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DISCUSSION PAPERS

# **A Novel Institution: The Zollverein and the Origins of the Customs Union**

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## **Abstract**

The *Zollverein*, the outcome of sequential negotiations between Prussia and other sovereign German states in 1834, was the first international customs union, the template for modern ones such as the European Union. This paper applies a bargaining model to analyse the logic behind the creation of this novel institutional form and the choice of sequential rather than multilateral negotiations. The existence of negative coalition externalities, the effects of new coalitions on non-participants, led the agenda setter, Prussia, to choose sequential over multilateral negotiations as that lowered the membership reservation prices of the other states involved. Institutionally the features of a customs union structure provided a higher payoff for the agenda setter than capturing the welfare gains from the differential tariff setting in a free trade agreement, explaining the emergence of this novel institutional structure on an international scale.

**JEL Codes:** F15; F55; N43

**Keywords:**

Customs Union, Trade Agreement, Trade Institution, Trade Negotiations, Germany

# I. Introduction

The rise of nation states was closely associated with the rise of unified customs territories within them. The Zollverein, the 1834 customs union between German states, was the first international trade agreement that created a unified customs area between independent sovereign nations, unifying customs areas across political borders rather than just within them. Its institutional characteristics, in particular the free trade area, the common external tariff and the explicit revenue sharing mechanism, made it the first customs union according to modern understanding, even providing the template<sup>1</sup> for the definition of that institutional structure (Viner, 1950). This paper takes up a model-based analytic narrative structure to understand the mechanisms that led to the emergence of this novel institutional structure in the centre of Europe.

The Zollverein was not only the first customs union; it was also a multilateral trade agreement resulting from a sequential negotiation process. It is therefore an excellent historical case study for the ongoing debate about the role of regional trade agreements in the creation of multilateral agreements, often labelled as stepping stones versus stumbling blocks (Aghion, Antras and Helpman, 2007). Traditionally, the economic history literature has focused on the reasons underlying the existence of the Zollverein rather than analysing its creation process. Consequently, the actual nature of the formation process - why this multilateral agreement was the outcome of sequential negotiations - has never been explained in any great depth.

This paper, consequently, focuses on the origin and emergence of this institution. The starting point is a demonstration that the situation of the sovereign German states in the early 19th century fits very well into a particular game-theoretic structure building on coalition externalities which are the effects an agreement, a coalition, between some states has on those not involved. Using an analytic narrative approach, the analysis illuminates these externalities as the mechanism underlying the negotiation structure and the institutional outcome and thereby more generally the nature of the formation process of trade agreements. The Zollverein, and the customs union as an institution, were born due to the particular interdependence between neighbouring German states at the time.

The Zollverein was an important step of the institutional modernization processes started by German states during the Napoleonic wars. Some of them, most notably Prussia, began to

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<sup>1</sup> Google Ngram Viewer searches also show that the term *customs union* entered the English language just shortly after the creation of the Zollverein.

modernize their customs and tariff structures by establishing modern, external customs systems. In 1828, the first customs union agreements were concluded, which led consequently to the establishment of the Zollverein on 1 January 1834 as a customs union of seven<sup>2</sup> states. Over the next three decades, a number of further states joined this union, which saw substantial structural changes after the 1866 war between Prussia and Austria and finally became part of the internal political structure of the German Empire in 1871 (Hahn, 1982; Henderson, 1984). The Zollverein set the template for a customs union; it had no internal customs borders, common external tariff rates, and an explicit revenue distribution system. The net revenues, after the states' costs for border customs administration were compensated, were split evenly according to population size<sup>3</sup>. Certain necessary administrative functions were handled by a small standing office, while any significant decision, such as tariff rate changes, had to be made unanimously by a congress of all member states that met approximately every three years. Actual border controls and practical customs administration were still in the purview of the national services. The Zollverein treaties also constrained member states with regard to public monopolies and producer taxes. As a consequence of the common tariff system, weights and measurements were harmonized, and the acceptance of multiple currencies in use throughout its territory was regulated (Hahn, 1982; Henderson, 1984).

In the second half of the 19th century the emerging historiography about its creation focused on Prussia's hegemony. One influential interpretation was given by Treitschke (1872), who saw the Zollverein as a first step towards German unification under the enlightened guidance of the Prussian monarch. This nationalistic view interpreted the Zollverein as a move by Prussia to assert hegemony over Germany and to diminish the influence of its rival, Austria. This view began to be challenged in the 20th century, where, for example, Taylor (1946) and Kitchen (1978) both argue that Prussia's motives were initially of economic nature and only became political later on. Murphy (1991) provides a differing political interpretation, arguing that the Zollverein was intended as a political bulwark against France. The theory commonly accepted in the current economic history literature (Alesina and Spolaore, 2003; Williamson, 2006) was introduced by Dumke (1976; 1994) and emphasizes the huge fiscal savings due to economies of scale in customs administration. Financial gains, which resulted from these savings, are seen as the main incentive for the creation and participation in the union. Further works about the

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<sup>2</sup> This counts the group of technically independent Thuringian principalities as a single entity.

<sup>3</sup> The required population counts were standardized by the Zollverein as well, giving an impetus to the development of systematic statistics collections by many German states.

formation process such as Hahn (1982) and Henderson (1984) are more descriptive in their approaches and do not provide a structural analysis explaining the observed structures of the formation.

A major recent exception is Ploeckl (2015) which systematically works through the formation sequence of the Zollverein demonstrating what factors, especially what externalities, shaped the accession of each country. Linking these externalities to the predictions of the same game theoretic model as used in this paper, it is carefully illustrated how their impact can explain the observed actions of the countries involved, including the timing and sequence of joining. This paper complements Ploeckl's historical contribution with an emphasis on and analysis of institutional developments, focusing on the institutional nature of trade agreements rather than the turn by turn of historical events.

The issues of the formation and nature of trade agreements do receive attention in the modern trade literature, especially with regard to the design of a global trade architecture and the role of regional trade agreements. As Evenett (2004) outlines, there are three approaches to explain the formation process of such trade agreements. The first two, *Technocratic Entrepreneurship* and *Geopolitics and Mercantilism*, focus on the respective role of technocratic experts as well as geostrategic and mercantilistic motives without providing a clear structural framework. The third, *Domino Regionalism*, stresses the cascading political economy effects of trade creation and diversion. In this approach, which was formalized by Baldwin (1999), an idiosyncratic event changes the internal political economy within one state, which then joins the trade agreement. The resulting trade creation and diversion effects lead to political economy changes in other countries, leading them to join as well.

Similarly, Aghion, Antras and Helpman (2007) developed a bargaining model based on an underlying cooperative game. More general than Baldwin's approach, it provides a theoretical framework for the role of regional agreements in building a global trade agreement and is flexible enough to allow general conclusions about the nature of the formation process. The central feature is the existence of coalition externalities, which represent the impact regional agreements have on those states that are not involved. These externalities turn out to be the main determinant for the structure of the formation process. The model's general nature allows its application to historical circumstances, so it can shed new light on the origins of the Zollverein and the formation of a customs union. My central argument is that the historical situation of the German states in the early 19th century fits the setup of this theoretical model

by Aghion et al. very well; the logic of the model, including the presence and the nature of coalition externalities, explains therefore the observed formation process with its bargaining structure of bilateral negotiations and the novel institutional form of a customs union.

The nature of the formation process of trade agreements has implications for other effects, such as a possible endogeneity between the membership in trade agreements and the effect of such a membership on trade flows between states (Baldwin, 2006; Wolf and Ritschl, 2011). Keller and Shiue (2014) show such a relationship for the Zollverein using one of the factors presented in this paper, namely international market access based on geographic location, as an instrument for a state's accession into the customs union. This paper complements that analysis by providing a structural framework which explains that utilized correlation and embeds it within the larger formation process.

The following section describes the game-theoretic setup and underlying historical context, in particular the set of states involved as players, their potential actions and the nature of coalition externalities. The latter's impact is then demonstrated in the next two sections, which explore the influence of these externalities on the observed bargaining structure and institutional choice. The final section concludes, in particular, with a discussion about the implications for the sequence of negotiations and the importance of coalition externalities.

## **II. A Formation Framework**

Aghion, Antras and Helpman (2007) provide a game-theoretic framework for negotiations about trade agreements. It is framed as a noncooperative game, but their setup with a group of states negotiating without strong restrictions on the agreement structure resembles closely a cooperative game with transferable utility where a number of players decide on cooperative actions by forming coalitions. This approach, however, usually focuses on the resulting coalitions of states; in other words, who signs on to a trade agreement in the end, without specifying the bargaining and formation process. It is therefore combined with a bargaining structure which determines the specific characteristics of the formation process and resulting payoff outcome.

The outcome of the bargaining game is a partition of all players into non-overlapping coalitions. If a coalition has more than one player, it represents a trade agreement between coalition members. A value function based on the underlying cooperative game gives a payoff for each coalition and depends consequently on the objectives of the involved actors. Aghion et

al. (2007) use mainly aggregate welfare as the objective in modern negotiations. The relevant aims, and consequent payoffs, of tariff and trade policies at the time of the Zollverein will be discussed later on.

The first stage of the bargaining game is the decision of the agenda setter, the leading state, about the negotiation structure. It can choose either a multilateral approach, making simultaneous offers to all other players, or a sequential approach, starting with an offer to only one country. Under multilateral negotiations, states weigh up their received offers individually and simultaneously respond with a "yes" or "no" decision. If at least one state says "no", the negotiations fail and no agreement is reached. The resulting outcome is therefore either a global agreement or no agreement at all. Under the sequential approach the agenda setter makes offers to the individual states sequentially. If one state decides to reject the offer, the negotiations stop and the result is an agreement with all the countries which had received and accepted their offers prior to this rejection. The extensive form of this bargaining game is depicted graphically in Figure 1.

Each membership offer has under both negotiation structures an associated payoff, which may contain lump sum transfers between states, that is used by states to evaluate a potential membership. Based on this Aghion et al. (2007) define the concept of coalition externalities.

There are positive coalition externalities in a country if its payoff, and consequently the reservation price of joining the coalition, increases when two or more other states form a coalition. Negative coalition externalities imply that the country's payoff decreases in such a case, and no coalition externalities exist if the payoff does not change. Thus, positive coalition externalities imply that one country profits from an agreement between other countries while negative coalition externalities imply that it loses.

## II.1 Set of Players

This model has two types of players, the agenda setter and regular players. This categorization fits well for the states that were members of the *Deutsche Bund*, the common political governance institution for German States created by the Congress of Vienna in 1815, and the following classifies individual states.

The institutional structures of the *Deutsche Bund* had three different categories<sup>4</sup> of member states: first, Austria and Prussia as part of the great European powers that served as guarantors

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<sup>4</sup> Table 1 provides a number of statistics about the different states, that are fairly in line with the legal categories.

for the acts of the Congress of Vienna and consequently the constitution of the *Deutsche Bund*; second, a number of mid-sized powers, such as Bavaria and Hannover, with full voting rights in its Diet; and third, smaller principalities and free cities as part of shared voting arrangements (Angelow, 2003).

Prussia and Austria were the agenda setters for the *Deutsche Bund* and consequently for trade negotiations, a role that will be discussed in more detail later on.

The main set of players is the second group: mid-sized states with full voting rights. This group contains Baden, Bavaria, Hannover, Hesse-Cassel, Hesse-Darmstadt, Saxony and Wuerttemberg. Most of these states had begun to institutionally modernize following the French or Prussian examples, including the creation of new customs systems with external tariff border systems and the abolishment of internal tariff lines. Some of these states had also started to negotiate in varying constellations about trade agreements. These negotiations, however, failed to result in more than short-lived and narrow agreements (Henderson, 1984; Müller, 1984). Their participation demonstrates that these states were active on their own behalf in trade negotiations, yet none had a dominant position like an agenda setter. This implies that they all fit the profile of regular players very well.

The third group are small, though formally independent, states without individual voting rights. The constitution of the German Federation specified groups of states with a common vote, leaving the actual voting arrangement up to the group members. Due to their size, non-contingent geographic locations and independent participation in early trade negotiations, some of these groups, however, should be split up. I split Braunschweig and Nassau, the two largest states under this arrangement, and classify them as individual players. I do the same for Oldenburg, as well as the group of free cities, notably Frankfurt, Hamburg and Bremen. Alternatively, it is possible to include a coalition of such states as a single player. This is appropriate for the Thuringian principalities<sup>5</sup>, which had a shared voting group and ended up with a shared membership in the Zollverein.

This leaves a number of very small, geographically dispersed principalities, which were combined in a number of voting blocs. In contrast to their Thuringian counterparts, they had no clear dynastic, geographic or other connection. Some of them, for example the Anhalt principalities, were enclaves within the territories of other states such as Prussia<sup>6</sup>. Encompassing states usually treated these small principalities similarly to the enclaves of other

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<sup>5</sup> Map 1 in the online map appendix demonstrates the geographic linkages between these principalities.

<sup>6</sup> Map 1 also shows some of these enclaves, for example Schwarzburg-Sondershausen.

larger states by including them into their own tariff systems.<sup>7</sup> The actual sovereigns of these enclaves were financially compensated for the loss of tariff revenues, usually based on the number of enclave inhabitants. Since these small principalities surrendered their tariff policy to encompassing neighbours, they did not participate in trade negotiations and are therefore not considered as players in these circumstances.

I also excluded the neighbouring states Denmark, the Netherlands and Switzerland as players. The Swiss had received a guarantee of their absolute neutrality in the Congress of Vienna and saw any sharing of sovereignty required by an involvement as unacceptable. Denmark owned the German principality of Holstein-Lauenburg, an official member of the *Deutsche Bund*, but the Danish King preferred consistency of economic policy within his dominion over a possible membership in the *Zollverein*. Similarly, the Netherlands owned a principality, Luxembourg, which was considered to be German (i.e. a member of the *Deutsche Bund*). Luxembourg joined the *Zollverein* in 1842 as part of the Prussian tariff system due to political pressure. As one of the fortresses of the *Deutsche Bund* was located there, the German states in the *Zollverein* moved decisively to secure the adhesion of Luxembourg, once France had floated plans about a possible customs union (Henderson, 1984). The Netherlands itself had a trade policy which tried to extract as much as possible from its favourable geographic position, controlling the Rhine's mouth into the North Sea. Necessary compensation would have made an accession too costly for Prussia and the *Zollverein* (Van Zanden and Van Riel, 2004).

A final neighbour with the potential to become substantially involved in German trade agreements was France. In contrast to the afore-discussed foreign states, it also had the size, economic strength and political importance to become a leader rather than simply a follower state, so its potential will be discussed in the following section on the role of the agenda setter.

### **II.1.1 Agenda setter**

After the Napoleonic wars there was a small group of major powers that guaranteed stability in Europe. The two leading German nations, Prussia and Austria, as well as a neighbour, France, were part of this group. This strategic importance, combined with their economic size and

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<sup>7</sup> The small state was treated as a territory of the encompassing country with regard to customs issues. Furthermore, customs officials from the larger state might have the right to enter the smaller state's territory in an official capacity. For example, Schwarzburg-Sondershausen allowed Prussian officials to enter the territory for investigatory purposes (VBDZ 35). Reprinted archival documents in von Eisenhart Rothe, Ritthaler and Oncken (1934) are cited as VBDZ and the corresponding document number within this collection.

significance, implies that these nations had a superior position in trade negotiations with other German states. Formulated in the framework of the game, they can be seen as a distinct class of players with a special set of actions to which follower states can only react. Such a player is labelled an agenda setter.

Prussia was the only one of the three that became actively involved in trade negotiations and is therefore the only relevant agenda setter. It actively assumed this role in 1828 when it opened negotiations with Hesse-Darmstadt (Hahn, 1982), but two prior decisions already foreshadowed this action. The first was Prussia's refusal to follow up on the mandate for closer economic cooperation given to the *Deutsche Bund*, which is discussed later on in the context of the negotiation structure. The second is domineering behaviour exhibited in its enclave policy. Although the inclusion of enclave territories within the customs area of the surrounding nation was nothing extraordinary<sup>8</sup>, Prussia's unilateral imposition of this policy in 1818 on a number of formally sovereign, independent enclaves clearly was. The inability of the affected principalities to reverse or even change the imposed terms shows Prussia's ability to dictate the structures of trade negotiations.

Similarly, both France and Austria had the potential, due to their size and geographical location, to become agenda setters. Neither grasped the opportunity, mostly due to their preferences for strong protection and against differential tariffs (VBDZ 772). Importantly, the geographical situation<sup>9</sup> also did not present them with as extensive opportunities for administrative savings as it did for Prussia. This implies that the possible payoff from trade agreements with German states for both France and Austria were considerably lower than for Prussia. As a consequence, Austria took a passive stance towards the first rounds of negotiations conducted by German states and adopted a policy of accommodation towards Prussia (Branchart, 1930). The French government was acting in a similar way to its Austrian counterpart. Despite receiving repeated letters from its Bavarian and German representatives, detailing the possibility of gaining influence over German states through trade policy, the French government did not deviate from its high tariff policy, angering possible partners in Germany. The July revolution in 1830 did not notably change this stance (Krauss, 1987).

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<sup>8</sup> Prussia's negotiations with independent enclaves in 1818 contain calculations, which demonstrate that the inclusion of (non-independent) territories of other German states within Prussia's tariff line was a common occurrence (VBDZ 31).

<sup>9</sup> Prussia's borders with other German states were far more extensive than those of Austria or France.

After Prussia had assumed the role of the agenda setter in 1828 through starting negotiations with another German state, neither France nor Austria contested that move. Nor did they see a Prussian success at forming a customs union with other German states as beneficial for them either. This did not cause them to become active players, but they allowed other German states to use their backing and weight in negotiations with Prussia, which is explained in more detail in the discussion of coalition externalities.

## II.2 Set of Actions

The role of the agenda setter during the formation process is formally stylized into two main characteristics. First, the agenda setter has the right to decide when and with whom negotiations are opened. More precisely, Prussia had to choose between opening multilateral negotiations, i.e. simultaneous negotiations with all follower states, or bilateral, sequential ones. Second, the agenda setter proposes the membership terms for each state it opens negotiations with. As a consequence, follower states have only to act in a single instance, namely they can accept the proposed terms and join the agreement or reject the offer and stay outside. These proposed terms of membership had two main dimensions: first, the policy areas covered in the agreement; and second, its institutional structure.

All players were members of the *Deutsche Bund*. This implies the existence of a political institution which already covered a number of policy areas including security-related topics, such as an institutionalized military cooperation between the member states. The existence of these structures meant that these issues were the topic of separate negotiations between German states and therefore excluded from the discussions about the *Zollverein* (Angelow, 2003). Article 19 of the *Bundesakte* (VBDZ 156), the constitution underlying the *Deutsche Bund*, contained the intention, and thereby an authorization, to coordinate trade and customs policy<sup>10</sup>; the *Bund*, however, decided to leave these issues to individual member states (Angelow, 2003). This implies that the range of topics potentially covered by relevant negotiations were predominantly economic policies, including tariff and other trade barriers and a range of related

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<sup>10</sup> This is further discussed in the section on the bargaining structure, since it provided the possibility of an institutional framework for multilateral negotiations.

internal issues such as tax structures, monopolies and privileges, currencies, legal structures and regulatory issues. Another area was the trade relationships with foreign nations<sup>11</sup>.

In consequence, while the negotiations were focused on specific economic issues only they did not face any such restrictions in institutional or structural terms. The states were free to accept any institutional structure short of a political unification. This allowed for bilateral as well as multilateral arrangements, either free standing or potentially embedded into the Deutsche Bund. The players' negotiations also had to cover the length of the agreement with possibilities ranging from one-time actions to permanent ones.

### **II.3 Coalition Externalities**

Coalition externalities are the main factor in the model determining the outcome of the negotiations, including bargaining structure, institutional characteristics and the eventual accession sequence. This importance is due to their impact on the payoffs for all players involved. Aghion et al. (2007) justify this prominence by emphasizing their existence and importance for trade creation and diversion effects of modern trade agreements.<sup>12</sup> Nevertheless, this assumes that the utility function of the relevant actor, in modern settings usually a democratic government, is predominantly concerned with general economic welfare. This is not reasonable for early 19th century German states, where political power rested to a large degree with individual sovereigns or small elites whose preferences focused on fiscal and mercantilistic notions.

As these externalities are the main factor affecting the payoff of players, they obviously drive trade and tariff policy choices. This implies that understanding the contemporary factors underlying these policies allows the identification of the main coalition externalities relevant at the time of the Zollverein. The following outlines, therefore, historically important goals for trade policies in the context of externalities for trade negotiations between German states.

Williamson (2006) identifies three central motives for tariff policies between 1789 and 1938: a revenue motive, a strategic tariff motive, and a Stolper-Samuelson factor compensation motive. The first is based on fiscal reasons; governments set tariffs to raise revenues, either for

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<sup>11</sup> One such issue, namely shipping on the rivers Rhine and Elbe, was already dealt with through two official commissions by the affected countries, established by the Congress of Vienna (Angelow, 2003). Consequently, the topic was not covered by the Zollverein.

<sup>12</sup> Rieder (2006) shows the existence of such externalities empirically for the case of the European Union.

the state's or even the sovereign's personal coffers. The second is based on the idea of strategic tariff setting. At the time of the Zollverein this motive focused predominantly on reciprocal market access, so tariff setting involved negotiations with other states about reciprocal concessions. The third is based on internal political economy, more precisely a connection between trade and politics based on the Stolper-Samuelson theorem as extensively explored by Rogowski (1990). Given tariff rates affect relative prices between sectors, for example agriculture and manufacturing, and thus the relative income of these sectors, their members have an incentive to influence tariff setting with the resulting relative rates reflecting the relative influence and strength of individual sectors.

Actions related to tariff setting and trade policy by the agenda setter and follower states affect coalition externalities and consequently the payoffs of the states involved. The agenda setter profits from stronger negative coalition externalities, since these lower the payoff necessary to persuade a state to join the agreement. It will therefore try to maximize the impact of externalities on follower states in these three areas.

Starting with fiscal effects, a new coalition formed by the agenda setter can affect the revenues of third states directly and indirectly. The direct effect is the impact on tariff revenues through the change in trade volumes. A coalition can divert trade, reducing the imports of third countries and consequently lowering their tariff revenues. Diversion of trade, additionally, had an indirect effect through impacting practical trade routes. Such roads bolstered revenues not just through transit tariffs but also through demand for services along the route. Affected were, for example, logistics, transportation, housing, food, or access to markets such as fairs. Governments were able to levy taxes and fees and derived substantial revenues this way. Traffic patterns change when tariff barriers change; free traffic within a coalition enticed merchants to use routes in customs union territory and to bypass outside countries.

The second is the political economy of trade politics. Given geographical positions, a coalition might be able to obtain control over all relevant trade routes leading into a non-member country. The coalition consequently had a certain degree of control over the tariff system of that country, as high transit tariff barriers had similar effects to high barriers by the country itself. This poses problems if a state aimed to secure market access through reciprocal preferential treatment and therefore planned to implement a low tariff system<sup>13</sup>. Such an implementation, or even offer, towards another state becomes meaningless and consequently cannot elicit

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<sup>13</sup> See map 5 for Saxony's location, the most notable state facing this issue during the formation of the Zollverein.

reciprocation. The perception that a state lost control over its own customs system has not only trade but also political effects. 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 annexed small, formally independent, territories. The rulers of 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 towards annexation by larger neighbours, in particular Prussia.

The third is internal political economy. Rogowski's framework stresses the effects of trade barriers on factor compensation and therefore the relative political power of 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 west. The Zollverein essentially took over Prussia's moderate rates, which were neither prohibitive nor free trade-oriented.<sup>14</sup> The effect of a neighbouring state joining a coalition like the Zollverein might not only have affected sectors differentially but also 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 besides Prussia was a combination of different, sometimes completely unconnected territories, each with their own strongly differing regional interest. An accession of neighbouring states into the Zollverein changed the relative strength of regions, shifting their political power. Such a 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 payoff required to convince the state to join. Governments of follower states could obviously foresee that coalition externalities reduce their payoff, so they had an incentive to prevent or reduce them in anticipation. To counter effects caused by a coalition's control over roads, states had to find ways to secure access to unimpeded trade routes. Possibilities were building or improving roads through their territory, especially in coordination with other affected states. To counter potential international effects, states had

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<sup>14</sup> Prussia targeted a tariff rate of 10% in 1818. The tariff was, however, based on weight and not value, and subsequent price decreases raised tariff levels considerably above that (Ohnishi 1973).

to use reciprocal power before they were cut off. This implies concluding formal diplomatic agreements with foreign nations to lock in preferential treatment for market access. In addition, a state could commit itself by treaty not to join the coalition, which would serve as a signal to foreign states and raise the predominantly political cost to the agenda setter to compensate for 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; thus, mitigation was more complicated in that regard.

### **III. Bargaining structure**

The existence and nature of these coalition externalities have ramifications. A main impact is their influence on the agenda setter's decision between multilateral and bilateral negotiations and the eventual sequence of the latter.

To decide whether to opt for multilateral or sequential bargaining, the agenda setter compares the payoff resulting from multilateral negotiations<sup>15</sup> with that from sequential bargaining<sup>16</sup>. As the agenda setter has the power to determine the order of offers, it can select the optimal sequence to secure the highest possible payoff. Sequential bargaining will consequently be selected if the latter is higher than that from multilateral negotiations. This is conditional on the relevant payoff being positive; the agenda setter will not start negotiations if it does not profit from them.

Sequential, bilateral negotiations involve the formation of intermittent trade agreements. If coalition externalities exist, newly-formed coalitions affect the reservation price of other states to join the agreement and consequently the eventual payoff for the agenda setter. This raises the question as to what externality characteristics lead to a choice of bilateral negotiations. The model implies that the existence of negative coalition externalities in at least one country is a necessary and sufficient condition for the choice of sequential negotiations in a setting with

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<sup>15</sup> Formally, the payoff in the multilateral setting is the core allocation where follower states receive their lower bound payoff and the agenda setter its upper bound payoff.

<sup>16</sup> This also assumes that there are no further negotiations or redistribution after the conclusion of the agreement. The Zollverein's unanimity rule for treaty changes essentially prevented any such modifications.

three countries. In a setting of more than three countries, it is no longer sufficient<sup>17</sup>, but still a necessary condition. Ultimately, the agenda setter will choose bilateral negotiations if the negative, lowering effects on the states in the optimal sequence outweigh the positive, increasing effects.

The Zollverein was formed through bilateral negotiations, so it remains to establish that multilateral negotiations were also a possible choice for Prussia. The institutional framework of the Deutsche Bund indeed offered Prussia the opportunity for multilateral negotiations, which it rejected on at least two specific occasions. The first was the attempt by a number of states to follow up on the mandate of closer commercial integration articulated in the afore-mentioned *Bundesakte*. The full plenum, in particular due to Prussia's influence, however, remained inactive and nothing resulted from the initial impetus. The existence of this article, including the fact that years later it again led some states to petition for multilateral negotiations, demonstrates that multilateral negotiations between German states were indeed a possibility and that Prussia explicitly rejected them (Arning, 1930). Another moment was Prussia's reaction to the *Mitteldeutscher Handelsverein*, an association between a number of German states formed in reaction to Prussia's first customs union agreement with Hesse-Darmstadt<sup>18</sup>. Prussia insisted on negotiating only with individual states, thereby rejecting any demands for negotiations with all of the *Handelsverein's* members combined (VBDZ 609) (Haferkorn, 1933).

The model has particular assumptions about the end of negotiations. In both cases, the rejection of a single offer ends the complete negotiation process. For sequential negotiations, this results in a coalition of all states which had accepted their offer beforehand while for multilateral negotiations, this results in a complete breakdown of negotiations without any agreement. Aghion et al. (2007) justify this modelling choice with references to current voting procedures within the WTO and EU. I argue that this is also appropriate for the trade negotiations between German states at that time.

As indicated above, a number of smaller German states were negotiating during the 1820s. Although they occasionally reached agreements, these always fell apart before they could be implemented. These failures, however, were usually complete rather than resulting in

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<sup>17</sup> The existence of negative coalition externalities is still sufficient if no positive externalities exist.

<sup>18</sup> Map 2 shows the extent of the Prussia-Hesse-Darmstadt union and map 3 shows the *Mitteldeutscher Handelsverein*.

agreements between those states that did not change their views on the proposed terms<sup>19</sup>. This shows that failed multilateral negotiations did not result in smaller coalitions.

Facing the outlined choice between bilateral and multilateral negotiations, Prussia opted for bilateral, sequential ones. This implies that the agenda setter's payoff from this approach appeared to be higher than, or at least as high as, the payoff from multilateral negotiations. If coalition externalities existed, then indifference between the two required that positive and negative externalities of the optimal sequence were balancing each other out. If the choice was due to a preference for sequential negotiations, then negative coalition externalities had to be dominant during the formation process.

The model implies that if negative coalition externalities lead to bilateral negotiations, the agenda setter selects the sequence to maximize these externalities. Ploeckl (2015) analyses the complete sequence of accession treaties to the Zollverein using the optimal sequence prediction of this theoretical framework. He demonstrates extensively the existence and strong dominance of negative coalition externalities during the Zollverein negotiations. In particular, it is shown that the conclusion of bilateral accession agreements had strong externality effects in the three trade policy areas of financial revenues, market access and political economy, outlined above.

The strong presence of negative coalition externalities is already visible in Prussia's choice to start the negotiation sequence.<sup>20</sup> Its agreement with Hesse-Darmstadt in 1828 had no real obvious benefit for Prussia; in financial terms, it was even a considerable loss due to the limited savings from the short length of border covered<sup>21</sup> and the substantial monetary transfers. The agreement, however, had a strong impact on other German states. One such externality was strategic since it prevented Hesse-Darmstadt from joining Bavaria and Wuerttemberg, who had formed an agreement around the same time, preventing a further expansion of their undertaking. Another externality was the effect on the other Hessian states, in particular on the neighbouring Hesse-Cassel. Besides a regional economic effect from the custom border changes, the treaty explicitly called for Hesse-Darmstadt to use its political influence and dynastic relations to convince the neighbouring Hessian sovereignties to accede as well (VBDZ 379); Prussia especially wanted Hesse-Cassel to join (VBDZ 370) as its geographic position linked two major Prussian territories and brought all trade routes between the south of Germany and the

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<sup>19</sup> The second section of VBDZ contains a wide range of archival documents relating to these negotiations between the states. Bavaria and Wuerttemberg participated in these discussions before they formed their own union as shown in maps 3 and 4; however, their agreement was the result of separate negotiations.

<sup>20</sup> The description of the externalities here is taken from Ploeckl (2015).

<sup>21</sup> See map 2

North Sea ports, as gateways to many international markets, under Zollverein control. As a consequence, the southern German states experienced a number of negative externalities, in particular financial ones. Higher transit tariffs would reduce trade, and therefore tax revenues, and lead to a reduction in market access, since Prussia's control over trade routes affected the ability of these states to conclude reciprocal trade agreements with foreign nations.

The model omits, due to its static nature, one particular consideration, namely when the agenda setter decides to open negotiations. In a dynamic version, this decision would depend on the expected changes in the agenda setter's payoff over time. In the early 1820s Prussia's financial situation was not as rosy, so the necessary financial outlays required were outweighing the expected benefits. However, by the middle of the decade this was no longer a constraint (Henderson, 1984), so Prussia's political and economic gains became relatively more important. When negotiations between Bavaria and Wuerttemberg in 1827 raised the spectre of a larger agreement, Prussia had to start its negotiations to pre-empt that development from raising the reservation prices of most other states as such an agreement might have mitigated coalition externalities and reduced Prussia's payoff as a consequence.

#### **IV. Institutional Choice**

After establishing the set of players, the range of actions, the choice of bargaining structure and the role of externalities, the final question is why the Zollverein became a customs union.

Following Viner (1950), a customs union has three central characteristics: no tariff barriers between its members, a uniform external tariff, and a predetermined revenue distribution scheme. As the first and third item, the latter in the form of transferable utility between members, are direct elements of the framework, what remains is to show how the common external tariff system, and therefore the new institutional form as a whole, can be explained by the underlying logic of the framework.

The model implies that the agenda setter determines the offers and therefore membership terms, so why did Prussia implement this institutional innovation? As agenda setter it had the opportunity to choose an institutional form that maximized its own payoff. The prevalence of negative externalities implies that Prussia could capture the membership gains of the other states through bilateral negotiations. This new institutional form was, therefore, chosen to maximize the payoff of the complete agreement as well as the intermittent negative coalition externalities.

The maximization of the agreement payoff through a customs union is closely linked to Dumke's 1994 thesis about economies of scale in customs administration as the underlying reason for the Zollverein. Only a customs union enables a significant reduction in border administration leading to substantial administrative savings. In other words, both a customs union and a regular free trade agreement lead to a fall in direct revenues due to free trade over borders between members, whereas only a full customs union allows for a significant reduction in or even the abolishment of customs controls. Dumke also demonstrates that these administration costs were quite high compared to customs revenues. For smaller states the costs of an external border system were even so prohibitive that they had to resort to internal tolls and tariffs on the roads through their territory instead. Following Dumke (1976), Table 1 lists the ratio of border length to area, which is a good quantitative estimate for the ratio of administrative costs to revenues of an external tariff borders system.<sup>22</sup>

This customs union advantage over a free trade agreement stems from a difference in the necessity of enforcing rules of origin regulations. FTA members can only uphold differential tariff rates against third country imports if rules of origin regulations are enforced at all borders. The relatively small size and complex, interwoven geographical positions of German states made it easy to enter the lower tariff member state, relabel the origin of the goods and then freely export into the higher tariff member state with tariff savings outweighing higher transport costs and the risk of detection. The preferential trade agreement between Hesse-Darmstadt and Baden in 1824 had this problem. Hesse, which had strong budgetary problems, was running high tariffs for revenue purposes, while Baden, as a trading-oriented nation, had relatively low tariffs. This created two possibilities for foreign producers. For example, a trader in Bavaria, who wanted to sell in Hesse-Darmstadt, either travelled directly to Hesse-Darmstadt paying high tariffs on his goods, or travelled to Baden, paying low tariffs but only slightly higher travel costs, and then entered Hesse-Darmstadt without further payments and masked the origin of his goods as Baden. Within a year, Hesse-Darmstadt cancelled the treaty due to complaints about such smuggling and Baden's inaction in this matter (Müller, 1984).

Rules of origin regulations underlay the ability of FTA members to uphold separate tariff rates on imports. This ability, essentially the retention of a state's right to set its own tariff rates, has economic implications and can affect a state's general welfare. The agenda setter will select

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<sup>22</sup> Map 6 shows the borders of the Zollverein, which were substantially 'rounder' than that of individual states shown in the other maps.

a free trade agreement if its payoff from capturing the welfare effects of member states' deviations from the customs union tariffs outweighs the payoff from capturing the administrative cost reductions. For Prussia the latter were dominant, explaining why it chose a customs union over a regular free trade agreement.

The administrative savings through a customs union also explain why Prussia became the agenda setter rather than Austria or even France. Calculating the length of the borders with other German states that would become internal borders of a customs union shows for Prussia a value of approximately 3,180 km, compared to 1,197 km for Austria and 434 km for France. Additionally, these values are biased against Prussia as France's border with German states, notably Baden, consisted mainly of the Rhine, therefore cheap to administer. Similarly, Austria's borders with Saxony and Bavaria were mountainous in large parts, again implying comparatively lower costs. Furthermore, the calculation for Prussia excludes the borders of enclaves, including Prussian ones and those within Prussia<sup>23</sup>. Another difference was the number of German neighbour states. While Austria had three and France had four, Prussia had at least a dozen<sup>24</sup>, indicating that it could profit comparatively more from a widespread agreement than a small number of bilateral ones.

The number of neighbours is also relevant for the impact of coalition externalities, especially the relative impact on sectors or regions. The uniform tariff rules of a customs union make differential tariff preferences for neighbouring states less likely. This usually hurts border regions, who find themselves facing higher tariff and trade barriers to access either markets within the new customs union. Additionally, these new barriers might likely require a change in transport routes, affecting international market access as well. Finally, a customs union is more likely than a free trade agreement to divert exports into other markets within the union, thereby hurting tariff revenues of neighbouring states. Thus, Prussia's choice of a customs union structure over a free trade agreement exerted stronger negative coalition externalities on multiple other states<sup>25</sup>.

The Zollverein became the first international customs union because the cost reductions, which were possible due to the substantial length of borders between German states, outweighed the welfare gains from tariff deviations. These deviations would have been rather

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<sup>23</sup> However, as indicated above, special arrangements were usually made for these already before the Zollverein.

<sup>24</sup> The numbers for France and Austria include Prussia, while the exact number for Prussia depends on how enclaves and small principalities are counted.

<sup>25</sup> Direct examples of this effect are shown in Ploeckl (2015).

minor, since the Zollverein tariff, mirroring in this regard the previous Prussian tariff, was fairly moderate and an explicit compromise between the interests of industrializing and agricultural-dominated member states. This effect was reinforced by the comparatively stronger impact a customs union structure had on potential further member states.

## V. Conclusion

Traditionally, the economic history literature on the creation of the Zollverein has focused on the underlying reason for its formation rather than the structure of the formation process itself. This paper demonstrates that a game-theoretic approach can go beyond explaining the historical events and illustrate the development of general institutional structures, in particular the new institutional form of a customs union. The central idea that shapes the process is the presence of coalition externalities, the effects intermediate agreements have on those states not involved. Their particular nature led to the emergence of the first customs union and the origins of this new institutional form of trade agreements.

This conceptual approach allows for finding a balance between individual factor explanations, such as financial savings or international market access, and fully contingent descriptions, which do not provide a structural explanation. It also allows for widening the scope of relevant factors from purely financial administrative savings, traditionally the main explanation for the Zollverein, to the inclusion of important geographical, political and trade policy factors.

This paper demonstrates that the underlying theoretical framework fits the historical situation of the Zollverein very well, provides a categorisation of coalition externalities in this particular context, and explains two important characteristics of the formation process. The model, however, also provides predictions for another aspect of this process, namely the sequence of accession into the customs union. The discussion of the bargaining structure already alludes to this. Ploeckl (2015) builds upon the framework outlined here and provides a thorough, historical, explanation of the observed accession sequence. In particular, it is demonstrated that this sequence indeed has the characteristics of the optimal sequence implied by the model. The main conclusion of that analysis, namely that specific coalition externalities determined each step of the accession sequence, reinforces the model use and the conclusions drawn here about the importance of these externalities for the resulting institutional form.

The Zollverein was the first customs union because of the particular nature of the coalition externalities at the time. In the historical negotiations between German states, these externalities were substantially influenced by geographic considerations. The location of trade routes and the consequential impact on customs revenues as well as the physical control over these routes and the impact for international market access were much more shaped by the geographical conditions in the historical situation of the 19th century than they are today. This importance of geographical factors reinforced the relative size of coalition externalities, indicating that the latter were especially strong in this setting. This is contrasted by the relatively lower importance of tariff barriers<sup>26</sup> as the dominating benefit and cost consideration.

The nature of such externalities is also the determining factor for similarities and differences between the Zollverein and modern institutions, in particular the customs union underlying the European Union. The Zollverein was a very focused institution, in which participating states did not link its economic nature with other political considerations. Consequently, the relevant externalities are very much focused on trade-related impacts. The broader nature of the EU implies that the relevant externalities in its case have differed substantially. Its origin as a multilateral organisation points towards the existence of positive coalition externalities, which made it beneficial to start with a larger coalition than sequential negotiations. Over time, this changed and more negative externalities, in particular in trade questions as demonstrated by Rieder (2006), came to shape the expansion of the EU in a more sequential manner.

The Zollverein was a successful trade agreement providing the template of a customs union between modern economies, and its example allows us to draw conclusions for modern trade policy. It provides a case study where an agenda setter uses a sequential approach to form a coalition and illustrates the importance of externalities and the effect a coalition has on non-participating states. It shows that regional agreements can be building blocks, but for the successful conclusion of a global free trade agreement, the agenda setter should have sufficient possibilities to exert negative coalition externalities during the formation process. Finally, it points us towards the nature of these externalities as a decisive factor in determining the institutional forms trade agreements might take.

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<sup>26</sup> This also includes technical, non-tariff barriers.

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## Tables

Table 1: Summary Statistics about Zollverein members

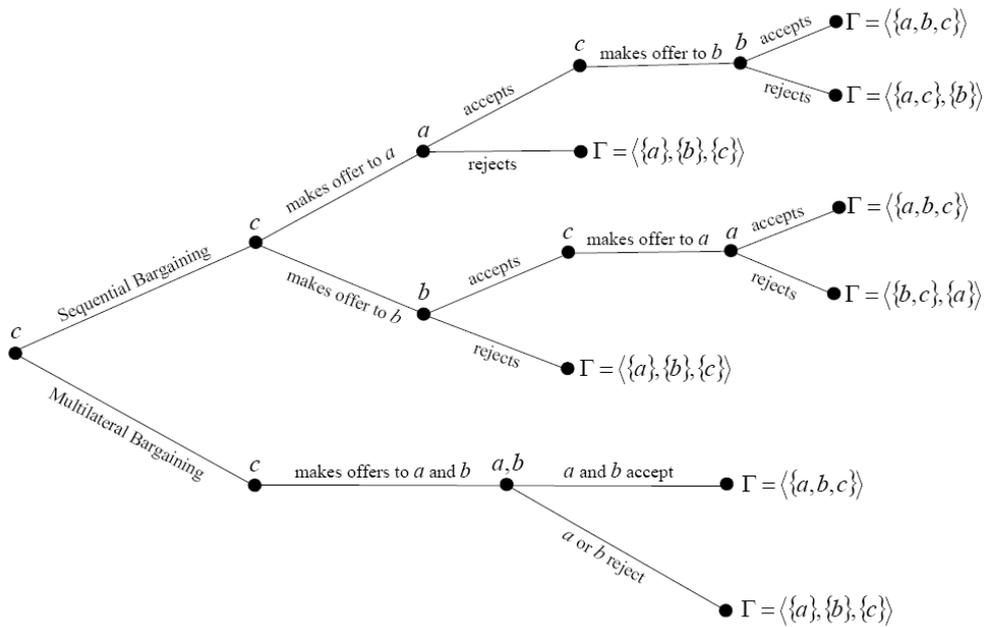
State	Zollverein Accession	Area	Border/Area	Inhabitants 1834
Prussia		5108.9	0.22	13690653
Hesse-Darmstadt	02/14/1828	152.7	1.06	758748
Hesse-Cassel	08/25/1831	166.2	1.13	640674
Bavaria	03/22/1833	1387.5	0.27	4251118
Wuerttemberg	03/22/1833	354.3	0.48	1632781
Saxony	03/30/1833	271.9	0.59	1595668
Thuringia	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	
Thuringia (territories as of 1858)				
Sachsen-Weimar		65.9	1.8	
Sachsen-Coburg-Gotha		36.5	2.5	
Sachsen-Meiningen		46.3	2.3	
Sachsen-Altenburg		23.2	2.7	
Reuss-Greiz		6.3	5.3	
Reuss-Juengere Linie		52.3	3.5	
Schwarzburg-Rudolstadt		17.4	3.3	
Schwarzburg-Sondershausen		17.6	2.7	

Data source: Dumke (1994), Henderson (1984)

# Figures

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

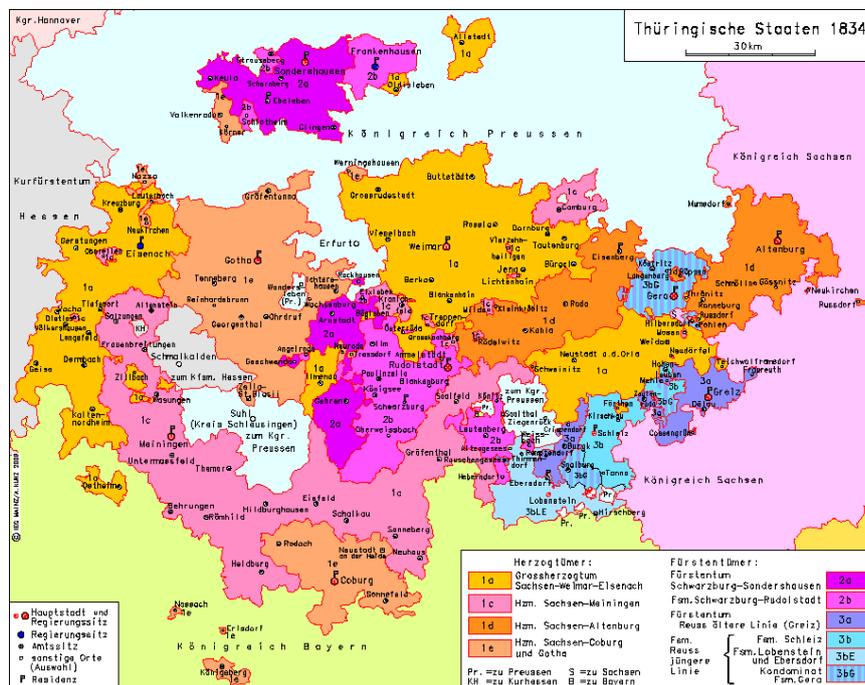
Figure 1: Extensive form of the bargaining model



This is Figure 1 from Aghion, Antras and Helpman (2007)

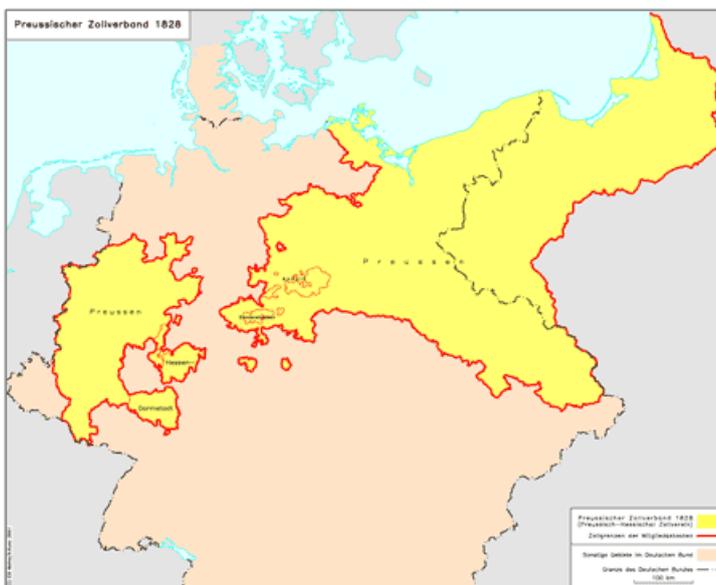
# Online Map Appendix

## Map 1: Thuringian States in 1834



Source: Map 684 IEG Maps

## Map 2: Prussia – Hesse-Darmstadt Customs union in 1828



The map depicts the extent of the customs area after the first agreement between Prussia and Hesse-Darmstadt in 1828.

It also shows the inclusion of small principalities and enclaves surrounded by Prussian territories in the customs area.

Source: Map: 072 IEG Maps

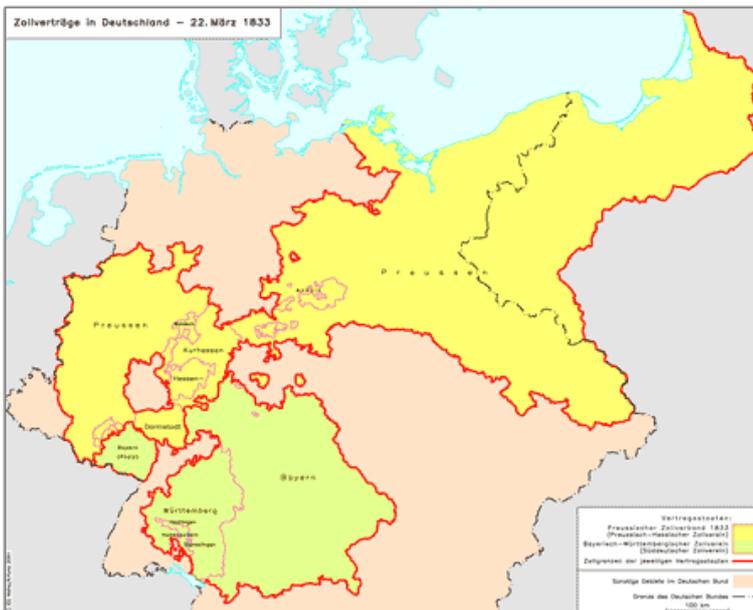
Map 3: Customs areas between German States in 1828



The map depicts the three main customs areas that formed between German States: The customs unions between Prussia and Hesse-Darmstadt as well as between Bavaria and Wuerttemberg, and the looser trade agreement of the Mitteldeutscher Handelsverein

Source: Map 071 IEG Maps

Map 4: Customs areas between German States in 1833



The map depicts the customs areas between German states after the agreement between Hesse-Cassel and the Prussia-Hesse-Darmstadt union in March 1828. It shows the remaining Bavaria-Wuerttemberg union and the demise of the Mitteldeutscher Handelsverein.

Source: Map 073 IEG Maps

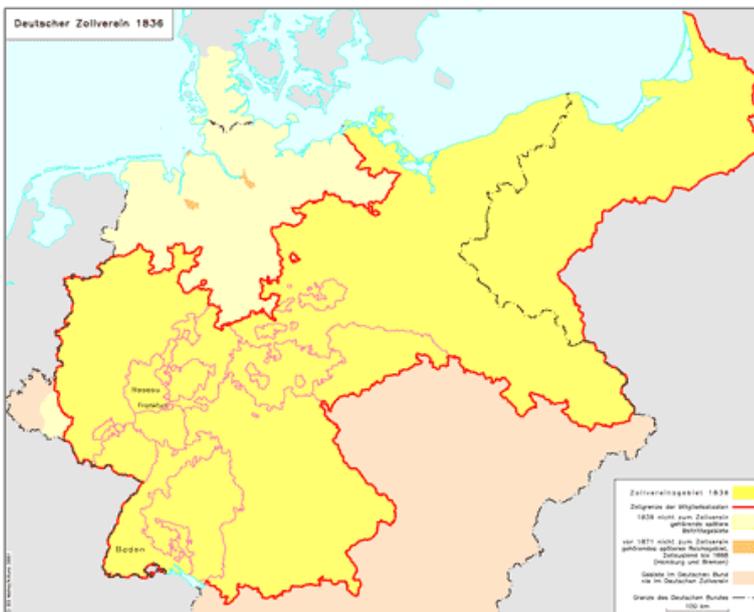
Map 5: Zollverein members by 1834



Source: Map 075 IEG Maps

The map depicts the main accession states after Hesse-Cassel, namely the two southern states of Bavaria and Wuerttemberg, Saxony and Thuringia. The customs union of all these states adopted the name “Zollverein” with its official start at the beginning of 1834.

Map 6: Zollverein members by 1836



Source: Map 077 IEG Maps

The map depicts the extent of the Zollverein in 1836 after the accession of Baden, Nassau and Frankfurt. It also illustrates the geographic contiguity of the remaining states outside of the Zollverein in the Northwest of the Deutsche Bund.