Wolf, Nikolaus

Working Paper

Was Germany ever united? Borders and domestic trade, 1885 - 1933

Diskussionsbeiträge des Fachbereichs Wirtschaftswissenschaft der Freien Universität Berlin, No. 2006/4

Provided in cooperation with:
Freie Universität Berlin

Suggested citation: Wolf, Nikolaus (2006) : Was Germany ever united? Borders and domestic trade, 1885 - 1933, Diskussionsbeiträge des Fachbereichs Wirtschaftswissenschaft der Freien Universität Berlin, No. 2006/4, http://hdl.handle.net/10419/28031

Diskussionsbeiträge des Fachbereichs Wirtschaftswissenschaft
der Freien Universität Berlin

Volkswirtschaftliche Reihe

2006/4

Was Germany ever united?
Borders and Domestic Trade, 1885 - 1933

Nikolaus Wolf

ISBN 3-938369

Was Germany ever united?
Borders and Domestic Trade 1885 – 1933[1]

Nikolaus Wolf

Freie Universität Berlin

First Draft December 2005

This draft 25 January 2006

Abstract

Was Germany ever united? Given the historical circumstances of Germany's unification in the 19th century there is no obvious answer to this question. But such an answer can affect the prospects of the post-1989 unification process, and beyond this of European integration. We provide an econometric analysis of Germany's economic integration across various internal borders from the foundation of the Kaiserreich until the end of the Weimar Republic. This analysis is based on a new comprehensive set of domestic trade flow data on railways and waterways, covering all parts of Germany 1885-1933. First, the disintegration effects by the separation of Alsace-Lorraine and Western Poland from Germany after the Versailles treaty were somewhat limited by previous disintegration of these regions. Second, while there is broad support for increasing integration across old political, administrative, and confessional borders between 1885 and 1933, a geographical divide between eastern and western parts of Germany had a persistent trade diverting effect well into the 1930s.

Keywords: Germany, Economic Integration, Railways, Waterways

JEL: F15, N13, N14, N90

[1] The author gratefully acknowledges financial support form the Fritz Thyssen foundation, Cologne, and excellent research assistance from Katja Bruisch and David Stenzel. The paper profited much from discussion with participants of the 2nd Berlin Colloquium, Dec. 2005.

I. Introduction

One of the main puzzles in international economics is how political and institutional borders affect the pattern of economic integration (Obstfeld and Rogoff 2000). The formal removal of political borders by free trade agreements apparently affects trade patterns only to a very limited extend (see McCallum 1995, Engel and Rogers 1996 on the US-Canadian border). And even further institutional arrangements such as the process of European integration seem to have surprisingly little effects on trade (Nitsch 2000). Evidence from the sudden political unification of Poland after WWI indicates that even 15 years after their removal the former partition borders had an average tariff-equivalent of about 20% on domestic trade flows across Poland (Wolf 2005). Similarly, the impact of currency unions on trade is heavily disputed (see Rose 2000, Glick and Rose 2002, Ritschl and Wolf 2005, Berger and Nitsch 2005). Why is it so difficult to change economic borders?

A growing literature is trying to resolve this puzzle. A first line of research identified problems of specification and measurement error. Notably Anderson and van Wincoop (2003) showed that it is crucial to take location-specific unobserved heterogeneity, especially effects of "multilateral trade resistence" (like price level effects), into account. This reduces the border effects, but it does never eliminate them. Second, there is a large literature suggesting that administrative and political borders often coincide with the reach of various networks (Rauch 1996, Greif 1993). Combes et al. (2004) show that taking the trade-creating and trade-diverting effects of social networks into account helps to reduce the effect of administrative borders in France on domestic trade flows by about a third. Similarly, biased development of infrastructure within administrative and political borders might increase the persistence of their effects (see Limao and Venables 2001). But still, in all of these studies a large, statistically and economically significant border effect remains unexplained. A related literature following Alesina and Spolaore (2003) asks a more general question: what is the relationship between political and economic integration? Does political integration always foster economic integration as most authors in the border-literature apparently assume? Can we take it for granted that the shape of political borders is exogenous to economic relations? While this probably holds for the case of modern Africa (Herbst 2000), the same assumption is more demanding for Europe. Economic integration might well produce scope for political disintegration (see Alesina and Spolaore 2003 for a theoretical argument) or the opposite,

foster political integration. We need much more empirical work to understand these interactions.

This paper looks into the case of Germany's political unification from the late 19th century onwards based on an extremely detailed set of domestic and cross-border trade flows. As noted by many students of European history, Germany is characterized by both, a high degree of internal fragmentation along various fault-lines but also by several dramatic changes to the shape of her borders. Given the availability of very detailed data on domestic trade flows, German history can provide new insights into the interaction between economic and political integration. The aim is to shed light on two related questions: how did economic integration evolve over time? And what was the effect of changing political borders on economic integration, compared to other lines of fragmentation (cultural, geographic)?

To this end, we first sketch out in section II the historical background on Germany's political fragmentation and the large historiographical literature on the problem of Germany's political and economic unity. Section III describes a general theoretical framework to analyse the process of economic integration and possible effects of political, cultural, or other lines of fragmentation. In section IV we describe in detail the data, namely the relevant sources, characteristics and pitfalls of that data. Section V contains an empirical analysis, where we estimate the effect of various potential or obvious borders on the course of integration, and their changes over time. Section VI concludes.

II. The long shadow of the Reich: Germany's fragmentation in historical perspective

Let us take the foundation of the German Empire, the "Kaiserreich", in 1871 as a starting point to explore the economic unification of Germany. In order to analyze the degree of integration or fragmentation of this Kaiserreich and possible interactions between various internal borders we need some background knowledge about its origin. The aim of this section is first, to assess to what extend the shape of Germany in 1871 was due to exogenous political events, and to what extend it was the "endogenous" result of earlier processes. Related to this is the second aim: to derive hypotheses about potential fault-lines of internal fragmentation that can be expected when we analyze the economic integration of Germany from 1871 onwards.

It has often been stated that there was little necessary or unavoidable in the foundation of the Kaiserreich in 1871, that the shape of Germany in 1871 was largely the outcome of a series of historical accidents (e.g. Nipperdey 1993). Translated into the parlance of economics, the unification of Germany in her 1871 borders was the result of exogenous political events rather than the endogenous political consequence of earlier political or other processes. Contrary to this view, an older historiography in the tradition of Treitschke (1879) argued that the political unification of 1871 was the teleological endpoint of a long preparatory process. Among other factors like the early attempts to create a body of German law (Getz 1966), the German Zollverein of 1834 featured prominently as a precursor of the Empire (see Hamerow 1969). More recent work by economic historians sheds new light on this debate. According to Dumke's seminal work (Dumke 1976) the emergence of the Zollverein was largely driven by the struggle for political survival of the ruling elites. Small states usually had a very unfavourable ratio between territory and length of their outer borders, which could be improved by joining a customs union, and some of the small states were under growing pressure from parliamentary budget control. For example, when Electoral Hessia entered a customs union with Prussia in January 1832, this was in the very interest of the ruling Hessian elite because it raised new funds free of parliamentary control. Sure, as a by-product it also helped Prussia to bridge the gap between her western and eastern provinces and created incentives for others to follow. Also, the beginnings of railways in German states in the 1830s did not aim at the unification of Germany in the spirit of Friedrich List (1833), but sometimes even contributed to further disintegration. While List planned to connect the main cities and economic centres of Germany, in 1850 there was still no direct connection between Munich (Bavaria), Stuttgart (Württemberg), or Karlsruhe (Baden), but parallel north-south lines. Similar, the important ports of Hamburg and Bremen were politically independent and hence not directly linked into the railway system of the Kingdom of Hanover (see Fremdling, Federspiel, and Kunz 1995). In the long run, however, each of these railway lines contributed to the economic integration of Germany. As Carol Shiue finds in a recent study on the Zollverein, the removal of customs borders between member states of the 1834 Zollverein to some extend helped to integrate grain markets between them (Shiue 2005).

But even after the enlargement of the Zollverein in 1852/54, the political unification of this customs union was far from inevitable. The Zollverein did not work without conflict and internal crisis (Fischer 1972), the efforts to further unify German law stagnated in the early

1860s (Stolleis 1992), and especially: still in 1865 there did not seem to be a political majority in favour of anything which would look like the Kaiserreich of 1871. Since the revolution of 1848 the public was divided into partisans of a "großdeutsche Lösung", which would have included the German parts of the Habsburg monarchy, partisans of a "kleindeutsche Lösung" under the lead of Prussia, and a group which feared a German national state altogether (mainly in the free cities of Hamburg, Bremen and Frankfurt). The German princes in turn struggled for their political survival, and in their majority fought against the solution of 1871 in the war of 1866. What changed this situation and made political unification finally possible was not a slow, stepwise process of social and economic integration but the politics of the Prussian chancellor Bismarck towards a Prussian dominance over the minor German states at the cost of Habsburg.

When the Kaiserreich was finally founded in January 1871, it was all but united. Let us shortly review the major internal fault-lines that ran across this Empire and some of their historical background. At least five of such internal borders can be identified, with many overlaps and interdependencies. First, the Kaiserreich in 1871 was constitutionally a compromise between Prussian dominance and the attempt of the medium states to keep their autonomy. While the Prussian king became German Emperor, the Prussian prime minister the German chancellor, and Prussia covered the largest part of the new Empire, the central powers of the new Empire were weak. Important policy tools such as most parts of the administration, large parts of the law, or infrastructure policies (railways, canals, streets) remained at the state-level, which had a near-monopoly on direct taxes. Therefore, one can hypothesize that the old, historically inherited state borders continued to play their part within the new Empire.

Second, Germany of 1871 was deeply divided by cultural differences; especially the divide between catholic and protestant regions, which in turn closely but not completely followed old political borders. This was rooted in the specific character of the Holy Roman Empire of the German Nation (the "Reich") which existed from the Middle Ages through its dissolution in 1806.[2] While this Reich developed some characteristics of a state such like a central administration and legislative and judicative bodies especially from the late 15th century onwards, the executive power of the central authority remained always very limited. It is not the aim of this paper to trace the origins of the central powers' weakness (on this issue

[2] The most comprehensive history of the Reich is still Karl Otmar von Aretin (1993-97), „Das Alte Reich 1648-1806", Stuttgart.

see recently Volckart 2005). But starting with the religious conflicts in the 1530s and internationally sanctioned with the peace of Westphalia in 1648, modern state building in Germany took exclusively place below the level of the old medieval Reich. Importantly, while in France and England religion was linked to the crown, in the Reich the matter was left to the local prices and cities. The Emperor – from 1438 onwards nearly always of the house of Habsburg - acted in this respect like a prince among other princes. A predominantly catholic Bavaria coexisted with a Lutheran Saxony and a Calvinist Palatinate within the Holy Roman Empire of the German Nation. A special case was Prussia, which was predominantly protestant but gained after the Congress of Vienna the catholic Rhine and Ruhr areas. Due to a serious conflict between the central power and the protestants on the one hand side and the catholic church on the other during the late 1870s and 1887 ("Kulturkampf") this internal border may well have been more visible in the 1880s than afterwards.

A third potential fault-line which probably played a role in 1871 is a consequence not so much of history but rather of natural geography. The bulk of industrial developments in 19th century Germany essentially clustered around some large cities (Berlin, Hamburg, Munich) and three regions of rich mineral resources, especially brown coal and hard coal. The first is the Rhine valley and all neighbouring regions, including the Ruhr area, connected by the Rhine and its tributaries. The second is the area between Halle and Zwickau in Saxony, the third is Upper Silesia. The latter two regions had natural waterway connections to Berlin via Elbe and Oder and to several sea ports. However, before the emergence of the railway and large scale construction of canals, the two eastern clusters were essentially unconnected to the western one. From 1847 onwards there existed a railway connection between Gleiwitz (Silesia) and Zwickau (Saxony), and also some indirect connection to the west. But it was still costly and cumbersome to transport mass commodities over larger distances for a long time. Before the First World War there was still no waterway connection between the industrial centres of western Germany and the eastern industrial regions (Tipton 2003). In 1911, only 7.9 % of all coal consumed in Berlin originated from the west, while 24.4% was British, and the rest originated either from Saxony or Silesia (Fremdling 2002, table 9). We can hypothesize that due to the long absence of any direct connection for mass transportation between these areas, trade flows may show a geographical divide between east and west well into the 1920s.

Forth, against this geographical divide in east and west, the Zollverein may have increased trade between its members. While the Zollverein did by no means lead to the formation of the Kaiserreich, it obviously contributed to economic integration of its members (see Shiue 2005). Moreover, cooperation between early members of the Zollvereins tended to go beyond customs policy and involved aspects of monetary integration (Holtfrerich 1989) but also infrastructure policies (Voigt 1965). Therefore we can ask, whether early membership continued to affect the degree of integration between them, or inversely, to what extend latecomers had difficulties to catch up to the integration of the core.

Fifth and finally, when the Kaiserreich was formed in 1871, her borders were the outcome of the long struggle between Prussia, Habsburg, and concessions to the national activists. The Norddeutscher Bund, formed after the Prussian victory over Habsburg and allied troops at Königgrätz in 1866, included all German states north of the Main[3] but also all other Prussian territories outside the German with non-German majorities, especially the Polish East. After the victory of Prussia and her allies over French troops in late 1870, this Norddeutscher Bund was extended to include all other parts of the German Federation except the territories of Habsburg but now including the newly attained French provinces of Alsace and Lorraine. Hence, the Kaiserreich of 1871 included some territories with non-German speaking population majoritiy and a long history of affiliation with states outside of Germany. How evolved the integration of these territories into the new German state? In the following we will explore the process of Germany's economic integration generally and to what extend this was affected by the mentioned five potential fault-lines.

III. A theoretical framework to measuring fragmentation

Starting with the work of Hamilton and Winters (1992), Frankel and Wei (1993), and especially McCallum (1995), it has become a widespread approach to analyse the course of economic integration across political borders within the framework of a gravity model. This empirical model basically relates trade flows between two economic areas (regions, countries) to the importer's demand, the exporter's supply, and to the geographical distance between them. It is a helpful tool for explorative purposes since it usually fits the data very well while imposing only weak restrictions on the underlying economic structures. Several authors,

[3] This is true with the exception of Luxemburg, which was subject of an international crisis in 1867 and granted neutrality.

including Redding and Venables (2001), Eaton and Kortum (2002), and most notably Anderson and van Wincoop (2003), have shown that it is possible to derive a gravity formulation from competing models of trade with equally tight microfoundations. Here I will follow Anderson and van Wincoop (2004), since their model has by now become the new standard in the literature.

Let Y_i^k be the value of production and E_i^k the value of expenditure in area i for product k. Assume that the allocation of production and consumption within a country $\{Y_i^k, E_i^k\}$ is separable from the allocation of trade across countries (see Anderson and van Wincoop 2004). Moreover, assume that all produced varieties are aggregated by a CES-aggregator, and that all trade costs are proportional to the quantity of trade. Let us define X_{ij}^k as the value of exports from area i to j in product k. A CES-demand structure implies

$$X_{ij}^k = \left(\frac{p_{ij}^k}{P_j^k}\right)^{1-s^k} E_j^k, \tag{1}$$

where s^k is the elasticity of substitution among varieties within sector k, p^k_{ij} is the ("c.i.f.") price charged by i for exports to j and P^k_j is the CES price index:

$$P_j^k = \left[\sum_i (p_{ij}^k)^{1-s^k}\right]^{1/(1-s^k)}. \tag{2}$$

Since we assume trade costs to be proportional to trade, the price p^k_{ij} can be written as $p^k_i\, t^k_{ij}$, where p^k_i is the ("f.o.b.") supply price received by producers in area i and t^k_{ij} is the mark-up over that price that is associated with trade costs. We will later allow for some modification of the relation between transport costs and trade volume. Trade costs are our variable of interest and equals one plus the tariff equivalent of trade barriers.

Imposing for all i and all k the market clearing conditions

$$Y_i^k = \sum_j X_{ij}^k \tag{3}$$

yields the gravity model, namely

$$X_{ij}^k = \frac{E_j^k Y_i^k}{Y^k}\left(\frac{t_{ij}^k}{P_j^k P_i^k}\right)^{1-s^k}, \tag{4}$$

where Y^k is the total output in sector k and I assume that trade costs are symmetric ($t_{ij} = t_{ji}$). The price indices P^k_j and P^k_i can be solved as a function of the set $\{Y_i^k, E_i^k\}$ and the trade barriers t^k_{ij}. Hence, given that trade flows and the set of production and consumption patterns can be identified, this structure allows estimating the effect of all kind of trade barriers. For

example, given that two regions are separated by a political border involving direct (tariffs) or indirect (waiting times) costs to cross that border, the model allows us to estimate the effect of these costs on the volume of bilateral shipments.

The approach is especially suited for applications to historical data, because it is very undemanding in terms of data. There are several ways to estimate the theoretical gravity equation (4). First, one can use non-linear least squares to estimate the structural equation under the restrictions imposed by the functional forms of the price-indices (Anderson and van Wincoop 2003). Alternatively, one can use data on price-levels, production, and consumption and estimate with OLS, as done in Baier and Bergstrand (2001) or Head and Mayer (2000). However, this kind of data is often unavailable, and even more so in a historical context. Therefore, we will choose a third approach that has become common in the most recent literature, as it delivers unbiased estimates of trade costs with minimal data requirements (see Anderson and van Wincoop 2003 and 2004, Eaton and Kortum 2002, Hummels 2001). This approach is to take logs of (4) and replace the price-indices and production and consumption variables with a set of area- and time-specific dummies. The equation to be estimated is then

(5) $$\ln(X_{ij}^k) = c + A_i^k + A_j^k + (1-s^k)\ln(t_{ij}^k) + e_{ij}^k, \text{ where}$$

$$A_i^k = \ln(Y_i^k) - (1-s^k)\ln(P_i^k) \text{ and } A_j^k = \ln(E_j^k) - (1-s^k)\ln(P_j^k).$$

Hence, we include a set of time-specific importer dummies, one for each area, which take on the value of one whenever that area enters the panel as an importer. The same holds for a set of exporter dummies. These dummies have the advantage to take not only difference in local purchasing power and production into account but all variation that is specific for a location but not for a bilateral pairing of locations. This can include the character of some location as a seaport, or place for cabotage, as well as the endowment of a location with mineral or other immobile resources.

Moreover, the model can be easily extended to account for data that is given in metric tons instead of values, which is often the case with historical sources on domestic trade (see Wolf 2005). In this case we are dealing with

(6) $$X_{ij}^k = p_i^k t_{ij}^k Z_{ij}^k,$$

where Z^k_{ij} is the volume of exports in metric quantities (tons). To estimate the model one has to adjust (5) for this special nature of the data and estimate

(7) $$\ln(Z_{ij}^k) = c + A_i'^k + A_j^k - s^k \ln(t_{ij}^k) + e_{ij}^k \text{, where}$$

$$A_i'^k = \ln(Y_i^k) - (1 - s^k)\ln(P_i^k) - \ln(p_i^k) \text{ and } A_j^k = \ln(E_j^k) - (1 - s^k)\ln(P_j^k).$$

Note that in absence of value data it is crucial to have data which is highly disaggregated in terms of commodity groups in order to avoid aggregation bias.

In principle, the model allows assessing degrees of economic integration simply by regarding the structure of estimated residuals, i.e. without any ex ante assumption about the existence of barriers to trade. Large negative residuals – measured against the standard error of the regression - indicate that the observed bilateral trade flow is smaller than predicted by the model, i.e. given distance, and location-specific characteristics. Vice versa, large positive residuals indicate well integrated regions. This method delivers a very general picture of the pattern of economic integration. However, in order to explain an observed pattern of economic integration one needs to make some assumptions about the nature of "trade costs" or the fragmentation of trade flows. As usual in the literature, let us assume that trade costs are a function of transport costs that increase in distance between locations by some exponent (which is to be estimated), and the costs associated with crossing a border (see Hummels 2001):

(8) $$t_{ij}^k = dist_{ij}^{\beta_1} \exp(\beta_2^k border_{ij}^k),$$

where $border_{ij}$ is a dummy variable defined as

(9) $$border_{ij} = \begin{cases} 1 \text{ if areas i, j are separated by at least one internal border,} \\ 0 \text{ else.} \end{cases}$$

A negative and significant coefficient $ß_2$ on such a dummy would give evidence of a trade diverting effect of internal borders on domestic trade flows.

In the empirical section we will explore the effects of the five above mentioned internal borders where we expect some persistent effect of domestic trade in the Kaiserreich. Four of them (administrative borders, east-west divide, early Zollverein-membership, ethnic divides) can be constructed as simple dummies according to (9). Confessional differences, however, which may have exerted an impact on trade flows especially during the "Kulturkampf"-period, do not follow too closely administrative borders. For example, while a

Bavarian majority is catholic, within Bavaria there are both protestant and catholic regions. To take this into account, we construct a variable confessional difference, which divides the German population into two groups (Catholics, Non-Catholics) and is bilaterally defined as

$$confdiff_{ij} = abs(Non-Catholic-share_i - Non-Catholic-share_j), \quad (10)$$

where (Non-Catholic-share)$_i$ is the percentage share of non-Catholics in the total population of area i according to the census of 1885. We take the absolute value of bilateral differences between areas to proxy for the existence of religious differences across Germany.

IV. The Data: sources, characteristics, problems

Our analysis of Germany's economic integration is based on a large and newly compiled dataset on domestic trade flows between all parts of the Kaisserreich in her 1871 borders, including trade with neighbouring foreign regions. The data is disaggregated for trade on railways and waterways and for about 200 groups of commodities and was published from 1885 onwards annually. The fact that this kind of detailed data is available might surprise, and is due to rather special historical circumstances.

Usually historical data on trade flows exists only for those trade flows that cross a tariff border, just because the collection of tariff information was the very motivation to collect trade data. Due to the Zollverein, the information on trade flows between the future member states of the Kaisserreich before 1871 is rather sparse. But growing conflict about the distribution of tariff incomes raised the necessity to collect some statistical information in the 1860s. Some parliamentary commission was installed, but little else happened (see "Einführung" in Statistik des Deutschen Reichs, 1891). Only the heated debate about the traffic policy within the new German state, especially the question about the role of railways as opposed to canals and waterways, gave birth to a statistic of Germany's domestic trade flows. In 1883 the Prussian Royal Statistical Office published the first volume of a statistic of domestic trade flows on railways, which contained the complete matrix of bilateral flows disaggregated for various groups of goods and 36 domestic and 15 foreign traffic districts. First it was published monthly, then on a quarterly base. From 1885 onwards this statistic was published annually, which makes the mass of contained information usable. It took some more time to develop a truly comparable statistic on trade flows on waterways (rivers, lakes, and canals). The first volume of this statistic appeared just before the outbreak of the First World War for 1913, published by the Federal Statistical Office (which since 1907 also

published the railway statistics). After the War, the statistic was continued, while under varying titles, in a way comparable to the earlier years. The Federal Republic of Germany also continued the statistic, first only for the territory of the FRG, from 1994 onwards systematically extended to include again the regions of the former GDR. Hence, there is an extremely detailed source to explore the course of Germany's economic integration from the 19th century onwards well into our days.

Let us consider some details about the data with respect to the geographical disaggregation and the grouping of goods. In the 1883 statistic, the Kaiserreich was split into 36 domestic trade districts, which closely followed the old administrative borders of the member states, but already aggregated some of the very minor ones (e.g. the many small administrative units in Thuringia were aggregated into Thüringische Staaten). In most cases the borders of these districts followed the state borders (e.g. Bavaria, or Alsace, and Lorraine), or respectively the provincial borders of Prussia. Due to several adjustments of the shape of these districts over time – some districts were split like Bavaria into two, some minor ones were grouped together with others like Leipzig city into Saxony -, we need to consolidate the districts over time. This gives a total 21 domestic and further 13 foreign consolidated trade districts (CTDs). Map 1 shows the consolidated domestic trade districts for the period 1883-1913. We see that the district borders allow us to follow the five mentioned potential fault-lines of internal fragmentation over time.

After the Great War, the statistic was continued and this in a way not totally free of a revisionist perspective. Alsace and Lorraine were still accounted for, but there old systematic numbers of the domestic districts were replaced with new systematic numbers of the foreign districts. Similarly, the now Polish regions of Westprussia and Posen were aggregated into a district called "Westpolen (alle ehemaligen deutschen Gebiete)", given a new number, but kept in the statistic. Fortunately from the researchers point for view, this allows us to analyze the effects of new political borders on trade flows. Some other territorial changes however, are more difficult to take into account, because the new borders split old traffic districts in a way that the matrix of trade relations between them and all others before and after the war are not fully comparable. This is the case for Upper Silesia, where the most heavily industrialized parts went to Poland after the public vote of 1921, and Schleswig, where the northern part was after 1919 returned to the state of Denmark. Map 2 gives the consolidated traffic districts for

the situation after 1921. Given the mentioned exceptions, most districts are identical with the pre-war districts.

The disaggregation of the data into groups of goods was very high and closely followed the German statistical system as applied in the foreign trade statistics, but it also varied over time. For example, hard coal was sometimes disaggregated into raw coal, cokes, and briquets, sometimes not. There are only minor changes over time, but again, some consolidation of the data was necessary to ensure comparability. Due to the fact, that the data is given in metric tons and not in transported values, we have to apply our econometric model version (7) and analyze them separately. In the following, we will explore trade flows for only 6 selected groups of commodities (some of them aggregated from several others), which account for more than 50% of the total transported volume. These groups are

- Hard coals
- Brown coals
- Chemical products
- Rye
- Iron and processed Steel
- Paper and related products.

We analyze the complete matrix of bilateral trade flows for these 6 groups based on the consolidated trade districts (see Maps 1 and 2) for the years 1885, 1913, 1925, and 1933, and for the two modes of transport, railways and waterways. For a total of 34 CTDs and due to the fact that trade on waterways is not available for 1885, we have a total of 48.552 observations, obviously with many zero-observations and several missings for trade with foreign CDTs. In the next section we will estimate the econometric model of (7) based on the described data and search for the impact of the five potential fault-lines of internal fragmentation as described in the historical section.

V. Was Germany ever united? First Results for 1885 – 1933

We estimate model (7) with Tobit to account for the many zero-observations in the data, and we allow for heteroskedasticity across our panel because local shocks probably did not travel uniformly. The main results are contained in five Tables; historical results in tables 1-4, modern results in table 5. Table 1 starts with analysing trade flows both within and across

the borders of the Kaiserreich (borders of 1871-1914). Table 2 proceeds to the analysis of trade flows within the German borders, where some additional information, e.g. on differences about the ethnic and religious composition of the population are used. Table 3 uses the disaggegated trade data for commodity groups within the borders of the Kaiserreich. Table 4 in turn looks at the historical experience within the borders of Germany today, i.e. the borders of October 1990.

Consider table 1. The overall fit of the model is good but not excellent for a gravity model. However, the coefficients are highly significant and all have the expected signs, except early membership in the Zollverein of 1834, which has no significant effect based on the larger trade sample. The outer borders of the Kaiserreich are highly trade diverting, and increasingly so. And there are massive internal borders. If we neglect the effects of a varying elasticity of substitution, trade within Prussian provinces exceeds trade across Prussian borders by roughly 66% before WWI and still 50% after WWI. Similarly, there is a divide between east and west., which is defined to run from Mecklenburg over Brandenburg to Thuringia. Assuming a uniform elasticity of substitution of five, crossing this internal border implies paying a tariff-equivalent of 11% before WWI and still 6.5% after WWI. Taken together, the results indicate that Germany experienced economic integration between 1885 and 1933 together with quite massive external economic disintegration. Moreover, all these effects were apparently stronger for trade on railways than for trade on waterways. This might be a hint that railways are to a larger extend subject to biasing infrastructural and tariff policies than waterways (e.g. since the Congress of Vienna there were attempts to liberalize waterways, partly successful, see Napp-Zinn 1928).

In table 2 we neglect the cross-border trade flows to focus on the internal economic geography of the Kaiserreich. This also allows us to look at the effects of religious and ethnic fragmentation, for which the information outside of the Kaiserreich would not be fully comparable. First note that within Germany the effects of distance are somewhat smaller than in the full sample, which indicates an integration effect additional to the two effects mentioned above. Next, for the German sample, the Zollverein-variable turns out to be highly significant, but with the "wrong" sign. Trade between early members of the Zollverein was significantly lower in the 1880s through 1933 than trade between members and non-members. This suggests that there may have been some factors influencing German trade flows that we did not yet take into account. A look at the map shows that these factors are seaports. The

latecomers in the Zollverein were the northern parts of Germany, especially the port-cites of Bremen and Hamburg, but also the area around the important seaport of Emden. Similar to the east-west divide between the several industrial clusters of Germany that developed based on the availability of mineral resources, especially energy resources (coal), there was an axis of very intense trade relations in north-south: this trade was in the main part trade between industrial centres of production and seaports, i.e. imports of raw-material and semi-finished products and exports of coal and industrial products. The last column in table 2 shows that this north-south trade creating factors were more important on waterways than on railways. Hence, the European east-west divide has within Germany a mirror in north-south linkages. Importantly, the east-west divide is not significant on waterways from 1913 onwards. This probably reflects the effect of the new canal connection from Dortmund to the east, which was opened in 1899 and showed a tremendous development after that (see Kunz 1995, also Napp-Zinn 1928). That is, waterways tended to connect east and west more than railways. Moreover, there is evidence that trade within the administrative borders of Prussia continued to exceed trade across her borders, but decreasing over time. Finally, while neither religious nor ethnic differences apparently played a major role in Germany until 1913 – there is no evidence of a "Kulturkampf-effect" based on the Kaiserreich-sample – we do find a strong treatment effect of the new borders after 1919. Not surprisingly, the new borders separating Alsace and Lorraine in the West and Western Poland in the East from Germany had a significant effect on trade flows. But note that this effect again differed for trade on railways and trade on waterways: the effect was much stronger for trade on railways. An additional analysis (table 2, last column) shows that the effect differed between the two regions. While Western Poland was already before WWI badly integrated into the Kaiserreich, this was not true for Alsace-Lorraine. Accordingly, while in both cases the separation from Germany had a significant and negative treatment effect, this effect was much stronger in the case of Alsace-Lorraine than in the case of Western Poland.

Table 3 gives results based on commodity groups. We focus the analysis on trade on railways, in order to include the year 1885 and to make sure that differences between the goods are not due to differences in the choice of transportation mode. First we see that treating the different commodities separately helps to increase the fit of the model. There also seem to be – not surprisingly – large differences in distance-related transport costs and other barriers to trade across commodity groups. However, any comparison needs to take into account that there might be large differences in commodity-specific elasticities of substitution

(see Evans 2003, Wolf 2005). If we take the benchmark estimates from Evans (2003) for good-specific elasticities, the estimated distance related trade barrier is largest for hard coal, followed by iron and steel products, brown coal, rye, paper and lowest for chemical products. This makes sense in terms of value to weight ratios, which are highest for chemical products and usually lowest for mineral products. The pattern of internal borders is roughly similar across all these commodity groups, namely there is some evidence of an intra-Prussian border and quite massive evidence for an east-west border as well as a north-south axis of intense trade. Given differences in elasticities, especially trade flows in hard- and brown coal but also all other industrial products (such as the energy intensive paper and chemical products) show this east-west divide, but not rye. The tariff equivalents of the east-west divide developed for the various commodity groups between 1885 and 1933 as follows: hard coal (38%, 36%), brown coal (77%, 38%), iron and steel (22%, 16%), chemical products (13%, 21%), paper and related products (19%, 10%), and rye (18%, 0%). Note the increase for chemical products, but the disappearance of the effect for rye. Hence, products which are independent from the availability of energy resources are less affected by this internal border. If we consider the last rows of table 3, we see that for all products there was a large treatment effect of the new outer borders of Germany after the Versailles treaty in 1919. For example, based on the Evans (2003) estimates for elasticities of substitution, the average tariff equivalent of the new borders for Iron and Steel products in 1925 was 437% (!), for chemical products it was 88%, for rye it was 117 %. In 1933 these trade barriers were still extremely high but had declined somewhat (364%, 79%, 53% respectively).

Finally, let us consider table 4, where we restrict the sample to include only trade districts within the borders of Germany today. Overall, the results are quite similar to the results from tables 2 and 3, with the exception that there is now also evidence of a religious divide affecting domestic trade: German Catholics and Protestants apparently do have some tradition to stay apart. But more interestingly, we still see a quite large east-west divide as well as evidence for significantly above average trade relations in north-south direction. This might be surprising for those who use to relate differences between the German East and the West to differences in the level of overall economic development. Here, we argue that part of the story is a lack of economic integration that is probably due to the development of industrial centres based on spatially separated mineral resources. The industries of Berlin and Saxony depended much more on coal and ore from eastern regions than on resources from the west, while the Ruhr industry was obviously little affected by the availability of coal in distant

regions. However, consider the difference between railways and waterways as already noted above (table 2). The effect on railways is much stronger than for the pooled sample, hence indicating that waterways had a counteracting impact. This is probably due to the opening of the first part of the large east-west canal project "Mittellandkanal" in 1899, and the subsequent extensions, finished until 1916. If we look at railways alone and drop all other variables except the east-west divide, which coincides in the case of the Germany 1991 sample with the future border between GDR and FRG, we see that still in 1933 there was a significant internal border. If we assume an average elasticity of substitution of 3, the implied tariff equivalent of this border changed from 23% in 1885 to 14% in 1933. Hence, there was a lot of progress in terms of east-west economic integration from the Kaiserreich to the end of the Weimar Republic, but Germany was still far from an economic unity.

VI. Conclusion and outlook

This paper was a first attempt to put the debate about Germany's economic unification in an historical long run perspective. The aim was to answer two related questions: how did the economic integration of Germany evolve over time? And what was the effect of changing political borders on economic integration, compared to other lines of fragmentation (cultural, geographic)? In short, there was a lot of evidence that Germany experienced a process of economic integration across old borders such as inherited political and administrative borders or cultural divides between Catholics and Protestants. However, most important were the effects of some internal east-west divide that was much more present on railways than on waterways and can be traced back to the emergence of 19th century industrial clusters around regions rich in mineral resources. Together with the natural geography of waterways which mostly flow in north-south rather than east-west direction and probably intensified by the long history of Germany's political fragmentation this resulted in two economically disintegrated parts of Germany. During the Kaiserreich and later the Weimar Republic, the effect of this internal border declined – probably due to improvements in infrastructure such as the construction of the "Mittellandkanal" - but it never disappeared. Hence, the process of political unification was broadly followed by increasing economic integration, while some internal borders were surprisingly persistent. In line with this, we found a differential effect of the post-Versailles borders on trade flows. Both, in the case of Alsace-Lorraine and Western Poland the new borders had a significant negative effect on trade flows. But if measured against pre-1914 trade integration this "treatment effect" of the new borders was much more

important in the case of Alsace-Lorraine than in the case of Western Poland due to the fact that Western Poland was already before WWI only poorly integrated into the German economy.

What are the lessons to be drawn from this historical case study? First, the German case shows once again that political integration can foster economic integration through a multitude of possible channels. Infrastructure that connects previously separated regions is probably one of the most important factors. Second, natural geography such as the combination of natural transport ways with the availability of mineral resources might put some constraints on integration that are hard to overcome. Obviously, to what extent such a natural barrier to economic integration implies a loss of welfare would depend on the structure of demand across a country (see Evans 2003). But this very high persistence of internal disintegration certainly provides a new and less demanding benchmark for Germany's economic integration today. Third, in order to assess the effects of changing political borders on the economy properly, one needs to estimate the "treatment effect" of the new border, controlling for potential idiosyncratic variations in bilateral trade flows that are not time-dependent. Doing so, one finds in the case of the new borders between Alsace-Lorraine and Germany and Western Poland and Germany that already before WWI integration varied significantly, and so did the "treatment effect" of the new borders. This qualifies the many statements about the disastrous effects of changing borders on the European economy in the wake of Versailles (for example Pollard 1981). It also helps to assess the prospects of future European economic integration (see Ritschl and Wolf 2005).

References

Statistical Sources:

Königlich-Preußisches Ministerium der Öffentlichen Arbeiten (1886), Statistik der Güterbewegung auf Deutschen Eisenbahnen im Jahre 1885, Berlin, 1886.

Kaiserliches Statistisches Amt (1914), Statistik der Güterbewegung auf Deutschen Eisenbahnen im Jahre 1913, Berlin, 1914.

Statistisches Reichsamt (1926), Die Güterbewegung auf Deutschen Esienbahnen im Jahre 1925, Berlin 1926.

Statistisches Reichsamt (1933), Die Güterbewegung auf Deutschen Esienbahnen im Jahre 1933, Berlin 1934.

Kaiserliches Statistisches Amt (1914), Verkehr und Wasserstände der Deutschen Binnenwasserstrassen im Jahre 1913, Berlin 1914. Neudruck 1977 als Statistik des Deutschen Reichs, Bd. 274, Osnabrück 1977.

Statistisches Reichsamt (1926), Verkehr auf Deutschen Binnenwasserstrassen im Jahre 1925, Berlin 1926, Neudruck 1977 als Statistik des Deutschen Reichs, Bd. 326, Osnabrück 1977.

Statistisches Reichsamt (1934), Verkehr auf Deutschen Binnenwasserstrassen im Jahre 1933, Berlin 1934, Neudruck 1977 als Statistik des Deutschen Reichs, Bd. 447, Osnabrück 1977.

Journal Articles and Books

Alesina, Alberto and Eliana **La Ferrara** (2005), "Ethnic Diversity and Economic Performance", *Journal of Economic Literature*, Vol. XLIII (3), pp. 762-800.

Anderson, James and Eric **van Wincoop** (2003), "Gravity with Gravitas: A solution to the Border Puzzle", *American Economic Review* 93 (1), pp. 170-192.

Anderson, James and Eric **van Wincoop** (2004), "Trade Costs", Boston College, mimeo.

Aretin, Karl Otmar von (1993), *Das Alte Reich. 1648-1806*, Klett-Cotta, Stuttgart, 1993-1997.

Dumke, Rolf, H. (1976), *The Political Economy of German Economic Unification: Tariffs, Trade and Politics of the Zollverein Era*, Diss., Madison 1976.

Eaton, Jonathan and Samuel **Kortum** (2002), "Technology, Geography and Trade", *Econometrica* LXX, pp. 1741-1779.

Evans, Caroline L. (2003), "The Economic Significance of National Border Effects", *American Economic Review* 93 (4), pp. 1291-1312.

Fischer, Wolfram (1972), „Der Deutsche Zollverein. Fallstudie einer Zollunion", in: Fischer (ed.), *Wirtschaft und Gesellschaft im Zeitalter der Industrialisierung*, Göttingen, 1972.

Frankel, Jeffrey and Shang-Jin **Wei** (1993), "Trade Blocs and Currency Blocs", in: Guillermo de la Deheza et al. (eds.), *The Monetary Future of Europe*, London: CEPR.

Fremdling, Rainer (2002), "Reguionale Interdependenzen zwischen Montanregionen in der Industrialisierung, in: Toni Pierenkemper (ed.), *Die Industrialisierung Europäischer Montanregionen im 19. Jahrhundert*, Franz Steiner Verlag, Stuttgart, 2002, pp. 365-388.

Fremdling, Rainer, Ruth **Federspiel**, and Andreas **Kunz** (1995), *Statistik der Eisenbahnen in Deutschland 1835-1989*, Scripta Mercaturae Verlag, St. Katharinen, 1995.

Getz, H. (1966), *Die deutsche Rechtseinheit im 19. Jahrhundert als rechtspolitisches Problem*, Bonn 1966.

Hamilton, Carl and L. Alan **Winters** (1992), "Opening up international trade in eastern Europe", *Economic Policy* 14 (April), pp. 139-141.

Head, Keith and Thierry **Mayer** (2002), "Illusory Border Effects: Distance mis-measurement inflates estimates of home bias in trade", CEPII Working Paper No. 2002-01.

Holtfrerich, Carl-Ludwig (1989) "The monetary unification process in 19th-century Germany: relevance and lessons for Europe today", in: de Cecco and Giovannini (eds.), *A European Central Bank? Perspectives on monetary unification after ten years EMS*, Cambridge 1989.

Hummels, David (2001), "Towards a Geography of Trade Costs", Purdue University, mimeo.

Kunz, Andreas (1995), "The economic performance of inland navigation in Germany, 1835-1935: A reassessment", in Andreas Kunz and John Armstrong (eds.), *Inland Navigation and Economic Development in Nineteenth-Century Europe*, Philipp von Zabern, Mainz.

McCallum, John (1995), "National Borders Matter: Canada-U.S. Regional Trade Patterns", *American Economic Review* 85 (3), pp. 615-623.

Napp-Zinn, Anton Felix (1928), *Binnenschifffahrt und Eisenbahn. Werden, Gestalt und Problem ihres verhältnisses im Deutschen Reich*, Gloeckner, Leipzig, 1928.

Nippderdey, Thomas (1993), *Deutsche Geschichte 1866-1918. Zweiter Band. Machtstaat vor der Demokratie*, Beck, München.

Nitsch, Volker (2004), Border Effects and Border Regions: Lessons from the German Unification, Jahrbuch für regionalwissenschaft, Vol. 24 (2004), pp. 23-38.

Redding, Stephen and Anthony **Venables** (2001), "Economic Geography and International Inequality", CEP Discussion Paper No. 495, London School of Economics.

Ritschl, Albrecht and Nikolaus **Wolf** (2005), "Endogeneity of Currency Unions and Trade Blocs: Evidence from the Interwar Period", mimeo, Freie Universität Berlin.

Shiue, Carol (2005), „From political Fragmentation towards a customs union: Border effects of the German Zollverein, 1815-1855", *European Review of Economic History*, Vol. 9 (2), August 2005, pp. 129-162.

Stolleis, Michael (1992), „Innere Reichsgründung" durch Rechtsvereinheitlichung 1866-1880", in: Christian Starck (ed.), *Rechtsvereinheitlichung durch Gesetze – Bedingungen, Ziele, Methoden – 5. Symposium der Kommission „Die Funktion des Gesetzes in Geschichte und Gegenwart" am 26. und 27. April 1991*, Vandenhoeck und Rupprecht, Göttingen, pp. 15-41.

Treitschke, Heinrich von (1879), *Deutsche Geschichte im 19. Jahrhundert, 5 Teile*, Leipzig, 1879-1894.

Voigt, Fritz (1965), *Verkehr. Zweiter Band. Erste Hälfte. Die Entwicklung des Verkehrssystems*, Duncker und Humblot, Berlin.

Volckart, Oliver (2005), „Die Ursachen der deutschen Kleinstaaterei", Humboldt University, mimeo.

Wolf, Nikolaus (2005), "Path Dependent Border Effects: the Case of Poland's reunification (1918-1939)", Explorations in Economic History Vol. 42 (2005), pp. 414-438.

Table 1: **All Trade Flows**, **1885-1933**, Tobit, dep. var.: ln(trade), z-stat in parentheses, bold letters indicate significance at 10% or better

	Pooled (Rail & Water)	Railways (1885-1933)	Pooled 1885-1913	Railways 1885-1913	Pooled 1925-1933	Railways 1925-1933
Constant	**13.750** (44.361)	**16.230** (53.165)	**15.036** (32.858)	**17.305** (38.422)	**12.542** (29.570)	**15.131** (36.503)
Log(distance)	**-1.689** (-32.508)	**-2.025** (-38.962)	**-1.939** (-25.898)	**-2.247** (-30.267)	**-1.453** (-20.273)	**-1.789** (-24.776)
Reich_in	**1.577** (7.237)	**2.284** (10.482)	**09.31** (2.677)	**1.422** (4.153)	**2.078** (7.237)	**2.982** (10.032)
Prussia_in	**0.433** (4.813)	**0.483** (5.409)	**0.501** (3.867)	**0.581** (4.554)	**0.416** (3.340)	**0.450** (3.608)
East-West	**-0.413** (-7.935)	**-0.475** (-9.035)	**-0.525** (-6.889)	**-0.568** (-7.458)	**-0.316** (-4.434)	**-0.393** (-5.446)
Zollverein34	-0.017 (-0.170)	0.020 (0.208)	-0.043 (-0.305)	0.003 (0.025)	0.042 (0.302)	0.081 (0.564)
Time varying location dummies	yes	yes	yes	yes	yes	yes
Adj. R2	0.347	0.460	0.344	0.434	0.343	0.480

Table 2: **Reich in 1913 Borders**, **1885-1933**, Tobit, dep. var.: ln(trade), z-stat in parentheses, bold letters indicate significance at 10% or better

	Period	Pooled	Pooled Railways	Time Varying	Time Var. Railways	Time Var. Waterways	"treatment effects" of new borders
Constant		**16.001** (42.301)	**18.766** (53.061)	**16.016** (42.357)	**18.772** (53.173)	**11.321** (11.977)	**16.048** (42.556)
Log(dist.)	1885	**-1.656** (-25.998)	**-1.976** (-31.505)	**-1.900** (-17.149)	**-2.272** (-21.111)	-	**-1.949** (-21.133)
	1913			**-1.773** (-17.321)	**-2.085** (-21.537)	**-0.852** (-3.471)	**-1.807** (-20.516)
	1925			**-1.398** (-13.544)	**-1.685** (-17.451)	**-0.696** (-2.606)	**-1.428** (-16.229)
	1933			**-1.612** (-15.677)	**-1.854** (-17.970)	**-0.779** (-3.495)	**-1.546** (-17.493)
Prussia_in	1885	**0.307** (2.594)	**0.363** (3.124)	**0.749** (3.379)	**0.486** (2.212)	-	**0.878** (3.989)
	1913			0.163 (0.766)	**0.367** (1.783)	-0.679 (-1.150)	0.304 (1.420)
	1925			0.053 (0.251)	0.217 (1.076)	-0.485 (-0.681)	-0.064 (-0.300)
	1933			**0.386** (1.843)	**0.396** (1.875)	0.268 (0.475)	0.276 (1.309)
East-West	1885	**-0.398** (-6.265)	**-0.617** (-9.587)	**-0.868** (-6.419)	**-0.703** (-5.245)	-	**-0.843** (-6.507)
	1913			**-0.463** (-3.957)	**-0.808** (-6.806)	-0.333 (-0.826)	**-0.425** (-3.736)
	1925			**-0.191** (-1.651)	**-0.510** (-4.425)	-0.042 (-0.093)	**-0.198** (-1.746)
	1933			**-0.245** (-2.031)	**-0.496** (-3.929)	-0.271 (-0.797)	**-0.292** (-2.458)

Table 2 (continued)

Zollv34_in	1885	**-0.634** (-4.216)	**-0.244** (-1.693)	-0.274 (-1.075)	**-0.566** (-2.253)	-	0.019 (0.073)
	1913			**-1.004** (-3.991)	**-0.403** (-1.700)	**-1.561** (-2.998)	**-0.718 (-2.744)**
	1925			-0.359 (-1.377)	0.285 (1.179)	**-2.578** (-3.808)	**-0.635 (-2.402)**
	1933			**-0.709** (-2.942)	-0.238 (-0.957)	**-1.853** (-3.742)	**-1.003 (-4.056)**
Conf. Diff.	1885	-0.079 (-0.561)	-0.164 (-1.106)	-0.429 (-1.330)	-0.010 (-0.033)	-	-0.367 (-1.159)
	1913			0.038 (0.152)	-0.294 (-1.117)	0.276 (0.367)	0.106 (0.429)
	1925			-0.234 (-0.871)	-0.306 (-1.101)	-1.479 (-1.427)	-0.308 (-1.156)
	1933			0.212 (0.763)	-0.009 (-0.032)	-0.319 (-0.424)	0.199 (0.718)
Ethnic (French & Polish majority)	1885	-0.622 (-1.115)	**-1.257** (-2.146)	-0.361 (-0.441)	-0.896 (-1.122)	-	-
	1913			-0.339 (-0.435)	-0.765 (-1.008)	**-1.021** (-1.726)	-
	1925			**-1.969** (-2.361)	**-2.769** (-3.391)	**-1.825** (-2.510)	-
	1933			**-1.647** (-2.017)	**-2.685** (-3.359)	-0.574 (-0.951)	-
Alsace& Lorraine	1885+1913	-	-	-	-	-	-0.235 (-0.835)
	1925+1933	-	-	-	-	-	**-2.443** (-6.655)
Western Poland	1885+1913	-	-	-	-	-	**-0.953** (-3.486)
	1925+1933	-	-	-	-	-	**-0.617** (-1.626)
Time var. location dummies		yes	yes	yes	yes	yes	yes
Adj. R2		0.321	0.461	0.324	0.461	0.177	

Table 3: **Reich in 1913 borders, 1885-1933**, Railways only, **Commodity Groups**, Tobit, dep. var.: ln(trade), z-stat in parentheses, bold letters indicate significance at 10% or better

	Period	Hardcoal	Browncoal	Iron&Steel	Chemicals	Paper etc.	Rye
Constant		**26.648** (23.748)	**20.986** (15.694)	**17.952** (34.856)	**15.865** (30.120)	**16.036** (38.355)	**23.858** (31.395)
Log(distance)	1885	**-3.675** (-11.900)	**-2.117** (-5.227)	**-2.333** (-14.370)	**-1.876** (-12.472)	**-2.138** (-15.962)	**-3.504** (-15.462)
	1913	**-3.300** (-9.884)	**-2.285** (-6.320)	**-1.945** (-13.345)	**-1.806** (-13.595)	**-1.959** (-17.517)	**-3.593** (-18.547)
	1925	**-2.811** (-9.748)	**-1.381** (-3.853)	**-1.791** (-13.396)	**-1.322** (-8.565)	**-1.650** (-12.959)	**-2.624** (-12.806)
	1933	**-2.753** (-8.573)	**-1.466** (-3.502)	**-1.932** (-13.703)	**-1.473** (-9.944)	**-1.577** (-13.523)	**-3.509** (-16.613)
Prussia_in	1885	0.629 (0.689)	-1.262 (-1.359)	**0.662** (1.718)	0.377 (1.215)	0.331 (1.202)	0.618 (1.217)
	1913	**1.511** (1.691)	0.266 (0.312)	0.458 (1.438)	0.184 (0.729)	**0.488** (2.089)	0.638 (1.423)
	1925	-1.036 (-1.362)	-0.522 (-0.573)	**0.506** (1.762)	0.109 (0.346)	**0.720** (2.941)	0.425 (0.991)
	1933	0.603 (0.719)	0.261 (0.264)	0.442 (1.439)	0.427 (1.487)	**0.599** (2.690)	0.337 (0.715)
East-West	1885	**-0.866** (-1.655)	**-1.540** (-3.486)	**-0.418** (-1.813)	**-0.477** (-2.806)	**-0.674** (-3.455)	**-0.783** (-2.395)
	1913	**-1.473** (-3.185	**-1.401** (-2.807)	**-0.631** (-3.438)	**-0.793** (-5.057)	**-1.036** (-7.435)	-0.254 (-1.021)
	1925	-0.417 (-1.060)	**-1.346** (-2.801)	**-0.276** (-1.761)	**-0.594** (-3.837)	**-0.395** (-2.906)	-0.007 (-0.025)
	1933	**-0.839** (-1.586)	**-0.873** (-1.670)	**-0.304** (-1.813)	**-0.785** (-4.461)	**-0.381** (-3.105)	-0.313 (-1.116)

Table 3 (continued)

		Hardcoal	Browncoal	Iron&Steel	Chemicals	Paper etc.	Rye
Zollverein34_in	1885	-0.103 (-0.121)	**-2.672** (-3.010)	-0.293 (-0.695)	**-1.217** (-3.318)	-0.427 (-1.268)	-0.441 (-0.708)
	1913	**-1.341** (-1.686)	-1.137 (-1.308)	**-0.683** (-1.716)	-0.307 (-1.014)	-0.262 (-0.965)	-0.163 (-0.310)
	1925	-0.824 (-1.173)	**-1.818** (-2.068)	0.587 (1.462)	0.427 (1.010)	**1.104** (3.148)	**-1.289** (-2.439)
	1933	**-1.514** (-1.800)	**-2.395** (-2.245)	-0.179 (-0.435)	-0.385 (-1.065)	0.342 (1.132)	0.859 (1.592)
Conf. Diff.	1885	1.946 (1.560)	-1.554 (-1.384)	0.069 (0.133)	0.152 (0.411)	-0.363 (-0.944)	-0.301 (-0.503)
	1913	0.462 (0.477)	**-2.826** (-2.534)	0.511 (1.277)	-0.163 (-0.562)	-0.148 (-0.476)	**-1.222** (-2.297)
	1925	0.967 (1.131)	-0.891 (-0.710)	-0.091 (-0.224)	-0.511 (-1.156)	-0.372 (-0.986)	-0.117 (-0.192)
	1933	-0.081 (-0.073)	-2.228 (-1.428)	-0.284 (-0.699)	0.255 (0.653)	0.467 (1.512)	-0.873 (-1.293)
Ethnic (French & Polish majority)	1885	1.034 (0.889)	0.531 (0.345)	-0.957 (-1.473)	-0.911 (-1.409)	-1.033 (-0.973)	-1.299 (-1.456)
	1913	1.894 (1.644)	1.899 (1.464)	**-1.540** (-2.530)	-0.140 (-0.325)	-1.351 (-1.317)	-0.373 (-0.606)
	1925	-	-	**-3.447** (-5.019)	**-2.554** (-3.630)	**-3.454** (-3.056)	**-3.472** (-3.754)
	1933	-	-	**-3.147** (-4.591)	**-2.358** (-3.619)	**-4.051** (-3.692)	**-1.978** (-1.769)
Time varying location dummies		yes	yes	yes	yes	yes	yes
Adj. R2		0.412	0.425	0.635	0.693	0.753	0.609

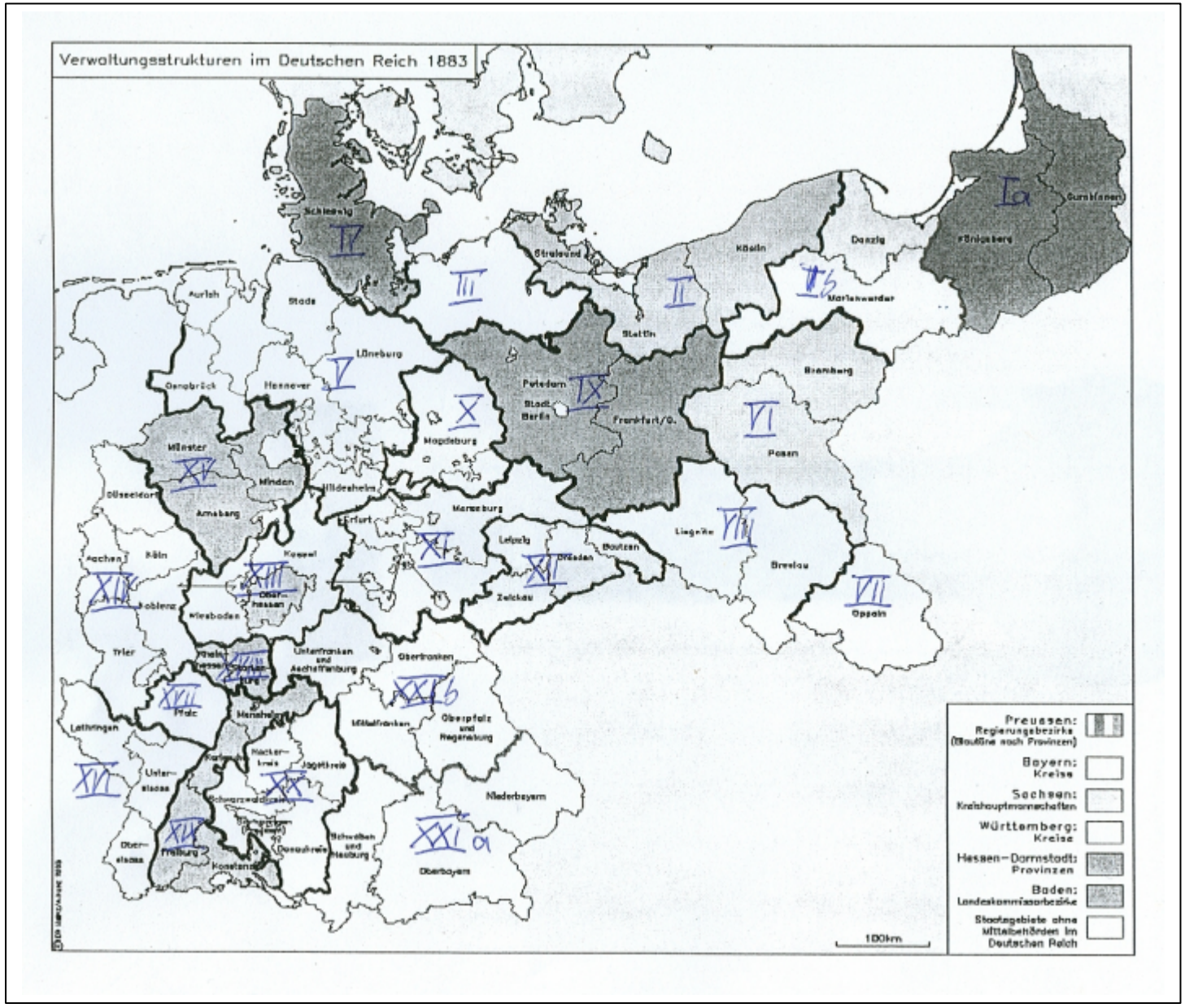
Table 4: **Trade in borders of Germany 1991**, **1885-1933**, Tobit, dep. var.: ln(trade), z-stat in parentheses, bold letters indicate significance at 10% or better

	Period	Time Varying	Time Var. Railways	Time Var. Railways (Distance and East-West only)
Constant		**15.921** (34.819)	**18.477** (44.433)	**19.405** (68.809)
Log(distance)	1885	**-2.017** (-15.801)	**-2.356** (-19.060)	**-2.489** (-21.860)
	1913	**-1.637** (-12.188)	**-1.978** (-16.219)	**-2.107** (-18.744)
	1925	**-1.302** (-11.650)	**-1.639** (-14.758)	**-1.801** (-18.010)
	1933	**-1.563** (-13.998)	**-1.814** (-14.938)	**-1.997** (-17.994)
Prussia_in	1885	**1.239** (4.942)	**0.899** (3.559)	-
	1913	0.240 (0.942)	**0.781** (3.166)	-
	1925	-0.059 (-0.247)	0.235 (1.029)	-
	1933	0.159 (0.662)	0.271 (1.103)	-
East-West (FRG-GDR)	1885	**-0.730** (-5.407)	**-0.609** (-3.564)	**-0.622** (-4.048)
	1913	-0.002 (-0.713)	**-0.455** (-2.763)	**-0.604** (-4.316)
	1925	-0.092 (-0.397)	**-0.513** (-3.420)	**-0.568** (-4.355)
	1933	0.108 (0.183)	-0.238 (-1.587)	**-0.393** (-2.690)

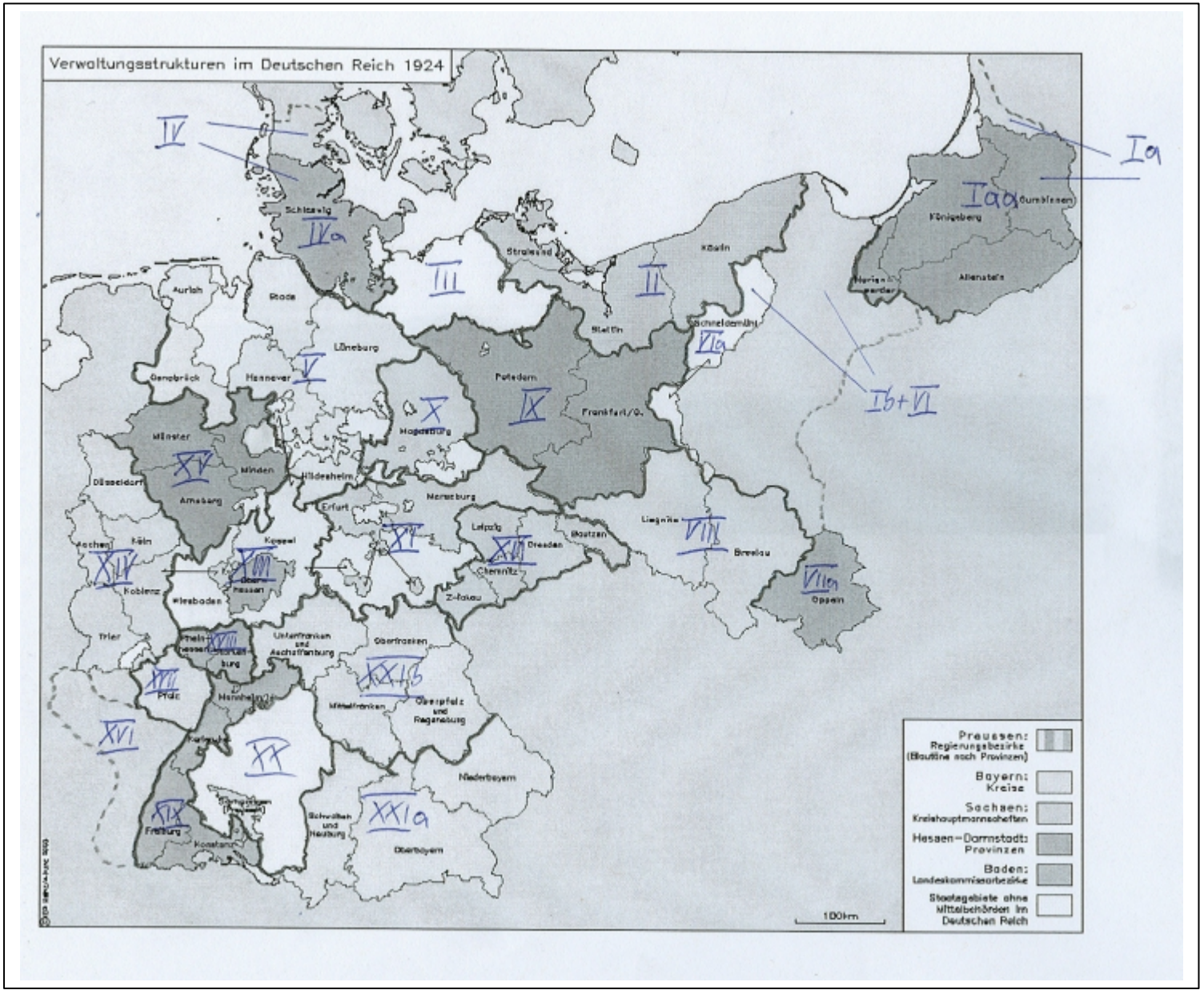
Table 4 (continued)

Zollverein34_in	1885	0.345 (1.103)	-0.238 (-0.784)	-
	1913	**-1.016** (-3.029)	0.229 (0.794)	-
	1925	**-0.953** (-3.060)	-0.048 (-0.184)	-
	1933	**-0.905** (-3.122)	-0.200 (-0.685)	-
Conf. Diff.	1885	**-0.784** (-1.667)	-0.428 (-0.919)	-
	1913	**-0.747** (-1.724)	**-0.939** (-1.976)	-
	1925	**-0.973** (-2.364)	-0.638 (-1.459)	-
	1933	-0.641 (-1.533)	**-1.001** (-2.203)	-
Time varying location dummies		Yes	Yes	Yes
Adj. R2		0.312	0.479	0.476

Map 1: Consolidated Trade Districts for German Trade Flows on Railways and Waterways, 1883-1913



Map 2: Consolidated Trade Districts for German Trade Flows on Railways and Waterways, 1924-1933



Diskussionsbeiträge
des Fachbereichs Wirtschaftswissenschaft
der Freien Universität Berlin

2006

2006/1 BERGER, Helge / Jakob de HAAN / Jan-Egbert STURM
Does Money Matter in the ECB Strategy? New Evidence Based on ECB Communication. 25 S.
Volkswirtschaftliche Reihe

2006/2 BERGER, Helge / Carsten HEFEKER
Does Financial Integration Make Banks Act More Prudential? Regulation, Foreign Owned Banks, and the Lender-of-Last Resort. 31 S.
Volkswirtschaftliche Reihe

2006/3 BÖNKE, Timm / Giacomo CORNEO
Was hätte man sonst machen können? Alternativszenarien zur rot-grünen Einkommensteuerreform. 28 S.
Volkswirtschaftliche Reihe