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The Economic Effect of the EU Eastern Enlargement for Border Regions in the Old Member States

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The Economic Effect of the EU Eastern Enlargement for Border Regions in the Old Member States

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Abstract

The paper evaluates the impact the EU Eastern enlargement in 2004 had for the economic performance of NUTS2 region located at the border to the new member states. Effects are identified by applying a synthetic control method. It compares the economic performance of these regions with synthetic control groups generated by weighting potential control regions that share the same characteristics of the border regions, but are not located at the border to the new member states. Results show that overall, the EU enlargement had a positive impact for the regional GDP of these border regions. However, when looking at selected region individually, it becomes evident that a heterogeneous treatment effect is at play: While the German region of Lower Bavaria has profited from the EU enlargement, the Italian region of Friuli-Venezia Giulia reveals a weaker performance than they would have in the absence of the enlargement. This suggests that regions adjust differently to the changes in market access. Furthermore, results indicate that an anticipation effect is at play. Hence, border regions seem to develop differently in the years prior to the enlargement than they would have, had the enlargement not taken place.

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

JEL Classification: F15, R10, R11

1 Introduction

About a decade ago, in May 2004, eight Eastern European countries have joined the European Union in the hitherto largest expansion. This enlargement differed from previous enlargement rounds insofar, as the wealth gap between old and new member states was more distinct, mainly because of the Soviet legacy of the new member states. The gross national income per capita (measured in purchasing power parities) of the new member states, for instance, amounted to merely 40% of the old member states (i.e. the EU-15) (Baas and Brücker, 2010). Because of the large discrepancy in wages and socioeconomic conditions, the enlargement came with both hopes and fears about the effects of the full economic integration. This has particularly been the case in regions located at the former EU-external border, as these border regions were assumed to be especially affected by the integration effects, because of their geographical proximity to the new member states (European Commission, 2001). Hence, following the New Economic Geography (NEG) model, these border regions were assumed to experience more drastic changes in the so-called market access than more central regions due to their sheer geographical proximity to the new member states (e.g. Krugman, 1991; Krugman and Venables, 1990; Hanson, 2005; Bosker and Garretsen, 2010). While advocates of the enlargement viewed the border location as an advantage, arguing that the privileged access to the markets in the new member states constitutes an incentive for firms to locate in these regions, opponents feared a depression of wages, increasing unemployment and an increased (price) competition from foreign firms on domestic markets (e.g. Niebuhr, 2008; Lafourcade and Paluzie, 2011).

The empirics a decade after the enlargement provide a rather clear picture, suggesting an overall positive effect of the EU Eastern enlargement in 2004 for both the new member states as well as for the old member states (e.g. Baas and Brücker, 2010; Elsener, 2013b and 2013a). However, most studies that assess the effect of the enlargement round focus on EU-wide impacts on growths or on country effects, but do not consider the peculiarities of border regions. Studies that do emphasize on border regions usually compare pre- and post enlargement outcomes of border and non-border regions in a narrow time-frame (e.g. Braakmann and Vogel, 2010). However, as border regions might face pronounced adjustment pressures in the short-run due to decreasing transaction costs and strong external effects, it is crucial to investigate the performance of these regions for a sufficient time period to draw valid conclusions about the effects of the EU Eastern enlargement.

This paper adds to the existing literature on the economic effects of the EU Eastern enlargement in 2004 in two ways: First, it explicitly focuses on the effect the EU enlargement had on the

economic performance (i.e. regional GDP) of NUTS2 regions located at the former EU external border. Second, by choosing a relative long time-period (i.e. 32 years), the paper also looks at the dynamics in the years prior and past the EU enlargement in 2004. This allows to account for the effects of trade agreements implemented prior to the enlargement as well as for transitional regulations in place past the EU Eastern enlargement 2004. In order to identify the effects the EU enlargement had on the regional GDP of regions at the former EU external border, the paper applies a synthetic control method (SCM) first introduced by Abadie and Gardeazabal (2003) and extended by Abadie *et al.* (2010, 2014). This method compares the economic development of the border regions in the aftermath of the EU enlargement with synthetically generated controls. When both the border regions and thier synthetic controls behave similarly over an extended period of time prior to the enlargement, then any discrepancy of regional GDP after the enlargement can be ascribed to the enlargement itself; thus, the discrepancy can be interpreted as the causal effect of the enlargement. The SCM is very suitable for the analysis, because of the small number of EU-15 regions that are directly located at the border to the new member state. Thus, out of all 186 EU-15 regions (NUTS2), merely three (West) German regions, four Austrian regions and one Italian region share a border with the new Eastern European member states.¹ Furthermore, compared to standard panel regression design, the SCM profits from explicitly revealing both the relative contribution of each control unit to the counterfactual of interest and the similarities between the regions affected by the event of interest (i.e. the EU enlargement in 2004) and the synthetic control group, in terms of pre-intervention outcomes and other predictors of post-intervention outcomes (Abadie *et al.*, 2010). It is therefore more transparent than the usual panel regression design. Because the weights of the regions that contribut to the synthetic control are restricted to one, the SCM also safeguards against extrapolation.

On the aggregate level (i.e. when taking all eight border regions together) results show that the aggregate reveals a better performance in the years after the EU enlargement than it would have had the EU enlargement not taken place. Thus, when comparing the economic growth path of the aggregate after the EU enlargement with its counterfactual (i.e. synthetic contol), it becomes evident that the aggregate of all border regions reveals a better growth trajectory than its synthetic control. However, when evaluating the enlargement effect for individual border region, it becomes evident that the effect is not homogeneous, but that regions adjust differently to the adjustment pressure. While the German regions of Lower Bavaria, for instance, shows a better performance than it would have in the absence of the enlargement, the Italian region

¹Regions from the former East Germany are not considered in this paper, given their peculiar economic development in the 1980s and 1990s.

of Friuli-Venezia Giulia show a poorer perform than they would have in the counterfactual situation. Overall, these results suggest two things: First, it is not possible to draw any general conclusions about the effect of the EU Eastern enlargement for regions located at the former EU external border. Instead, regions adjust differently to the institutional changes in the course of the enlargement. Second, results indicate that an anticipation effect is at play. Hence, border regions seem to develop differently in the years prior to the enlargement than they would have, had the enlargement not taken place.

The remainder of the paper is structured as follows: the next section provides a brief overview of the theoretical models addressing the effects of economic integration. It also sketches the corresponding empirical evidence from the literature. Section 3 introduces the synthetic control method (SCM) and describes the sample and data as well as the estimation strategy. The results from the empirical analysis are provided in Section 4. The paper closes with a critical discussion of the main results and their implication in the light of the current debate on the further enlargement of the European Union and its consequences for regions located at the border to the new member states.

2 The Impact of Economic Integration

As outlined above, the EU enlargement in 2004 constitutes the largest expansion of the EU and the economic and political integration of ten European countries into the EU common market. With the exception of the Mediterranean island states Malta and Cyprus, the new member (namely the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Slovakia and Slovenia) were part of the former Eastern bloc. The economic and political integration of these countries was the final step in a long integration process, initiated in the early 1990s that had led to a gradual trade liberalization and implementation of EU legislations. With the accession of the new member states, most formal barriers to cross-border economic interaction like technical regulations have been removed, and institutional and administrative disparities have become easier to overcome due to the implementation of the *acquis communautaire*. Therewith, it exceeded earlier trade agreements that merely dealt with the gradual reduction of tariffs.

The economic integration in 2004 took place via three main channels, namely an intensified trade of goods and services, migration of labor, and free movement of capital that all triggered a reduction of transaction costs. Hence, the cost for cross-border trade for goods, and services as well as the costs for movement of capital and labor noticeably decreased. Even thus the economic integration of the new member states has been long planned and, hence, anticipated

by the economic actors in the border regions of the old member states, the actual effects of the implementation of the *acquis communautaire* like the reduction of legislative barriers, less restrictive border controls and lower waiting times at the border were only visible in May 2004. Hence, it is plausible to treat the EU Eastern enlargement as an external shock for regions located directly at the border to the new member states. As these regions were exogeneously selected into the treatment group because of their sheer geographic location and because their selection into the treatment group is stable over time, the EU Eastern enlargement may be conceived as a natural experiment, despite the presence of anticipation effects.

In the literature, the effect of economic integration, i.e. a decline of cross-border transportation costs, has frequently been assessed under the New Economic Geography (NEG) model put forward by Krugman (1991) and Krugman and Venables (1990, 1993). One substantial aspect of their considerations is the role of space. Thus, the NEG assumes that within a country, regions adjust differently to trade liberalization and economic integration is assumed to entail an uneven development of economic activities within the integrating countries. In an application of the NEG model, Villar (1999) explicitly considered differences in market access as a decisive factor with respect to spatial integration effects. Brühlhardt *et al.* (2004) and Crozet and Koenig (2004) trace more explicitly what happens to domestic spatial distribution of economic activities when cross-border transaction costs decrease in the course of economic integration. Their theoretical models predict that *ceteris paribus*, regions with inherently less costly access to foreign markets such as border regions realize the largest gains from trade liberalization. While Brühlhardt *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. Given that border regions are endowed with a relative better access to the markets in the newly integrated countries, these regions should profit in particular from economic integration. Hence, the extension of the market and the potential increase in cross-border economic activities may influence the performance of regional firms due to the emergence of new economic opportunities in the new markets (Braakmann and Vogel, 2010; Niebuhr, 2008; Brühlhardt *et al.* (2004).

Even though the theoretical models suggest that trade liberalization and economic integration reveal a positive effect for both the old and the newly integrated countries, it would also be plausible to find no or a negative effect. Hence, regions located at the former EU external border are conceived as peripheral, and so are their counterparts in the new member states. Therefore, they may not have been affected from the EU enlargement at all, as trade of goods and services and migration takes place between national hubs (Bathelt *et al.*, 2004). Furthermore, the

economic integration also entails an increased competition from foreign firms on the domestic market. As Niebuhr (2008) points out, this is especially the case in border regions, potentially reducing the attractiveness of border regions as production sides.

Nevertheless, the empirical evidence greatly confirms a positive effect of economic integration in general and the EU Eastern enlargement in particular. At the national level, Baas and Brücker (2010), for instance, find a positive effect of the EU enlargement for key macroeconomic indicators (GDP and employment) in Germany and the United Kingdom. In a similar vein, Dustmann *et al.* (2010) find a positive effect of labor migration from the new member states for the tax revenue of the United Kingdom. Works with a particular emphasis on the integration effects on border regions include Brakman *et al.* (2012), who find a positive effect of economic integration on the population in border regions in the EU, while Hanson (1996) reports an increase in manufacturing jobs in US cities close to the Mexican border after the establishment of the NAFTA. Assessing the opposing effect, i.e. the effect of economic disintegration, Redding and Sturm (2008) find that West German cities located close to the inner German border experienced a decline in population as well as an economic downward trend, once the border was established. The only study that focuses explicitly on the effects of the EU Eastern enlargement in 2004 on border regions is the work by Braakmann and Vogel (2010). They can show that especially small service firms located in German NUTS1 regions that share a border with the new member states profited from the EU Eastern enlargement, while large firms did not profit at least in the years immediately after the EU Eastern enlargement.

In contrast to the study by Braakmann and Vogel (2010, this paper evaluates the regional economic effect the EU Eastern enlargement in the medium-run, i.e. seven years after the enlargement. It does so by applying a synthetic control method that compares the economic performance of regions located at the border to the new member states in the years after the enlargement with the counterfactual situation, i.e. the economic development in these regions had the EU enlargement in 2004 not taken place.

3 Research Design

3.1 The Synthetic Control Method

As outlined above, the empirical analysis is based on a synthetic control method (SCM) that compares a unit of interest (in this case the region located at the former EU external border) with a synthetically generated control group that is generated as a combination of regions

located in the old member states (EU-15) which share similar characteristics and are shaped by the same structural process than the border regions prior to the EU 2004 enlargement, but which are not located at the border to the new member states. Borrowing from the statistical matching literature, these regions are referred to as the *donor pool* (Abadie *et al.*, 2014). By comparing outcomes between the unit representing the case of interest and otherwise similar but unaffected units, the research design can be conceived as a treatment-control design. The treatment group consists of the border regions in the old member states, whereby in the first step, the treated unit is generated as the aggregate of all eight border regions in order to evaluate the overall effect the EU enlargement had on the economic performance of border regions. In the second step, for two selected border regions, namely the German region of Lower Bavaria and the Italian region of Friuli-Venezia Giulia, the effect of the EU enlargement is individually evaluated. This allows assessing whether the effect is homogeneous for all regions or whether heterogeneous effects are at play.

The *synthetic control* is created as the weighted average of all units included in the *donor pool*, hence it is a linear combination with coefficients that sum up to one (Abadie and Gardeazabal, 2003 and Abadie *et al.*, 2010, 2014). Formally, the synthetic control can be represented by a $(J \times 1)$ vector of weights $W = (w_2, \dots, w_{J+1})'$, with $0 \leq w_j \leq 1$ for $j = 2, \dots, J$ regions and $w_2 + \dots + w_{J+1} = 1$ (Abadie *et al.*, 2010, 2014). The value for the vector of weights W is chosen so that the characteristics of distinct border regions that best approximated by the characteristics of the synthetic control. This is, the difference between a $k \times 1$ vector X_1 , that contains the values of the of the pre-enlargement characteristics of one distinct border region, and X_0 , a $k \times J$ matrix containing the values of the same variables for the regions in the *donor pool*, should be minimized.²

The intuition behind the SCM is straightforward and comparable to the statistical matching approach. This is, only units that are similar in both observed and unobserved determinants of the outcome of interest should produce similarly trajectories of the outcome variable over extended periods of time (Abadie *et al.*, 2010 and 2014). When both the unit representing the case of interest and the synthetic control behave similarly over an extended period of time, prior to the intervention, a discrepancy of outcome variables following the intervention is interpreted as produced by the intervention itself (Abadie *et al.*, 2010 and 2014).

Compared to a panel regression design, the advantage of the SCM is that it makes explicit

²Thus, W^* is chosen as the value of W that minimizes $\sum_{m=1}^k v(X_{1m} - X_{0m}w)^2$, where v_m is a weight that reflects the relative importance that is assigned to m -th variable when narrowing the discrepancy between X_1 and X_0W (Abadie *et al.*, 2014).

both the relative contribution of each control unit to the counterfactual of interest and the similarities between the unit affected by the event of interest and the synthetic control in terms of pre-intervention outcomes and other predictors of post-intervention outcomes (Abadie *et al.*, 2010 and 2014). It is, therefore, more transparent than the usual panel regression design. Furthermore, it safeguards against extrapolation, because the weights of the units that contribute to the synthetic control can be restricted to one.

3.2 Sample and Data

As indicated above, the SCM generates the synthetic control from an *a priori* defined *donor pool* of potential control units. As an inappropriate comparison may lead to erroneous conclusions, the identification of this *donor pool* group (i.e. the selection of regions that may constitute potential controls) is highly important, (King *et al.*, 1994; Abadie *et al.*, 2014). If comparison units are not sufficiently similar to the regions representing the case of interest, then any difference in outcomes between these two sets merely reflects disparities in their characteristics, but does not reveal any valid conclusion about the effect of the EU enlargement (see Abadie *et al.*, 2014). To account for this fact, for each border region under consideration an individual synthetic control region is generated, comprising merely regions that are assumed to be driven by the same structural process than the distinct border region. This is, regions with geographic peculiarities such as the French oversea departements, the Spanish regions Ceuta and Melilla, as well as insular regions are *a priori* excluded from the donor pool. Because of a lack of data availability, all Greek regions are also excluded. All in all, the *donor pool* is a balanced panel encompassing all remaining NUTS2 regions from the old (EU-15) member states that do not share a border with the new member states for the years 1980 to 2011. Therewith, the panel includes a sufficient pre-intervention period, i.e. 24-years before the intervention, i.e. the EU enlargement 2004. The post-intervention period includes seven years. The selection is mainly driven by data availability.

The dependent variable is the regional GDP per capita in billions of euro in 2005 prices. The data is obtained from the Cambridge Econometrics' European Regional Database, a highly disaggregated dataset across both sectoral and sub-regional dimensions. For the pre-intervention characteristics, a standard set of economic growth predictor that has frequently been identified in the literature as affecting regional growth is used (e.g. Cuaresma-Crespo *et al.*, 2014). The set includes the regional population density, the regional employment rate, the industrial share of the regional GVA, and the regional innovativeness, approximated via the number of patents per 1000 employees. Furthermore, the for three years (1980, 1990 and 2000) the pre-enlargement

GDP is included as further explanatory factors. Data on these variables is also obtained from the Eurostat Regional Database and the Cambridge Econometrics European Regional Database. Table A.1 in the Appendix provides an overview over the distinct explanatory variables included in the model.

3.3 Estimation Strategy

Having identified the synthetic control, the synthetic control estimator of the effect of the treatment is quite intuitive. Hence, it is given by the comparison of post-intervention outcome of interest (i.e. the regional GDP) between the distinct border region and its synthetic control. Given that Y_{jt}^N denotes the outcome observed for region j at time t in the absence of the intervention for units $j=1, \dots, J+1$ and time period $t=1, \dots, t$, and Y_{jt}^I denotes the outcome that would have been observed for unit j at time t if unit j is exposed to the intervention, $Y_{jt}^I - Y_{jt}^N$ is the effect of interest (Abadie *et al.*, 2010 and 2014). Thereby, the model for untreated outcomes Y_{jt}^N is given as:

$$Y_{jt}^N = \delta_t + Z_j \theta_t + \lambda_t \mu_j + \epsilon_{jt},$$

where δ_t is an unobserved (common) time effect, Z_j are the observed pre-enlargement covariates, μ_j are permanent unobserved variables, and ϵ_{jt} are unobserved transitory shocks at the unit level with zero mean. The basic idea of the synthetic control method is to reweight the control group so that the *synthetic control* matches Z_j and (some) pre-enlargement Y_{jt} of the treated unit, so that as a result, μ_j is automatically matched. The identification of the *synthetic control* and the estimation of the treatment effect (i.e. the EU enlargement 2004) is conducted using the freely available *synth* package for Stata, developed and made available by Abadie *et al.* (2014).

In the following, the model is first applied to an aggregate of all border regions in order to evaluate the overall effect the EU enlargement had when taking all border regions together. Hence, in the first step, the aggregate of all eight border regions constitutes the treated unit. The aggregate is generated by recalculating the regional GDP per capita as well as the values for the explanatory factors for the aggregate of all eight border regions together. In the second step, the model is estimated for two selected border regions, namely for the German region of Lower Bavaria and for the Italian region of Friuli-Venezia Giulia. This allows evaluating the impact the enlargement had on single regions. It furthermore allows identifying whether the effect is homogeneous across all border regions, or whether heterogeneous effects are at play.

4 The Economic Impact of the EU 2004 Enlargement

4.1 Overall Effect

Figure 1 depicts the aggregated economic development of all eight border regions together for the years from 1980 to 2011 as well as the development of the respective *synthetic control*. As the graphs reveal, the aggregate of all eight border regions shows a better economic performance in terms of per capita GDP than its *synthetic control*, suggesting that overall, the border regions have experienced a more favorable development in the years after the EU Eastern enlargement than they would have in the counterfactual situation, i.e. when the enlargement had not taken place. Thereby, the discrepancy between the aggregate of all eight border regions and its *synthetic control* did already start in 2000, four years before the enlargement was actually implemented. This suggests the existence of anticipation effects. Hence, economic actors within the border regions may already changed their behavior in the anticipation of the EU enlargement. As the year 2000 almost coincides with the implementation of fixed exchange rates between the Euro and the former currencies of the Eurozone member states in 1999, the fixed exchange rates regime provides a further *ad hoc* explanation for the discrepancy between the economic development of border regions and their *synthetic controls*. that may be worth assessing in detail in an extension of this paper.

Figure 1: Trends in Regional GDP per Capita: Border Regions (Aggregate) vs. Synthetic Border Regions (Aggregate)

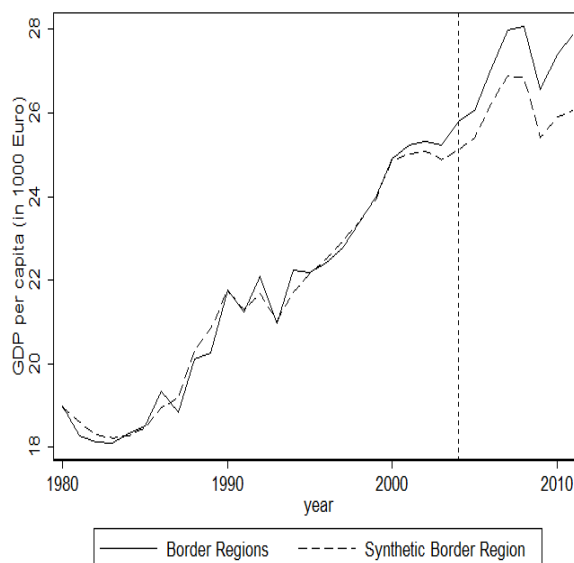


Table A.2 in the Appendix reports the weights of the European regions from the *donor pool* that have contributed to the *synthetic control*. As it becomes evident, out of all European NUTS2 regions included in the *donor pool*, nine contribute to the *synthetic control*. Thereby, the Italian region Emilia-Romagna contributes the highest share, followed by the Spanish region Navarra, the Austrian region Vorarlberg and the German region Detmold. When comparing the GDP predictor means in the pre-enlargement period of the border region aggregate and its synthetically generated counterpart, it becomes evident that the values of GDP predictors in the pre-enlargement period of the *synthetic control* match the values of the border region aggregate quite good (see Table 1). This suggests that the discrepancy in the per capita GDP between the aggregate and its *synthetic control* may indeed be attributed to the EU Eastern enlargement.

Table 1: GDP Predictor Means ^a

Variable	Border Regions	Synthetic Border Regions	Donor Pool
Employment Rate	93.27	93.23	92.42
Patent Intensity	27.49	27.41	21.02
Industry Share	26.80	26.68	20.38
GDP 1980	18.99	21.23	34.53
GDP 1990	21.78	21.75	37.94
GDP 2000	24.90	24.87	41.91

^a All variables except lagged GDP per capita are averaged for the 1990-2003 period.

4.2 Single Region Effects

Having identified the overall effect of the EU enlargement, in the following, the focus is laid on the individual region. Hence, in this subsection, the effect of the EU enlargement is evaluated for two selected regions, namely the Italian region of Friulia-Venezia Giulia, and the German region of Lower Bavaria. Following the SCM approach outlined above, for each of the two regions, a synthetic control is identified, and the regional economic performance of these two border regions is compared to the respective synthetic controls, i.e. to the situation had the EU enlargement not taken place.

In Italy, the region of Friuli-Venezia Giulia is the only Italian NUTS2 region that shares a border with the new member states. It is located in the North of Italy, directly at the border to Austria and Slovenia. Overall, Friuli-Venezia Giulia could continue its positive GDP development after the EU enlargement in 2004. However, as Figure 2 shows, when comparing the trend in GDP of Friuli-Venezia with its synthetic counterpart, the regional economic performance is less favorable than it would have, had the enlargement not taken place. Thereby, the discrepancy in per

capita GDP between the region and its synthetic counterpart already started to appear in 2000, indicating that anticipation effects or effects attributed to the implementation of the fixed exchange rates regime are at play.

Figure 2: Trends in Regional GDP per Capita: Friuli-Venezia Giulia vs. Synthetic Friuli-Venezia Giulia

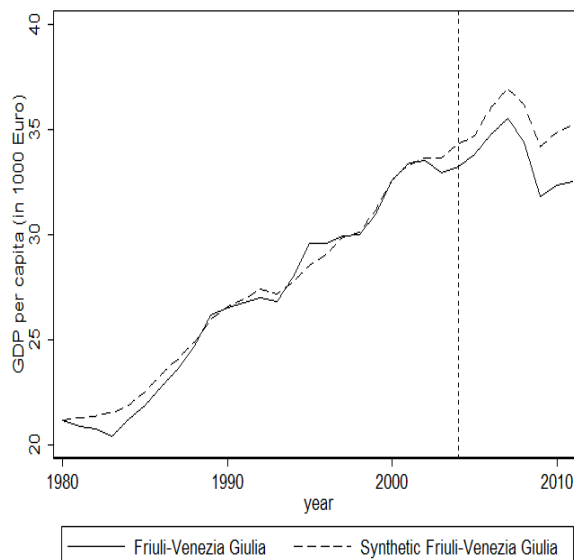


Table 2: GDP Predictor Means ^a

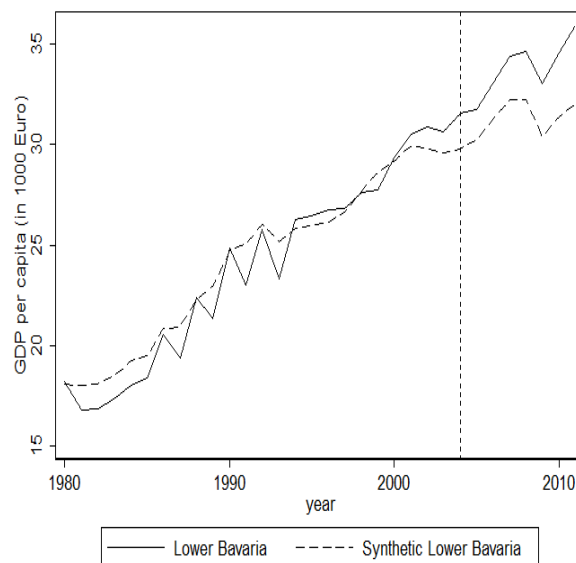
Variable	Friuli-Venezia Giulia	Synthetic Friuli-Venezia Giulia	Donor Pool
Employment Rate	101.51	101.30	92.42
Patent Intensity	18.38	18.23	21.02
Industry Share	23.64	23.88	20.38
GDP 1980	21.21	21.23	34.53
GDP 1990	26.55	26.58	37.94
GDP 2000	32.59	32.60	41.91

^a All variables except lagged GDP per capita are averaged for the 1990-2003 period.

As Table A.3 in the Appendix depicts, out of all NUTS2 regions included in the *donor pool*, eight regions contribute to the *synthetic control*. Thereby, four of them are Italian regions (Marche, Abruzzo, Umbria, and Calabria). Besides these Italian regions, the German region of Rhineland-Palatinate, the Austrian region Vorarlberg, Luxemburg, and the British region Lancashire contribute to the *synthetic control*. Table 2 reports the means of the GDP predictor variables for the pre-enlargement period. As it becomes evident, in the case of Friuli-Venezia Giulia, the actual values match the synthetic counterpart quite well, particularly when comparing the values to the EU-15 average, i.e. to the unweighted average of all regions included in the *donor pool*.

In Germany, seven NUTS2 regions are located at the border to the new member states. However, four of these belong to the former East Germany and are not taken into account in this paper, given their peculiar economic development in the years after the German unification. The remaining three German border regions are all located in the federal state of Bavaria. In the following, the focus is laid on the region of Lower Bavaria, located in the South-East corner of Germany, directly at the border to Austria and to the Czech Republic. Regarding the effect of the EU Eastern enlargement for this region, Figure 3 shows that Lower Bavaria could realize a more favorable economic development in the years following the enlargement than it may had in the absence of the enlargement. Thus, in contrast to the Italian region, the difference between the regional GDP and the GDP of the synthetic Lower Bavaria is positive, indicating a positive effect of the EU Eastern enlargement. As in the two cases outlined above, the discrepancy in the development already started in 2000, indicating towards either an anticipation effect or an effect entailed by the implementation of fixed exchange rates of the Eurozone members in 1999.

Figure 3: Trends in Regional GDP (1000 of Euro): Lower Bavaria vs. Synthetic Lower Bavaria



As Table A.4 reveals, out of all regions included in the donor pool, eight have contributed to the synthetic Lower Bavaria, whereby the German region Brunswick contributed the highest share. In addition, the German regions Swabia and Trier, and the Italian region Abruzzo contributed considerably to the synthetic Lower Bavaria. When comparing the predictor means of Lower Bavaria and its synthetic counterpart (Table 3), it becomes evident that the values do not perfectly fit. Hence, in the case of Lower Bavaria, the synthetic control does not match the actual Lower Bavaria quite so good. This finding indicates that in an extension to the paper, it

might be advantageous to revise the donor pool so that the included regions constitutes better potential control for the border region under consideration.

Table 3: GDP Predictor Means

Variable	Lower Bavaria	Synthetic Lower Bavaria	Donor Pool
Employment Rate	90.22	90.39	92.42
Patent Intensity	25.05	25.09	21.02
Industry Share	29.19	28.57	20.38
GDP 1980	18.23	18.10	34.53
GDP 1990	24.87	24.72	37.94
GDP 2000	29.34	29.19	41.91

^a All variables except lagged GDP per capita are averaged for the 1990-2003 period.

5 Discussion

The paper has assessed the impact the EU Eastern enlargement in 2004 had for the economic performance of border regions located at the former EU-external border. It did so by contrasting the development in the regional GDP of these regions prior and past the EU enlargement with their respective synthetic controls. The respective synthetic control groups have been generated by weighting potential control regions that share the same structural characteristics than the border regions prior the EU Eastern enlargement, but that are not located directly at the border to the new member states. Results have shown that at the aggregate level, i.e. when taking all eight border regions together, the aggregate reveals a better performance in the years after the EU enlargement than it would have had the EU enlargement not taken place. Thus, when comparing the economic growth path of the aggregate of all eight border regions after the EU enlargement with its counterfactual (i.e. synthetic control), it becomes evident that the aggregate of all border regions reveals a better growth trajectory than its synthetic control. However, when evaluating the enlargement effect for individual border region, it becomes evident that the effect is not homogeneous, but that regions adjust differently to the adjustment pressure. While the German regions of Lower Bavaria shows a better performance than it would have in the absence of the enlargement, the Italian region of Friuli-Venezia Giulia show a poorer performance than they would have in the counterfactual situation. Furthermore, the findings reveal that the discrepancy between the economic performance of the border regions and their respective synthetic controls already started in the years before the actual accession of the new member states. Hence, in both the aggregate as well as in the two individual border regions, one can observe a deviation between the actual GDP and the counterfactual GDP (i.e. the GDP had the enlargement not taken place) from 2000 onward. This suggests that the anticipation of the enlargement

was sufficient to change the behavior of regional economic actors. Interestingly, this is true for both, border regions that perform better than their respective synthetic counterparts (i.e. Lower Bavaria), and border regions that perform worse than their synthetic counterparts (i.e. Friuli-Venezia Giulia). Given the contrasting results for the two individual border regions, the paper shows that it is not possible to draw any general conclusions about the effect of the EU Eastern enlargement for regions located at the former EU external border. Instead, heterogeneous effects are at play and border regions have differently adjusted to changes in market access entailed by the EU Eastern enlargement.

Even though the results provide new insights into the causal effect of the EU Eastern enlargement on the economic performance of regions located at the former EU external border, some caveats have to be noted. First, the synthetic controls did not perfectly match the border regions in the years prior to the enlargement. This is especially the case in the German region of Lower Bavaria. In order to ease this caveat, a more suitable composition of the *donor pool* would be fruitful. Here, it would be plausible – at least for the Italian and German regions – to restrict the *donor pool* to non-border regions from the EU-6 member states, as these regions did not face any changes in their market access during the 1980 and 1990. Furthermore, the exclusion of next-to-neighbors from *donor pool* might limit bias resulting from potential spillovers. Furthermore, in an extension of the paper, it is a very desirable endeavour to perform several placebo tests in order to confirm the robustness of the results. Potential placebo studies may thereby include both *in-time placebos* and *in-space placebos*. For the in-time placebo, the effect of the EU enlargement is artificially estimated for a different year. If the SCM also estimates large effects when applied to these artificial dates, when the intervention did not occur, the validity of the overall results would be small. For the *in-space placebo* test, the enlargement may be reassigned in space. If similar or larger estimates arose when the intervention (i.e. enlargement) is artificially reassigned to regions not directly exposed to the intervention, the validity of the results would be limited (Abadie *et al.*, 2014). Finally, in an extension to the paper, it would be useful to expand the evaluation of single region effects to all eight border regions. This allows identifying whether the effects are homogeneous within individual countries (e.g. Germany or Austria) or whether the effects are heterogeneous also within one and the same country.

References

- Abadie, A., Diamond, A., and Hainmueller, J. (2010). Synthetic Control Methods for Comparative Case Studies: Estimating the Effect of Californias Tobacco Control Program. *Journal of the American Statistical Association*, 105(490):493–505.
- Abadie, A., Diamond, A., and Hainmueller, J. (2014). Comparative Politics and the Synthetic Control Method. *American Journal of Political Science*, 10.1111/ajps.12116:1–16.
- 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*, 17:125–128.
- 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.
- Bosker, M. and Garretsen, H. (2010). Trade costs in empirical new economic geography. *Papers in Regional Science*, 89(3):485–511.
- Braakmann, N. and Vogel, A. (2010). The Impact of the 2004 EU Enlargement on the Performance of Service Enterprises in Germanys Eastern Border Region. *Review of World Economics*, 146:75–89.
- Brakman, S., Garretsen, H., Marrewijk, C., and Oumer, A. (2012). The Border Population Effects of EU Integration. *Journal of Regional Science*, 52:40–59.
- Brühlhart, M., Crozet, M., and Koenig, P. (2004). Enlargement and the EU Periphery: The Impact of Changing Market Potential. *The World Economy*, 27(6):853875.
- Commision, E. (2001). On the impact of enlargement on regions bordering candidate countries. community action for border regions.
- Crozet, M. and Koenig., P. (2004). EU Enlargement and the Internal Geography of Countries. *Journal of Comparative Economics*,, 32(2):265–279.
- Cuaresma, J. C., Doppelhofer, G., and Feldkircher, M. (2014). The Determinants of Economic Growth in European Regions. *Regional Studies*, 48(1):44–67.

- Dustmann, C., Frattini, T., and Halls, C. (2010). Assessing the Fiscal Costs and Benefits of A8 Migration to the UK. *Fiscal Studies*, 31(1):1–41.
- 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*, 91:154163.
- Hanson, G. (1996). Economic Integration, Intraindustry Trade, and Frontier Regions. *European Economic Review*, 40(3):941–949.
- Hanson, G. (2005). Market Potential, Increasing Returns and Geographic Concentration. *Journal of International Economics*, 67(1):1–24.
- King, G., Keohane, R. O., and Verba, S. (1994). *Designing Social Inquiry: Scientific Inference in Qualitative Research*. Princeton University Press.
- Krugman, P. AND Venables, A. (1990). *Unity with Dignity in the European Economy: The Southern Frontier*, chapter Integration and the Competitiveness of Peripheral Industries, pages 56–77. Cambridge University Press.
- Krugman, P. (1991). Increasing returns and economic geography. *Journal of Political Economy*, 99(3):483–499.
- Krugman, P. and Venables, A. (1993). Integration, specialization, and the adjustment. Technical report, National Bureau of Economic Research.
- Lafourcade, M. and Paluzie, E. (2011). European Integration, Foreign Direct Investment (FDI), and the Geography of French Trade. *Regional Studies*, 45(4):419–439.
- Niebuhr, A. (2008). The Impact of EU Enlargement on European Border Regions. *International Journal of Public Policy*, 3(3):163–186.
- Redding, S. and Sturm, D. (2008). The Costs of Remoteness: Evidence from German Division and Reunification. *American Economic Review*, 98(5):1766–1797.
- Villar, O. A. (1999). Spatial distribution of production and international trade: a note. *Regional Science and Urban Economics*, 29(3):371–380.

A Appendix

Table A.1: Variables, Measures and Data Sources

Variable	Measure	Data Source
GDP	GDP per capita (in 1000 Euro) at 2005 prices	Cambridge Econometric Regional Database
Population Density	Population (as on January 1st) by square km	Eurostat Regional Database
Employment Rate	Share of employees at the regional active population	Cambridge Econometric Regional Database
Industry	Industry share of regional gross value added	Cambridge Econometric Regional Database
Patent Intensity	Number of patents reported to EPO per 1000 employees	Eurostat Regional Database

Table A.2: Region Weights in the Synthetic Border Region (Aggregate)

Region	Nuts Code	Weight
Vorarlberg	AT34	.150
Schwaben	DE27	.114
Lüneburg	DE93	.097
Detmold	DEA4	.151
Comunidad Foral de Navarra	ES22	.163
Emilia-Romagna	ITH5	.170
Luxemburg	LU00	.002
Alentejo	PT18	.140
Highlands and Islands	UKM6	.013

Table A.3: Region Weights in the Synthetic Friuli-Venezia Giulia

Region	Nuts Code	Weight
Rhineland-Palatinate	DEB3	.064
Umbria	ITI2	.029
Marche	ITI3	.627
Abruzzo	ITF1	.092
Calabria	ITF6	.002
Luxemburg	LU00	.120
Vorarlberg	AT34	.039
Lancashire	UKD4	.027

Table A.4: Region Weights in the Synthetic Lower Bavaria

Region	Nuts Code	Weight
Swabia	DE27	.155
Brunswick	DE91	.200
Trier	DEB2	.136
Abruzzo	ITF1	.191
Flevoland	NL23	.134
Upper-Austria	AT31	.005
Norte	PT11	.119
Lincolnshire	UKF3	.060