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School of Economics

# Working Papers

ISSN 2203-6024

## The Zollverein and the Sequence of a Customs Union

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Working Paper No. 2015-02

February 2015

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# The Zollverein and the Sequence of a Customs Union

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## **Abstract**

The Zollverein was the first international customs union, essentially defining these particular trade agreements. This paper utilizes the predictions of a game theoretic model to analyse the observed sequence of accessions into this union. Coalition externalities, the effects the accession of one state has on states remaining on the outside, are the central mechanisms explaining the negotiations between Prussia, the agenda setter, and other German states. This is demonstrated by detailing these financial, strategic and political externalities and demonstrating their influence on trade policy decisions.

Key Words: Customs Union, Germany, Coalition Externalities, Trade Negotiations

JEL Codes: F13, N43

# 1 Introduction

The creation of the Zollverein in 1834 was a major breakthrough for economic unification between German states. This institution, however, was not only an important step for the rise of a unified, modern Germany, it also marks a more general institutional development. The Zollverein was the first customs union between sovereign, independent states. This forerunner status makes it an excellent case study to understand the formation process of such a trade agreement.

Despite this prominence of the Zollverein its formation process has received scant attention in the economic history literature. Traditionally academic literature saw the Zollverein as a precursor to political unification and interpreted this customs union therefore as a political tool created by Prussia to exert power over other German states (Treitschke, 1872). Alternative approaches saw it either as the outcome of a series of contingent events (Henderson, 1984) or as a preventive union built by Prussia against France (Murphy, 1991). These predominantly political explanations were challenged by Dumke (1976), who focused on the financial advantages of membership stemming from economies of scale for customs administration. Although these explanations provide a reason for the creation of the Zollverein they fail to really explain the structure of the formation process. Ploeckl (2014) takes this up by utilizing a game theoretic model to explain two important characteristics of this process, namely the bilateral bargaining structure and the chosen institutional form of a customs union. This paper extends these results by using the predictions derived from this model to explain the order of the observed accession sequence of the Zollverein.

The issues of the formation and sequencing of trade agreements have received considerable attention in the modern trade literature, especially

with regard to the design of a global trade architecture and the role of regional trade agreements through which it can advance. One example is Aghion, Antras and Helpman (2007) which develops a bargaining model based on an underlying cooperative game. Ploeckl (2014) shows that the setup of this model, which provides a theoretical framework for the role of regional trade agreements in building a global free trade agreement, fits the historical context of the Germany in the early 19th century very well and allows therefore its application to explain the development of the Zollverein. Following an analytic narrative approach this paper expands on this by utilizing further conclusions from the application of this model, in particular the implications about the sequence of accessions. The model predictions are shown to explain the respective actions of the governments of the involved German states, which allows to draw more general conclusions about the formation process of these kind of international agreements.

The central mechanism explaining the logic of the process is the existence of coalition externalities. The accession of states into a trade agreement has ramifications, negative as well as positive, on those that remain outside. These coalition externalities were contingent on the specific context for each state, but usually involved financial, geostrategic, or internal political economy motives. The workings of this mechanism are explored in detail for every accession into the Zollverein during the first half of the 19th century, confirming the underlying logic of the model conclusions.

The next section introduces the theoretical framework used for the analysis, in particular the notion and scope of coalition externalities are detailed. Furthermore predictions about the optimal sequence for bilateral accession negotiations are derived. The following section takes this

framework up and goes through each accession, detailing the logic of the process and the coalition externalities at work. The final section concludes.

## **2 A formation framework**

Ploeckl (2014) demonstrates that the theoretical framework developed by Aghion et al. describes the historical situation of the German states in the early 19th century extremely well. The model has one central state opening the formation process by taking on the role as the agenda setter, a position that starts with the decision whether to pursue multilateral or bilateral negotiations. If it chooses the former, it makes an simultaneous offer to all other states. If all states accept the proposed trade agreement forms, if at least one state rejects it the whole agreement falls through. If the agenda setter chooses bilateral negotiations, it sequentially makes offers to other states until one offer gets rejected and the agreement is formed with all states that had accepted prior offers. Figure 1 presents this process in a visual form by depicting the extensive form of the game with three states.

### **2.1 Coalition externalities**

The model requires a mechanism that explains why the agenda setter is not indifferent between bilateral and multilateral negotiations. This is achieved by introducing coalition externalities, states outside the agreement are affected, positively or negatively, if other states join the coalition. Aghion et al. justify this modelling choice by demonstrating the existence of externalities embodied in trade creation and diversion effects caused by the

formation of trade agreements.<sup>1</sup> Ploeckl (2014) argues that these particular trade externalities are essentially only relevant if the utility function of the deciding government is strongly concerned with public welfare, an assumption that is not as applicable to the sovereigns of early 19th century German states. The remainder of this section, which is taken from Ploeckl (2014), provides an expansive description of the relevant historical goals of trade and tariff policies, which point towards the central externalities at the time and the resulting utility functions of the main parties involved.

Williamson (2006) distinguishes three central motives for global tariff setting between 1789 and 1938: a revenue motive, a strategic tariff motive and a Stolper-Samuelson factor compensation motive. The first is rather self-explanatory – governments set tariffs with the idea of raising revenues to satisfy their budgetary needs. The second is based on the theory revolving around strategic tariff setting. In early 19th century Europe this concept focused predominantly on reciprocal market access. This implies that states change their tariffs to either elicit reciprocal responses by other countries or as a reciprocal reaction to other states. The third motive concerns the internal political economy of countries, more precisely a connection between trade and politics based on the Stolper-Samuelson theorem and extensively explored by Rogowski (1990). Tariff rates affect relative prices between sectors, for example agriculture and manufacturing, and therefore the relative income of these sectors. Their members have therefore an incentive to influence tariff setting and the resulting relative tariff rates reflect the relative strength of individual sectors.

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<sup>1</sup> Rieder (2006) shows the existence of these trade diversion and creation effect externalities empirically for the case of the European Union.

The coalition externalities caused by the expansion of a customs union on states outside of the union are therefore located in these areas. The framework implies that the agenda setter profits from stronger negative coalition externalities, since these lower the pay-off necessary to entice a state to accept a membership offer. It will therefore try to maximize the impact of the effects in these three areas.

The first point is the effect on tariff revenues. A new coalition can affect the revenue of a third state in two major ways. One is the change in trade volume. A coalition can cause trade to be diverted or even prevented, which triggers the trade volume of the outside country to sink. This obviously lowers the revenues from tariffs. A coalition can also affect revenues through the diversion of trade routes. Major trade routes bolster revenues through transit tariffs and through demand for services along the route. Affected services are, for example, logistics, transportation, housing, food, or access to markets such as fairs. Governments are able to levy taxes and fees on these and derive in this way revenues from trade. Traffic patterns change when tariff barriers change, free traffic within a coalition entices merchants to use routes in customs union territory, and outside countries lose revenues.

The second area is international trade politics. Given geographical positions, a coalition might be able to obtain control over all relevant trade routes leading into a country not within the customs union. The coalition obtains in this way a certain degree of control over the tariff system of the affected country, since traders can no longer evade transit tariffs levied by the coalition. High transit tariffs have effectively the same impact on traders as high tariff rates of the country itself. This poses problems for a state which has the intention to secure market access through reciprocal preferential treatment and therefore wants to implement a low tariff

system. The state is no longer able to offer low trade barriers to another state, and consequently cannot offer the necessary reciprocation. In the extreme the coalition could block all trade destined for the country and the state loses consequently control over its customs system. The power to determine one's own tariff system is a question of political sovereignty; losing that power threatens the political situation of the sovereign. This was a real fear for the sovereigns of smaller German states in light of the mediatization process of independent states, started through the *Reichsdeputationshauptschluss* of 1803, where stronger states absorbed small, formally independent, territories into their reign. The rulers of the surviving small principalities only had guarantees by the Congress of Vienna to secure their dynastic rights and therefore had the fear that a loss of control over trade policy would be the first step of being absorbed by larger neighbours, in most cases Prussia.

The last issue is internal political economy. Rogowski's framework stresses the effect of tariffs on factor compensation and therefore on the relative political power of different sectors. Prussia's tariff system of 1818 is an example of this – its moderate tariffs were a compromise between the demands of agriculture, located predominantly in Prussia's east, and the industrial and commercial interests in the western parts of its territory. The Zollverein essentially took over Prussia's moderate rates, which were neither prohibitive nor free trade-oriented.<sup>2</sup> The adoption of these tariff rates by new member states had only minor effects on the relative strength of different sectors due to this moderation. The effect of neighbour states

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<sup>2</sup> Prussia targeted a tariff rate of 10% at the institution of the tariff in 1818. The tariff was, however, based on weight and not value, and subsequent price decreases raised tariff levels considerably over the target rate.

joining the Zollverein had less of a differential impact on sectors than it had on different regions. Regional interests played an important part in tariff choices, as Prussia demonstrates. Its customs system not only balanced commercial and agricultural interests, but also represented a compromise between the eastern and western territorial parts of Prussia (Ohnishi, 1973). The geographical structure of a number of German states, with the most prominent example of Prussia, was a combination of sometimes completely unconnected territories. This had strongly differing regional interests as a consequence. An accession of neighbouring states into the Zollverein changed the relative strength of regions, shifting political power and interest. This change in the internal political economy of a state can influence its government to look more favourably on the Zollverein and thereby reduce the necessary pay-off required to convince the state to join.

Since coalition externalities reduce their pay-off, states obviously have the incentive to prevent or reduce them before they receive a membership offer. Governments had a number of options to do so. To counter effects caused through a coalition's control over roads, states had to find ways to secure access to unimpeded trade routes. Some of the possibilities were building or improving roads going through their own territory as well as coordination agreements with other states. To counter the potential international effects, states had to use reciprocal power before they were cut off. This implies that they preferred to conclude formal diplomatic agreements with foreign nations, locking in preferential treatment with regard to market access. In addition, a state might commit itself by treaty not to join the coalition, which serves as a signal to foreign states and raises the, predominantly political, cost that the agenda setter has to pay to overcome the necessary breakup of an official treaty. To counteract effects on the internal political economy, governments have limited options. Since

these effects cause shifts in relative power and demands, governments would need to make concessions to specific regions and sectors. These concessions, for example tax relief, are costly from a government viewpoint; therefore, it might be more profitable to accept the externalities than to the attempt to mitigate them.

## **2.2 Optimal Sequence**

In this theoretical framework the externalities shape the formation process in particular ways, first they determine the agenda setter's decision between bilateral and multilateral negotiations. This decision is based on the pay-offs the agenda setter receives under both scenarios with the potential difference determined by coalition externalities. The existence of negative coalition externalities is a necessary, but not sufficient, condition for the selection of bilateral negotiations.

The second impact of externalities happens in case the agenda setter selects to make individual offers rather than bringing everyone to the table. The actual sequence of negotiations is chosen by the agenda setter in such a way that it maximizes its payoff. This optimization relies on maximizing negative coalition externalities and minimizing positive coalition externalities on states further down the sequence. If there are no coalition externalities then all the sequences that result in the same final coalition, i.e. include the same states, give the agenda setter an identical pay-off – it is therefore indifferent between them.

The characteristics of the model imply that the optimal sequence will exhibit the following:

*For any two consecutive elements of the optimal sequence, it has to hold that conditional on the prior section of the sequence the externality of the accession of the first on the second is at least as negative (or at most as positive) than the externality of the second on the first.*

If this property does not hold, the sequence is obviously not optimal and could be improved by switching the two elements.

In practical terms this implies that the chosen sequence can be expected to adhere to the following regularity:

*A state which has a stronger negative impact on many other states than they have on it is likely to be an early element of the sequence.*

And a special case is the situation where two states only impact each other through their accession.

*If two states have only an impact on each other, the agenda setter will pick that state first, which has the stronger negative impact on the other.*

An empirical illustration of these regularities is given in the appendix.

The following analysis of the observed sequence of the Zollverein is based on these regularities rather than an investigation of all possible sequences. Since the set of potential sequences numbers in the hundreds of thousands and not enough quantitative evidence exists for a mathematical or statistical approach the following analysis is focused on demonstrating that the observed order of accessions exhibits the mentioned regularities of the optimal sequence. In particular the remainder of the paper demonstrates the existence and nature of the externalities that determined

the sequence, their strategic use as well as the mitigation attempts by affected states.

### **3 The formation of the Zollverein**

Prussia was clearly the agenda setter for the formation of the Zollverein. The first step towards assuming this role was its customs system reform in 1818, which lifted internal tariff lines and established a border customs system (Ohnishi, 1973). In the wake of this reform its government also decided unilaterally to treat enclaves of other states, in some cases actually the whole state, within its borders as Prussian territory with regard to customs purposes. Affected states were offered direct financial revenues as compensation.<sup>3</sup> Some states complied with Prussia's actions fairly quickly,<sup>4</sup> but some resisted, ultimately unsuccessful, for years<sup>5</sup>. During the next few years Prussia remained on the outside when other German states conducted trade negotiations between them.<sup>6</sup> It reversed course and assumed the agenda setter role by convincing Hesse-Darmstadt in 1827 to join its customs system, a move which jolted other German states. Once it had taken up the role, Prussia filled it by leading the negotiations, which resulted in the formation of what has become to be known as the Zollverein, the accession of further states in the decades to follow, as well as official trade

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<sup>3</sup> Prussia initially offered compensation based on per-capita tariff revenues, but the actual amount was fixed sum, rounded for practical purposes.(VBDZ 33-35)

<sup>4</sup> The treaty with Schwarzburg-Sondershausen was completed in October 1819 (VBDZ

<sup>5</sup> The agreement with Anhalt-Dessau and Anhalt-Koethen was successfully concluded on July 17th, 1828, more than ten years after the dispute arose (VBDZ 155).

<sup>6</sup> This is the content of the documents in the second section of the first volume of VBDZ.

relationships with foreign nations such as France, England and Russia (Eisenhart Rothe and Ritthaler, 1934; Henderson, 1984).

Given this role as the leading nation of the Zollverein, Prussia's motivations during the negotiations reflect the reasons for the creation and formation process of this customs union. This is evident in a note the Prussian Finance Minister, Motz, sent to his colleague Eichhorn about negotiations with Bavaria and Wuerttemberg<sup>7</sup>:

*In the report to his Majesty about a customs and trade treaty with Bavaria and Wuerttemberg the following conditions should be considered:*

- 1. Political importance concerning our position in Germany*
- 2. Impact on the Mitteldeutscher Verein and elimination of all its negative effects on Prussia.*
- 3. Financial and economic advantage for Prussia*

*I will further comment on 3. The following principles should be applied:*

- a. Free trade in the goods and manufacturing sector of the combined states is conditional on the required security through certificates of origin, at most with the modification that full import and export tariffs are removed only after two to three years, for now reduced by half, but on the explicitly affirmed principle of complete free trade. The advantages are an increased market for larger domestic industries and especially for our far superior manufacturing, increased trade and, in this regard, especially a better utilization of the Elbe through Magdeburg.*
- b. Through a possible accession of Rheinbayern to the Hessian and Prussian Zollverein besides the advantages of lower administrative costs through enlargement and better borders along the customs line.*

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<sup>7</sup> The following is a translation of VBDZ 747 by the author of this paper.

His first item demonstrates that Prussia's aims for the Zollverein – and customs policy in general – were more than just fiscal or even economic; political calculus entered the negotiations. The statement indicates that Prussia was concerned with its influence on other German states, so the Zollverein was helping to prevent the rise of a third power in Germany besides Prussia and Austria. Additionally, Prussia was motivated by the desire to obtain a common German reaction against potential threats from France. The Zollverein was initially not aimed at pushing Austria out of Germany, but the economic unification without Austria allowed Prussia to do so later on (Murphy, 1991). The explicit political gain for Prussia explains why the government was willing to accept the financial losses it sustained. In direct financial terms Prussia's tariff revenues dropped significantly with the Zollverein, implying a substantial financial transfer to most of the other member states of the Zollverein (Chroust, 1949; Henderson, 1984).

The importance of coalition externalities and the choice for sequential negotiations are illustrated in his second item. It shows that the *Mitteldeutscher Handelsverein*, a trade agreement between a group of German states which will be explored in more detail later, was an attempt by those states to mitigate externalities caused by the accession of Hesse-Darmstadt into the Prussian tariff system. Furthermore, the Prussian government realized that multilateral negotiations with members of the *Mitteldeutscher Handelsverein* would have a negative impact on Prussia's pay-off. The item demonstrates that states recognized the existence of coalition externalities and incorporated them in their strategic actions.

The third item illustrates the influence of fiscal and economic motives on tariff policy. His comments highlight the expected positive effects of an increase in market size, an increase in transit traffic and through fiscal

savings from economies of scale in customs administration. The reference to the utilization of the river Elbe implies that tariff rates influenced the routes taken by merchants, and it demonstrates that governments cared about, and likely profited fiscally from, these routes. The item also demonstrates a disadvantage of a free trade agreement versus a customs union, namely its need for certifications of origin. This point plays an important role in determining the institutional structure of the Zollverein as demonstrated by Ploeckl (2014).

Once Prussia had assumed the role as agenda setter and had made the decision for sequential negotiations, the next step was to select the actual sequence. The deterministic nature of the sequence implies that the first element represents the major decision from which other elements follow logically. So why did Prussia select Hesse-Darmstadt as the first state to create a customs union with ?

The Grand Duchy of Hesse and by the Rhine, usually referred to as Hesse-Darmstadt, was one of the middle powers in Germany, numbering slightly less than a million inhabitants. Shaped by the Congress of Vienna it had two disjoint territories located to the north and south of the independent city of Frankfurt. Both territories bordered Prussia's main western province<sup>8</sup>, though the length of these borders was fairly short and the number of relevant trade routes crossing was small (VDBZ 363). Economically its main products were agricultural, including wine, with some textile production as well as trading activity in Mainz with its harbour on the river Rhine (VBDZ 350). Its fiscal position was still shaky from the aftermath of the Napoleonic wars and the subsequent reforms (Hahn,

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<sup>8</sup> The northern part additionally bordered the Prussian enclave of Wetzlar.

1982). Due to dynastic relations the state had strong connections with the neighbouring Hessian states, in particular Nassau and Hesse-Cassel.

Although the state was actively involved in the discussions about trade agreements with the southern German states during the 1820's it secretly enquired about trade negotiations with Prussia in 1827. Its government had two main motives to agree to a customs union once Prussia had chosen to assume the role of agenda setter and open trade negotiations, first the potential financial revenues outweighed those from an agreement with the southern states (VBDZ 368) and second the political climate within the state was changing from focusing on the demands of certain industries and regions which looked towards the markets in southern Germany to those of the northern regions and certain agricultural and textile branches which saw northern markets, especially Prussia, as much more enticing (VBDZ 373).

The financial dimension of the agreement between Hesse-Darmstadt and Prussia was substantial. The smaller partner profited considerably with regard to customs revenues, alleviating its considerable financial troubles. In 1830 the Hesse-Darmstadt government officially calculated the increased net revenue at 280000 fl per year (Hahn, 1982), which was in line with their expectations during the negotiations, which were around 200000-270000 fl (VBDZ 368). This increase represented close to 5% of of the Hesse-Darmstadt's budget in 1830 (Hahn, 1982) and did not even include other additional revenue due to the economic impact of the Zollverein.

These financial advantages for Hesse-Darmstadt were mirrored by corresponding financial losses for Prussia, since the savings in customs administration expenses was fairly low due to the short border between the two states. Next to the financial downside the agreement had another major negative consequence for Prussia, namely the necessary involvement of a

foreign government in tariff setting for a major part of its customs system. Furthermore the agreement had no immediate, apparent upside, it did not create a tariff-free connection between the two major Prussian territories, nor did Prussia attain control over another major trade route (VBDZ 363). As seen at the time, the agreement appeared not to have any direct, obvious benefit for Prussia (VBDZ 373).

So if the union with Hesse-Darmstadt was not profitable on its own terms, why did Prussia make this choice rather than forging an agreement with one of the other neighbouring states, for example Hesse-Cassel, Saxony or the Thuringian principalities. The reason behind this strategic choice is the above described characteristic of the optimal accession sequence, a state with a corresponding, relative higher negative externalities on another state should be earlier in the sequence.

An accession of these alternative partner states, especially Saxony and the Thuringian principalities, would have had no direct, first-order externalities on Hesse-Darmstadt, which was mostly due to the missing geographic proximity between these states. However Hesse-Darmstadt had relative stronger negative externalities down the sequence once the impact of this accession on the remaining states is taken into account. The first impact is the obstacle this agreement put in place for the expansion of the union between Bavaria and Wuerttemberg, preventing the rise of a third power in Germany. The major externality however was the pressure this move put on the other Hessian states, in particular Hesse-Cassel. The treaty explicitly stated that Hesse-Darmstadt should seek the accession of the neighbouring Hessian sovereignties (VBDZ 379); Prussia focused attention squarely on Hesse-Cassel (VBDZ 370) due to its position between the two major Prussian territories. If this were achieved then the Prussian tariff area would control all trade routes between the south of Germany and the North

Sea ports which represented the gateways to many important international markets. The externalities on the subsequently affected states would therefore be financial, higher transit tariffs would reduce trade and therefore tax revenues, and a reduction in market access, since Prussia's control would harm the ability of these states to conclude reciprocal trade agreements with foreign nations.

The discussion about the nature of coalition externalities argued that states will attempt to mitigate them and take measures to raise their own reservation threshold. The new coalition between Prussia and Hesse-Darmstadt caused exactly such a reaction. On September 24th, 1828 a large group of affected German states established the *Mitteldeutscher Handelsverein*, a formal trade agreement (VBDZ 532). Geographically, the territories of its members covered north and central Germany, containing the major trade fairs of Frankfurt and Leipzig as well as the trade roads between these two and the major North Sea ports, the important port city of Bremen was even an official member state (VBDZ 532). It also covered all roads between the two main Prussian territories. The three southern states – Bavaria, Wuerttemberg, which had formed its own union, and Baden – were not involved. Baden did not border geographically with any of the *Mitteldeutscher Handelsverein* member states, and the agreement was also a reaction against externalities caused by the Bavarian-Wuerttemberg customs union, which had indicated its intention to seek additional members (VBDZ 351-353).

The nature of the agreement reveals that it was designed to mitigate externalities; it was neither a customs union nor did it create a free trade area between its member states. Its content was focused on preserving the trade route access of member states and hinder the enlargement of the two newly created customs unions in Germany. The treaty had therefore two

central elements – first, it intended to safeguard and improve control over trade routes by agreements to retain low transit tariffs and to instigate an intensive road improvement program<sup>9</sup>. Second, it contained the explicit legal commitment of its member states not to join any other customs union during the lifetime of the treaty. These two elements were proffered in order to prevent further coalition externalities in a threefold way. They fostered traffic on the roads under the control of the *Mitteldeutscher Handelsverein*, guaranteeing reliable access from and to foreign markets and therefore allowing for reciprocal trade policy, and attempted to prevent additional coalition externalities by forcing Prussia to switch to multilateral negotiation.<sup>10</sup> Most of the expected effects of further accessions to the Prussian system were negative; therefore, the *Mitteldeutscher Handelsverein* member states would have achieved a higher pay-off if multilateral negotiations about a merger with the Prussian union had been successfully concluded at this stage (Haferkorn, 1933). Nevertheless, Prussia refused collective negotiations and actively pursued policies to break this agreement up, which it did successfully by inciting Hesse-Cassel to defect three years later.

The defection of this Hessian state into the existing union between Prussia and Hesse-Darmstadt broke the *Mitteldeutscher Handelsverein* due to the state's central geographic location. Wedged between the two Prussian territories it controlled not only a direct transport link between these two but also the traditional German north-south trade routes as well as the

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<sup>9</sup> This program never really started in any serious way due to coordination problems, disagreement about route prioritization and a lack of the necessary funds (Thimme, 1931).

<sup>10</sup> The official conference protocol states an agreement between the member states about negotiations with all other German states on the basis of the principles of the *Mitteldeutscher Handelsverein* (VBDZ 531).

important east-west connection between the major trade fairs in Frankfurt and Leipzig. This literally split the *Mitteldeutscher Handelsverein* into a group of northern states around Hannover and the central-south bloc of Saxony, Frankfurt and the Thuringian principalities.

The union between Prussia and Hesse-Darmstadt had had strong negative externalities on Hesse-Cassel. The higher tariff border of its direct neighbor Hesse-Darmstadt was a central factor, leading to civil unrest in its southern part in 1830 – the regional population blamed Hesse-Cassel's tariff policy for its miserable economic situation. Additionally, Prussia continued its road building program, which led Hesse-Cassel to fear losing transit traffic to alternative trade routes, especially the Rhine (Thimme, 1931). These are in contrast to the loose and neutral nature of the *Mitteldeutscher Handelsverein*, in particular the intended road improvement program designed to foster Hesse-Cassel's transit revenues, which had made membership in the *Mitteldeutscher Handelsverein* the natural choice of the ruling duke who strongly resisted any treaty perceived to be threatening his sovereignty (Hahn, 1982). Consequently the duke did not receive the diplomatic overtures through his relations in Darmstadt very well, the political establishment however was more open to an improvement in the effectively dormant political relationship with Prussia. These factors convinced the government, though not the ruling duke, of Hesse-Cassel to defect from the *Mitteldeutscher Handelsverein* and accept Prussia's offer of membership in 1831. Although the duke resisted as long as possible, his internal political position became untenable and he was forced to abdicate in the fall of 1831. His son and successor signed the ratification documents within a few weeks of assuming power (Hahn, 1982).

As indicated above, the accession of Hesse-Cassel into the Prussian custom system caused considerable negative coalition externalities on a whole range of

states. This defection was a decisive blow to the *Mitteldeutscher Handelsverein*. The enlarged Prussian customs union area now split its area into two unconnected geographical blocks. It also countered any attempts of the *Mitteldeutscher Handelsverein* members, as well as the Bavarian-Wuerttemberg union, to secure unimpeded trade routes between southern Germany and major trading ports in the north. Again, the accession sequence followed a pattern with admitting a state whose accession caused considerable negative externalities on others, but was, due to its geographical position, relatively immune to possible externalities through the accession of other states.

Prussia's successful work against the *Mitteldeutscher Handelsverein* included cooperation with the next element of the sequence, namely the union of Bavaria and Wuerttemberg. These two states decided on a more amendable relationship with Prussia, rather than attempt to build an agreement with the the *Mitteldeutscher Handelsverein*. This was due to the southern union neither being able to make financial contributions large enough to convince these German states, nor having enough political power over them. The possibilities of the southern union to affect externalities of other states were fairly small and could not lower the reservation price thresholds of the states, which formed the *Mitteldeutscher Handelsverein*, low enough.

This cooperation was formalized with an extensive trade agreement in 1829, which was accompanied by a road-building program, enhancing the connections of southern Germany to the north (VDBZ 766). Since the territory of the *Mitteldeutscher Handelsverein* covered all possible routes, Prussia convinced two small Thuringian principalities, both members of the *Mitteldeutscher Handelsverein*, to allow them to create a route through their

territory <sup>11</sup>(Thimme, 1931). Additionally, Prussia and Bavaria pursued a closer cooperation between their respective postal services, which led to tensions with the Thurn and Taxis family, that held the postal monopoly for the Thuringian principalities and some of the other states of the *Mitteldeutscher Handelsverein*<sup>12</sup>(Helbig, 1991). The following accession of Hesse-Cassel into the Prussian customs system in 1831 shifted the trade routes available to the southern union from the control of the *Mitteldeutscher Handelsverein* to the Prussian union. This exerted negative externalities on Bavaria and Wuerttemberg, which were affected particularly by increased transit tariffs on the traditional routes through Hesse-Cassel (VBDZ 655), and led to continued negotiations between the two customs unions, which were concluded in March 1833 (Eisenhart Rothe and Ritthaler, 1934).

The resulting union became the institution commonly identified as the Zollverein, since this was the central treaty that determined the institutional details for the customs union covering large parts of Germany. Bavaria and Wuerttemberg received a strong financial pay-off through the use of the population-based revenue distribution scheme (Alber, 1919). They also received political concessions through the right to negotiate trade agreements with foreign powers and present them to the whole union for approval. The Zollverein, this newly formed coalition, exerted externalities on Saxony and the Thuringian principalities, which faced being surrounded by one custom system once the Zollverein would come into force on January

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<sup>11</sup> The two principalities, Meiningen and Coburg, were bought off with direct monetary compensation as well as improvements to local infrastructure (Thimme, 1931).

<sup>12</sup> The Thurn and Taxis family was a strong ally of Austria, the resistance against the Prussian-Bavarian plans, which rested on the interpretation of monopoly rights and legal treaties, had therefore the implicit backing by Austria (Helbig, 1991).

1st, 1834. Baden was affected similarly, since all its German neighbour states were now part of one common customs area. These new coalition externalities, together with the point that no other state would have had a significant impact on Bavaria and Wuerttemberg, show that this particular accession again followed the outlined characteristics of the optimal sequence.

Cooperation and potential unification between the two customs unions led to the fear of complete isolation in Saxony<sup>13</sup> and some of the Thuringian principalities. The fear was already evident during the early stages of the cooperation when, in 1829, Saxony and the Thuringian principality of Saxony-Weimar insisted on an exit clause in a second treaty of the *Mitteldeutscher Handelsverein*. This article allowed them to end their membership in the *Mitteldeutscher Handelsverein* early in case the two customs unions merged (VBDZ614). Since Prussia was aware of this clause (VBDZ 624), the negotiations and their successful conclusion with Bavaria and Wuerttemberg exerted negative coalition externalities on Saxony by giving them legal cover to leave the *Mitteldeutscher Handelsverein* (VBDZ 862). Saxony therefore joined the Zollverein on virtually identical terms to Bavaria and Wuerttemberg, although it had a considerably stronger economic situation. As one of the most developed and industrial regions in Germany, this state was also a centre for international trade, especially through its trade fair in Leipzig (Kiesewetter, 1988). This implied that Saxony's share of Zollverein imports, and therefore source of customs revenues, was substantially higher than its population share. The acceptance of the standard revenue distribution scheme showed that

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<sup>13</sup> The fear of being isolated from major trade routes showed up again when other German States, especially Prussia, started to build railroads (Kiesewetter, 1988).

Prussia was able to use coalition externalities to extract financial concessions from Saxony. Given the geographic position, as well as economic importance, of the states which had not yet joined the Zollverein, Saxony would have only been affected by the accession of Thuringian principalities into the Zollverein. Nonetheless, given the smaller size of Thuringia and the issue that most of the relevant international trade routes were now running through Zollverein territory, the potential impact was very low.

Together with Saxony, the Thuringian principalities started to become isolated with the accession of Hesse-Cassel and the treaty with Bavaria and Wuerttemberg.<sup>14</sup> It became complete for Thuringia when Saxony signed its treaty to join the Zollverein in late March 1833. As this agreement created even more negative coalition externalities on the principalities, Prussia was therefore able to extract significant concessions with regard to political power and membership rights. The small principalities were no longer able to insist on full individual membership, but agreed to pool together in a common institution, which reduced the possible number of veto players in internal Zollverein negotiations and prevented the value of the veto being diluted any further (Henderson, 1984). These arrangements are the central reason Prussia concluded the negotiations with Saxony prior to those with the Thuringian principalities, since the impact of Saxony on Thuringia was greater than the potential reverse impact, allowing Prussia to extract more political concessions.

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<sup>14</sup> The negotiations in December 1832 show that the Thuringian states already expected the coming agreement between the Prussian and the Bavaria-Wuerttemberg unions. They tried unsuccessfully to convince Prussia to come to an agreement before the conclusion of the negotiations with Bavaria and Wuerttemberg (VDBZ 847).

Baden was a mid-sized state in the south west of Germany and shared a long border with France as well as Switzerland. This geographic position led it to be the major gateway for trade between France, Switzerland and the rest of the German states. Consequently, this position and role made it less dependent on trade routes to the north. This was reinforced through its access to the Rhine, which formed Baden's borders with France and Switzerland and allowed access to a number of important German and international markets. The accession of the Hessian states had therefore no major impact on Baden, as already noted by the contemporary Prussian official Bernstorff (VBDZ 382). The accession of Wuerttemberg and Bavaria in 1834, however, isolated Baden from most German markets. The fear of complete isolation and its possible effect on trade, as well as the large market of the Zollverein, led to negotiations and its eventual accession into the Zollverein (Müller, 1984). Due to its position as a trading centre, Baden had a very strong free trade orientation. Its tariffs were fairly low before the accession, so it had to concede the introduction of the substantially higher Zollverein tariffs as part of its membership.<sup>15</sup> The comparatively larger importance of Wuerttemberg and Bavaria for Baden, rather than vice versa, explains the later accession of Baden.

After the accession of Hesse-Darmstadt, two important Hessian states, Nassau and the free city of Frankfurt, remained outside the Zollverein. Nassau was running a mildly successful tariff system, especially due to certain tolls on the Rhine (Hahn, 1982). This implied it had a fairly high reservation price, and so for a long time its politics towards Prussia was relatively hostile. The accessions of the southern German states, however, led to the fear of complete isolation, despite ready access to the Rhine. The

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<sup>15</sup> See Ploeckl (2013) for an economic analysis of this change in tariffs.

government attempted to compensate the loss of other German markets through a trade treaty with France in 1835, which also represented a legal obstacle to Zollverein membership. The limited nature of the treaty and the distance to France meant that this trade agreement did not have much of an impact on the economic situation of the country. Coalition externalities, namely the swelling anger of local farmers who were shut out from neighbouring markets in other German states through the new trade barriers around the Zollverein, however, led to a change in Nassau's position. It used a formal technicality to nullify the treaty with France and ratified an accession treaty with the Zollverein in December 1835. Additionally, it gave a number of concessions with regard to shipping on the Rhine.(Hahn, 1982)

Nassau's access to the Rhine was the only direct connection Frankfurt had to it, once its other Hessian neighbours had joined Prussia and the Zollverein. Since it was an important trading hub with international connections, such a connection was important (VBDZ 765). The city already suffered through the Zollverein, since its trade fair, the central institution for its status as a major trading city, were undermined by the fair in the neighbouring city of Offenbach. That fair was located in Zollverein territory and drew trading business away from Frankfurt, since it saved the merchants the costs of leaving and re-entering the Zollverein. As a consequence, Nassau's accession caused considerable externalities on Frankfurt, while the loss of Frankfurt as a market would have represented the only major externality on Nassau. Nassau's accession meant that Frankfurt lost its last unimpeded access to the Rhine and was completely isolated, which led to the speedy conclusion of its own negotiations with Prussia and its formalized membership in January 1836. As a notable mitigation attempt Frankfurt had concluded a trade agreement with the

United Kingdom on May 13th, 1832, with reciprocal preferential treatment.<sup>16</sup> Such an agreement obviously provided an obstacle to membership, though the British government did ultimately agree to a request from Frankfurt to be released from the treaty obligations. As a result Frankfurt's terms of membership in the Zollverein had two major specifications – first a major political concession, it had to share full membership rights with Nassau and second a financial compromise, it did not participate in the population-based revenue system, but received a fixed sum. Although this sum was higher than a potential population-based revenue share, the vastly higher per capita income and trade incidence of Frankfurt imply that it received less than its marginal contribution to the total Zollverein revenues (Henderson, 1984; Hahn, 1982).

The accession of Baden, Frankfurt and Nassau filled geographic gaps within Zollverein territory, which had now a fairly round, convex shape. This had the consequence that remaining independent states, located in the north, did in contrast to their southern German counterparts not face the threat of being isolated geographically (VBDZ 646). Also their direct access to major ports, and therefore international markets, had the implications that the related absence of strong coalition externalities meant that Prussia found the required reservation price too high and did not secure their accession at the time. The nature of coalition externalities, and their dependence on geography, therefore determined the set of states which formed the initial members of the Zollverein.

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<sup>16</sup> British diplomats realized that such a treaty was likely not able to prevent Frankfurt from joining the Prussian tariff system eventually, a possible delay however would be costly to Prussia (VBDZ 824).

Brunswick and Hannover concluded, as a reaction to the Zollverein, their own customs agreement, the *Steuerverein*, in 1834, which Oldenburg joined in 1836. The almost completed negotiations about its renewal in 1841 fell apart due to differences between Hannover and Brunswick about the route of a new road, which would have caused traffic through Brunswick to decrease significantly. To avoid isolation, Brunswick turned to Prussia and joined the Zollverein in 1842 (Wittenberg, 1930). Hannover finally joined in 1854, but by then the Zollverein had turned into an arena for the political struggle between Prussia, Austria and the other German states. The treaty with Hannover gave Prussia another direct connection between its two territories and diminished the bargaining power of the other German states considerably. Hannover was compensated for this with a premium on its regular share of customs revenues (Arning, 1930; Henderson, 1984). Facing the defection of its last remaining partner within the *Steuerverein*, and therefore isolation, Oldenburg followed Hannover into the Zollverein in 1854 (Henderson, 1984). The remaining independent states were either annexed by Prussia after the war in 1866, leading to an accession of their territories into the Zollverein, or in case of the major port cities Hamburg and Bremen joined after major political pressure through the empire in the late 1880's.

## **4 Conclusion**

The Zollverein was the first international customs union which makes its formation process an informative case study for the formation of multilateral trade agreements. Ploeckl (2014) shows that a formal model, combining an underlying cooperative game with a bargaining model, fits the historical context of German states in the early 19th century extremely well

and explains the observed negotiation structure and institutional form. The model also has implications for the sequence of accession into a trade agreement; this paper demonstrates how this approach can explain the actual sequential formation process, in particular the observed accession sequence, of the Zollverein very well.

The existence of coalition externalities is central to this explanation of the process. In the case of the Zollverein it also allows to integrate more reasons than purely financial administrative savings, as currently stated by the literature, into the structure of the formation process. Adding further important geographical, political and trade policy factors into the coalition externalities framework results in enough flexibility to explain the individual accession decisions without losing the formal structure necessary to support general conclusions. The demonstrated power of externalities to explain the formation sequence also validates further the results of Ploeckl (2014) regarding the decision between a multilateral and sequential bargaining approach and the selection of a customs union as institutional structure.

The formation process of the Zollverein is a clear and clean example for how international trade agreements forms. It highlights the importance of coalition externalities and demonstrates that the sequence of negotiations can influence the value for states to join, affecting their membership decisions. The history of the Zollverein therefore demonstrates that not only the decision between multilateral and bilateral negotiations matters for the creation of a universal trade agreement but also the optimal sequencing of accession negotiations.

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## Appendix

### Effects of coalition externalities:

#### *Example 1*

Country A is the agenda setter and the columns represent the formed coalition, the joint pay-off of this coalition, as well as the pay-offs for the individual countries

Coalition	Pay-off	A	B	C	D
A	10	10	8	8	8
AB	20	12	8	5	6
AC	20	12	7	8	7
AD	20	12	7	7	8
ABC	30	17	8	5	2
ACB	30	15	7	8	2
ABD	30	16	8	4	6
ADB	30	15	7	4	8
ACD	30	15	6	8	7
ADC	30	15	6	7	8
ABCD	34	<b>19</b>	8	5	2
ABDC	34	16	8	4	6
ACBD	34	17	7	8	2
ACDB	34	13	6	8	7
ADBC	34	15	7	4	8
ADCB	34	13	6	7	8

The optimal sequence for the agenda setter A is BCD.

B is the first country in the sequence, since it has the stronger negative effect (-3/-2) on the other states than C or D (both have -1/-1). This illustrates the regularity with which states that have a stronger impact on others appear early in the sequence.

The agenda setter chooses C over D, because C has an effect of -4 on D, while D only has an effect of - 1 on C. This illustrates the special case, where only two states with an impact on each other are to be selected

*Example 2*

Coalition	Payoff	A	B	C	D
A	10	10	8	8	8
AB	20	12	8	5	6
AC	20	12	7	8	7
AD	20	12	7	7	8
ABC	30	17	8	5	5
ACB	30	15	7	8	5
ABD	30	16	8	4	6
ADB	30	15	7	4	8
ACD	30	15	6	8	7
ADC	30	15	6	7	8
ABCD	34	16	8	5	5
ABDC	34	16	8	4	6
ACBD	34	14	7	8	5
ACDB	34	13	6	8	7
ADBC	34	15	7	4	8
ADCB	34	13	6	7	8

The coalition pay-offs and externalities in this example are identical to the first, but with one exception – the highlighted pay-off for D under a coalition of A with B and C is now 5 instead of 2. This change results in a new optimal sequence, namely BC, which illustrates that the grand coalition with all states is no longer the optimal outcome.

## Tables

Table 1: Summary Statistics about Zollverein members

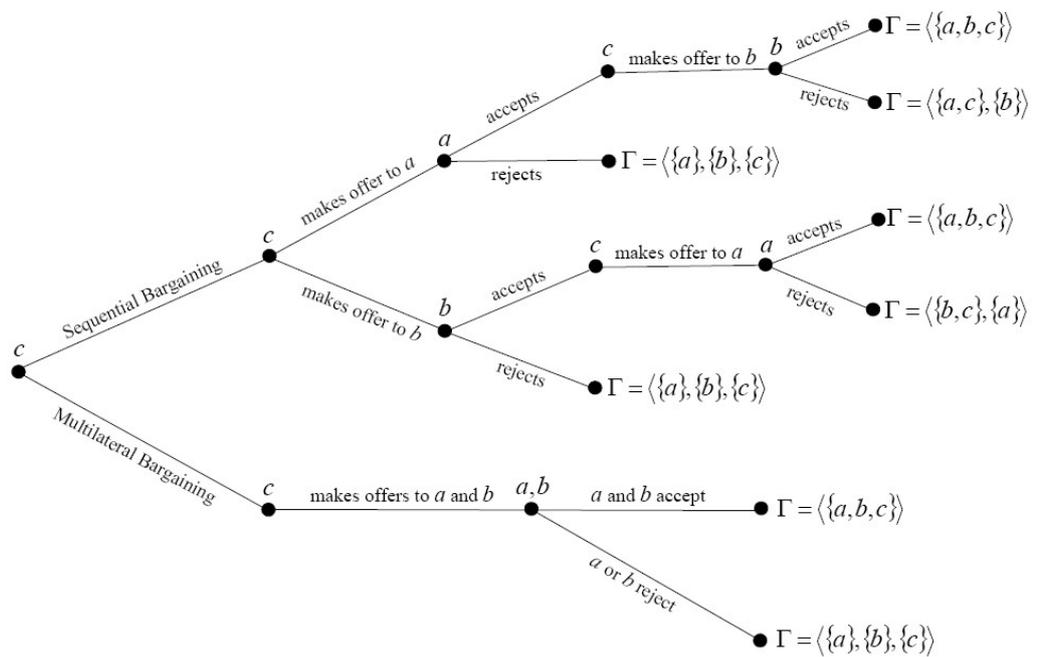
State	Treaty Signature	Size	Border/Area	Population
Prussia		5108.9	0.22	13690653
Hesse-Darmstadt	02/14/1828	152.7	1.06	758748
Hesse-Cassel	08/25/1831	166.2	1.13	640674
Bavaria	03/22/1833	1387.5	0.25/0.27*	4251118
Wuerttemberg	03/22/1833	354.3	0.48	1632781
Saxony	03/30/1833	271.9	0.59	1595668
Thuringia	05/10/1833	265.5	908478	
Baden	05/12/1835	278.4	0.75	1228024
Nassau	12/20/1835	85.5	0.67	373601
Frankfurt	01/02/1836	1.8	8	60000
Brunswick	10/19/1841	67.7	2.23	
Hannover	09/07/1851	698.7	0.58	
Oldenburg	03/01/1852	107.3	0.82	
			*without/with Rheinpfalz	
<i>Thuringia</i> (territories as of 1858)				
Sachsen-Weimar		65.9	1.8	
Sachsen-Coburg-Gotha		36.5	2.52	
Sachsen-Meiningen		46.3	2.3	
Sachsen-Altenburg		23.2	2.68	
Reuss-Greiz		6.3	5.3	
Reuss-Juengere linie		52.3	3.46	
Schwarzburg-Rudolstadt		17.4	3.26	
Schwarzburg-Sondershausen		17.6	2.7	

Data taken from: Dumke R., *German Unification in the 19th Century: the political economy of the Zollverein*, 1994,  
Henderson W.O., *The Zollverein*, 1984

## Figures

The extensive form of the bargaining model for the three-country case is as follows:

Figure 1: Extensive form of the bargaining model



This is Figure 1, taken from Aghion, Antras and Helpman, 2007

Figure 2: Map of Customs Unions in Germany in 1828 (Map 1)



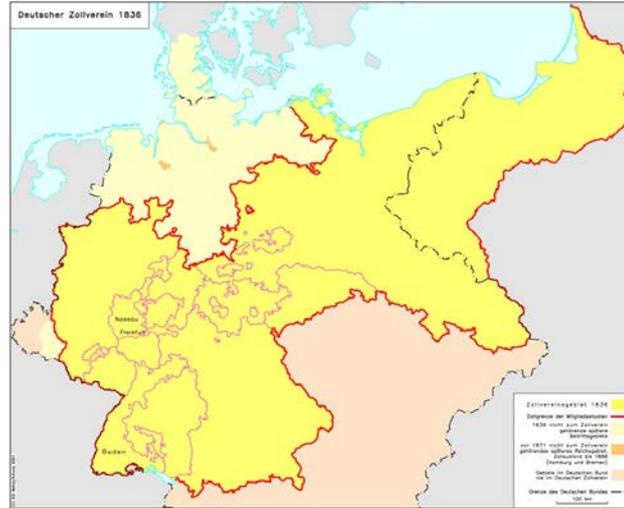
The map depicts the two customs unions that formed in Germany in 1828, namely between Prussia and Hesse-Darmstadt (yellow) as well as between Bavaria and Wuerttemberg (green). Additionally, the *Mitteldeutscher Handelsverein*, the trade agreement of a number of remaining German states, is illustrated (orange). Source: HGIS Germany

Figure 3: Map of the Zollverein formation in 1833 (Map 2)



The map depicts the formation of the Zollverein during 1833. The sequence starts with the Prussian-Hessian union (yellow), then Bavaria and Wuerttemberg (green), Saxony (light purple) and Thuringia (gray). Source: HGIS Germany

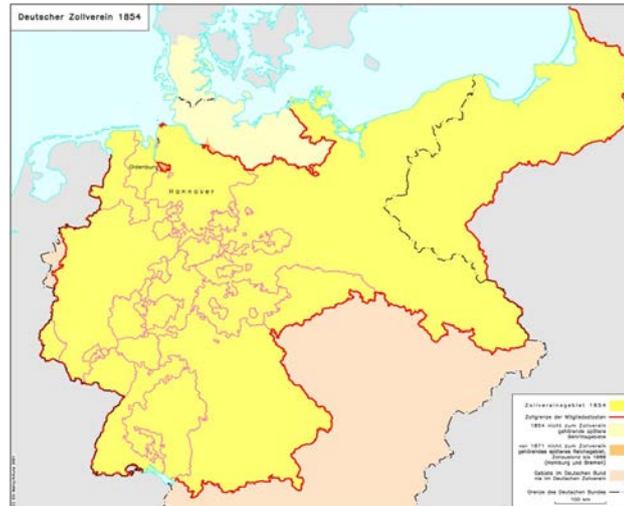
Figure 4: Map of the Zollverein in 1836 (Map 3)



The map depicts the extent of the Zollverein in 1836.

Source: HGIS Germany

Figure 5: Map of the Zollverein in 1854 (Map 4)



The map depicts the extent of the Zollverein in 1854.

Source: HGIS Germany