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Steven Brakman
Harry Garretsen
Charles van Marrewijk
Abdella Oumer

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Abstract

Distance related variables typically vary in a cross-section dimension but less so in a time dimension across cities, regions, or countries. The enlargement of the EU or the introduction of the euro, however, can be looked upon as integration shocks that are informative of the consequences of changes in distance over time. *Border* cities or regions are thought to be more affected by these shocks than more central locations because of the larger impact of changes in the transaction costs that go along with EU integration along the border. Both at the urban and regional level, we find a beneficial influence of the EU integration process as measured by the growth in population share along the integration borders, leading to an extra growth rate of about 0.15 percentage points per annum. The positive integration holds on both sides of the integration border, is active for a limited distance (up to 70km) and time period (up to 30 years), and is particularly important for large cities and regions. Despite the positive EU integration effect, being located along a border remains a burden in view of the (larger) negative general border effect. We do not find similar positive border-integration effects as a result of the introduction of the euro.

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Steven Brakman
Faculty of Economics and Business
University of Groningen
PO Box 800
NL – 9700 AV Groningen / The Netherlands
S.Brakman@rug.nl

Harry Garretsen
Faculty of Economics and Business
University of Groningen
PO Box 800
NL – 9700 AV Groningen / The Netherlands
J.H.Garretsen@rug.nl

Charles van Marrewijk
Utrecht University
School of Economics
Janskerkhof 12
NL – 3512 BL Utrecht / The Netherlands
J.G.M.vanMarrewijk@uu.nl

Abdella Oumer
Faculty of Economics and Business
University of Groningen
PO Box 800
NL – 9700 AV Groningen / The Netherlands
A.M.Oumer@rug.nl

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1 Introduction

Systems of cities change slowly over time and appear to be stable over long periods. This stability has often been observed by urban historians.[2] However, subsets of cities do evolve over time, following changes in the economy, institutional changes or technological developments (Desmet and Rossi-Hansberg, 2008). These evolutions can take decades, or even centuries (Bairoch, 1988). This time dimension creates practical difficulties in analyzing the ultimate causes of changes in city systems as consistent data for many countries and a sufficiently large number of cities over a long time period are not readily available, see Bosker et al (2008) for an exception.

Only relatively recently have discretionary policy changes or (quasi-)natural experiments been used to shed light on what drives changes in the development of (systems of) cities and to investigate stability of the system after a shock. Davis and Weinstein (2002), for instance, analyze the consequences of the allied bombing of Japanese cities during World War II (WWII). A similar exercise was performed by Brakman, Garretsen and Schramm (2004) for the bombing of German cities by allied forces during the same period. These studies show that the development of cities follows indeed a relatively stable path, in the sense that cities tend to return to their pre-shock path following the shock. At the same time, it is possible that the development of cities leap-frogs to another development path, see Bosker et al., (2007). Some less dramatic experiments, however, like changes in the degree of economic integration, illustrate that the effects for notably border cities, can be substantial. Hanson (2001, 2004) shows that the integration process between Mexico and the USA accounts for a sizeable portion of employment growth in U.S. border cities over the sample period. The opposite of integration is segregation. Redding and Sturm (2008) analyze the effects on border cities along the new border following the post WWII division of Germany into East and West Germany in 1949. They, like Hanson (2001), find that the effects on (west) German cities along the newly created intra-German border are substantial; traditionally centrally located cities suddenly found themselves in the periphery of Germany, resulting in a sharp decline of the population (more so for small than for large border cities). At an even more disaggregated scale, Ahfeldt et al. (2010) show for the case of the Berlin Wall and the

[2] Hohenberg (2004, p. 3051) notes that '[t]aking both the resistance and the resilience of cities together, it is perhaps not surprising that the European system should rest so heavily on places many centuries old, despite the enormous increase in the urban population and the transformation in urban economies'.

city of Berlin, that also within a city a division (and subsequent reunification) can lead to remarkable changes with respect to the economic structure of a city, especially along borders.

Border cities are of special interest in the wake of these integration shocks, because these cities experience more drastic changes in their so-called market access (see below) than more central cities (Hanson, 2005).[3] The enlargement of the European Union (EU) and the introduction of the euro can be looked upon as two policy-induced, integration that shed light on the consequences of changes in market access in other EU markets. Central to our paper is the notion that cities or regions that are close to the border are the most affected by these changes in EU integration , as they are especially confronted with changes in market access, whereas the effects for cities or regions further away from the border are more subdued.

Our paper is structured as follows. In section 2 we summarize the two EU integration experiments, EU enlargement and the introduction of the euro), that we analyze in the remainder of the paper. Based on Redding and Sturm (2008), section 3 provides the theoretical background. Section 4 describes the data and section 5 introduces the central empirical specification. The general benefits of our approach are that (i) we can focus on the consequences of economic integration for cities and regions, (ii) our results are most likely not affected by other aspects such as changes in natural resources or climatic changes, and (iii) we have a sufficiently large number of observations to analyze different effects (timing, distance decay, border asymmetry and size asymmetry). Section 6 discusses the estimation results. As far as we are aware, we provide the first analysis to find, both at the urban and at the regional level, a beneficial influence of the EU enlargement process as measured by the growth in population share along the integration borders, leading to an extra growth rate of about 0.15 percentage points per annum. This positive integration effect declines with distance, is about the same for new and old members, and is more important for large cities and regions. Despite this positive EU integration effect associated with EU enlargements, being located along a border remains a burden in view of the (larger)

[3] In general, in studies like these demand linkages between cities or regions are strong, but the geographical reach is limited, which motivates why especially border cities might experience fundamental changes in market access, rather than an economy wide sample of cities (Bosker and Garretsen, 2010)

general negative border effect. We do not find similar positive border-integration effects as a result of the introduction of the euro. Section 7 concludes.

2 EU enlargement and the introduction of the Euro

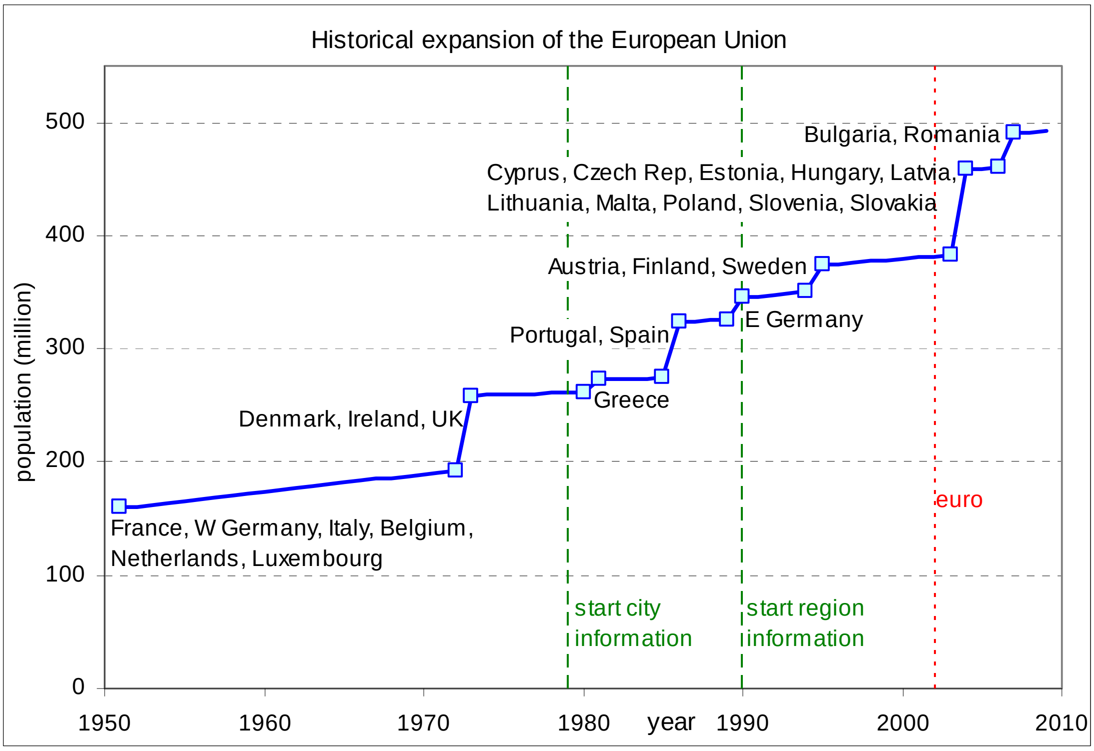
European integration has many faces, but two developments in recent years stand out: EU enlargement with new member states and the introduction of the Euro (see Baldwin and Wyplosz, 2009 or Van Marrewijk, 2007 for more details). The European economic integration process started after WWII with the European Coal and Steel Community (ECSC), established in 1951 by the Treaty of Paris. As the name indicates, the ECSC was an agreement related to specific sectors and established free trade among the member countries for the (at that time very important) coal and steel sectors only. Although the strengthening the economic integration process was initially aimed to reduce the probability of future wars, one of the most important consequences of the development of the EU is to increase economic integration. Many important enlargement steps were taken to this end as summarized in Table 1.

Table 1 Overview of European Union enlargement process

1951	ECSC Membership	European Coal and Steel Community Belgium, France, Luxembourg, the Netherlands, Italy, and W. Germany
1957	EURATOM	European Atomic Energy Community
1957	EEC	European Economic Community
1967	EC	European Communities; combining ECSC, EEC, and EURATOM
1973	Membership	+ United Kingdom, Ireland, and Denmark
1981	Membership	+ Greece
1986	Membership	+ Spain and Portugal
1990	Membership	+ East Germany (reunification of West and East Germany)
1993	EU	European Union
1995	Membership	+ Finland, Austria, and Sweden
1999	EMU	Economic and Monetary Union
2002	Euro	Introduction of the euro
2004	Membership	+ Cyprus, Czech Rep., Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Slovenia, and Slovakia.
2007	Membership	+ Bulgaria and Romania.

Figure 1 describes the changes in the size of the EU in terms of the population involved. The vertical axis measures the total size of the population of the member states. The jumps in the line indicate that each EU enlargement increases the total affected population abruptly. Associated with this process is the simultaneous abolishment of a border in an economic sense, resulting in a sudden drop of transaction costs across borders. In this respect, especially the first enlargement in 1973 (with Denmark, Ireland and the UK), the third enlargement in 1986 (with Spain and Portugal), and the Eastern enlargement in 2004 (with ten new members along the eastern border of the EU) stand out. The total population of the EU is now close to 500 million people, making it one of the largest integrated markets in the world. For our analysis it is important to note that enlargements substantially increase the (potential) market access for the EU members.

Figure 1 Historical expansion of the European Union, 1951-2010



The second experiment we look at is the introduction of the Euro. This was the culmination of a process – after the collapse of the Bretton-Woods system in 1972 – via fixed exchange rates to a single currency in Europe. The history was a succession of successes and failures within the European Monetary System, but finally governments agreed on the introduction of the Euro, and as of January 1, 2002 Euro coins and notes were introduced.[4] The Maastricht treaty stipulates that certain macro-economic criteria have to be met, related to government debt, inflation, etc., before countries can introduce the Euro. In practice this implies that a sub-set of countries that are a member of the EU also belong the Euro-area.[5] Also the introduction of the Euro can be viewed upon as an integration experiment reducing barriers to trade such that the potential market access of those involved increases. A priori, the effects of this experiment can be expected to be smaller than for economic integration because ever since the fall of the Bretton-Woods system, European policy makers aimed (with mixed success) at more or less fixed exchange rates, and in practice border cities were often accustomed to 'dual' exchange rates for day-to-day payments (that is, coins and bills of different denominations often circulated in border cities). In addition, the introduction of the Euro took place in 2002 (or, technically, in 1999) as the Euro-members already enjoyed a very high degree of economic integration.

The central question in this paper is if indeed border cities or regions are more affected by the reduction in transaction costs that go along with EU integration. As in Hanson (2001) and Redding and Sturm (2008) we expect that especially cities and regions along the border benefit disproportionally from the increased (export) market access. However, as is also stressed by Overman and Winters (2006), increased (export) market access is not the only force experienced by border cities or regions. Increased (import) competition could work in the opposite direction. In the New Economic Geography (NEG) models this is the so called price-competition effect. The net effect has to be determined empirically. Arguably, the integration experiments we analyze are less spectacular than the German division studied by Redding and Sturm (2008) and the variation in the data following an integration shock is expected to be smaller than for the German division in 1949. Redding and Sturm (2008), mention that economic integration might be endogenous and developments related to changes in market access might induce changes in economic integration. However, it is not clear how especially border cities ore regions could induce these international policy changes. Furthermore, we use a much larger sample of cities and regions in substantially more countries than Redding and Sturm (2008), such that the lack of

[4] Formally the Monetary Union started in 1999.
[5] In 2010 the Euro-area consists of Belgium, Germany, Ireland, Greece, Spain, France, Italy, Cyprus, Luxembourg, Malta, The Netherlands, Austria, Portugal, Slovenia, Slovakia, and Finland.

variation in the data caused by the two experiments which we study is compensated by a larger number of observations.

Following the integration shock, the question arises how long the effect lasts. Based on the estimates of Redding and Sturm (2008) for border cities in Germany, we initially take this duration to last about 40 years.[6] With respect to the EU enlargements it took more than 20 years, after the creation of the ECSC in 1951, before the first EU enlargement occurred in 1973 (see Table 1). This implies that the first enlargement in 1973 and all subsequent enlargements fall within the 40 years duration period. Since our city sample starts in 1979 and the first *change* (needed for the empirical specification, see below) is only observed in 1989, the duration period of 40 years has effectively elapsed for the founders of the EU. Consequently, no border integration effects are active between France, West Germany, Italy, Belgium, Luxembourg and the Netherlands for the period of observation. All other border integration changes, including that of the introduction of the Euro, are active for the entire sample period of observation once they occurred.

3 Theoretical framework

The theoretical framework is based on a multi-region version of Helpman's (1998) geographical economics model, as used in Redding and Sturm (2008). As usual in these models (see Brakman, Garretsen, and van Marrewijk, 2009 Ch. 3-4), the combination of increasing returns to scale and transport costs leads to *agglomeration forces* as firms want to locate production near large markets (home market effect) and consumers want to live in large markets (consumer love of variety and transport costs result in a low cost of living effect). At the same time, the model exhibits *spreading forces* as a plethora of competitors in a large market make less-crowded locations more attractive (competition effect) and (in this specific model) a large market raises the costs of an in-elastically supplied, non-traded local amenity, thus leading to higher costs of living near large markets (congestion effect). The tug of war between the agglomeration and spreading forces in the model determines the distribution of population among the available locations.

[6] We also include some sensitivity analyses with respect to the duration of the integration effect.

The economy consists of a number of locations or areas $a \in \{1,..,A\}$, where the areas can be either cities or regions. Each area has an exogenous stock H_a of non-tradable amenity in elastic supply, referred to as housing in Helpman (1998). The number of consumers or laborers L is mobile across locations and each supplies one unit of labor in-elastically, spends a share $\mu \in (0,1)$ of income on horizontally differentiated varieties and the remaining share $1-\mu$ on the non tradable amenity. The production of varieties takes place under increasing returns to scale (with fixed cost and constant marginal cost in terms of labor) and is based on monopolistic competition with a constant elasticity of substitution between varieties of $\varepsilon > 1$ (Dixit and Stiglitz, 1977).[7] There are iceberg transport costs for varieties, such that $T_{ai} > 1$ units must be shipped from location a to make sure one unit arrives in location i.

The population of areas is endogenously determined by migration decisions of workers between locations to ensure that the same real wage holds in all populated areas in the long-run equilibrium. If we let w_a, L_a, P_a^M, n_a, and p_a be the (nominal) wage rate, the number of laborers, the Dixit-Stiglitz price index for varieties, the number of varieties produced, and the local (free on board) price of such a variety (all at location a), respectively, then it can be shown (see also Redding and Sturm, 2008) that the equilibrium real wage, that holds for all areas, can be reformulated as an equilibrium population L_a of area a, that equals:

(1) $$L_a = \Omega \underbrace{\left(\sum_i (w_i L_i)(P_i^M / T_{ai})^{\varepsilon-1}\right)^{\mu/\varepsilon(1-\mu)}}_{FMA_a} \underbrace{\left(\sum_j n_j (p_j T_{ja})^{1-\varepsilon}\right)^{\mu/[(1-\mu)(\varepsilon-1)]}}_{CMA_a} H_a,$$

where Ω is a function of parameters and the common real wage. The terms FMA_a and CMA_a denote firm market access and consumer market access, respectively. Firm market access FMA_a measures the proximity of firms located in a to the demand from all markets, including the market of its own location (depending on labor income in a location, the associated price index, and the transport costs of getting goods from a to all markets). It determines the wage rate that firms can afford to pay in zero profit equilibrium and combines both the home market effect and the competition effect mentioned above (if surrounding areas are characterized by relative low price

[7] In principle, it is straightforward to include more increasing returns industries, each with a different elasticity of substitution. Thus, large cities or regions can host more industries than smaller cities.

indices, the current location faces more competition and is less attractive. The more so for high elasticities of substitution and low transportation costs). Consumer market access CMA_a measures consumer's ease of access to tradable varieties (depending on the number of varieties produced in a location, the locally charged price, and the costs of getting goods from there to a). It captures the cost of living effect mentioned above. Finally, the term H_a (stock of non-tradable amenity) is associated with the congestion effect. Note that the model assumes labor mobility (resulting in real wage equalization for all areas, *a)*.[8] It is well-known that labor mobility in the EU is relatively limited. This implies that if integration, or for that matter any shock, has some impact on L_a this is additional evidence of the strength of the forces at work.

Equation (1) clarifies that locations in the vicinity of national borders that pose significant obstacles to trade flows (leading to high trade costs T_{ai}) have lower firm and consumer market access and thus lower population levels in long-run equilibrium. Redding and Sturm (2008) thus take the division between East and West Germany after WWII until the reunification in 1990 as an example of a shock that creates a border effect. They calibrate the above model and show that (i) cities close to the border decline in population through changes in T_{ai} and T_{aj} in equation (1) above (an effect that diminishes as the border distance increases), and (ii) the border effect is weaker for larger cities as these – initially home to a larger set of industries than smaller cities – are able to specialize and access export markets more readily than smaller cities. Their empirical estimations find strong support for (i) and (ii).

Our emphasis in this paper is on a *reverse* policy shock, instead of division we will thus look at integration. The European integration process strives to reduce international obstacles between countries (leading to lower trade costs T_{ai}). On the one hand, the process of European integration is arguably more gradual and its impact on border locations not as strong as abrupt and severe as the German division after WWII. One would thus expect the impact on border population size to be smaller and harder to find for the EU integration process. On the other hand, the number of countries, regions, and cities involved in the EU integration process is considerable larger than for the case of the German division (see the next section), such that if there

[8] See Redding and Sturm (2008, p. 1772), equation (1).

is an economically meaningful impact we should be able to find it. Following Redding and Sturm (2008) our main hypothesis is thus as follows:

I. Cities or regions that are close to an abolished border as a result of EU integration shock (*in casu* EU enlargement or the introduction of the euro) experience a relative population increase.

Based on the discussion above, we can also formulate sub-hypotheses IIa-c:

II. a) The border effect is different for large and small border cities or regions.
b) The border effect is stronger for EU enlargement compared to the introduction of the euro.
c) The border effect gets weaker when the distance from the border increases.

Whether the border effect is indeed positive remains to be seen. Redding and Sturm (2008) stipulate that the market access effect will be dominant, but NEG theory is inconclusive as competition effects counter-act the home market effect. The net effect has to be determined empirically. Brakman, Garretsen, and Van Marrewijk (2009, ch 11) provide an illustration of the forces at work in a related simulation experiment as they show that 'building a bridge' between two locations in a multi-location NEG setting affects all locations, but those near the 'bridge' (or in the present case, near a disappearing border) are affected the most. The simulations indicate that the competition effect for standard parameter values does not dominate the other forces and that integration benefits the border areas.

4 Data

We collected two basic non-balanced panel data sets: one for European cities, using data from Brinkhoff (http://www.citypopulation.de) and another for European regions, using data from Eurostat.[9] For the analysis in this paper we included information from 34 European countries, leading to a total number of 1,457 regions and 2,410 cities, see Table 2 for a list of countries and the number of regions and cities for each country. Note that these numbers are neither proportional to a country's total population nor to its size. France, for example, has only a limited number of cities included in the data set, while Germany has a large number of regions compared to other countries. Consequently, in our sample Germany and France have more regions than cities,

[9] See the data appendix for a detailed description of the data.

which is in contrast to the other countries under consideration that have more cities than regions in the sample. Seven countries in Table 2 are not current EU member countries (although some are candidate countries, see Figure 2 below), these are Bosnia & Herzegovina, Croatia, Macedonia, Montenegro, Norway, Serbia, and Switzerland (in the estimations we differentiate between EU countries only, and all countries). Note that Bosnia & Herzegovina, Montenegro, and Serbia are only included in the city analysis, while Macedonia is only included in the region analysis. The other 30 countries are included both in the city as well as in the region analysis.

Table 2 Included countries with # of regions and # of cities

Country	# regions	# cities	Country	# regions	# cities
Austria	35	75	Luxembourg	1	28
Belgium	44	113	Macedonia	8	34
Bosnia & Herzegovina	n.a.	24	Malta	2	30
Bulgaria	28	43	Montenegro	n.a.	25
Croatia	21	28	Netherlands	40	121
Czech Republic	14	56	Norway	19	52
Denmark	11	72	Poland	66	177
Estonia	5	30	Portugal	30	94
Finland	20	59	Romania	42	42
France	100	39	Serbia	n.a.	62
Germany	429	155	Slovakia	8	42
Greece	51	54	Slovenia	12	43
Hungary	20	67	Spain	59	75
Ireland	8	54	Sweden	21	125
Italy	107	128	Switzerland	26	102
Latvia	6	32	Turkey	81	133
Lithuania	10	50	UK	133	146
Total #	1,457	2,410			

Figure 2 depicts the various EU countries and candidate EU countries in 2010. The analysis focuses on *classic border* integration effects, meaning that we focus on land connections. Furthermore, borders areas (cities or regions) are only defined as border areas if at some point in the history of our sample they are affected by an integration shock. An example is Germany. Border areas along the Dutch-German border are excluded as they experience no integration shock with respect to integration since the entry of The Netherlands and Germany into (the forerunner of) the EU already took place in 1951. However, border areas along the German-Polish border are included in the definition of border areas as they are affected by integration (in 2004). For the case of the Euro shock we follow the same procedure (implying that for the Euro shock border areas along the Dutch German borders are included in the border definition).

Figure 2 The European Union in 2010

Source: http://europa.eu

As is clear from Figure 2 (and Table 3 below), most EU enlargements were related to land borders. However, there are enlargements related to crossing sea borders, such as UK – France or Denmark – Sweden.[10] Focusing on land borders, we still have to determine when a region or city classifies as a border region or city that is affected by

[10] A sensitivity test with respect to non-land borders is available upon request; this does not affect the results mentioned in the main text.

EU integration. For regions this is simple: if two regions in different countries are contiguous at a land border that is affected in the EU integration process, they classify as a border region. For cities we have to specify some cut-off distance and a way of measuring it in order to classify as a border city. In the baseline setting, we include all cities with a maximum *road* distance of 70 km (which is different from an ‘as the crow flies’ distance) to the affected border as border cities.[11] Other road distances (50 km and 85 km) are part of our sensitivity analysis.

Table 3 Overview of affected continental land borders in sample period

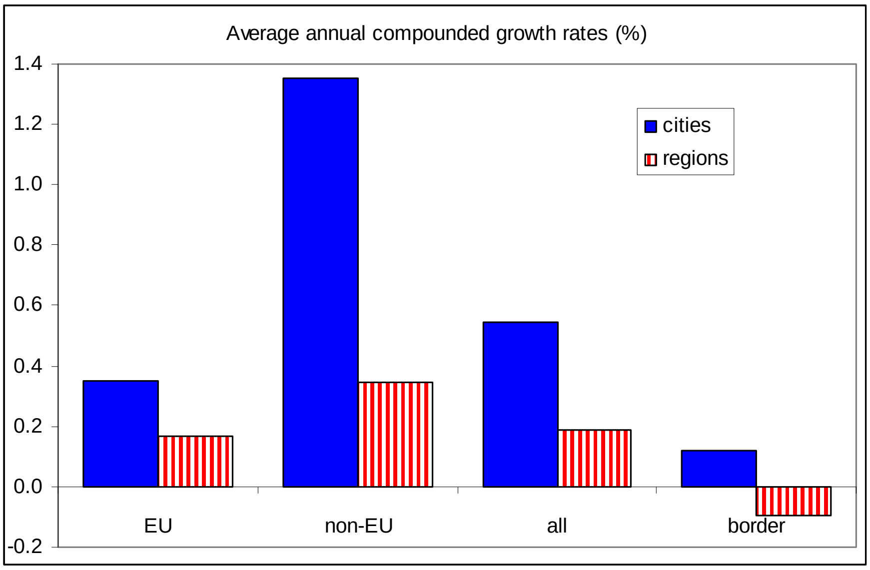
Enlargement year	Affected border of enlargement between Country 1	 Country 2
1973	Denmark	West Germany
1981	n.a.	n.a.
1986	Spain	France
	Spain	Portugal
1990	West Germany	East Germany
1995	Sweden	Finland
	Austria	Germany (west)
	Austria	Italy
2004	Estonia	Latvia
	Latvia	Lithuania
	Lithuania	Poland
	Poland	Germany (east)
	Poland	Czech Republic
	Poland	Slovakia
	Czech Republic	Germany
	Czech Republic	Austria
	Czech Republic	Slovakia
	Hungary	Slovakia
	Hungary	Austria
	Hungary	Slovenia
	Slovenia	Austria
	Slovenia	Italy
2007	Romania	Hungary
	Romania	Bulgaria
	Bulgaria	Greece

Combining the map information in Figure 2 with the timing and EU enlargement schedule in Table 1, and the sample period shown in Figure 1, we have a complete overview of all affected EU enlargement borders and their starting year over the entire

[11] The road distance was measured manually for all cities using Google Maps; data available on request

sample period.[12] As noted above, the effect remains operative until the end of the observation period once it starts. The table shows that there was/were: 1 affected border in the 1973 enlargement, no affected borders in 1981, 2 affected borders in 1986, 1 affected border in 1990, 3 affected borders in 1995, 14 affected borders in 2004, and 3 affected borders in 2007. The majority of EU integration activity thus concentrates towards the end of the period, although some cities and regions are affected throughout the entire period.

Figure 3 Average annual compounded population growth rates[*]



[*] border refers to the EU integration cities and regions, not the euro cities and regions

Table A1 in the appendix provides some basic information on the different types of cities and regions identified in the EU integration process. The average city size in the EU (110k) is both larger than the non-EU cities (82k) and larger than the size of the cities along the EU integration border (93k). The same holds for the median city size, which is 51k for EU cities, 26k for non-EU cities, and 33k along the integration border. When calculating the average annual compounded growth rates (in per cent), we observe (see Figure 3) that the smaller non-EU cities grow faster than the larger EU cities, namely 1.35 per cent compared to 0.35 per cent. More interesting for this study, however, is the fact that the cities along the EU integration border grow even slower (0.12 per cent), which makes it a priori unlikely to find positive EU integration effects. The analysis below, however, distinguishes between the general border effect (which is expected to be negative) and the EU integration border effect (which is thus

[12] Note that we exclude the only non-continental land border between Ireland and the UK affected by EU enlargement. Including it does not affect our results.

expected to be positive). Since the negative general border effect typically turns out to be stronger than the (temporary) positive EU integration border effect, the net border effect is negative (as illustrated in Figure 3). Similar observations hold for the regional data, since (i) the average population size of EU regions (374k) is larger than along the integration borders (296k), (ii) the median size of EU regions (251k) is larger than along the integration borders (181k), and (iii) the average growth rate of EU regions (0.17 per cent) is larger than along the integration borders (-0.09 per cent). The non-EU regions again grow more rapidly (0.35 per cent) than the EU regions (see Figure 3).[13] In all cases, the growth rate of regions is smaller than the growth rate of the concomitant cities, indicative of a general process of urbanization.

5 Empirical strategy

To investigate the hypotheses discussed in section 3, we use a difference-in-differences methodology by comparing the growth performance of European areas close to a border abolished during the EU integration process (treatment group) to the growth performance of other European areas (control group). Consequently, we focus on the distribution of population over the regional or urban system within each country. Let pop_{at} be the population of area *a* in time *t* and $share_{at} = pop_{at} / \sum_{a \in C} pop_{at}$ (where C is the country index) be the share of the population in the regional or urban system. Our baseline empirical specification is as follows:[14]

(3) $$sharegrowth_{a,t-s,t} = \beta\, border_a + \gamma(border_a \times integration_{at}) + d_t + D_C + \varepsilon_{at} \ ,$$

where $sharegrowth_{a,t-s,t}$ is the annualized rate of growth (per cent) in the population share of area *a* from time period $t-s$ to t; $border_a$ is a dummy equal to one when an area is a member of the border group as a whole and zero otherwise[15]; let $B \equiv \{ a \in A \mid border_a = 1 \}$, then $integration_{at}$ is a dummy equal to one at time *t* if

[13] The size of non-EU regions is larger than the size of EU regions (in contrast to the size of cities), namely an average of 624k and a median of 314k.

[14] The link between equations (1) and (2) can be seen by log-differentiating (1). The *border×integration* dummy captures the combined effect of changes in FMA and CMA caused by changes in transport costs. The implicit assumption is that the integration dummy captures the effects on population growth through: the price index, market size (wages*initial population), and the number of varieties (firms). The main concern when considering econometric biases in estimates like these are omitted variables. To some extent the dummy variables (fixed effects) deal with this. Below we deal separately with the FMA term in the sense that smaller cities might experience an integration shock differently than large cities (that might already be home to important export industries).

[15] See section 4 on the definition of affected cities or regions.

$a \in B$ and an EU integration border within its reach was abolished at most 40 years ago. A similar reasoning applies to the case of the introduction of the euro. In this way we can distinguish within the border group as a whole, whether the selected group of border regions or cities that experience European integration (or the introduction of the Euro) perform differently from those not affected by European integration (or the introduction of the Euro). Furthermore, d_t is a full set of time dummies; D_C is a full set of country dummies; and ε_{at} is the error term. Note that the term $integration_{at}$ does not only depend on time but also on location.[16] This is caused by the fact that during the EU history several borders were abolished at different locations and different time periods, see Table 3 for an overview. This dummy is therefore, for example, equal to zero for cities along the Austria-Italy border (either in Austria or in Italy) until 1994 and equal to one from 1995 onwards.[17] Equation (2) allows for unobserved fixed effects in area population levels which are differenced out by computing growth rates. The time dummies control for common macroeconomic shocks affecting the population growth throughout Europe and trends in population growth rates. The country fixed effects take care of unobserved heterogeneity between countries, as our areas are part of different national (urban) systems with different policies (for example regarding the extent to which they stimulate activity in border areas). The coefficient β captures any systematic difference in population growth rates of border areas versus other areas. The key coefficient is γ, on the interaction between border areas and EU integration and the relative performance of population growth for treatment and control areas. The prediction is that this coefficient should be positive.

6 Estimation results

6.1 EU Enlargement

The baseline estimation results for both urban- and regional population share growth rates are given in Table 4. Columns (1) and (3) provide the results when information from all countries with available data are included, while columns (2) and (4) restrict

[16] In contrast to Redding and Sturm (2008).

[17] Similarly, for an Austrian city such as Linz (close to both the German and Czech Republic border), this dummy is equal to zero up to 1994 and equal to one from 1995 onward (as part of Austria-Germany border region) *and* equal to one from 2004 onward (as part of the Czech Republic-Austria border region), that is the dummy is one until 2043 (for a period longer than 40 years). For our period of observation, this time extension beyond 40 years is never an issue.

attention to data from EU countries only (thus slightly narrowing the size of the control group). The results are virtually the same in all cases. The first line indicates that border areas are indeed poor performers relative to more central locations. The population share growth rate is -0.21 percentage points per year for border cities and -0.31 percentage points for border regions. Our key coefficient of interest on the interaction between border areas and EU integration ($border_a \times integration_{at}$), is given in the second row of the table. The effect is positive and highly significant. As a result of the integration process, the population share growth rate for border areas rises by about 0.15 percentage points, both for cities and regions. On the one hand, this is an indication of the success of the EU integration process. On the other hand, we observe that it is not sufficient to reverse the relative decline of border areas, neither for cities nor for regions.

Table 4 Urban and regional population share growth rates; baseline estimates

	Urban population		Regional population	
	(1)	(2)	(3)	(4)
$border_a$	- 0.210***	- 0.227***	- 0.312***	- 0.314***
	(0.0549)	(0.0568)	(0.0415)	(0.0418)
$border_a \times integration_{at}$	0.147***	0.180***	0.145***	0.148***
	(0.0499)	(0.0516)	(0.0542)	(0.0561)
Year effects	Yes	Yes	Yes	Yes
Country effects	Yes	Yes	Yes	Yes
Sample cities / regions	all cities	all cities	all regions	all regions
Sample countries	all countries	EU countries	all countries	EU countries
Observations	6,286	5,239	23,096	20,670
R^2	0.050	0.064	0.043	0.032

Robust standard errors in parentheses; *** p<0.01; ** p<0.05; * p<0.1

Our definition of affected border cities is based on an across-the-road travel distance to the border of 70 km. This is, of course, to some extent an arbitrary measure, although it is in line with the extent of distance effect found by Redding and Sturm (2008) for the German division process. Table 5 provides the baseline estimates for urban population share growth for two alternative distance measures, namely 50 km and 85 km across-the-road travel distance to the border. [18] The results are in line with our previous findings, with $border_a \times integration_{at}$ effects positive and highly statistically significant, in the range of 0.11 to 0.17 percentage points rise per year. Again, this is not sufficient to offset the relative decline of border cities.

Table 5 Urban population share growth rates; variations in distance

	50 km border (1)	(2)	85 km border (3)	(4)
$border_a$	- 0.176***	- 0.191***	- 0.145***	- 0.168***
	(0.0550)	(0.0561)	(0.0548)	(0.0537)
$border_a \times integration_{at}$	0.111*	0.142**	0.131*	0.174**
	(0.0613)	(0.0623)	(0.0706)	(0.0689)
Year effects	Yes	Yes	Yes	Yes
Country effects	Yes	Yes	Yes	Yes
Sample regions	all cities	all cities	all cities	all cities
Sample countries	all	EU	all	EU
Observations	6,286	5,239	6,286	5,239
R^2	0.050	0.062	0.049	0.062

Robust standard errors in parentheses; *** p<0.01; ** p<0.05; * p<0.1

Naturally, this raises the question on the spatial reach of the $border_a \times integration_{at}$ interaction effect, recall hypothesis IIc. The answer is given in Table 6, where we subdivide the border cities into cities (i) within the range of 50 km from the border, (ii) within the range 50 to 70 km from the border, and (iii) within the range of 70 to 85 km from the border. For the first two types of cities, the $border_a \times integration_{at}$ effect is positive and significant. For the third type of cities (within the range 70 to 85 km from the border), the $border_a \times integration_{at}$ is positive, but not statistically significant. This leads us to conclude that we can safely restrict attention to cities within the 70 km range, which is in line with the findings of Redding and Sturm

[18] The table reports the results for urban population share of columns (1) and (2) in Table 4 for the alternative specification of a 50 km and 85 km border distance. We also looked at all borders in the sample, i.e. not only the border areas that are affected by a shock. Also those border *cities* are adversely effected by the border location, but less so (by a factor two) than the border cities at the affected borders. Border *regions* along the borders of these core EU members show a small positive effect..

(2008). Note that this implies that our regional estimates include a collection of border cities (within the 70 km range) as well as non-border cities (outside the 70 km range). In addition, we constructed an artificial border to see if the estimates are statistical artifacts. To this end we selected, at random, 416 cities and 306 regions end defined these as border areas (the same numbers as in the sample). Next, we repeated the estimates for this random border sample for integration shocks. The treatment group and timing was also constructed at random. The results (see appendix II) indicate that this exercise resulted in non-significant outcomes, both for border areas in general as well as for the treatment group.

Table 6 Urban population share growth rates; extent of distance effect[19]

	(1)	(2)
$border_a$	- 0.200***	- 0.219***
	(0.0584)	(0.0605)
$border_a \times integration_{at}\big\|_{50km}$	0.124**	0.163***
	(0.0552)	(0.0575)
$border_a \times integration_{at}\big\|_{50-70km}$	0.194***	0.242***
	(0.0702)	(0.0719)
$border_a \times integration_{at}\big\|_{70-85km}$	0.115	0.138
	(0.125)	(0.125)
Year effects	Yes	Yes
Country effects	Yes	Yes
Sample cities	all cities	all cities
Sample countries	all countries	EU countries
Observations	6286	5239
R^2	0.051	0.064

Robust standard errors in parentheses; *** p<0.01; ** p<0.05; * p<0.1

The next effect we analyze is the duration of the $border_a \times integration_{at}$ effect, which is taken to be 40 years in the baseline scenario. To do that, we created four separate dummy variables, each covering a period of 10 years after the abolishment of an EU

[19] The table reports the results for individually exclusive distances for the baseline 70 km specification.

border. The dummy variable $border_a \times integration_{at}\big|_{10-20\,years}$, for example, equals one if an EU border was abolished for the respective border area between 10 and 20 years ago (and zero for the other time dummies). As Table 3 shows, the border between Spain and France was abolished in 1986. This implies that for the cities and regions along the Spain – France border the variable $border_a \times integration_{at}\big|_{10-20\,years}$ is equal to one in the period 1996 – 2005. Table 7 shows that for border cities the $border_a \times integration_{at}$ effect is operative (positive and significant) for a period of about 20 years. This is significantly shorter than the (opposite) effect on the duration of the German division found by Redding and Sturm (2008), which lasts for 40 years. We think that the impact of the much more dramatic shock experienced in Germany is responsible for this longer duration, but the limited number of observations we have for the EU integration effect for time periods of more than 20 years also plays a role.[20] The results in Table 7 on the duration of the EU integration effect are a bit less straightforward for the regional data, which indicates that this effect is positive and significant for the 0 – 10 years and 20 – 30 years periods and not significant for the other periods. The inclusion of both border and non-border cities in the border region data may partially explain this finding.

[20] As Table 3 shows, only the German-Danish border generates observations within the 30-40 years of duration, leading for both cities and regions to a limited number of observations in this range.

Table 7 Urban and regional population share growth rates; timing effect estimates

	Urban population (1)	(2)	Regional population (3)	(4)
$border_a$	- 0.200***	- 0.219***	- 0.288***	- 0.290***
	(0.0561)	(0.0583)	(0.0411)	(0.0414)
$border_a \times integration_{at}\big\|_{0-10\ years}$	0.128**	0.161***	0.206***	0.213***
	(0.0528)	(0.0544)	(0.0542)	(0.0558)
$border_a \times integration_{at}\big\|_{10-20\ years}$	0.154**	0.204***	- 0.0911	- 0.0961
	(0.0699)	(0.0721)	(0.0613)	(0.0623)
$border_a \times integration_{at}\big\|_{20-30\ years}$	- 0.0149	- 0.00675	0.604***	0.604***
	(0.154)	(0.154)	(0.185)	(0.189)
$border_a \times integration_{at}\big\|_{30-40\ years}$	- 0.0189	- 0.00752	0.209	0.202
	(0.261)	(0.261)	(0.172)	(0.170)
Year effects	Yes	Yes	Yes	Yes
Country effects	Yes	Yes	Yes	Yes
Sample cities / regions	all cities	all cities	all regions	all regions
Sample countries	all	EU	all	EU
Observations	6,286	5,239	23,096	20,670
R^2	0.050	0.064	0.044	0.033

Robust standard errors in parentheses; *** p<0.01; ** p<0.05; * p<0.1

Table 8 Urban and regional population share growth rates; small and large areas

a. Urban population share growth rates	All countries (1)	(2)	EU countries (3)	(4)
$border_a$	- 0.350***	- 0.120	- 0.352***	- 0.145
	(0.0641)	(0.0898)	(0.0646)	(0.0953)
$border_a \times integration_{at}$	0.304***	0.0929	0.308***	0.148*
	(0.0720)	(0.0715)	(0.0728)	(0.0779)
Year effects	Yes	Yes	Yes	Yes
Country effects	Yes	Yes	Yes	Yes
Sample cities[a]	large cities	small cities	large cities	small cities
Sample countries	all countries	all countries	EU countries	EU countries
Observations	3,248	3,036	2,908	2,331
R^2	0.065	0.112	0.085	0.109

b. Regional population share growth rates	All countries (1)	(2)	EU countries (3)	(4)
$border_a$	- 0.403***	- 0.101	- 0.406***	- 0.103
	(0.0479)	(0.0842)	(0.0486)	(0.0821)
$border_a \times integration_{at}$	0.209***	0.0448	0.214***	0.0471
	(0.0629)	(0.0968)	(0.0655)	(0.0934)
Year effects	Yes	Yes	Yes	Yes
Country effects	Yes	Yes	Yes	Yes
Sample regions[b]	large regions	small regions	large regions	small regions
Sample countries	all countries	all countries	EU countries	EU countries
Observations	16,314	6,782	15,060	5,610
R^2	0.033	0.112	0.034	0.048

Robust standard errors in parentheses; *** p<0.01; ** p<0.05; * p<0.1
[a] Large is bigger (and small is less) than median of earliest observations, where earliest observation is the earliest year population data are available for the city
[b] A region is large if it includes a city whose population size exceeds the median of cities.

Table 8 analyzes the difference in economic impact of EU integration for cities and regions of different size, see hypothesis IIa. We define a city to be large if its earliest observation exceeds the median of all earliest observations and to be small otherwise. A similar procedure for regions would lump together large geographical areas or regions with many small cities or with one big city as 'large' regions. Instead, we opted for a more coherent definition, in which a region is large if it includes a city whose population size exceeds the median of cities. Table 8 shows that the overall positive EU integration effect for border areas is driven by the results for large cities/regions. For small cities/regions the integration effect is usually not even statistically significant, and the same hold for the border dummy as such. This differs from the findings of Redding and Sturm (2008, table 7, p.1794) for the reunification of Germany, which is arguably a smaller shock than the German division. They find some evidence that the reunification had positive effects, but differentiating between large and small cities results in [p.1793]: 'coefficients substantially smaller in magnitude than for the division and are not statistically significant at conventional levels.' Be as it may, for our sample we find that larger cities and regions are the ones that receive a positive integration thereby confirming hypothesis IIa.

Table 9 Urban and regional population share growth rates; asymmetry: old and new members since 2004

	Urban population		Regional population	
	(1)	(2)	(3)	(4)
$border_a$	- 0.212***	- 0.229***	- 0.298***	-0.300***
	(0.0536)	(0.0557)	(0.0406)	(0.0409)
$border_a \times integration_{at,old}$	0.162***	0.193***	0.0930*	0.0945*
	(0.0611)	(0.0611)	(0.0512)	(0.0521)
$border_a \times integration_{at,new}$	0.131**	0.166***	0.368***	0.381***
	(0.0622)	(0.0645)	(0.103)	(0.109)
Year effects	Yes	Yes	Yes	Yes
Country effects	Yes	Yes	Yes	Yes
Sample cities / regions	all cities	all cities	all regions	all regions
Sample countries	all countries	EU countries	all countries	EU countries
Observations	6,286	5,239	23,096	20,670
R^2	0.050	0.064	0.043	0.032

Robust standard errors in parentheses; *** p<0.01; ** p<0.05; * p<0.1; $border_{art}$ refers to an artificially created border, see the main text for details.

Finally, Table 9 analyzes asymmetric border effects, where we disentangle the border effects for the existing EU members and the new entrants, specifically for the substantial enlargements in 2004 and 2007. Note again that for instance German cities along the Polish border are included as *border* cities of the existing EU member Germany and German cities along the Dutch or French border are included as non-border cities. As the table indicates, our main results are not affected. More specifically: (i) there is a significant and negative general border effect and (ii) there is a significant and positive border-integration effect, both for the border cities of the old and new EU members, like for instance German cities along the Polish border and vice versa respectively. The table also shows that the border effect is about the same at the city level for old and new members, while it is higher for the new members than for the old members at the regional level.[21] We attribute this difference again to the more coherent unit of observation at the urban level than at the regional level.

6.2 The introduction of the Euro

The second integration experiment described in section 2 is that of European monetary integration, ultimately resulting in the introduction of the euro for 12 countries in 2002 (enlarged in the period 2007-2011 to 17 countries).[22] As already discussed above, the *additional* effects of the introduction of the euro on the market access variables of border cities or regions compared to non-border cities or regions (which ultimately determines location decisions) are expected to be smaller than the additional effects of the EU integration process as measured by accession, see hypothesis IIb. Not only is the euro related to a smaller part of the economic forces, but also (and more importantly) monetary unification was a much more gradual process with many decades of experimentation with fixed or managed exchange rates and a long period of adhering to strict rules before the actual introduction of Euro coins and bills in 2002 took place. Our results are summarized in Table 10, which shows that (i) the population share growth rates are significantly smaller along the borders of the euro area (about 0.13 per cent for cities and 0.20 per cent for region) and (ii) there is no discernable positive effect on these growth rates that can be

[21] At the city level an F-test for equality of the border-integration coefficients for old and new members cannot be rejected at any standard significance level. In contrast, this equality hypothesis is rejected at the 5 per cent level for the regional estimates. We also estimated old and new border effects for the whole period and found similar results.
[22] Or 20 countries if one includes San Marino, Monaco, and the Vatican.

attributed to the introduction of the euro.[23] Border cities and regions have no benefits in terms of their population growth share growth from introducing the euro.

Table 10 Urban and regional population share growth rates; introduction of the euro

	Urban population (1)	(2)	Regional population (3)	(4)
$border_{euro}$	- 0.132***	- 0.138***	- 0.208***	- 0.204***
	(0.0450)	(0.0459)	(0.0286)	(0.0283)
$border_{euro} \times euro_{at}$	- 0.0105	0.0132	- 0.0470	- 0.0623
	(0.0577)	(0.0580)	(0.0451)	(0.0456)
Year effects	Yes	Yes	Yes	Yes
Country effects	Yes	Yes	Yes	Yes
Sample cities / regions	all cities	all cities	all regions	all regions
Sample countries	all countries	EU countries	all countries	EU countries
Observations	6,286	5,239	23,096	20,670
R^2	0.050	0.062	0.043	0.032

Robust standard errors in parentheses; *** p<0.01; ** p<0.05; * p<0.1

7 Conclusion

Urban historians have shown that the evolution of cities follows a relatively stable path (Bairoch, 1988). At the same time, long time series on city population also reveal that (sub-sets of) cities can leap-frog to new development paths. Relatively recently, discretionary policy changes or natural experiments have been used to shed light on what drives these changes in the development of (sub-sets of) cities and to investigate whether they are, indeed, stable after a shock or policy change. Redding and Sturm (2008) analyze the effects of the post WWII division of Germany into East and West Germany in 1949 on border cities along the new border between the two Germany's. They find that the effects of the German division on the cities along the border were substantial, resulting in a sharp decline of the population along the new border (more so for small than for large cities).

[23] Note that the selection of border cities and regions for the introduction of the euro is quite different from that of the EU integration (accession) process, and in particular includes cities and regions along the borders of the countries that started the process: France, Germany, Italy, Netherlands, Belgium, and Luxembourg. Taking 1999 instead of 2002 as the starting year for the early 11 countries involved does not change our results.

We apply the methodology developed by Redding and Sturm (2008) to the case of the EU enlargements that took place from 1973 onwards, which can be expected to affect especially border cities as these cities experience larger changes in market access than cities further away from the border. We also analyze regional data and look at the effects of the introduction of the Euro on border locations. Both at the urban and regional level, we find a beneficial influence of the EU integration process as measured by the growth in population share along the integration borders, leading to an extra growth rate of about 0.15 percentage points per annum. The positive integration effect associated with EU enlargements holds on both sides of the integration border, is active for a limited distance (up to 70km) and time period (up to 30 years), and is driven by the larger cities and regions. Despite this positive EU integration effect, being located along a border remains a burden in view of the (larger) general negative border effect. We do not find similar positive border-integration effects as a result of the introduction of the euro. In short, we find support for our hypotheses I and II from in section 3.

References

Ahlfeldt, G.M., S.J. Redding, D.M. Sturm and N. Wolf (2010), "The economics of density: evidence from the Berlin Wall," mimeo.

Bairoch, P. (1988), *Cities and economic development; from the dawn of history to the present*, University of Chicago Press, Chicago.

Baldwin, R. and C. Wyplosz (2009), *The economics of European integration*, McGraw-Hill, Third Edition, London.

Bosker, M., S. Brakman, H. Garretsen, and M. Schramm (2007), "Looking for multiple equilibria when geography matters: German city growth and the WWII shock," *Journal of Urban Economics* 61: 152-169.

Bosker, E.M., E. Buringh, and J.L. van Zanden (2008), "From Baghdad to London: the dynamics of urban growth in Europe and the Arab world 800-1800," *CEPR Discussion Paper 6833, CEPR, London.*

Bosker, M. and H. Garretsen (2010), "Trade costs in empirical New Economic Geography," *Papers in Regional Science* 89(3): 485-512.

Desmet, K., and E. Rossi-Hansberg (2008), "Spatial growth and industry age," *Journal of Economic Theory* 144: 2477-2502.

Hanson, G. (2001), "U.S.–Mexico integration and regional economies: evidence from border-city pairs," *Journal of Urban Economics* 50(2): 259-287.

Hanson, G.H. (2005), "Market potential, increasing returns and geographic concentration." *Journal of International Economics* 67(1): 1–24.

Helpman, E. (1998), "The size of regions," in: D. Pines, E. Sadka, and I. Zilcha (eds), *Topics in public economics: theoretical and applied analysis*, Cambridge: Cambridge University Press, 33-54.

Hohenberg, P. M. (2004), "The historical geography of European cities," in: V. Henderson and J-F. Thisse (eds), *Handbook of Regional and Urban Economics*, Vol. 4: *Cities and geography*, Amsterdam: Elsevier North-Holland.

Marrewijk, C. van (2007), *International economics: theory, application, and policy*, Oxford University Press, Oxford, U.K.

Overman, H., and L.A. Winters (2006), "Trade and economic geography: the impact of EEC accession on the UK," mimeo, London.[24]

Redding, S.J., and D.M. Sturm (2008), "The costs of remoteness: evidence from German division and reunification," *American Economic Review* 98(5): 1766-97.

[24] http://personal.lse.ac.uk/OVERMAN/research/shockloc18_dp.pdf

Appendix I Data description

The data consist of two non-balanced panel data sets on location and population, one for European cities and one for European regions. The data for European cities were collected from Brinkhoff (http://www.citypopulation.de/), whereas the data on the European regions were obtained from Eurostat (http://epp.eurostat.ec.europa.eu/). The urban population data covers the period from 1979 to 2010, with irregular intervals. The regional data cover the period from 1990 to 2008, with only a few missing observations. Border regions are defined as regions that have a common border with a neighboring EU country. The location of cities was collected from Google maps (http://www.maps.google.com/). Border cities are cities within a road distance of 70 kilometers from the nearest national border(s). We also experimented with border cities within 50 kilometers and 85 kilometers road distance from a national border. The total number of cities is 2410, namely 1950 EU cities and 460 non-EU cities (Table A1.a). Out of the 1950 EU cities 416 (21 per cent) are border cities (using the 70 kilometers border distance). The regional data set consists of 1457 regions, namely 1302 EU regions and 155 non-EU regions. Out of the 1302 EU regions 306 (24 per cent) are border regions (see Table A1.b).

Table A1 Basic urban and regional information (EU integration)

a. Urban data	# cities	Population mean	Population median	growth* rate (%)
EU Cities	1,950	110,484	50,984	0.351
Non-EU cities	460	82,483	26,066	1.355
All Sample Cities	2,410	105,631	44,956	0.542
EU integration border cities (70 km)	416	93,054	32,891	0.119
b. Region data	# regions	Population mean	Population median	growth rate (%)
EU Regions	1,302	373,760	251,000	0.168
Non-EU regions	155	624,317	314,200	0.346
All Sample regions (total)	1,457	398,679	256,000	0.187
EU integration borders	306	296,173	180,900	-0.094

* average annual compounded growth rate (%), based on beginning and end value

Appendix II Random border

Table A2 reports the effects of an artificially created border from a random selection of 416 non-border cities and 306 non-border regions (equal to the number of border cities or regions). The start of the integration period for each city or region was chosen randomly from one of the periods relevant for this country[25] and active henceforth. As the table shows, creating this artificial border effect within the EU does not lead to any significant border effects.

Table A2 Urban and regional population share growth rates; artificial border

	Urban population		Regional population	
	(1)	(2)	(3)	(4)
$border_{art}$	0.0529	0.121	0.0293	0.0494
	(0.0781)	(0.0928)	(0.0347)	(0.0391)
$border_{art} \times integration_{art,t}$	0.0308	- 0.0285	0.0241	0.00897
	(0.0920)	(0.106)	(0.0509)	(0.0543)
Year effects	Yes	Yes	Yes	Yes
Country effects	Yes	Yes	Yes	Yes
Sample cities / regions	all cities	all cities	all regions	all regions
Sample countries	all countries	EU countries	all countries	EU countries
Observations	6,286	5,239	23,096	20,670
R^2	0.049	0.062	0.041	0.030

Robust standard errors in parentheses; *** p<0.01; ** p<0.05; * p<0.1; $border_{art}$ refers to an artificially created border, see the main text for details.

[25] For countries not actively affected by integration in the whole period, such as Belgium, the nearest border effect was chosen, in this case 1995. The list is available on www.charlesvanmarrewijk.nl