003) and refined by Abadie *et al.* (2010 and 2015). Basically, the SCM compares the economic development of each border region in the years after the EU Eastern enlargement with the economic development of synthetically generated controls that approximate the counterfactual situation, i.e. the hypothetical economic performance of the border regions had the EU Eastern enlargement not taken place. The approach allows the identification of the treatment effect of the EU Eastern enlargement for each border region individually and the evaluation of the Average Treatment effect on the Treated (ATT), i.e. the average enlargement effect over all border regions. By choosing a relatively long time period of eight years after the enlargement, the empirical analysis also accounts for the fact that cross-border cooperation needs some time to emerge and that the enlargement effects may only unfold in the medium term.

Results indicate that on average, a negative enlargement effect can be observed. The effect is, however, not statistically significant and is mainly driven by the two capital regions of Berlin and Vienna. When excluding these two regions from the analysis, a positive enlargement effect is visible in the medium term. This finding supports the presumption that regions with inherently better access to new markets can profit from economic integration (see, for example, Brülhart *et al.*, 2004; Niebuhr and Stiller, 2002).

When looking at the enlargement effects in the individual border regions, it becomes evident that border regions are differently affected by the enlargement and that heterogeneous enlargement payoffs can be observed. Descriptive evidence suggests that rural border regions with a comparatively high regional GDP in the years prior to the enlargement have predominantly profited from the enlargement, while rural border regions with a comparatively weaker economic performance prior to the enlargement could not capitalize on the enlargement to the same extent. For urban regions, however, the opposite seems to be the case. Here, economically successful urban regions reveal negative treatment effects, whereas urban regions characterized by a lower economic performance in the years prior to the enlargement experienced positive enlargement effects. As it will be shown below, these effects may, however, be confounded by several intervening factors. When quantitatively assessing the drivers of the heterogeneous

treatment effect, the regional employment rate, the strength of the industrial sector and the regional endowment with physical infrastructure positively correlate with the regional enlargement payoff. Translated into the political context, the findings suggest that one-size-fits-all policy solutions are not appropriate. Instead, regional growth policies in regions bordering the new member states should pursue place-based solutions that consider regional characteristics.

The remainder of the paper is structured as follows: Section 2 sketches the regional economic and geographic theories on the spatial effects of economic integration and outlines the existing empirical evidence. Section 3 introduces the key characteristics of the 15 border regions and classifies these regions according to their settlement structure and economic performance. Section 4 introduces the research design and the regional data, while Section 5 outlines the results from the empirical analysis. The paper closes with a critical discussion of the results in Section 6.

2 Spatial Effect of Economic Integration - Theory and Empirical Evidence

In the literature, the effects of economic integration on border regions have not yet been conclusively assessed. Hence, it is still unclear whether regions located on the border to newly integrated countries have been particularly affected by the integration process, and whether the potential integration effect is positive or negative (Brülhart, 2011; Petrakos and Topaloglou, 2008). In regional economic and geographic theory, spatial effects of economic integration have traditionally been assessed in classic trade and location theories (Niebuhr and Stiller, 2002). Trade theories assume that spatial effects of economic integration emerge as a result of intra-country factor reallocation. Regions with inherently better access to new markets such as port cities and border regions are assumed to profit from an increase in international trade flows (Rauch, 1991). Hence, these regions can attract exporting firms due to their proximity to the new markets and the presumably lower access costs. The increase in economic activities may then translate into a positive regional economic performance (see Capello, 2007 and Niebuhr and Stiller, 2002). While trade theories primarily focus on the trading of goods, they also apply for the trading of services that has also been implemented through the EU enlargement and the ratification of the Acquis Communautaire in the Eastern European member states.

In contrast to trade theories that deal with the consequences of international trade flows for the regional factor reallocation within a country, classic location theories explicitly focus on the

geographic location decisions of firms and view trade flows as a consequence of these location decisions (Niebuhr and Stiller, 2002). Based on the classic location models of Lösch (1944) and Giersch (1950), location theories presume that the location decisions of firms are determined by the size of the market for goods and services that they can serve. As borders constitute barriers to free flows of goods and services, they constrain the accessible market area of firms located in these regions. Hence, they are less attractive location sites for firms (see Capello, 2007; Niebuhr and Stiller, 2002 for an overview). When free movement of goods and services is implemented, borders no longer constitute barriers to factor flows. This increases the market potential of firms in border regions. As a consequence, border regions may gain in attractiveness due to privileged access to the new markets (Niebuhr, 2008).

New Economic Geography (NEG) models integrate considerations of both trade and location theories. NEG models were initially introduced by Krugman (1991) in his seminal core-periphery model and have been modified and extended by Krugman and other authors since then (Niebuhr and Stiller, 2002). The models explain regional disparities in economic activities by endogenous location decisions of both firms and employees (see Capello, 2007 and Niebuhr and Stiller, 2002 for an overview). Since economic integration facilitates cross-border factor movement and decreases cross-border transportation costs, it is assumed to affect the regional distribution of economic activities in favor of border regions. This assumption is tested in various theoretical applications of NEG models. Brülhart *et al.* (2004) and Crozet and Koenig (2004), for instance, trace explicitly what happens to the spatial distribution of economic activities within a country when cross-border transaction costs decrease. Their theoretical models predict that border regions ceteris paribus realize the largest gains from economic integration. While Brülhart *et al.* (2004) attribute this to a concentration of human capital in border regions, Crozet and Koenig (2004) predict that trade liberalization drives domestic firms to regions close to the border, unless competition is too strong. Their results are mirrored in other models, leading Brülhart (2011) to conclude that the available NEG models predict that regions with inherently less costly access to foreign markets, such as border or port regions, ceteris paribus realize the largest gains from economic integration.

Despite these theoretical contributions, empirical evidence on the topic is comparatively scarce. Niebuhr and Stiller (2002) provide a comprehensive overview of earlier empirical works that assess the effect of economic integration on border regions for the European as well as North American context. The majority of these studies apply gravity models to estimate the magnitude of border effects on cross-border flows of economic activities (see, for example, Head and Mayer, 2000 and Nitsch, 2000 for the European context), or focus on the cross-border business linkages

of firms in selected border regions (see, for example, Krätke and Borst, 2007 and Leick, 2010 for Germany). While these studies provide initial empirical evidence on border effects as well as on the factors that facilitate or hinder cross-border economic activities, they do not evaluate the effects of changes in market access on border regions in a causal way.

In the past decade, however, several studies have been conducted that apply quasi-experimental research designs in order to identify the causal effects of economic integration. Redding and Sturm (2008), for instance, evaluate the effect of the German separation on West German cities located close to the inner German border. They find that these cities experienced a decline in population and economic performance once the border was established. Focusing on Austrian border regions, Brülhart *et al.* (2012) identify a significant effect on regional employment rates and wages in border regions after the fall of the Iron Curtain. With respect to the various EU enlargement rounds, Brakman *et al.* (2012), reveal positive enlargement effects on population size in border regions on either side of the inner European borders. In a quasi-experimental study that focuses explicitly on the effects of the EU Eastern enlargement in 2004 on border regions, Braakmann and Vogel (2010) show that small service firms located in German Federal States bordering Poland or the Czech Republic profited from the EU Eastern enlargement, while large firms did not profit, at least in the years immediately after the EU Eastern enlargement.

While these studies differ in the estimation strategy, the regional context and the outcome variable, they still predominantly support the hypothesis that border regions (or firms located in these regions) are positively affected by economic integration. Yet it would also be plausible to find no or negative integration effects in border regions. This assumption is supported by the fact that border regions may systematically differ from core regions in characteristics other than the geographic location. Hence, border regions often constitute peripheral, low-opportunity areas, characterized by lower population densities and the lack of any major regional agglomeration center (Krätke and Borst, 2007; Petrakos and Topaloglou, 2008). Consequently, they may lack the resources to exploit integration benefits with which urban systems are endowed (Duranton and Puga, 2004). Moreover, they may be less well integrated into international trade and knowledge flows that commonly take place between global hubs (Bathelt *et al.*, 2004; Krätke and Borst, 2007). Less innovative border regions in particular, which compete predominantly via price, may suffer from the increased international competition, reducing the attractiveness of these regions as production sites (Niebuhr, 2008; Topaloglou *et al.*, 2006). Moreover, these less innovative regions are commonly insufficiently endowment with cognitive capital, which may hamper their capability to fully exploit new knowledge that is circulated by increased factor mobility (Caragliu and Nijkamp, 2012; Cohen and Levinthal, 1990).

Overall, these arguments suggest that there may be certain regional characteristics that could prevent border regions from profiting from economic integration, despite their spatial proximity to the new member states. At the same time, the arguments indicate that the effects of the EU economic integration may vary across border regions, depending on integral characteristics of these regions such as their economic performance, their settlement structure, their stock of human capital or their innovativeness. As it will be shown below, the Austrian, German and Italian regions located on the border to the new member states inevitably differ in their regional characteristics, suggesting that they have been differently affected by EU Eastern enlargement of 2004.

3 Border Regions in the EU-15

To learn more about the border regions at the frontier to the new member states, this section clusters the Austrian, Italian and German border regions according their settlement structure and economic performance in the years prior to the EU enlargement in 2004. Overall, the treatment group consists of all EU-15 regions at the second level of the Nomenclature des Unités Territoriales Statistiques of 2006 (NUTS-2 level of 2006) that share a border with any of the new member states. Even though lower levels of analysis such as the NUTS-3 or municipal level would facilitate the isolation of the immanent border effect (see Brülhart *et al.*, 2012 for a thorough discussion), in this essay, the NUTS-2 level is used as the level of analysis. This level is chosen, because for several regional covariates long time-series data is only available at this higher aggregated level. Moreover, in Germany, several regional borders at the NUTS-3 level changed in the course of local government reorganization, affecting in particular border regions in Saxony and Mecklenburg-Western Pomerania. This would further aggravate the analysis at the NUTS-3 level for German border regions.

Figure 1 maps the 13 regions that are located on the border to the new member states. Precisely, these are the five Austrian regions Upper Austria, Lower Austria, Burgenland, Styria and Carinthia that share a border with either Slovenia, Hungary, Slovakia or the Czech Republic, the Italian region of Friuli-Venezia Giulia, which borders Slovenia, and the seven German border regions Mecklenburg-Western Pomerania, Brandenburg, Dresden, Chemnitz, Upper Franconia, Upper Palatinate and Lower Bavaria, which share a border with either Poland or the Czech Republic.

Of the German regions, Mecklenburg-Western Pomerania, Brandenburg, Dresden and Chemnitz are located in the East of Germany, the former German Democratic Republic (GDR). The

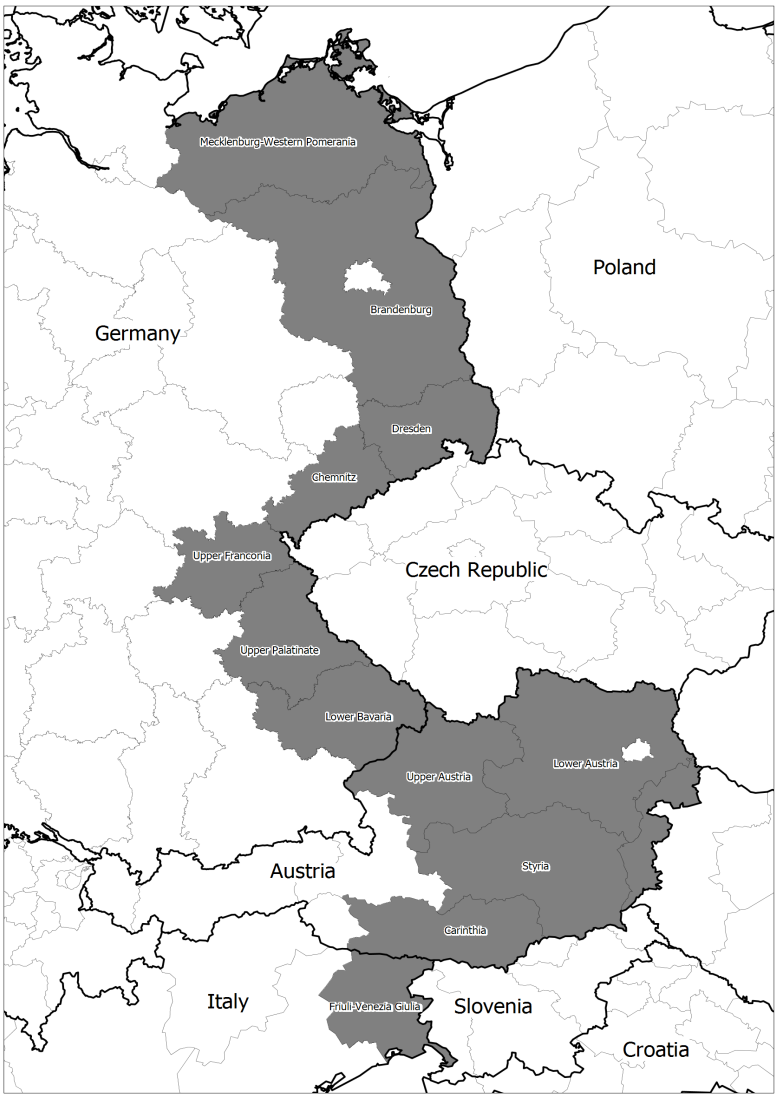

Figure 1: NUTS-2 Regions on the Border to the New Member States
The map depicts German, Austrian and Italian border regions located at the border to the new member states at the NUTS-2 level of 2006.

economic trajectory of these regions in the 1990s, therefore, differs from the remaining EU-15 regions. Along with these 13 regions, the two capital regions of Berlin and Vienna are also treated as border regions, given their proximity to the new member states and their location within a NUTS-2 border region. The consideration of these two capital regions also enables a comparison between the enlargement effect on rural, peripheral border regions and metropolitan centers close to the border.

In the following, the 15 NUTS-2 regions that form the treatment group are clustered according to the regional settlement structure and the regional economic performance in the years before

the EU Eastern enlargement, i.e. from 2000 to 2004 (see Table 1). While the regional settlement structure may serve as a proxy for the presence of regional agglomerations, the regional GDP per capita serves as an indicator of the overall regional economic context. Both take up the assumption that border regions with a higher population density and border regions with a stronger economic performance are more capable of exploiting new market potentials, an argument that can also be found in Krätke and Borst (2007) and Petrakos and Topaloglou (2008).

Table 1: Typology of EU-15 Regions on the Border to the New Member States[a]

	High GDP	Low GDP
Agglomration Center and Urban Regions	Berlin Vienna Friuli-Venezia Giulia Upper Franconia	Dresden Chemnitz
Rural Regions	Upper Palatinate Lower Bavaria Styria Upper Austria Lower Austria Carinthia	Brandenburg M.-W. Pomerania Burgenland

[a] Thresholds are as follows: 150 inhabitants per squared kilometer for the regional settlement structure; GDP above 75% of the EU-15 average for the regional economic performance. Data are obtained from the Eurostat Regional Database (Eurostat, 2016).

Regarding the regional settlement structure, the two capital regions of Berlin and Vienna stand out from the remaining border regions. Hence, both regions are characterized by very high population densities of around 4,000 inhabitants per square kilometer in the four years prior to the EU Eastern enlargement. Consequently, both regions classify as agglomeration centers according to the official classification of the German Federal Institute for Research on Building, Urban Affairs and Spatial Development (Bundesinstitut für Bau-, Stadt- und Raumforschung, BBSR, 2014). Along with the two capital regions, the two East German regions of Chemnitz and Dresden are also among the more densely populated border regions with a population density above 200 inhabitants per square kilometer. Together with the Italian region of Friuli-Venezia Giulia and the German region of Upper Franconia, which both reveal population densities above 150 inhabitants per square kilometer, they classify as urban regions according to the BBSR classification (Bundesinstitut für Bau-, Stadt- und Raumforschung, 2014). Among the rural regions, i.e. regions with a population density below 150 inhabitants, the Austrian region of Upper Austria and the German regions of Lower Bavaria and Upper Palatinate are the most densely populated regions. These regions revealed population densities of between 110 and 115

inhabitants per square kilometers in the pre-enlargement period. The remaining border regions are all characterized by population densities below 100 inhabitants per square kilometer.

In terms of regional economic performance, the 5-year average of the regional GDP per capita for the years prior to the enlargement, i.e. 2000 to 2004, is highest in the Austrian capital region of Vienna, followed by the Austrian region of Upper Austria and the Italian region of Friuli-Venezia Giulia. In the same years, the four border regions located in East Germany, namely Chemnitz, Dresden, Mecklenburg-Western Pomerania and Brandenburg, realized the lowest GDP per capita. These four regions also qualified as Objective 1 regions in the European structural funds programming period 2000 to 2006 (European Commission, 2015). Along with the four East German regions, the Austrian border region Burgenland also qualified as an Objective 1 region, i.e. as a region with a GDP below 75% of the EU-15 average (European Commission, 2015). All other border regions reveal GDPs per capita above the 75% community average in the years prior to the enlargement.

When classifying the border regions according to their settlement structure and economic performance, it becomes evident that rural regions prevail (see Table 1). The economically stronger rural border regions include the Austrian regions of Upper Austria, Lower Austria, Styria and Carinthia as well as the German border regions of Upper Palatinate and Lower Bavaria that are both located in the Federal State of Bavaria. The group of economically weaker rural border regions includes the two East German border regions of Brandenburg and Mecklenburg-Western Pomerania and the Austrian region of Burgenland. Given their less favorable regional characteristics, it may be plausible to assume that these regions may not profit from the EU Eastern enlargement to the same extent that economically stronger regions do. Among the agglomeration centers and urban regions, three types can be identified: firstly the two capital regions of Vienna and Berlin, secondly the Italian region of Friuli-Venezia Giulia and the German region of Upper Franconia, and thirdly the two East German regions of Dresden and Chemnitz that have qualified as Objective 1 regions in the EU structural funds programming period 2000 to 2006.

4 Research Design

To evaluate the economic effect of the EU Eastern enlargement in 2004 on border regions in a causal way, the enlargement is thought of as an exogenous change to cross-border factor mobility that affected border regions notably more than non-border regions given their geographic proximity to the new member states. The EU Eastern enlargement in 2004 was the final step

in a long integration process initiated in the early 1990s that had led to gradual trade liberalization and may hence have been anticipated by regional economic actors. However, the actual consequences of the enlargement only became noticeable in May 2004, when the Acquis Communitaire was fully implemented in the Eastern European member states, enabling free flows of goods, services, capital and labor as well as the full adoption of the common legal framework[1] (Epstein and Jacoby, 2014). The adoption of the common legal framework reduced legal barriers as well as formal non-tariff barriers to cross-border economic interaction such as rules of origin, import licensing, or technical regulations. The EU 2004 enlargement hence exceeded earlier trade agreements that merely dealt with the reduction of tariffs or trade quotas for goods. Given these institutional changes, it is plausible to treat the EU Eastern enlargement as an external change to market access that particularly affected regions located directly on the border to the new member states. As these regions were exogenously selected into the treatment group because of their geographic location and because their selection into the treatment group is stable over time, the EU Eastern enlargement may be thought of as a setting akin to a natural experiment.

4.1 The Synthetic Control Method

In the empirical analysis, the economic effects of the EU Eastern enlargement on the individual border regions in the old member states are identified and evaluated with the Synthetic Control Method (SCM). The SCM was introduced by Abadie and Gardeazabal (2003) and modified and extended by Abadie *et al.* (2010 and 2015). It constitutes an alternative method for evaluating the effect of an event or intervention that takes place at an aggregate level and affects aggregate entities (Abadie *et al.*, 2010). Basically, the SCM compares the outcome of interest (in this case the regional GDP per capita) after an event of interest (in this case the EU Eastern enlargement in 2004) in the entity affected by the event (in this case a border region) with the outcome of a weighted combination of unaffected entities (in this case a weighted combination of non-border regions) (Abadie *et al.*, 2010). This combination constitutes the so-called synthetic control. The weight for the unaffected units are chosen so that the entities included in the synthetic control best approximate the performance of the affected entity over an extended period of time prior to the event of interest (Abadie *et al.*, 2010). The idea of the SCM is that when both affected entities and their synthetic controls behave similarly over an extended period of time prior to the event of interest, then any discrepancy in the outcome variable after the event of interest can be ascribed to the event itself; therefore, the discrepancy can be interpreted as the causal

[1] Except for some transition agreements on labor migration in Germany and Austria.

effect of the event or intervention of interest (see Abadie *et al.* 2010 and 2015 for a detailed discussion of the SCM). The intuition behind the SCM is comparable to the statistical matching approach and may be thought of as a treatment-control design, as it compares the outcomes of treated units, i.e. border regions, and otherwise similar but untreated units, i.e. combinations of non-border regions. The discrepancy in the outcome variable between treated units and their corresponding synthetic controls can then be interpreted as the treatment effect on the treated. Given that Y_{jt}^{B} denotes the outcome, i.e. regional GDP per capita (in Euro in 2005 prices) observed for border region j in the post-enlargement period t and Y_{jt}^{SC} denotes the outcome observed for the synthetic control of border region j at time t for border regions $j = 1 \dots J$ and time period $t = 1, \dots T$, the treatment effect for each border region is the following:

$$\Delta = Y_{jt}^{B} - Y_{jt}^{SC}$$

Consequently, the weighted average of the discrepancy between all border regions and their synthetic controls constitute the Average Treatment effect of the Treated (ATT), whereby w_j reflects the weight attached to each of the border regions, so that larger border regions contribute to the ATT more than smaller ones:

$$\Delta = E[w_j(Y_{jt}^{B} - Y_{jt}^{SC})]$$

4.1.1 The Donor Pool

As indicated above, in the context of the EU Eastern enlargement, the treatment group includes the 13 border regions located on the border to the new member states and the two capital regions Berlin and Vienna. The remaining 199 European NUTS-2 regions in the EU-15 constitute potential control units. They form the so-called donor pool. The identification of the donor pool, i.e. the selection of regions that may constitute potential controls, is highly important: if the regions included in the donor pool are not sufficiently similar to the border regions, then any differences in outcomes between border regions and their synthetic controls may merely indicate disparities in their regional characteristics (Abadie *et al.*, 2015). Therefore, regions with geographic peculiarities are a priori excluded from the donor pool. This applies to the French overseas departments, the Spanish regions of Ceuta and Melilla, as well as to insular regions in France (Corsica), Spain (Balearics and Canaries), Portugal (Azores and Madeira) and Finland (Aland). Moreover, all Greek regions are also excluded because of a lack of data availability.

Along with this baseline configuration, three alternative configurations of the donor pool are tested for robustness. In the first alternative configuration, all regions that constitute immediate neighbors to the 13 border regions are also excluded from the donor pool to account for direct spatial spillover effects. In the second configuration, only NUTS-2 regions located in EU-6 countries, i.e. in Belgium, France, Germany, Italy, Luxembourg and the Netherlands are included in the donor pool. This accounts for possible integration effects from previous enlargement rounds. In the third configuration, all regions located on EU inner borders, for instance regions located on the French-German or Spanish-Portuguese border, and all regions located on the coast are excluded from the donor pool in order to isolate the border effect better. The overall results do not change when using these alternative donor pool configurations. Yet the match between the border regions and their synthetic controls deteriorates in these alternative configurations of the donor pool. Given this caveat, the reported results are based on the more encompassing donor pool of all EU-15 non-border regions, excluding the regions with regional peculiarities outlined above.

4.1.2 The Synthetic Controls

Having identified the donor pool, in the second step, for each of the 13 border regions and the two capital regions individual synthetic controls are generated. Technically, the synthetic controls are generated as weighted averages of non-border regions included in the donor pool, whereby the synthetic control can be represented by a $(J \times 1)$ vector of weights $W = (w_1, \ldots, w_J)'$, with $0 \leq w_j \leq 1$ for $j = 1, \ldots J$ non-border regions and $w_1 + \cdots + w_J = 1$ (Abadie *et al.*, 2010 and 2015). The weights for the regions included in the donor pool are selected by an algorithm based on the similarity of the border region with the regions included in the donor pool before the enlargement with respect to past realizations of the regional GDP per capita and several GDP predictor variables. In the analysis, the pre-enlargement period encompasses 13 years, i.e. the time period from 1991 to 2003. This observation period is given by the availability of regional data. The generation of the synthetic control is conducted using the *synth* package for Stata, developed and made available by Abadie *et al.* (2015). As the construction of a suitable comparison group, i.e. synthetic control, is based on a data-driven procedure, discretion in the choice of the comparison control units is reduced and inference is possible (Abadie and Gardeazabal, 2003; Abadie *et al.*, 2010).

For the GDP-predictor variables, a parsimonious set of standard economic performance predictor variables is used. The set includes variables that are commonly identified in the literature to affect a region's economic performance (see, for example, Cuaresma-Crespo *et al.*, 2014).

Table 2: GDP Predictor Variables for SCM[a]

Variable	Description
Dependent Variable:	
Regional GDP	GDP per capita in Euro in 2005 prices
GDP Predictor Variables:	
Population Density	Number of inhabitants per squared kilometer
Income Level	Average regional hourly wage in Euro in 2005 prices
Primary Sector	Share of agricultural sector (NACE Rev.2 A) on regional GVA
Secondary Sector	Share of industrial sector (NACE Rev.2 B-F) on regional GVA
Teritiary Sector	Share of service sector (NACE Rev.2 G-U) on regional GVA
Employment Rate	Share of employees on the regional active population
Patent Intensity	Number of patents reportet to EPO per 1,000 employees
GDP in 1991	GDP per capita in 1991 in Euro in 2005 prices
GDP in 1995	GDP per capita in 1995 in Euro in 2005 prices
GDP in 2000	GDP per capita in 2000 in Euro in 2005 prices

[a] Data are obtained from the Cambridge Econometric Regional Database (2015) and the Eurostat Regional Database (2016). EPO= European Patent Office; GVA=Gross Value Added; NACE=Nomenclature statistique des Activités économiques dans la Communauté Européenne (European Industrial Activity Classification).

Basically, three groups of predictor variables are taken into account: firstly variables that reflect the regional factor allocation such as the regional population density and the regional income level. These variables indicate the regional economic potential and should positively affect the regional GDP per capita. The second group of factors reflects the regional sectoral structure, and includes the share of the primary, secondary and tertiary sector of the economy on the regional Gross Value Added (GVA). Furthermore, the regional endowment with human capital, measured through the regional employment rate, and the regional innovativeness, approximated through the regional patent intensity, are included as further factors that affect the regional endogenous growth potential and, consequently, the regional economic performance[2]. Furthermore, for three years (1991, 1995 and 2000) the pre-enlargement regional GDP per capita are included as a fourth group of variables to account for inertia and path-dependency in the regional economic development. Data on the regional characteristics are obtained from the Cambridge Econometrics Regional Database (2015) and the Eurostat Regional Database (2016). Table 2 provides a comprehensive overview of the GDP predictor variables used to generate the synthetic controls of the border regions.

One advantage of the SCM compared to standard panel regression is that the SCM makes explicit the relative contribution of each control unit to the synthetic control (Abadie *et al.*, 2010 and 2015). The Tables in the Appendix list the regions and their corresponding weights

[2]The list is not conclusive and factors such as the share of employees with tertiary education and the share of human resources in science and technology are also important. However, for several possible covariates, time-series data for the years 1991 to 2000 are not available at the NUTS-2 level, which restricts the set of possible regional covariates.

that are included in the synthetic controls of the individual border regions. As becomes evident, of all EU-15 regions included in the donor pool, six to ten regions contribute to the synthetic controls of the individual border regions. Only for the capital city of Berlin as well as for Chemnitz is the number of regions that contribute to the synthetic control lower. This may result from the peculiar development of both regions during the 1990s due to their GDR legacy. When comparing the GDP predictor means in the pre-enlargement period of the border regions and their synthetic controls, it becomes evident that the values of GDP predictors in the pre-enlargement period of the synthetic controls match the values of the border regions quite well (see Tables in the Appendix). Only for population density do the values between the border regions and their synthetic controls differ in several border regions and their corresponding synthetic controls. For the remaining variables, the values of the border regions are close to the values of the synthetic controls in the pre-enlargement period, suggesting that any discrepancy in the economic performance of border regions and their synthetic controls in the post-enlargement period may indeed be attributed to the EU Eastern enlargement.

For the SCM to work, two identification assumptions must hold: firstly, the choice of pre-treatment characteristics should include variables that can approximate the path of the treated region, and secondly, the regions used to create the synthetic control, i.e. the donor pool, should not be affected by the treatment (Campos *et al.*, 2014). The first assumption can be tested by indicating the correlations between the GDP predictor variables and the regional GDP. As Table 3 shows, all GDP predictor variables under consideration sufficiently correlate with the regional GDP per capita. In contrast, the second assumption, also known as the Stable Unit Treatment Value Assumption (SUTVA) or non-macro effect assumption, is more difficult to justify in the context of the EU Eastern enlargement of 2004. Hence, the EU enlargement also undeniably affects other regions, and the SUTVA may be violated. Empirical results can thus only be interpreted as lower bonds of the true effects[3]

5 Empirical Results

The following section reports the average enlargement effect on the GDP per capita of border regions in the old member states as well as the individual enlargement effects in each of the 13 border regions and the two capital cities Berlin and Vienna. This juxtaposition allows for

[3]To account for potential spill over effects, regions that constitute immediate neighbors to the border regions were excluded from the donor pool in an alternative configuration of this pool. When using this alternative donor pool, results remain similar except for the East German regions for which immediate neighbors constitute important control regions.

Table 3: Correlation between Regional GDP and Regional Covariates[a]

Regional Covariates	Correlation coefficient
Population Density	.506
Employment Rate	.464
Patent Intensity	.397
Industrial Sector	-.211
Service Sector	.347
Agricultural Sector	-.373
Income Level	.816

[a] Correlation coefficients between GDP per capita and various regional covariates based on a pooled sample of EU-15 regions (NUTS-2) for the years 1980 to 2012. For the East German regions, only the years from 1991 onward are included.

an evaluation of the overall enlargement effect and an examination of whether the effects are homogeneous across all types of border regions or whether heterogeneous enlargement effects are at play.

5.1 Average Effect

Figure 2 depicts the weighted average of the regional GDP per capita of all 13 border regions and the two capital cities for the years from 1991 to 2012 as well as the weighted average of the corresponding synthetic controls. Both series are generated with weights corresponding to the size of the regional labor force, measured by the number of employees. This allows to account for the size of the regions and their relative contribution to the average of all border regions.

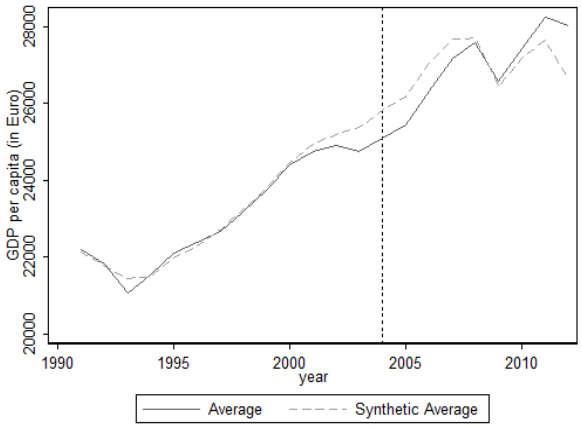

Figure 2: Trends in Regional GDP per capita Including Berlin and Vienna
Weighted average of border regions vs. weighted average of corresponding synthetic controls

The two series show a similar trend until 2000; from 2000 onward, however, the average of the synthetic controls shows a more favorable economic development than the average of the border regions. This suggests that border regions could not capitalize from the EU Eastern enlargement despite their geographic location on the border to the new markets. In contrast, the graphs suggest that border regions actually suffered from the EU Eastern enlargement, as their economic performance developed less favorably than that of their synthetic counterparts. However, as will be shown below, this result is strongly driven by the two capital regions of Berlin and Vienna that are both negatively affected by the enlargement. Therefore, in the second step, the two capital regions are excluded from the analysis. When excluding the two capital cities, the two series show a similar trend in the years immediately after the EU Eastern enlargement (see Figure 3). However, from 2007 onwards, the weighted average of all border regions (excluding Berlin and Vienna) reveals a better economic performance than the corresponding synthetic control, suggesting that in the medium term, border regions (excluding the capital cities Berlin and Vienna) have experienced a more favorable development in the years after the EU Eastern enlargement than they would have had the enlargement not taken place. This finding is in line with regional economic theories, assuming that ceteris paribus regions with inherently better access to new markets profit from economic integration (see Brülhart, 2011 for an overview). The time lag in the enlargement effect may result from the fact that the institutionalization of cross-border cooperation does not happen overnight, but requires some time to emerge[4].

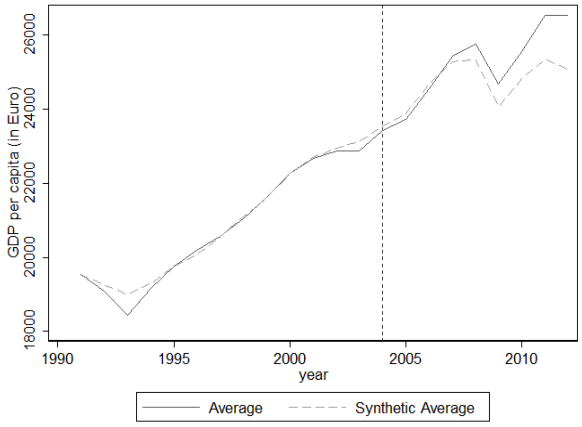

Figure 3: Trends in Regional GDP per capita Excluding Berlin and Vienna
Weighted average of border regions vs. weighted average of corresponding synthetic controls

[4]Another interpretation would relate to the recent economic crisis, potentially affecting border regions less severe than their synthetic controls. However, from a theoretical point of view, the economic crisis should affect both border and non-border regions. Moreover, as Figure 3 shows, the difference in border regions and their synthetic controls already emerges in 2007, i.e. a year before the crisis hit. Yet, in the medium term, potential confounding effects from the crisis cannot be ruled out completely.

The difference in short-term and medium-term adjustment also becomes evident when looking at the magnitude of the effect listed in Table 4. The table entries denote the difference (in %) in GDP per capita between border regions and their corresponding synthetic controls in the years after the EU Eastern enlargement. The first column shows the magnitude of changes for the first four years after the EU enlargement, i.e. the average change for the years 2004 to 2008, while the second column reports the magnitude of changes for the first eight years after the enlargement, i.e. the average change for the years 2004 to 2012. The values show that when including Berlin and Vienna, in the short term, the enlargement effect is negative, amounting to -1.94%. In the medium term, however, the effect is slightly positive and amounts to 0.11%. When excluding the two capital cities, the effect is positive and amounts to 0.26% in the short term and to 2.21% in the medium term.

Table 4: Magnitude of the Enlargement Effect in the Short and Medium Run

	Difference in post-enlargement average GDP per capita (in %) between Border Region and Synthetic Control	
	Average effect 4 years after Eastern Enlargement	Average effect 8 years after Eastern Enlargement
Average with Vienna and Berlin	-1.94	0.11
Average without Vienna and Berlin	0.26	2.21
Burgenland	0.33	2.67
Lower Austria	-0.42	2.13
Carinthia	1.64	3.45
Styria	3.18	3.36
Upper Austria	1.10	2.90
Vienna	-3.94	-2.35
Berlin	-9.30	-7.60
Lower Bavaria	0.02	5.43
Upper Palatinate	-0.28	4.02
Upper Franconia	-3.36	0.24
Brandenburg	-0.88	-2.13
Mecklenburg-Western Pomerania	-1.99	0.87
Dresden	3.91	6.90
Chemnitz	6.53	5.84
Friuli-Venezia Giulia	-1.49	-4.62

The relatively small magnitudes of the effects suggest that overall, the enlargement affected the economic performance of border regions only slightly. In the second step, it is now crucial to investigate the confidence attached to the estimated effects. There is, however, no accepted way to date of carrying out standard hypothesis tests when applying the SCM (see Abadie *et al.*, 2010; Campos *et al.*, 2014). One strategy to attain confidence about the level of statistical significance of the effects is to access the average differences in the economic development of border regions and their synthetic controls before and after the EU Eastern enlargement. This strategy has been proposed by Campos *et al.* (2014). Precisely, a linear difference-in-difference model is estimated that reveals the statistical significance of the differential between the average difference between the actual economic performance of the border regions and their

corresponding synthetic controls prior to the enlargement, and their average difference in the post-enlargement period. Table 5 indicates the level of statistical significance of the differences in the two series. It becomes evident that for the weighted average of all border regions (including the two capital regions Berlin and Vienna), the estimated DID coefficient is not statistically significant. This implies that on average, i.e. when taking all border regions together, border regions do not reveal a significantly higher or lower GDP per capita after the EU enlargement than they would have, had the EU enlargement not taken place. This finding suggests that in contrast to public concerns, on average, border regions in the old member states have not been the losers of the EU Eastern enlargement. When excluding the two capital cities of Berlin and Vienna, the DID coefficient is not statistically significant, either.

5.2 Regional Effects

So far, the results have shown that on average, border regions did not reveal a significantly higher or lower GDP in the years following the EU enlargement than they would have had the enlargement not taken place. Yet the weighted average over all regions does not say anything about the effects at the regional level. As outlined above, it is plausible that economically successful regions are better equipped to profit from changes in market access, whereas economically weaker regions may lack the resources to capitalize on the enlargement. To draw conclusions about the enlargement effects in the individual border regions, the enlargement effects are identified now for each border region individually.

The graphs in Figure 4 display the actual GDP per capita of the 13 border regions and the two capital cities Berlin and Vienna between 1991 and 2012 and the trends of the corresponding synthetic controls. The graphs reveal that several rural, economically successful border regions such as the Austrian regions of Upper Austria, Styria and Carinthia and the German region of Lower Bavaria show a more positive development in the post-enlargement period than their corresponding synthetic controls, indicating that this group of regions could profit from the enlargement. For the German region of Upper Palatinate and the Austrian region of Lower Austria, which also qualify as economically more successful rural regions, the effect is negative, however. Yet, when looking at the magnitude of the effects displayed in Table 4, it becomes evident that in each of these region, the enlargement effect is positive in the medium run. As Table 5 denotes, effects are, however, not statistically significant for any of the rural, economically successful regions.

Turning to the group of rural, economically weaker border regions, including Burgenland in Aus-

Table 5: Difference-in-Difference Estimates of EU Eastern Enlargement[a]

	GDP per capita (in 2005 Euro)	
	DiD estimate	R^2
	Std. error	N
Average with Vienna and Berlin	178.31	.69
	(805.05)	44
Average without Vienna and Berlin	618.32	.68
	(882.46)	44
Burgenland	530.94	.55
	(1051.64)	44
Lower Austria	522.45	.63
	(962.30)	44
Carinthia	962.70	.65
	(1046.06)	44
Styria	940.93	.62
	(1254.17)	44
Upper Austria	1002.43	.67
	(1242.49)	44
Vienna	-778.09	.51
	(1640.95)	44
Berlin	-1800.00**	.54
	(670.18)	44
Lower Bavaria	1616.926	.61
	(1216.76)	44
Upper Palatinate	1407.67	.61
	(1374.96)	44
Upper Franconia	61.32	.71
	(771.27)	44
Brandenburg	-260.45	.69
	(723.94)	44
Mecklenburg-Western Pomerania	404.90	.68
	(605.11)	44
Dresden	922.79	.67
	(758.79)	44
Chemnitz	1504.47*	.72
	(746.01)	44
Friuli-Venezia Giulia	-1100.00	.28
	(1027.16)	44

[a] Table entries denote the statistical significance of the difference between the average difference before the enlargement, i.e. 1991-2003 (between the border region and its synthetic control) and the average difference after the enlargement, i.e. 2004-2012 (between the border regions and its synthetic control). Results are presented for each region and for the two weighted averages. Robust standard errors in parentheses. Inference: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

tria and Brandenburg and Mecklenburg-Western Pomerania in Germany, the graphs in Figure 4 show that the two German regions actually develop less favorably than their corresponding synthetic controls, while the Austrian region of Burgenland reveals a more favorable development than its synthetic control. In the two East German border regions of Brandenburg and Mecklenburg-Western Pomerania, the discrepancy in the two series already emerges in the years prior to the enlargement. As the values in Table 4 show, in both regions, the negative effects are actually larger in the short term. In the medium term, both border regions seem to catch up with their synthetic controls. Overall, these results only partly support the presumption that rural, economically weaker border regions could not capitalize on the EU Eastern enlarge-

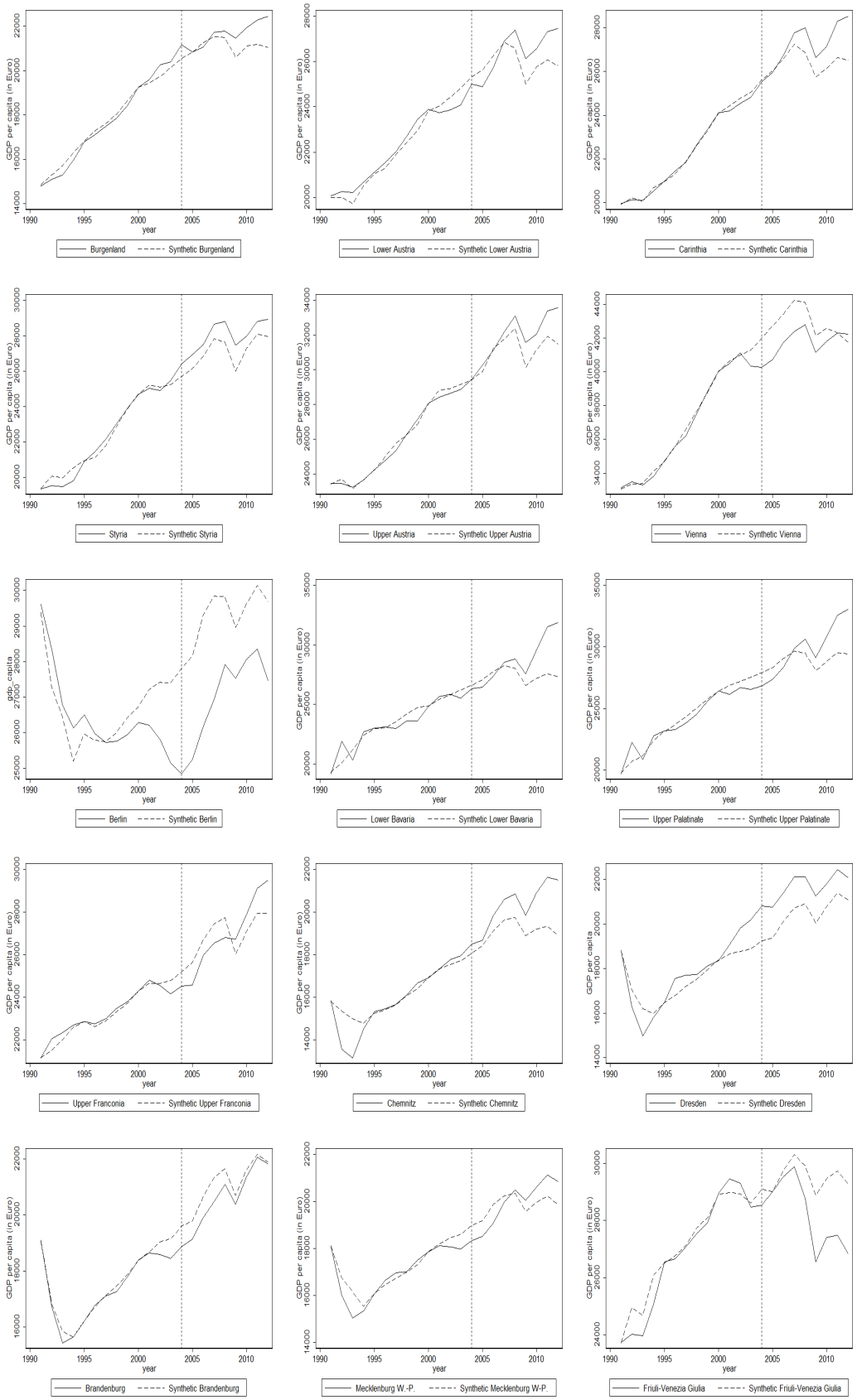

Figure 4: Economic Performance of Border Regions and their Synthetic Controls 1991-2012

ment to the same extent that economically stronger regions do (see, for example, Krätke and Borst, 2007; Petrakos and Topaloglou, 2008). As Table 5 shows, in none of these regions is the difference between the two series prior to and after the enlargement statistically significant, however.

When looking at the enlargement effects in the two capital cities and in the urban regions, results are surprisingly different. As the graphs in Figure 4 reveal, the capital cities Berlin and Vienna both reveal large negative effects. Hence, in Berlin, the difference between the actual GDP and the corresponding synthetic control amounts to -9.30% in the short term and to -7.60% in the medium term. For Vienna, the difference in the short term amounts to -3.94% and to -2.35% in the medium term (see Table 4). One possible explanation for the large negative effects may be the peculiarity of these capital regions, whose economic development may be primarily driven by the global economy and may not be affected by changes in market access at the regional level to the same extent that border regions with fewer ties to the global economy are. Moreover, the peculiarity of these regions in terms of population density aggravates the selection of suitable regions for the synthetic control. As Table A.20 in the Appendix shows, the synthetic control of Berlin only consists of four non-border regions, namely of Brussels, Leipzig, the French region Alps-French Riviera and the British region North Eastern Scotland. Hence, the negative enlargement effect for Berlin may be driven by the distinct economic performance of these four control regions in the 2000s. Effects are also negative in the Italian region of Friuli-Venezia Giulia and in the German region of Upper Franconia, suggesting that economically successful urban regions do not profit from changes in market access as expected from the literature (Campos *et al.*, 2014; Krätke and Borst, 2007; Rodríguez-Pose, 2012). In the case of Friuli-Venezia Giulia, the negative effect may be attributed to country-specific effects. Hence, during the 2000s, the Italian economy developed less favorable than other large EU-15 economies such as the French or Spanish economy (Eurostat, 2016). When looking at the statistical significance of the effects, the discrepancy between the two series prior to and after the EU enlargement of 2004 is statistically significant in Berlin, whereas for the remaining regions, effects are not statistically significant (see Table 5).

In contrast, for the economically weaker urban border regions in the East of Germany, namely Chemnitz and Dresden, a positive enlargement effect can be observed (see Figure 4 and Table 4). However, as both regions received large amounts of public funds during the 2000s, the positive and statistically significant enlargement effects in these regions cannot be isolated from potential funding effects. Hence, both regions qualified as Objective 1 regions in the EU structural funding programming period 2000 to 2006 and in the programming period 2007 to 2013. Moreover,

the German Federal State funds East German regions under the GRW program (Gemeinschaftsaufgabe - Verbesserung der Regionalen Wirtschaftsstruktur) (European Commission, 2015; Bundesministerium für Wirtschaft und Energie, 2016a and 2016b). Furthermore, the synthetic controls of both regions suffer from the relatively small number of non-border regions included. In the case of Chemnitz, only five non-border regions match the region's economic trajectory, indicating a certain degree of uncertainty about the ability of the synthetic control to reproduce the counterfactual situation, i.e. the economic development of the border regions had the EU Eastern enlargement not taken place.

Despite these caveats, the results still reveal several interesting findings. In particular, they show that border regions in the old member states have been differently affected by the EU Eastern enlargement of 2004. While all regions have continued their positive growth path after the EU Eastern enlargement, not in every region has the economic performance exceeded the economic performance of the counterfactual situation, i.e. the situation had the EU Eastern enlargement not taken place. On the aggregate level, results show that in contrast to popular concerns, the enlargement did not comprehensively weaken the economic performance of border regions. However, the enlargement did not lead to a comprehensive strengthening of border regions either, as may have been assumed from economic theory (see Brülhart, 2011 and Niebuhr and Stiller, 2002 for an overview). At least in the course of the EU Eastern enlargement of 2004, on average, the GDP of border regions has not been affected by the enlargement in a statistically significant way.

5.3 Explanatory Factors for Heterogeneous Treatment Effects

The results outlined above suggest that regions respond differently to the changes in market access. This section aims to shed more light on possible reasons behind the differential payoff of the EU Eastern enlargement 2004 for border regions. It does so by quantitatively examining factors that are associated with positive or negative enlargement effects. To identify regional factors that may drive the enlargement payoffs in border regions, a simple linear panel regression model with region and year fixed effects is estimated for the set of border regions in the post-enlargement period, i.e. from 2005 to 2012. Following the suggestions by Campos *et al.* (2014), the percentage difference between the actual GDP per capita of the border regions and their estimated synthetic counterparts serves as the dependent variable. This outcome variable inevitably suffers from being an estimate itself. Yet it is the best proxy for the extent to which a region has actually been affected by the EU Eastern enlargement. Formally, the regression model can be presented as follows:

$$Y_{jt} = \beta_0 + \beta_k \mathbf{X}_{k,jt} + \gamma_{j-1} R_{j-1} + \sigma_{t-1} T_{t-1} + \mu_{jt},$$

where Y_{jt} is the percentage difference between the actual and synthetic time series for region j at time t, β_0 is the unknown intercept, $\mathbf{X}_{k,jt}$ is a matrix of k observed explanatory variables, β_k is the corresponding coefficient for the $k-th$ variables, R_{j-1} are $j-1$ dummy variables for the border regions, γ_{j-1} are the coefficients for the region dummies, T_{t-1} are $t-1$ dummy variables for the years in the post-enlargement period, σ_{t-1} are the coefficients for the time dummies, and μ_{jt} is the error term.

Overall, four sets of potential explanatory factors for the differential enlargement payoffs across regions are examined. The first set includes again the regional factor allocation, approximated by the regional population density and the regional employment rate. Both factors take up the assumption that regions with a larger endowment with human resources are better equipped to exploit the effects of economic integration. The second set includes the share of the industrial sector in the regional Gross Value Added (GVA). This factor responds to the assumptions of international trade theory based on Balassa (1965), suggesting that the sectoral composition of a region is an important aspect for the extent to which a region can benefit from economic integration. The third set reflects the regional knowledge base, measured by the regional share of human resources in science and technology and the regional patent intensity. It accounts for the fact that more innovative regions can better absorb new ideas (see, for example, Caragliu and Nijkamp, 2012). Furthermore, they may be more successful in fighting increased competition from foreign firms. The fourth set of factors includes the regional endowment with infrastructure, responding to the fact that infrastructure is important for cross-border economic activities (Thissen, 2005; Bröcker *et al.*, 2010). Data on all explanatory variables are again obtained from the Cambridge Econometrics Regional Database (2015) and the Eurostat Regional Database (2016).

Table 6 depicts the regression coefficients for four different estimated model specifications. As becomes evident from the reported estimates, the regional employment rate, the relative strength of the regional industrial sector and the regional endowment with physical infrastructure correlate statistically significantly with higher positive enlargement effects. In contrast, the regional population density and the regional innovativeness do not correlate with the magnitude of the enlargement payoff in a statistically significant way. While the results only consider selected region-specific factors and are not conclusive, they nevertheless provide initial insights on factors that possibly influence the extent to which border regions have profited from changes in

market access following the EU Eastern enlargement of 2004.

Table 6: Explanatory Factors of the Enlargement Payoff in Border Regions[a]

	Specification 1	Specification 2	Specification 3	Specification 4
Employment Rate	72.74***	33.82**	33.96**	35.30**
	(15.21)	(13.23)	(13.75)	(13.48)
Population Density	-.008	-.014	-.015	-.017
	(.011)	(.009)	(.010)	(.010)
Strength Industrial Sector		.003***	.003***	.003***
		(.001)	(.001)	(.001)
Patent Intensity			-.209	-.644
			(4.12)	(4.09)
Human Resources in Science and Technology			-.076	-.143
			(.123)	(.124)
Roads				.363**
				(.162)
Constant	-60.30***	-46.54***	-41.95***	-50.93***
	(15.78)	(12.74)	(14.58)	(14.83)
Region FE	√	√	√	√
Year FE	√	√	√	√
Observations	120	120	120	120
R^2	.56	.72	.72	.74

[a] Table entries denote regression coefficients of with region and year fixed-effects. Standard errors in parentheses. Dependent variable: Percentage difference between the actual and the synthetic series of per capita GDP for each border region and each year after the EU Eastern enlargement 2004. Inference: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

6 Discussion and Conclusion

This paper has examined the effect of the EU Eastern enlargement in 2004 on the regional GDP per capita of German, Austrian and Italian regions located on the border to the new member states. It has done so by applying the Synthetic Control Method (SCM) that compares the economic performance of these border regions after the enlargement with a weighted combination of non-border regions that form the synthetically generated controls. This method allows the identification and evaluation of the economic enlargement effect in a causal way. Results show that on average, i.e. when considering all border regions together, a negative enlargement effect can be observed. This effect is mainly driven by the two capital cities of Berlin and Vienna. When excluding these two regions, a positive enlargement effect is visible in the medium term, suggesting that in line with regional economic theories, border regions are not the losers of the enlargement. Instead, they can indeed capitalize on their geographic location and profit from economic integration. This average enlargement effect is, however, not statistically significant.

When looking at the enlargement effects in the individual border regions, however, it becomes evident that border regions are differently affected by the changes in the market access. Descriptive evidence suggests that Austrian rural border regions with a high regional GDP per capita in the years prior to the enlargement have profited from the enlargement, while German rural

regions with a lower GDP per capita prior to the enlargement could not capitalize on changes in market access to the same extent. For urban border regions, the opposite seems to be the case. Here, urban regions characterized by a lower GDP in the years prior to the enlargement have experienced positive enlargement effects, while urban regions with high GDPs per capita in the years prior to the enlargement have witnessed negative enlargement effects. However, these results may be driven by regional peculiarities of the two capital regions Berlin and Vienna, by possible intervening effects of public funds, and by country effects.

When quantitatively examining possible factors that may explain the heterogeneous enlargement payoffs across border regions, results show that the regional employment rate, the relative strength of the regional industrial sector and the regional endowment with physical infrastructure correlate statistically significantly with higher positive enlargement effects, while the regional innovativeness and population density do not correlate with the magnitude of the enlargement effect in a statistically significant way. This suggests that it is particular structural factors that matter. At the same time, the regions' endowment with physical infrastructure, which is a common target of regional growth programs (see Crescenzi and Rodríguez-Pose, 2012 for an overview), seem to be equally important.

Even though the results provide new insights into the effect of the EU Eastern enlargement on the economic performance of regions located on the former EU external border, some caveats have to be noted: firstly, the Stable Unit Treatment Value Assumption (SUTVA) may not hold in the context of the EU Eastern enlargement. Hence, changes in market access inevitably affected all European regions, not only border regions. The results can thus only be interpreted as lower bonds for the true effects. Secondly, in several border regions, the synthetic controls do not perfectly match the economic trajectory of the border region in the years prior to the enlargement. This may violate the assumption that border regions and their synthetic controls reveal similar growth paths in the years prior to the EU Eastern enlargement. To attenuate these mismatches, it would be desirable to adjust the set of pre-enlargement GDP predictor variables to reflect better the growth trajectories of border regions in the pre-enlargement period. Yet the adjustment of the pre-enlargement GDP predictor variables is limited by the incompleteness of time-series data for many economic growth factors throughout the 1990s. The limited availability of data also prohibits the analysis at lower spatial levels such as the NUTS-3 or municipal level. Conducting empirical analyses at these lower levels would be desirable, as several empirical studies have shown that border effects rapidly decay with distance (Redding and Sturm, 2008; Brülhart *et al.*, 2012). In future research, it would also be desirable to repeat the analysis for alternative outcome variables such as the regional economic growth

rate, the regional employment rate, or the regional wage structure. This would provide a more comprehensive picture on the economic effect of the EU Eastern enlargement in 2004 on border regions in the old member states. In order to confirm the robustness of the results, it would also be desirable to perform in-time and in-space placebos tests (for further discussion on the inference in the SCM, see Abadie *et al.*, 2010 and 2015).

Despite these caveats, the essay still provides an initial attempt to identify and evaluate the effects of the EU Eastern enlargement on the GDP of border regions in a causal way. Results show that in contrast to public concerns, on average, border regions in the old member states have not been the losers of the EU Eastern enlargement of 2004. Instead, many border regions have developed more favorably than they would have had the enlargement not taken place. For some border regions, however, negative effects can be observed. These heterogeneous effects suggest that the border location is not sufficient for regions to profit from changes in market access. Instead, the regional context of border regions matters. When translating the findings into the political contexts, they suggest that one-size-fits-all regional integration policies are not appropriate. Instead, results suggest that – in line with the Smart Specialization Strategy of European Commission (see, for example, McCann and Ortega-Argilés, 2015) – regional policies designed to accompany economic integration in border regions should pursue place-based solutions that consider regional characteristics.

References

Abadie, A., Diamond, A. and Hainmueller, J. (2010). Synthetic Control Methods for Comparative Case Studies: Estimating the Effect of California's Tobacco Control Program. *Journal of the American Statistical Association*, 105(490):493–505.

Abadie, A., Diamond, A. and Hainmueller, J. (2015). Comparative Politics and the Synthetic Control Method. *American Journal of Political Science*, 59(2):495–510.

Abadie, A. and Gardeazabal, J. (2003). The Economic Costs of Conflict: A Case Study of the Basque Country. *American Economic Review*, 93(1):113–132.

Baas, T. and Brücker, H. (2010). Macroeconomic Impact of Eastern Enlargement on Germany and UK: Evidence from a CGE Model. *Applied Economics Letters*, 17(2):125–128.

Bathelt, H., Malmberg, A. and Maskell, P. (2004). Clusters and Knowledge: Local Buzz, Global Pipelines and the Process of Knowledge Creation. *Progress in Human Geography*, 28(1):31–56.

Braakmann, N. and Vogel, A. (2010). The Impact of the 2004 EU Enlargement on the Performance of Service Enterprises in Germany's Eastern Border Region. *Review of World Economics*, 146(1):75–89.

Brakman, S., Garretsen, H., Marrewijk, C. and Oumer, A. (2012). The Border Population Effects of EU Integration. *Journal of Regional Science*, 52(1):40–59.

Bröcker, J., Korzhenevych, A. and Schürmann, C. (2010). Assessing Spatial Equity and Efficiency Impacts of Transport Infrastructure Projects. *Transportation Research Part B*, 44(7): 795–811.

Brülhart, M. (2011). The Spatial Effects of Trade Openness: A Survey. *Review of World Economics*, 86(1):59–83.

Brülhart, M., Carrère, C. and Trionfetti, F. (2012). How Wages and Employment Adjust to Trade Liberalization: Quasi-experimental Evidence from Austria. *Journal of International Economics*, 86(1):68–81.

Brülhart, M., Crozet, M. and Koenig, P. (2004). Enlargement and the EU Periphery: The Impact of Changing Market Potential. *The World Economy*, 27(6):853–875.

Bundesinstitut für Bau-, Stadt- und Raumforschung (2014). Laufende Raumbeobachtung - Raumabgrenzungen. `http://www.bbsr.bund.de/BBSR/DE/Raumbeobachtung/Raumabgrenzungen/Regionstypen2011/regionstypen.html?nn=443270`.

Bundesministerium für Wirtschaft und Energie (2016a). *Gemeinschaftsaufgabe Verbesserung der regionalen Wirtschaftsstruktur (GRW)*. `http://www.bmwi.de/DE/Themen/Wirtschaft/Regionalpolitik/gemeinschaftsaufgabe,did=151112.html`.

Bundesministerium für Wirtschaft und Energie (2016b). *Förderperiode 2007-2013*. `http://www.bmwi.de/DE/Themen/Europa/Strukturfonds/foerderperiode-2007-2013.html`.

Cambridge Econometrics (2015). European Regional Database. `http://www.camecon.com/SubNational/SubNationalEurope/RegionalDatabase.aspx`.

Campos, N., Coricelli, F. and Moretti, L. (2014). Economic Growth and Political Integration: Estimating the Benefits from Membership in the European Union Using the Synthetic Counterfactuals Method. *IZA Discussion Paper*, 8162:1–37.

Capello, R. (2007). *Regional Economics*. New York, NY: Routledge.

Caragliu, A. and Nijkamp, P. (2012). The Impact of Regional Absorptive Capacity on Spatial Knowledge Spillovers: The Cohen and Levinthal Model Revisited. *Applied Economics*, 44(11):1363–1374.

Cohen, W. and Levinthal, D. (1990). Absorptive Capacity: A New Perspective on Learning and Innovation. *Administrative Science Quarterly*, 35(1):128–152.

Crescenzi, R. and Rodríguez-Pose, A. (2012). Infrastructure and Regional Growth in the European Union. *Papers in Regional Science*, 91(3):487–513.

Crozet, M. and Koenig, P. (2004). EU Enlargement and the Internal Geography of Countries. *Journal of Comparative Economics*, 32(2):265–279.

Cuaresma-Crespo, J., Doppelhofer, G. and Feldkircher, M. (2014). The Determinants of Economic Growth in European Regions. *Regional Studies*, 48(1):44–67.

Dauth, W., Findeisen, S. and Suedekum, J. (2014). The Rise of the East and the Far East: German Labor Markets and Trade Integration. *Journal of the European Economic Association*, 12(6):1643–1675.

Duranton, G. and Puga, D. (2004). Micro-Foundations of Urban Agglomeration Economies. *Handbook of Regional and Urban Economics*, 4:2063–2117.

Elsner, B. (2013a). Does Emigration Benefit the Stayers? Evidence from EU Enlargement. *Journal of Population Economics*, 26(2):531–553.

Elsner, B. (2013b). Emigration and Wages: The EU Enlargement Experiment. *Journal of International Economics*, 91(1):154–163.

Epstein, R. and Jacoby, W. (2014). Eastern Enlargement Ten Years On: Transcending the East–West Divide? *JCMS: Journal of Common Market Studies*, 52(1):1–16.

European Commision (2001). On the Impact of Enlargement on Regions Bordering Candidate Countries. Community Action for Border Regions. `http://ec.europa.eu/regional_policy/sources/docoffic/official/communic/pdf/borden.pdf`.

European Commission (2006). Die neue KMU Definition. `http://ec.europa.eu/enterprise/policies/sme/files/sme_definition/sme_user_guide_de.pdf`.

European Commission (2015). Objective 1: Eligible Regions. `http://ec.europa.eu/regional_policy/archive/objective1/regions_en.htm`.

Eurostat Regional Database (2016). http://http://ec.europa.eu/eurostat/web/regions/data/database.

Forster, B. (2007). Anpassungsdruck und Anpassungsstrategien des grenznahen Handwerks angesichts veränderter Wettbewerbsbedingungen im Zuge der EU-Erweiterung 2004. *Wirtschaft und Raum*, Band 15.

Giersch, H. (1950). Economic Union between Nations and the Location of Industries. *The Review of Economic Studies*, 17(2):87–97.

Head, K. and Mayer, T. (2000). Non-Europe: The Magnitude and Causes of Market Fragmentation in the EU. *Weltwirtschaftliches Archiv*, 136(2):284–314.

Knippschild, R. (2011). Cross-border Spatial Planning: Understanding, Designing and Managing Cooperation Processes in the German–Polish–Czech Borderland. *European Planning Studies*, 19(4):629–645.

Krätke, S. (2002). The Regional Impact of EU Eastern Enlargement: A View from Germany. *European Planning Studies*, 10(5):651–664.

Krätke, S. and Borst, R. (2007). EU Eastern Enlargement and the Configuration of German-Polish Inter-Firm Linkages. *Tijdschrift voor Economische en Sociale Geografie*, 98(5):621–640.

Krugman, P. (1991). Increasing Returns and Economic Geography. *Journal of Political Economy*, 99(3):483–499.

Leick, B. (2010). What Determines the Co-operative Potential for Firms in Western European and CEE Border Regions? A Comparative Micro-Level Analysis. *Economic and Business Review for Central and South-Eastern Europe*, 12(2):109–128.

Lösch, A. (1944). *Die räumliche Ordnung der Wirtschaft*. Jena: G. Fischer.

McCann, P. and Ortega-Argilés, R. (2015). Smart Specialization, Regional Growth and Applications to European Union Cohesion Policy. *Regional Studies*, 49(8):1291–1302.

Niebuhr, A. (2008). The Impact of EU Enlargement on European Border Regions. *International Journal of Public Policy*, 3(3):163–186.

Niebuhr, A. and Stiller, S. (2002). Integration Effects in Border Regions: A Survey of Economic Theory and Empirical Studies. *HWWA Discussion Paper*, 179:1–30.

Nitsch, V. (2000). National Borders and International Trade: Evidence from the European Union. *Canadian Journal of Economics*, 33(4):1091-1105.

Petrakos, G. and Topaloglou, L. (2008). Economic Geography and European Integration: The Effects on the EU's External Border Regions. *International Journal of Public Policy*, 3(3-4):146–162.

Rauch, J. (1991). Comparative Advantages, Geographic Advantages and the Volume of Trade. *The Economic Journal*, 101:1230–1244.

Redding, S. and Sturm, D. (2008). The Costs of Remoteness: Evidence from German Division and Reunification. *American Economic Review*, 98(5):1766–1797.

Resmini, L. (2003). Economic Integration, Industry Location and Frontier Economies in Transition Countries. *Economic Systems*, 27(2):205–221.

Rippl, S., Baier, D., Kindervater, A. and Boehnke, K. (2005). Does the Eastern Europe Enlargement of the European Union Mobilize Ethnocentric Attitudes? The Importance of Threats vis-à-vis Situational and Personality Factors. *Zeitschrift für Soziologie*, 34(4):288–310.

Rodríguez-Pose, A. (2012). Trade and Regional Inequality. *Economic Geography*, 88(2):109–136.

Thissen, M. (2005). RAEM: Regional Applied General Equilibrium Model for the Netherlands. In: van Oort, F., Thissen, M. and van Wissen, L. (Eds.) *A Survey of Spatial-Economic Planning Models in the Netherlands: Theory, Application and Evolution.*, 63–86. Rotterdam/The Hague, NAi Uitgevers.

Topaloglou, L., Kallioras, D., Manetos, P. and Petrakos, G. (2006). A Border Regions Typology in the Enlarged European Union. *Journal of Borderland Studies*, 20(2):67–89.

Trettin, L. (2010). Einfluss der EU-Osterweiterung auf den Wettbewerb auf Handwerksmärkten. *Springer Wirtschaftsdienst*, 90(1):35–42.

Xheneti, M., Smallbone, D. and Welter, F. (2013). EU Enlargement Effects on Cross-Border Informal Entrepreneurial Activities. *European Urban and Regional Studies*, 20(3):314–328.

A Appendix

Burgenland - A11

Table A.1: Balance Test: Burgenland

Variable	Burgenland	Synthetic Control
Employment Rate	.782	.786
Population Density	69.76	94.88
Patent Intensity	.112	.097
Primary Secor	.046	.047
Secondary Sector	.279	.280
Tertiary Sector	.664	.665
Hourly Wage	10.97	10.61
GDP per capita 1991	14806.35	14858.10
GDP per capita 1995	16794.62	16803.38
GDP per capita 2000	19238.92	19263.02

Table A.2: Synthetic Control: Burgenland

Region	NUTS Code	Weight
Namur	BE35	.210
Lüneburg	DE93	.096
Calabria	ITF6	.038
Norte	PT11	.076
Alentejo	PT18	.210
Cheshire	UKD2	.088
Highlands	UKM6	.282

Lower Austria - A12

Table A.3: Balance Test: Lower Austria

Variable	Lower Austria	Synthetic Control
Employment Rate	.860	.857
Population Density	79.42	73.42
Patent Intensity	.232	.231
Primary Secor	.032	.032
Secondary Sector	.340	.339
Tertiary Sector	.616	.613
Hourly Wage	12.61	12.56
GDP per capita 1991	20069.59	20001.22
GDP per capita 1995	21112.13	21044.47
GDP per capita 2000	23899.33	23814.34

Table A.4: Synthetic Control: Lower Austria

Region	NUTS Code	Weight
Vorarlberg	AT34	.145
Lower Franconia	DE26	.036
Western Finland	FI19	.052
Northern Finland	FI1A	.100
Franche-Comté	FR43	.217
Emilia-Romagna	ITD5	.071
Basilicata	ITF5	.016
Alentejo	PT18	.035
Cumbria	UKD1	.192
Highlands	UKM6	.136

Vienna - A13

Table A.5: Balance Test: Vienna

Variable	Vienna	Synthetic Control
Employment Rate	1.04	1.04
Population Density	3736.46	3651.24
Patent Intensity	.216	.204
Primary Secor	.001	.003
Secondary Sector	.195	.196
Tertiary Sector	.818	.818
Hourly Wage	18.02	18.08
GDP per capita 1991	33117.54	33083.95
GDP per capita 1995	34721.93	34689.96
GDP per capita 2000	40047.96	40013.12

Table A.6: Synthetic Control: Vienna

Region	NUTS Code	Weight
Brussels	BE10	.227
Walloon Brabant	BE31	.040
Hamburg	DE60	.124
Cologne	DEA2	.024
Rhinehessen Palatinate	DEB3	.039
Leipzig	DED3	.057
Campania	ITF3	.035
Inner London	UKI1	.083
Outer London	UKI2	.371

Carinthia - A21

Table A.7: Balance Test: Carinthia

Variable	Carinthia	Synthetic Control
Employment Rate	.957	.956
Population Density	58.61	91.80
Patent Intensity	.200	.200
Primary Secor	.021	.022
Secondary Sector	.307	.307
Tertiary Sector	.667	.667
Hourly Wage	12.89	12.87
GDP per capita 1991	19969.78	19944.34
GDP per capita 1995	20988.81	20961.57
GDP per capita 2000	24126.13	24095.01

Table A.8: Synthetic Control: Carinthia

Region	NUTS Code	Weight
Tyrol	AT33	.127
Vorarlberg	AT34	.113
Western Finland	FI19	.069
Basse-Normandie	FR25	.143
Franche-Comté	FR43	.039
Auvergne	FR72	.177
Luxembourg	LU00	.031
Norte	PT11	.042
Cumbria	UKD1	.030
West Wales	UKL1	.229

Styria - A22

Table A.9: Balance Test: Styria

Variable	Styria	Synthetic Control
Employment Rate	.953	.953
Population Density	72.21	138.96
Patent Intensity	.257	.256
Primary Secor	.025	.026
Secondary Sector	.353	.354
Tertiary Sector	.611	.612
Hourly Wage	12.43	12.42
GDP per capita 1991	19357.77	19381.92
GDP per capita 1995	20909.14	20934.47
GDP per capita 2000	24674.13	24703.6

Table A.10: Synthetic Control: Styria

Region	NUTS Code	Weight
Vorarlberg	AT34	.030
Lower Franconia	DE26	.109
Brunswick	DE91	.254
Western Finland	FI19	.075
Franche-Comté	FR43	.076
Luxembourg	LU00	.075
Norte	PT11	.035
Centro	PT16	.240
Cumbria	UKD1	.061
Cheshire	UKD2	.045

Upper Austria - A31

Table A.11: Balance Test: Upper Austria

Variable	Upper Austria	Synthetic Control
Employment Rate	.978	.973
Population Density	113.65	164.87
Patent Intensity	.305	.295
Primary Secor	.023	.028
Secondary Sector	.405	.406
Tertiary Sector	.556	.559
Hourly Wage	13.46	13.58
GDP per capita 1991	23448.47	23427.14
GDP per capita 1995	24233.82	24214.33
GDP per capita 2000	28070.97	28039.48

Table A.12: Synthetic Control: Upper Austria

Region	NUTS Code	Weight
Vorarlberg	AT34	.055
Stuttgart	DE11	.211
Navarra	ES22	.500
Western Finland	FI19	.006
Luxembourg	LU00	.001
Groningen	NL11	.094
Centro	PT16	.048
Cheshire	UKD2	.085

Lower Bavaria - DE22

Table A.13: Balance Test: Lower Bavaria

Variable	Lower Bavaria	Synthetic Control
Employment Rate	.906	.924
Population Density	111.18	238.78
Patent Intensity	.258	.130
Primary Secor	.021	.018
Secondary Sector	.396	.394
Tertiary Sector	.578	.579
Hourly Wage	12.64	11.72
GDP per capita 1991	19192.16	19321.93
GDP per capita 1995	23013.55	22981.5
GDP per capita 2000	24827.45	24855.93

Table A.14: Synthetic Control: Lower Bavaria

Region	NUTS Code	Weight
Note	PT11	.228
Centro	PT16	.075
Tees Valley and Durham	UKC1	.157
Cheshire	UKD2	.328
North Eastern Scotland	UKM5	.147
Highlands	UKM6	.065

Upper Palatinate - DE23

Table A.15: Balance Test: Upper Palatinate

Variable	Upper Palatinate	Synthetic Control
Employment Rate	.968	.950
Population Density	109.27	298.50
Patent Intensity	.489	.367
Primary Secor	.017	.019
Secondary Sector	.374	.369
Tertiary Sector	.607	.606
Hourly Wage	12.91	12.99
GDP per capita 1991	19717.17	19756.03
GDP per capita 1995	23177.77	23150.99
GDP per capita 2000	26409.15	26393.96

Table A.16: Synthetic Control: Upper Palatinate

Region	NUTS Code	Weight
Lower Franconia	DE26	.201
Rhinehessen-Palatinate	DEB3	.017
North Brabant	NL41	.125
Centro	PT16	.141
Cheshire	UKD2	.237
Lancashire	UKD4	.234
North Eastern Scotland	UKM5	.045

Upper Franconia - DE24

Table A.17: Balance Test: Upper Franconia

Variable	Upper Franconia	Synthetic Control
Employment Rate	.966	.961
Population Density	152.95	231.37
Patent Intensity	.335	.326
Primary Secor	.011	.012
Secondary Sector	.355	.355
Tertiary Sector	.634	.634
Hourly Wage	13.32	13.17
GDP per capita 1991	21157.39	21163.07
GDP per capita 1995	22858.43	22862.73
GDP per capita 2000	24276.68	24280.41

Table A.18: Synthetic Control: Upper Franconia

Region	NUTS Code	Weight
Freiburg	DE13	.283
Lower Franconia	DE26	.013
Swabia	DE27	.053
Muenster	DEA3	.211
Eastern Finland	FI13	.013
Norte	PT11	.092
Northumberland and Tyne and Wear	UKC2	.087
West Wales	UKL1	.154
North Eastern Scotland	UKM5	.094

Berlin - DE30

Table A.19: Balance Test: Berlin

Variable	Berlin	Synthetic Control
Employment Rate	.872	.914
Population Density	3862.18	579.34
Patent Intensity	.261	.111
Primary Secor	.001	.012
Secondary Sector	.209	.275
Tertiary Sector	.801	.721
Hourly Wage	16.49	14.39
GDP per capita 1991	29618.62	29379.4
GDP per capita 1995	26498.33	25966.31
GDP per capita 2000	26281	26725.57

Table A.20: Synthetic Control: Berlin

Region	NUTS Code	Weight
Brussels	BE10	.067
Leipzig	DED3	.573
Alps-French Riviera	FR82	.218
North Eastern Scotland	UKM5	.143

Brandenburg - DE40

Table A.21: Balance Test: Brandenburg

Variable	Brandenburg	Synthetic Control
Employment Rate	.756	.757
Population Density	87.12	159.53
Patent Intensity	.103	.100
Primary Secor	.017	.017
Secondary Sector	.316	.315
Tertiary Sector	.666	.665
Hourly Wage	12.42	12.41
GDP per capita 1991	19090.62	19072.25
GDP per capita 1995	16222.98	16206.97
GDP per capita 2000	18394.71	18377.21

Table A.22: Synthetic Control: Brandenburg

Region	NUTS Code	Weight
Walloon Brabant	BE31	.017
Hainaut	BE32	.057
Lüneburg	DE93	.016
Leipzig	DED3	.153
Schleswig-Holstein	DEE0	.468
Thuringia	DEG0	.220
Highlands	UKM6	.069

Mecklenburg-Western Pomerania - DE80

Table A.23: Balance Test: Mecklenburg Western-Pomerania

Variable	Mecklenburg Western-Pomerania	Synthetic Control
Employment Rate	.770	.770
Population Density	78.10	150.79
Patent Intensity	.048	.056
Primary Secor	.030	.030
Secondary Sector	.243	.243
Tertiary Sector	.724	.724
Hourly Wage	11.87	11.81
GDP per capita 1991	18109.22	18114.33
GDP per capita 1995	16090.26	16090.56
GDP per capita 2000	17869.91	17868.14

Table A.24: Synthetic Control: Mecklenburg Western-Pomerania

Region	NUTS Code	Weight
Namur	BE35	.127
Rhinehessen-Palatinate	DEB3	.239
Schleswig-Holstein	DEE0	.177
Andalusia	ES61	.113
Nord-Pas-de-Calais	FR30	.017
Calabria	ITF6	.258
Highlands	UKM6	.034
Northern Ireland	UKN0	.035

Chemnitz - DED1

Table A.25: Balance Test: Chemnitz

Variable	Chemnitz	Synthetic Control
Employment Rate	.837	.869
Population Density	275.58	200.37
Patent Intensity	.086	.046
Primary Secor	.010	.018
Secondary Sector	.360	.355
Tertiary Sector	.629	.625
Hourly Wage	11.02	10.33
GDP per capita 1991	15845.83	15813.52
GDP per capita 1995	15327.51	15257.19
GDP per capita 2000	16927.57	16935.69

Table A.26: Synthetic Control: Chemnitz

Region	NUTS Code	Weight
Leipzig	DED3	.176
Asturias	ES12	.359
Borte	PT11	.253
West Wales	UKL1	.207
North Eastern Scotland	UKM5	.005

Dresden - DED2

Table A.27: Balance Test: Dresden

Variable	Dresden	Synthetic Control
Employment Rate	.801	.814
Population Density	222.13	212.87
Patent Intensity	.204	.138
Primary Secor	.010	.014
Secondary Sector	.336	.332
Tertiary Sector	.655	.651
Hourly Wage	12.55	11.95
GDP per capita 1991	18836.22	18832.62
GDP per capita 1995	16487.57	16473.12
GDP per capita 2000	18368.44	18389.74

Table A.28: Synthetic Control: Dresden

Region	NUTS Code	Weight
Lüneburg	DE93	.051
Rhinehessen-Palatinate	DEB3	.041
Leipzig	DED3	.192
Schleswig-Holstein	DEE0	.057
Thuringia	DEG0	.375
Norte	PT11	.113
Tees Valley and Durham	UKC1	.171

Friuli-Venezia Giulia - ITD4

Table A.29: Balance Test: Friuli-Venezia Giulia

Variable	Friuli-Venezia Giulia	Synthetic Control
Employment Rate	1.01	.998
Population Density	150.80	292.88
Patent Intensity	.183	.190
Primary Secor	.019	.027
Secondary Sector	.263	.266
Tertiary Sector	.688	.691
Hourly Wage	11.82	11.58
GDP per capita 1991	23742.06	23724.81
GDP per capita 1995	26558.35	26510.25
GDP per capita 2000	28959.06	28912.61

Table A.30: Synthetic Control: Friuli-Venezia-Giulia

Region	NUTS Code	Weight
Brussels	BE10	.016
Cologne	DEA2	.225
Limousin	FR63	.097
Bolzano	ITD1	.334
Veneto	ITD3	.069
Luxembourg	LU00	.021
Norte	PT11	.053
Centro	PT16	.143
Berkshire, Buckinghamshire and Oxfordshire	UKJ1	.003
North Eastern Scotland	UKM5	.039