

The Zollverein and the formation of a Customs Union

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Abstract

The Zollverein, a customs union, of 1834 was the outcome of sequential accession negotiations between Prussia and a series of other German states. This paper applies a bargaining model to analyze the choices of the negotiation structure and accession sequence. The existence of negative coalition externalities, the effect of a new coalition on non-participants, led the agenda setter, Prussia, to choose sequential over multilateral negotiations. The nature of the coalition externalities within the areas of trade patterns, trade policy and political economy also explains the observed accession sequence. Further the choice of a customs union as the institutional structure was maximizing Prussia's utility by allowing larger coalition externalities.

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1 Introduction

In the 1830's a number of German states established the Zollverein. Jacob Viner stated that customs union" [...] was the pioneer and by far the most important customs union, and generalizations about the origin, nature, and consequences of unification of tariffs tend to be based mainly or wholly on the German experience" (Shiue, 2005). The Zollverein was furthermore the most important institutional development for the economic unification of Germany during the 19th century and a precursor for political unification more than thirty years later.

Traditionally academic literature focused on this role as a precursor and interpreted the Zollverein as a political tool created by Prussia to exert power over other German states. This view was challenged by Dumke (1976), who focused on the financial advantages of membership. These advantages stemmed predominantly from economies of scale for customs administration allowed by the institutional structure of a customs union. Both of these approaches provide a reason for the creation of the Zollverein but fail to give a consistent rationale for the observed nature of the formation process, especially the negotiation structure and sequence of accession.

The issue of formation and sequencing of trade agreements receives attention in the modern trade literature especially with regard to the role of regional trade agreements and the design of the current global trade architecture. Aghion, Antras, and Helpman (2006) develops a bargaining model on the basis of an underlying cooperative game to provide a theoretical framework for the role of regional trade agreements in building a global free trade agreement. This paper utilizes their approach to interpret the formation of the Zollverein, shedding new light on the development of this institution as well as providing a case study for the formation of a customs union.

The applied theoretical framework has a leading nation facing the deci-

sion between pursuing negotiations in a multilateral approach or to follow a sequential structure. If the agenda setter decides to pursue sequential negotiations, the model also provides insights into the optimal sequence of bilateral negotiations. The decisions about the negotiation structure as well as the actual sequence are driven by the existence and nature of coalition externalities, the effect of coalition formation on players which are not members. I show that Prussia, the clear leader of the Zollverein, chose sequential negotiations to profit from the existence of negative coalition externalities. These negative effects are classified in three broad categories, namely tariff revenues, reciprocal trade policy as well as internal political economy. The paper analyzes the observed sequence with regard to derived regularities of the optimal sequence, details the nature of coalition externalities for each of its members and investigates the reasons behind the institutional structure as a customs union.

The paper is structured as follows; after a short overview about the history of the Zollverein the relevant literature about the Zollverein as well as sequencing is reviewed. Then I introduce the game-theoretical model which serves as the framework for the analysis. The actual sequence is analyzed in chapter five and the implications for the economies of scale in customs administration hypothesis are discussed in chapter six. Chapter seven analyzes the institutional choice of a customs union for the Zollverein before the final chapter concludes.

2 Historical Overview and Previous Interpretations

The German states, who unified in 1871 into the German Empire, were outcomes of the 1815 Congress of Vienna, which revised the political landscape

within Germany after the Napoleonic wars. Prussia, considerably enlarged through its gain of territories on the Rhine, continued its internal reform process begun during the wars by establishing a new border tariff system in 1818 (Ohnishi, 1973). Over the next years various enclaves within Prussia were absorbed into this customs territory. At the same time other German states, especially in the south, began to negotiate with each other about trade agreements. After years of futile negotiations Bavaria and Wuerttemberg went ahead and agreed in 1827 to form a customs union. Shortly afterwards Hesse-Darmstadt agreed to join the Prussian tariff system in 1828. In the same year most of the remaining states signed a trade agreement, establishing the *Mitteldeutscher Handelsverein*.¹ In 1831 Hesse-Cassel left this agreement and joined the Prussian customs systems. After the Prussia-Hesse and the Bavaria-Wuerttemberg unions agreed in March 1833 to a merger by the start of 1834, Saxony as well as the Thuringian principalities joined as well. On the first of January 1834 the Zollverein came officially into force. Two years later Baden, Nassau and Frankfurt acceded. Over the next two decades Braunschweig, Luxembourg (1842), Hannover, Oldenburg (1854) became members as well. In the wake of the Prussian-Austrian war of 1866 Prussia forced considerable structural changes and after the founding of the German empire in 1871 the Zollverein became part of its political structure (Henderson, 1984; Hahn, 1982).

The Zollverein instituted in 1834 had common tariff rates which, like any decision, had to be set unanimously by a congress of all member states. The congress met approximately all three years. The net revenues, after the costs for border customs administration were compensated, were split according to population size. The necessary calculations were made by a small standing office in Berlin, which only had administrative functions. The Zollverein further introduced common weights and measurements as well

¹The nature of this agreement will be discussed in more details in section 5

as standardized the acceptance of multiple currencies in use throughout its territory (Henderson, 1984; Hahn, 1982).

In the second half of the 19th century the historiography about the creation of the Zollverein focused on Prussia's hegemony. One particular 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 saw the Zollverein as a move by Prussia to assert hegemony over Germany and diminish the influence of rival Austria. This view began to be challenged in the 20th century, where for example Taylor (1946) and Kitchen (1978) argue that Prussia's motive 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. Another interpretation was introduced by Dumke (1976; 1994), who emphasizes huge fiscal savings due to economies of scale in customs administration and the resulting financial gains for the participating states. This theory is commonly accepted in the current economic history literature (Williamson, 2003; Alesina and Spolaore, 2003).²

This view centers on two main ideas. First there are economies of scale in the provision of a customs administration and second rulers are in need of financial resources to uphold their endangered sovereignty. The first part was already recognized by contemporaries, evident in a rule of thumb used by Kuehne (1836), a high-ranking Prussian civil servant. This rule states that the ratio of border length to area is an approximation for the cost/revenue

²A more descriptive approach was taken by Eisenhart and Rothe (1934) who published a collection of internal documents relating to the development of the Zollverein for its centennial in 1834. A reference to their introductory texts is given as (Eisenhart Rothe and Ritthaler, 1934), a reference to a specific document is given as (VBDZ 111), where 111 refers to the listed number of the document within the collection

ratio of customs administration. Dumke shows evidence that the actual ratio of a state corresponds to the predicted rate, leading to cases, especially of small states, where revenues equal or exceed administration costs, making a border system unprofitable. This implies that especially small states expected to reap financial gains by joining the Zollverein. Appendix A lists the ratios of all Zollverein member states, indicating the relative financial viability of a border customs system.

In addition to Dumke's evidence the financial advantages of a larger customs area can be demonstrated with the example of Bavaria. Alber (1919) presents in his history of the Bavarian customs system time series of annual revenues and costs, which show for the years after the introduction of a new tariff system in 1825 costs of about 25% of revenues, corresponding well to the border to area ratio of 0.24. As part of the customs union with Wuerttemberg in 1828 Bavaria started to introduce a border system in the Rheinkreis, a smaller territory which was not connected to main Bavarian territory. The additional costs of securing a comparatively smaller territory caused the costs for the whole system to rise to over 40% of total revenues.

The second part of Dumke's argument states that the institutional structure of the Zollverein provided an incentive for the rulers in political terms, since the Zollverein revenues were not controlled by the respective parliaments, but directly at the disposal of the government. This allowed the reigning princes to increase their attempts of containment of revolutionary tendencies through lowering their revenue constraints. Governments of small states faced strong constraints due to the costs to build up a modern administrative system, especially after the creation of somewhat arbitrary border lines at the Congress of Vienna, as well as the comparatively higher administrative costs for small states itself.

In the following I outline a few serious shortcomings. The argument about the financial need fails to explain the strong resistance of certain smaller

states, embodied for example in the foundation of the *Mitteldeutscher Handelsverein*, since they miss out on tariff revenues due to their inability to organize a profitable customs tariff system. It also fails to account for the refusal of northern German governments, which were under the same political and financial pressures as states in the South, to join within the first years and decades of the Zollverein. It further cannot explain the choice of sequential over multilateral negotiations as well as the observed sequence with which states join.

The basis of the argument about states' financial needs is the existence of revolutionary threats. These still fail to explain the observed structure and sequence of negotiations, the initial resistance of smaller states or the decision of a few not to join during the first years. Examples are the early entry of Bavaria, a relative calm country when the aftermath of the French July revolution of 1830 spilled into German states, as well as the refusal by Braunschweig until 1842, which had experienced severe unrest in 1830.

Another problem with Dumke's thesis is the central assumption about revenues being the main motive for the setting of tariff rates. Although it is likely that revenues played a main motive in organizing a coherent tariff system, it is by no means certain. There are alternative motives for tariff setting, for example a state which pursues an explicit free trade policy will face a relative high revenue to cost ratio, since administrative costs are not proportional to the height of the tariff rates. This draws into doubt whether certain states were not able to raise extensive tariff revenues or whether this was just the observed effect of a conscious decision not to do so.

3 Sequencing matters

The literature about the Zollverein as well as the literature about trading systems does not give much attention to the question of sequencing, the

order of accession to a trading system. Evenett (2004) surveys the trade literature about the sequences of accession to trade agreements and identifies three main approaches. He labels the first Technocratic Entrepreneurship, which interprets the sequence as the outcome of a process driven by a group of technocratic experts. Although there are connections between administrative officials, no such coherent group of disinterested experts existed in the different German states before the Zollverein. The second approach is called Geopolitics and Mercantilism, and reflects the strategic trade theory motive. The sequence is the outcome of geopolitical pressure and mercantilistic concerns about international competitiveness. Similar to the first approach, no explicit formal framework is used in the analysis. These concerns do play a role in the sequence of the Zollverein, however the approach lacks a structural framework and in connection is unable to incorporate relevant coalition externalities besides international trade policy. The third idea is the so-called Domino Regionalism. 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 cause political economy changes in another country, causing it to join as well. Rieder (2006) conducts an empirical case study for the European Union after WWII based on this approach. This approach shows convincingly the existence and effect of coalition externalities during the formation of contemporary trade agreements. However besides lacking scope with regard to different externalities, the approach does not contain an explanation for the selected negotiation structure, nor can it explain the supply of membership and it does require an exogenous shock to be set in motion.

As Evenett mentions there new are approaches to overcome these limitations by modeling sequencing more rigorous theoretically. This paper uses a model recently developed by Aghion, Antras, and Helpman (2006), and shows in an applied case study how this framework can explain the observed

structure of the Zollverein formation process.

4 A formation framework

Aghion, Antras, and Helpman (2006) applies a cooperative game theoretic approach to investigate free trade negotiations, especially the role of regional trade agreements. The bargaining model results either in multilateral negotiations or a sequential structure. Payoffs are derived by interpreting possible trade agreements as possible coalitions in an underlying cooperative transferable utility game. The major focus is under which conditions the negotiations will result in global free trade.

The main analysis uses the three country case³ and generalizes to more players in some extension. The bargaining game results in a coalition structure which is a partition Γ of $\{a, b, c\}$. If the partition contains a coalition, that set of players can then be interpreted as the members of a trade agreement or specifically a customs union. Payoff, gross of lump-sum transfers, for each coalition C in the resulting partition Γ is given by the value function $v(C, \Gamma)$ of the underlying cooperative game. This value function depends on the objective function of the players involved.⁴

The first stage of the bargaining game is the decision of the agenda-setter about the negotiation structure. It can either choose a multilateral approach, making simultaneous offers to all other countries, or a sequential approach, making an initial offer to only one or at most a subset of countries. Under multilateral negotiations, states weigh their received offers individually and

³The three countries are labeled a , b , and c , with c designated to be the leader and therefore agenda setter.

⁴Aghion et al use mainly aggregate welfare as the objective. Since the value function is connected to the issue of coalition externalities the later section on these externalities will specify a more appropriate framework for the value function given the historical circumstances of the Zollverein.

simultaneously and respond with a yes or no decision. If at least one state refuses to accept, the negotiations fail and no agreement is reached. The resulting outcome is therefore either $\Gamma = \langle \{abc\} \rangle$ or $\Gamma = \langle \{a\}\{b\}\{c\} \rangle$. 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 offer prior to this first rejection. So if for example c approaches a first, which accepts, and then receives a rejection from b , the resulting partition is $\Gamma = \langle \{ca\}\{b\} \rangle$. Under both negotiation structures an offer consists of the membership in the coalition and an associated payoff, which may contain lump-sum transfers between states. These payoffs are also independent of any further states joining the agreement. The extensive form of the bargaining game is depicted in appendix B. To ease notation I follow Aghion et al. and define a function describing gross payoffs for coalitions and individual states within a given partition.

$$W(j) \equiv v(j; \{a\}, \{b\}, \{c\}) \quad \forall \quad j = a, b, c$$

$$W_{kl} \equiv v(j; \{j\}, \{kl\}) \quad \forall \quad j, k, l = a, b, c \quad \text{and} \quad j \neq k, j \neq l, k \neq l$$

$$W(kl) \equiv v(kl; \{j\}, \{kl\}) \quad \forall \quad j, k, l = a, b, c \quad \text{and} \quad k \neq l, k \neq j, l \neq j$$

$$W(abc) \equiv v(abc; \{abc\})$$

So $W(j)$ is country j 's payoff if there is no agreement at all, $W_{kl}(j)$ is the payoff for country j if countries k and l form an agreement, $W(kl)$ is the joint payoff of the countries k and l , which formed a coalition and $W(abc)$ is the joint payoff of the grand coalition, when all states join in the trade agreement. Aghion et al. introduce two concepts based on these payoffs

Definition: Coalition externalities

There are positive coalition externalities in country j when $W_F(j) > W(j)$,

negative coalition externalities, when $W_F(j) < W(j)$ and no coalition externalities when $W_F(j) = W(j)$, where F is a coalition of countries which does not include j .

Positive coalition externalities imply that one country profits from an agreement between other countries. Negative coalition externalities imply that the country loses due to an agreement between other states.

Definition: Grand-Coalition (GC) Superadditivity

There exists GC superadditivity if $v(C_G; (C_G)) > \sum_{C \in \Gamma} v(C; \Gamma)$ for every $\Gamma \neq (C_G)$. GC implies that the joint payoff of the Grand coalition is larger than the sum of the payoffs for any other coalition structure.

Aghion et al. define GC superadditivity for games with many players in such a way that it is equivalent to the existence of a non-empty core for the underlying cooperative game (Gillies, 1953).

4.1 Coalition externalities

Certain results of the model, like the decision between multilateral and sequential negotiations, are driven by the idea of coalition externalities. Aghion et al. justify this modeling choice by demonstrating their actual existence in trade creation and diversion effects due to the formation of trade agreements.⁵ This however assumes that the utility function of the relevant actor, in modern settings usually democratic governments, is predominantly concerned with public welfare. This is not reasonable for early 19th century German states, where political power rested in some cases with individual

⁵Rieder (2006) shows the existence of these trade diversion and creation effect externalities empirically for the case of the European Union.

sovereigns. The actors utility functions, which are connected to the value function of the underlying cooperative game, are based on important goals for tariff policies, and these main motives can be seen through the existence of coalition externalities influencing them.

Williamson (2003) in his analysis of world tariff setting between 1789 and 1938 distinguishes three different motives, 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 to raise revenues to satisfy their budgetary needs. The second is based on theory about strategic tariff setting. At the time of the Zollverein this concept is predominantly focused on reciprocal market access. The idea is 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. This approach rests on a connection between trade and politics shown by the Stolper-Samuelson theorem, which has been described by Rogowski (1990). It connects general influence of sectors, like agriculture or manufacturing, to tariff setting through change of relative prices by tariffs.

The agenda setter profits from stronger negative coalition externalities, since the payoff necessary to entice a state to accept an offer of membership is lower. Customs unions have an effect on third countries through changes in the trade environment. 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 causes 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 have effects on revenues through the transit tariffs and through demand for services along the route. These can be logistic services, transportation, housing, food

or access to markets like fairs. Governments are able to tax certain of these to derive revenues. Traffic patterns change when tariff barriers change, so free traffic within a coalition might entice merchants to change the roads they use, and therefore deprive other countries of revenues.

The second part is international trade politics. Given the geographical position, a coalition might be able to close all relevant trade-routes for a third country. This has the effect that the agenda-setter and its tariff-system can obtain a certain degree of control over the tariff system of the country in question. Imposing high transit costs on traffic to a country has a similar effect as a high tariff rate of the country itself. This poses problems for states running a low tariff system with the intention to secure market access through reciprocal preferential treatment. The state is no longer able to commit to another state with regard to low tariffs and therefore cannot successfully reciprocate. It can also go as far as a country no longer distinguishing between transit and import treatment of goods destined for the third country. The power to determine your own tariff system is also 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 under their reign. Since their weak dynastic rights were mainly held up through guarantees of the Congress of Vienna the rulers of small principalities had the fear that a surrender of trade policy would only be a first step of being absorbed by larger neighbours, especially Prussia.

The last point is internal political economy. Rogowski's framework, which was taken up by Williamson, stresses the effect of tariffs on factor compensation and the related relative political power of sectors. Prussia used its tariff system as the template for the Zollverein, likely because the government did

not want to change its successful compromise between the demands of agriculture, predominantly in the east, and industrial and commercial interest in the west, so tariffs were basically set for the Zollverein. The Prussian rates were not prohibitive nor free-trade oriented but at a moderate level.⁶ When states joined the Zollverein and Prussia and adopted these tariff rates, it had only minor effects on the relative strength of different sectors in these states. However besides sectoral differences geographical concerns played a role. The Prussian customs system not only balanced commercial and agricultural interests, it was a compromise between the eastern and western territorial parts of Prussia (Ohnishi, 1973). The geographical structure of a few German states, with the prominent example of Prussia itself, was a combination of sometimes completely unconnected territories with the consequence of strongly differing regional interests. An accession of neighbouring states into the Prussian tariff system could therefore change the internal political economy due to the differential impact on the various territories.

If the agenda-setter chooses sequential bargaining, states will attempt measures to prevent or reduce coalition externalities before receiving a membership offer. This raises their reservation value, so the agenda setter has to offer a higher payoff in a bid to secure their membership in the customs union. To counter effects caused through a coalition's control over roads states had to find ways to secure access to unimpeded trade routes. 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 are cut off. This implies that they prefer to conclude formal diplomatic agreements with foreign nations, locking in preferential treatment with regard to market

⁶Prussia 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.

access. Also a state might commit itself by a treaty not to join the coalition, which serves as a signal to foreign states and raises the, predominantly political, cost the agenda setter has to pay to overcome the necessary breakup of an official treaty. To counter 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 or increased political power, are costly from a government viewpoint, therefore it might be more profitable to accept the externalities than to the attempt to mitigate it.

4.2 Optimal Sequence

If the agenda setter chooses to follow a sequential path of bilateral negotiations, it has to make a decision about the sequence in which it makes offers to follower countries. The agenda-setter optimizes its payoff through the choice of a particular sequence. Different sequences influence the total payoff through maximizing negative coalition externalities or minimizing positive coalition externalities on states which haven't yet joined the coalition. If there are no coalition externalities, all sequences resulting in an identical final coalition result in the same outcome, making the agenda-setter indifferent about them.

Let S_i be the coalition which has formed after i states have accepted the offers of the agenda-setter, which is following the sequence S to make its offers. So S_i is simply the coalition of the agenda-setter and the first i states in the sequence S . Let $i(S)$ denote the i^{th} state in the sequence S and let Ω denote the set of all possible sequences S . The agenda-setter chooses sequence

$$S^* = \operatorname{argmax}_{S \in \Omega} W(S) - \sum_{i=1}^{|S|} W_{S_{i-1}}(i(S))$$

This optimal sequence has the following property:

For any two consecutive elements of the optimal sequence it has to hold that 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.

The optimal sequence will therefore show 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.

Appendix C contains numerical examples⁷.

After a discussion of the bargaining structure and the choice of a sequence over multilateral negotiations I will analyze the accession of each state into the Zollverein and show how the actual sequence follows the described char-

⁷The two numerical examples in the appendix illustrate both regularities. The first example results in the formation of the grand coalition. The second example sees a single change in externalities which cause the grand coalition to fail and a smaller coalition to form. Both examples only use negative externalities and the agenda setter is indifferent between multilateral negotiations and no negotiations at all

acteristics of the optimal sequence. This will be done by demonstrating the existence and nature of externalities, which determined the sequence, their strategic use as well as mitigation attempts by affected states.

4.3 Bargaining structure

To decide whether to opt for multilateral or for sequential bargaining, the agenda-setter compares the payoff resulting from multilateral negotiations⁸ with its payoff from the optimal sequence. Formally the agenda setter will choose sequential bargaining if

$$W(S^*) - \sum_{i=1}^{|S^*|} W_{S_{i-1}^*}(i(S^*)) > W(C_G) - \sum_1^M W(i)$$

The agenda setter will choose multilateral negotiations if the reverse inequality sign holds. If the payoff from both options is negative, the agenda setter will not start any negotiations.

The existence of negative coalition externalities in at least one country is a necessary and sufficient condition for the choice of sequential negotiation in a setting with three countries. In a setting of more than three countries it is no longer sufficient⁹, but still a necessary condition for the choice of sequential negotiations.

The bargaining game ends with the rejection of an offer by a follower state. This is based on the full information of the agenda setter as well as the static nature of the payoffs. The agenda setter therefore knows whether an offer will be accepted or rejected. Similar only one round is played, the

⁸Formally the payoff in the multilateral setting is the core allocation where follower states receive the lower bound payoff and the agenda setter its upper bound payoff.

⁹The existence of negative coalition externalities is still sufficient if no positive externalities exist

model does not include repeated attempts to build an agreement¹⁰. Sequential negotiations result in a coalition of all states which accept the offer, multilateral negotiations however do not lead to the formation of a coalition when at least one rejection is received. Aghion et al. justify this modeling choice with references to current voting procedures within the WTO and EU. I do so in the context of discussing the viability of multilateral negotiations for Prussia.

The Zollverein treaty that came into force with the beginning of 1834 was not the result of collective negotiations, but the outcome of individual negotiations between Prussia and the other member states. Although some of the negotiations overlapped, the treaty conclusions resemble a sequence. This order of negotiations was a conscious decision of the Prussian government. The first step was taking on the role as the leading nation and agenda setter, a decision which will be discussed in more detail in the next section. As agenda setter Prussia had the possibility to conduct multilateral negotiations but explicitly rejected the approach. The issue of a closer commercial integration had come up at the Congress of Vienna with the decision to defer any tangible negotiations about commercial and trade cooperation to the constituting session of the Deutsche Bund. The Bundestag however never followed up on this mandate in a serious way and nothing came out of the initial impetus. The existence of this article in the founding treaty of the Deutsche Bund as well as the fact that later on some states petitioned the Bundestag to take up multilateral negotiations based on it demonstrate that there was an institutional framework which made multilateral negotiations between German states possible. These initial debates, held 1819, demonstrate further that the breakdown of multilateral negotiations did to lead to

¹⁰The appendix of Aghion et al. considers extensions which continue the game through a transfer of agenda power once the initial agenda setter receives a rejection. Since Prussia never relinquishes its leading position, I do not consider these extension here

smaller groups of states, which may be in agreement over policy, forming an agreement based on their consensus in the negotiations. Also the multilateral negotiations between smaller German states during the next decade did not lead to smaller agreements when negotiations broke down. This justifies the modeling choice that a single rejection leads to a breakdown of the multilateral negotiations without the formation of smaller agreements. An explicit rejection of the multilateral approach was Prussia's insistence to negotiate only with individual member states of the *Mitteldeutscher Handelsverein*, rejecting any calls for negotiations with all its members combined (VDBZ 609) (Haferkorn, 1933). Prussia explicitly chose sequential negotiations over multilateral negotiations. This implies that Prussia's payoff from a sequential approach was higher than the payoff from a multilateral approach, which indicates the presence of negative coalition externalities in German trade negotiations.

5 The formation of the Zollverein

Each step of the actual sequence is analyzed to show how it corresponds to the above described characteristics of an optimal sequence. This is supported by demonstrating the nature of coalition externalities present in each case. The analysis includes a discussion of Prussia's role as agendasetter, the set of possible member states and the role of neighbouring states. Prussia reformed its tariff system in 1818 by lifting internal tariff lines and creating a border customs system. The Prussian government also decided to treat enclaves of other states within Prussian territory as domestic area and offered these states a financial compensation. Some states complied fast, some tried to resist it for years. During the next years Prussia remained relative passive with regard to trade negotiations until 1828. It assumed the leading position by convincing Hesse-Darmstadt to join its customs system, a move

which jolted other German states. It stayed in this position by leading the negotiation which resulted in the formation of the Zollverein, the accession of further states, as well as official trade relationships with foreign nations like France, England and Russia (Eisenhart Rothe and Ritthaler, 1934; Henderson, 1984). Given this role as the leading nation of the Zollverein, Prussia's motivation to pursue its creation and extension is relevant for the reasons behind the Zollverein. The Prussian Finance Minister Motz argues in a note (VBDZ 747) to his colleague Eichhorn about a report for the negotiations with Bavaria and Wuerttemberg as follows:

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 Mitteldeutschen 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 goods and manufactures of the combined states, 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. Advantages are an increased market for larger domestic industry 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 also lower administrative costs through enlargement and better borders of the customs line.*

His first point shows that this customs union was not only an economic or fiscal undertaking, but had for Prussia an explicit political intention. The political goals are varied and interwoven and include especially the desire to create a coherent Germany against France. The Zollverein had no explicit aim to push Austria out of Germany, but the economic unification without Austria allowed Prussia to do so later on. The Zollverein also prevented the rise of a third power in Germany besides Prussia and Austria (Murphy, 1991).

The second item illuminates the strategic thinking by the Prussian government about the use of externalities to forge the Zollverein. It shows that the *Mitteldeutscher Handelsverein* was a negative reaction to mitigate externalities caused by the accession of states into the Prussian tariff system and that Prussia was recognizing and actively working to exploit these externalities.

The third point shows that there were financial goals. The explanation given highlights the expected positive effects of an increase in market size, the positive effect through an increase in transit traffic and savings through economies of scale in customs administration.

As the leading nation Prussia decided which states were considered potential members states of a customs union . These decisions were based on the political and economical situation within Germany. The congress of Vienna in 1815 had created new borders for the states, which were considered to be German, and instituted the "Deutsche Bund" as a common political institution. The decision-making process in its Diet gave a full vote to a range of larger states and a shared voting arrangement for smaller states (Angelow, 2003). A similar distinction also applied to Prussia's and other large German states conduct of trade negotiations. One level were negotiations between at least two equal partners which share power about trade policy. Examples for this were the negotiations between southern German states during the

1820's. The other possibility was that a state surrendered its policy power to a usually larger partner which then controlled the common tariff policy.¹¹ The negotiations between Prussia and the enclaves which were surrounded by Prussian territory are an example for the later. These enclaves were either independent territories, for example the Anhalt duchies, or territories of other German states. This separation of states into two categories is based on a mixture of size, population and economic importance of the respective state. States, which negotiated as equals, seemed to have at least 200000 inhabitants, with the exception of the free cities, which were important trading places. One exception to this is the situation of the smaller Thuringian sovereignties. Since important trade routes went through their territory they had a somewhat stronger position. During the Zollverein negotiations those sovereignties, which had strong dynastic as well as geographic connections with each other, ended up pooling their membership and acting as one group instead of being individually included under the rule of larger neighbouring states. Prussia chose the set of players relevant for the negotiations and did so by choosing a set of larger states. By forcing small states to relinquish political power Prussia extracted high concessions from these states. Since each full member of the Zollverein had veto power over any institutional decision, this exclusion of small states from a full membership increased Prussia's bargaining position with large states¹² by keeping the veto as a more valuable bargaining asset (Eisenhart Rothe and Ritthaler, 1934).

After some successes with regard to enclaves, the treaty with Hesse-Darmstadt (HD) was the first customs treaty of Prussia which involved sharing control over customs policy. HD profited considerably with regard to

¹¹This usually meant that the small state will be treated as a territory of the larger state with regard to customs and trade issues. Usually the smaller state received a financial compensation for surrendering its rights

¹²More details about the individual states, which become full members of the Zollverein, are given in the appendix.

customs revenues, alleviating its considerable financial trouble¹³. Prussia's benefit is less obvious (VBDZ 373); HD did not connect the two Prussian territories, had no major trade route going through its territory (VBDZ 363), had only a small border with Prussia and the revenue sharing agreement resulted in considerable financial transfers from Prussia to HD. However the agreement had two political effects, it put pressure on the other small German states around Hesse-Darmstadt (VBDZ 373), as well as served as a hindrance to expansion plans of the Bavarian-Wuerttemberg customs union. The treaty explicitly stated that Hesse-Darmstadt should seek the accession of the neighbouring Hessian sovereignties (VBDZ 379); Prussia especially focused the attention on Hesse-Cassel (VBDZ 370) due to its position between the two major Prussian territories. Since the HD customs system was not very profitable, the accession of other states into the Prussian tariff system would not have had a major financial impact and its geographic position on the Rhine made the access to international trade fairly easy. This illustrates that Prussia selected as its first element of the sequence a state whose accession had a strong impact on others and whose own position would have not been significantly weakened by the accession of other states.

The accession of HD caused a reaction by a large group of the remaining German states which established the *Mitteldeutscher Handelsverein*. Geographically the agreement covered North and Middle Germany, containing the major trade fairs of Frankfurt and Leipzig as well as the trade roads between these two and the North Sea ports of Bremen and Hamburg. It also covered all roads between the two main Prussian territories. The three southern states, Baden, Wuerttemberg and Bavaria were not involved in the negotiation. Baden did not border geographically, while the Handelsverein

¹³In 1830 the HD government officially calculated the increased net revenue at 280000 fl per year, almost 5% of its budget (Hahn, 1982). This is in line with their expectations during the negotiations, which were around 200000-270000 fl (VBDZ368)

was also a reaction against the Bavarian-Wuerttemberg customs union, which was actively looking for further members. This institution was not designed to be a customs union or free trade area but focused primarily on its role as a tool against other unions. It had two primary goals, one was to safeguard and improve its control over trade roads by agreeing to keep transit tariffs low as well as an intensive road improvement program ¹⁴ . The second was an explicit agreement of its member states not to join any other customs union. The Handelsverein was an attempt to prevent further coalition externalities in a threefold way. It fostered traffic on the roads under control of the Handelsverein, it guaranteed reliable access from and to foreign markets, therefore allowing for reciprocal trade policy, and it attempted to prevent further exploitation of externalities by forcing Prussia to switch to multilateral negotiations. Most of the expected coalition externalities of further accessions to the Prussian system were negative, so the member states of the Handelsverein would have achieved a higher reservation price paid by Prussia if multilateral negotiations were successfully concluded (Haferkorn, 1933). Prussia however refused collective negotiations and actively pursued policies to break the Handelsverein up, which it did successfully with the accession of Hesse-Cassel three years later.

Hesse-Cassel (HC) had a strategically strong geographical location, controlling the traditional North-South routes, as well as the East-West connection between the major trade fairs in Frankfurt and Leipzig. Also a direct route between the two major prussian territories run through the state. This made it a sought-after country during earlier trade negotiations, the sovereign however resisted any treaty perceived to be imperiling his sovereignty. The loose and neutral nature of the *Mitteldeutscher Handelsverein*, whose in-

¹⁴This program however never really started in any serious way due to coordination problems, disagreement about route prioritization and lack of the necessary funds (Thimme, 1931)

tended trade route building program would have fostered HC's transit revenues, made it therefore the natural choice of the ruling duke (Hahn, 1982). The stronger tariff borders of its direct neighbor HD however were one of the factors, which led to civil unrest in the Southern part of HC in 1830. The regional population blamed HC's tariff policy for the miserable economic situation. This political impact and threat of losing transit traffic to alternative trade routes, especially the Rhine, convinced the government of HC to defect from the *Mitteldeutscher Handelsverein* and join the Prussian tariff system in 1831. The duke resisted as long as possible but 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) 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 area now split the *Handelsverein* into two unconnected geographical blocks. It countered any attempts of the *Handelsverein* members as well as the Bavarian-Wuerttemberg union to secure unimpeded trade routes between southern Germany and major trading ports in the North. By securing the accession of Hesse-Cassel Prussia was continuing to extend its customs system with a state whose accession caused considerable negative externalities on others, but was due its geographical position relative immune against possible externalities through the accession of other states, which again follows the characteristics of an optimal sequence.

The formation of the *Mitteldeutscher Handelsverein* caused a reaction by the two existing customs union, Prussia-HD and Bavaria-Wuerttemberg. Prussia decided to fight the *Handelsverein* and used the union of the two southern states to do so. The first step was the conclusion of 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 *Handelsverein* covered all possible routes, Prussia had to convince two small Thuringian principalities, both members of the *Handelsverein*, to allow them to create a route through their territory.¹⁵ This move put pressure on the *Mitteldeutscher Handelsverein*, because it broke its control of important trade routes. The following accession of Hesse-Cassel into the Prussian customs system in 1831 exerted negative externalities on Bavaria and Wuerttemberg, who were affected by increased transit tariffs through HC and full control of all major routes to the North by Prussia.(VBDZ 655) This led to continued negotiations between the two customs unions, which were concluded in March 1833 (Eisenhart Rothe and Ritthaler, 1934). The merger between the two unions created pressure on Saxony and the Thuringian principalities, which faced to be surrounded by one custom system. This move also put Baden in a similar position, all its German neighbour states were now part of one common customs area. No accession one of the remaining states would have had a significant impact, but Bavaria's and Wuerttemberg's membership had considerable externalities, which shows that this particular accession again followed the outlined characteristics of the optimal sequence.

The potential unification between the two unions led to the fear of complete isolation in Saxony¹⁶ and some of the Thuringian principalities. This had become evident when Saxony and the Thuringian principality of Saxony-Weimar insisted on a separate article in a second treaty of the *Mitteldeutscher Handelsverein* in 1829, which allowed them to end their membership early in case the two customs unions merged within the next years.(VBDZ614) Since Prussia was informed about this clause (VBDZ 624), the negotiations

¹⁵The two principalities,Meiningen and Coburg, were essentially bought off with direct monetary compensation as well as the improvements to local infrastructure.

¹⁶The fear of being isolated from major trade routes showed up again when other German States, especially Prussia, started to build railroads (Kiesewetter, 1988).

and successful conclusion of the negotiations with Bavaria and Wuerttemberg exerted negative coalition externalities on Saxony by giving them legal cover to leave the *Mitteldeutscher Handelsverein* (Eisenhart Rothe and Rithaler, 1934) Given the geographic position as well as economic importance of the states which had not yet joined, Saxony would have only been affected by the accession of Thuringian principalities into the Zollverein. But given the small size of the Thuringian market and the point that all further trade routes were by now running through territory of the Prussian custom union, the potential impact was very low.

Similar to Saxony, the Thuringian principalities become isolated with the accession of Hesse-Cassel into the Prussian customs system and the negotiations with the Bavaria-Wuerttemberg customs union. This isolation became complete when Saxony signed their treaty to join the Zollverein in late March 1833. This created even more negative externalities, based on which Prussia extract concessions with regard to political power and membership rights. The small principalities no longer insisted on individual membership but agreed to pool their membership in a common institution, reducing the possible number of veto players in internal Zollverein negotiations (Henderson, 1984). Prussia concluded the negotiations with Saxony prior to those with the Thuringian principalities since the impact of Saxony on Thuringia was larger than the potential reverse impact, allowing Prussia to extract more political concessions.

Baden shared a long border with France and was the main German state sharing bordering Switzerland. This geographic position led it to be the major gateway for trade between France, Switzerland and the rest of the German states. This position and role made it therefore less dependent on trade routes to the north. The accession of the Hessian states had no major impact on Baden as already noted by 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 the accession into the Zollverein (Mueller, 1984). The larger importance of Wuerttemberg and Bavaria for Baden than vice versa explains the later accession of Baden.

Nassau was running a mildly successful tariff system, especially due to certain tolls on the Rhine (Hahn, 1982), so for a long time its politics towards Prussia was relatively hostile. The prospect of being completely surrounded by the Prussian-led Zollverein led to a fear of complete isolation despite access to the Rhine. The government attempted to compensate the loss of other German markets through a trade treaty with France in 1835. However this trade improvement did not have much of an impact on the economic situation of the country. This and the swelling anger of local farmers who were shut out from neighbouring markets in other German states through the new trade barriers led to a reversal and the conclusion of an accession treaty in December 1835. Once the other Hessian states had joined the Prussian customs system, Nassauan territory become the only direct connection Frankfurt had to access the Rhine. 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 importance as a trading city was undermined by the fair in the neighboring city of Offenbach, which was located in the Zollverein and drawing business away from the fair in Frankfurt. The accession of Nassau therefore caused more externalities on Frankfurt than the loss of the market in Frankfurt for Nassau, and so once Nassau joined Frankfurt had lost its last unimpeded access to the Rhine and was completely isolated, leading to a speedy conclusion of its own negotiations with Prussia (Henderson, 1984; Hahn, 1982).

Northern German states did in contrast to their Southern German counterparts not face the threat of being isolated.(VBDZ 646) This absence of

possible coalition externalities caused Prussia not to pay the required reservation price to secure their accession. Braunschweig and Hannover concluded as a reaction their own customs union, the *Steuerverein*, in 1834, which Oldenburg joined in 1836. The almost finished negotiations about the renewal of the *Steuerverein* in 1841 fell apart due to differences between Hannover and Braunschweig about the route of a new road, which would have caused traffic through Braunschweig to decrease significantly. To avoid isolation Braunschweig turned to Prussia and joined the Zollverein in 1842 (Wittenberg, 1930). Hannover finally joined in 1854, however 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 so 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 as well (Henderson, 1984).

The negotiations of Prussia and other German states occurred within an international context as shown by the use of international trade treaties to mitigate coalition externalities. The situation of Austria and France, possible alternative agenda setters, as well as Switzerland, Netherlands and Denmark, possible follower countries, illustrate why independent German states are the only possible member states.

Austria had a predominantly passive stance towards the first rounds of negotiations conducted by German states. This was due to a policy of accommodation towards Prussia and internal pressure to uphold a prohibitive tariff system, which excluded economic cooperation (Branchart, 1930). The French government was acting similar to its Austrian counterpart. Despite receiving repeated letters from its Bavarian and German representatives, de-

tailoring the possibility to gain influence over German states through trade policy, the French government did not deviate from its high-tariff policy, angering possible allies in Germany. This stance also didn't change much through the July revolution in 1830 (Krauss, 1987). Both, France and Austria, had the potential due to their size and geographical location to become an agenda-setter for trade policy between German states. However both of them did not grasp the opportunity, likely due to their decision to prefer strong protection over possible gains from trade. Also France and Austria seemed to have a strong preference against differential tariffs. (VBDZ 772) The political and geographical situation for them did not present as much opportunity for administrative savings as it did for Prussia. These factors combined show that the possible payoff from trade agreements with German states for both, France and Austria, were considerable lower than for Prussia, since they had a lower coalition payoff as well as considerably less opportunities to exert any kind of externality on German states. This reduced their possibilities to extract concessions from the smaller German states.

Once Prussia had secured the first agreements with Hesse-Darmstadt, the role of the agenda-setter was filled, crowding out France and Austria. Both states did not see a Prussian success at forming a customs union with other German states as beneficial for them over the status quo. Therefore they undertook attempts to prevent such an outcome. In the framework of the model the agenda setter will not ask a state to join if the accession would make the agenda setter worse off compared to the result of the final coalition without this state. This will be the case if actions by outsiders change the reservation value of the state sufficiently upwards or reduce the joint payoff of the resulting coalition. France and Austria's attempts to do so included political support, for example Austria's backing of the *Mitteldeutscher Handelsverein*, which increased the payoff in political terms for states which had not yet joined Prussia. Another example are trade treaties, for example

France's treaty with Nassau, which raise the individual payoff due to their economic and financial benefits and lower a possible coalition payoff due to costs associated with either breaking the treaty or integrating it into the customs union.

Denmark, the Netherlands and Switzerland are further neighbour states. None of them had the size and economic power to be a potential agenda setter. The Swiss got a guarantee of their absolute neutrality on the Congress of Vienna, so any sharing of sovereignty through the involvement in a customs union was not acceptable for them. Denmark owned the German principality of Holstein-Lauenburg, a member of the Deutsche Bund, but the Danish King preferred consistency of economic policy within his dominion over a possible membership in the Zollverein. Similar to Denmark, 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, due to political pressure. One of the fortresses of the Deutsche Bund was located there, which led the German states in the Zollverein 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 favorable geographic position, controlling the Rhine's mouth into the North Sea. This position would have made an accession into the Zollverein too costly for Prussia and led it and the Zollverein to cooperate closer with the newly formed Belgium¹⁷. An important part of this cooperation was the creation of the "Iron Rhine", a rail connection between Antwerp and Cologne, which connected the Rhine to the North Sea by avoiding the Netherlands (Zanden and Riel, 2004)

¹⁷Belgium seceded from the Netherlands in 1830. The treaty of London in 1839, in which the Netherlands recognized Belgian Independence, contained a clause allowing Belgium the construction of the Rail link between the Rhine and the North Sea (Zanden and Riel, 2004)

6 Grand Coalition superadditivity

The idea of Grand Coalition superadditivity, as defined above, states that the value of a coalition of all states can be distributed in such a way that no group of states can gain a pareto-improvement for its members by breaking away and forming their own coalition. This is the idea of the core, a solution concept within cooperative game theory. Aghion et al. use a cooperative game to model the payoffs in the bargaining game. If previously individual players join a coalition, their individual payoff changes to a share of the total coalition payoff. Cooperative game theory does not determine how these shares are created ¹⁸, only determines upper and lower limits. A customs union fits this nicely since individual customs territories will be merged into one larger area and the payoff is distributed to the members according to some rule the member states accepted through their membership. Cooperative game theory can also accommodate coalition externalities, since the final partition is a parameter in the value function, which determines payoffs for all elements of the partition, and influences therefore also the payoff of players which did not join any coalition. Grand coalition superadditivity is a sufficient condition for the outcome of free trade between all players but not a necessary one. As Aghion et al show, the grand coalition can form despite failure of Grand coalition superadditivity, if externalities fulfill certain conditions.

Dumke's thesis about the creation of the Zollverein can be interpreted as stating that grand coalition superadditivity exists due to economics of scale in customs administration. As outlined above, there are several problems with regard to this argument. The incorporation of the idea of coalition externalities can overcome these shortcomings. As shown above coalition ex-

¹⁸There exist various solution concepts to determine shares, most prominent the Shapley Value (Shapley, 1953).

ternalities provide an explanation for the choice of negotiation structure as well as for the structure of the optimal sequence. Their existence provided Prussia with a clear choice between the two bargaining approaches and determined the actual sequence. Widening the scope of externalities beyond the purely financial issue of administrative savings gives also an explanation for Prussia's participation despite financial losses. This scope can also explain the participation of states whose chosen tariff levels had different objectives than tariff revenue maximization. Negative externalities also explain the initial resistance of states, as evident in the formation of the *Mitteldeutscher Handelsverein*, since attempts to mitigate them raised their reservation values and therefore payoffs from joining Prussia later on. Dumke's thesis cannot explain the initial refusal of the Northern German states, since their accession would have been led to administrative savings similar to those of the Southern German states. However Prussia was not able to lower their reservation values through coalition externalities, especially since their geographic situation allowed them free access to foreign trade partners.

7 Institutional Choice

Aghion et al. derive their model for free trade agreements, not explicitly for customs unions. They do note however that it is applicable to those cases as well. The model can cover the case of customs unions in general, since such unions are free trade agreements with the special provision of common tariff rates in all states. Additionally customs unions usually involve some kind of agreement about the distribution of tariff revenues. These monetary transfers make a customs union a good fit for the model, because they correspond to the possibility of transferring utility between coalition partners in the transferable utility game underlying the payoffs.

Dumke does not discuss the issue of institutional design but his thesis

about economies of scale in customs administration relies on the existence of administrative savings, which are only feasible under a customs union structure. The theoretical model specified above can accommodate different agreement structures without giving explicit notion to institutional design. To investigate this further I assume that the agenda setting power of the leading nation also includes the power to determine the institutional structure of the resulting trade agreement. This raises the question, why almost all negotiations between German states at the time were about forming customs unions and not just free trade agreements. One major characteristic which differentiates the unification process of the Zollverein from trade negotiations between European States after the Cobden-Chevalier treaty in the second half of the 19th century is this choice of a different institutional structure. The main reason for this differentiation is the importance of being able to enforce rules of origin regulations. Member states of a free trade area can only uphold differences in tariff rates against third country producers if the enforcement of rules of origin regulations at their borders is sufficiently strong. The relatively small size and complex interwoven geographical positions of German states allow for relatively cheap detours, so the savings through entering in the lower tariff rate FTA member state, forging the origin of the goods and then freely exporting into the higher tariff member state is easily outweighing the higher transport costs. This can be demonstrated using the preferential trade agreement between Hesse-Darmstadt and Baden in 1824. Hesse, which had strong budgetary problems, was running high tariffs for revenue purposes, Baden as a trading oriented nation had relatively low tariffs. This created a possibility for foreign producers, for example a trader in Bavaria, who wanted to sell in Hesse-Darmstadt, had two possibilities. He could travel directly to Hesse-Darmstadt from Bavaria, paying high tariffs on his goods. Or he could travel from Bavaria to Baden, paying low tariffs but only slightly higher travel costs, and then enter Hesse-Darmstadt without further payments by

masking the origin of his goods as Baden. One year later Hesse-Darmstadt canceled the treaty due to complaints about smuggling and the inaction of Baden in this question.

Free trade agreements do not provide economies of scale for customs administrations, while customs unions do. These economies of scale result in cost reductions leading to higher net tariff revenues. However free trade agreements provide economic benefits due to the optimal setting of tariff rates versus other countries, which might not be feasible with the common tariff rates required in a customs union. Contemporary governments estimated direct revenues from tariffs as more important than the economic benefits from improved trade environments. This implies in the framework of the model that the payoff of a coalition is higher if the institutional structure of a customs union is chosen over a preferential trade agreement. This higher coalition payoff, which allows the agenda setter to extract a higher payoff for itself, explains Prussia's choice of a Customs Union over a Free Trade agreement.

8 Conclusion

As shown above the predominant hypothesis in the economic history literature for the creation of the Zollverein has severe shortcomings. I demonstrate that using a recently developed bargaining model it is possible to resolve these problems and explain the formation process of the Zollverein in a consistent way. The idea of economies of scale in customs administration is still a considerable factor, however it is necessary to include further ideas for a consistent result. This improvement is achieved through the introduction of the concept of coalition externalities.

The concept of coalition externalities allow to widen the scope of relevant factors from purely financial administrative savings to inclusion of impor-

tant geographical, political and trade policy factors. This demonstrates the importance of these factors for the creation of the Zollverein and allow for a consistent explanation of the formation process. The externalities drive the decision between a multilateral and sequential bargaining approach and they are main determinants of the optimal sequence in case the agenda setter chooses the sequential approach.

The Zollverein was a successful customs union whose example allow to draw conclusions for modern trade policy. It provides an example where an agenda setter uses a sequential approach to form a coalition and illustrates the importance of externalities, the effect a coalition has on non-participating states. It shows that regional agreements can be building blocs but that for a successful conclusion of a global free trade agreement the agenda setter needs to have sufficient possibilities to exert negative coalition externalities during the formation process.

References

- AGHION, P., P. ANTRAS, AND E. HELPMAN (2006): “Negotiating Free Trade,” *NBER Working Paper*, (10721).
- ALBER, G. (1919): *Zollverwaltung und Zollertraegnisse in Bayern seit dem Jahre 1819*. Limmer, Muenchen, 8vo.
- ALESINA, A., AND E. SPOLAORE (2003): *The size of nations*. MIT Press, Cambridge, Mass., Alberto Alesina and Enrico Spolaore. ill. ; 24 cm.
- ANGELOW, J. (2003): *Der Deutsche Bund*. Wissenschaftliche Buchgesellschaft, Darmstadt, Juergen Angelow. 24 cm. Geschichte kompakt. Neuzeit.

- ARNING, H. (1930): *Hannovers Stellung zum Zollverein*. Culemann, Hannover, 8vo.
- BALDWIN, R. (1999): "A Domino Theory of Regionalism," in *Trading blocs : alternative approaches to analyzing preferential trade agreements*, ed. by J. Bhagwati, pp. 479–502. MIT Press, Cambridge, Mass.
- BRANCHART, A. (1930): *Oesterreich und die Anfaenge des preussisch-deutschen Zollvereins*. Marburg,.
- DUMKE, R. H. (1976): "The political economy of German economic unification : tariffs, trade, and politics of the Zollverein era," Ph.D. thesis, University of Wisconsin.
- (1994): *German economic unification in the 19th century : the political economy of the Zollverein*. Institut fuer Volkswirtschaftslehre, Universitaet der Bundeswehr Muenchen, Muenchen, ill., maps ; 29 cm. Diskussionsbeitraege ; Nr. 4/94.
- EISENHART ROTHE, W. v., AND A. RITTHALER (1934): *Vorgesichte und Begrueendung des Deutschen Zollvereins 1815-1834 Akten der Staaten des Deutschen Bundes und der Europaeischen Maechte*, vol. 2. Friedrich List Gesellschaft Reimar Hobbing, Berlin.
- EVENETT, S. (2004): "The Sequencing of Regional Integration," *Aussenwirtschaft*, (2004-IV).
- GILLIES, D. (1953): "Some Theorems on n-Person Games," Ph.D. thesis, Princeton University.
- HAFERKORN, H. (1933): *Bernhard August von Lindenau, die Zollfrage und der mitteldeutsche Handelsverein; unter Benutzung von Akten aus*

dem Saechsichen Hauptstaatsarchiv, dem Preussischen Geheimen Staatsarchiv, dem Geheimen aupt- und Staatsarchiv Weimar und dem Lindennau'schen Familienarchiv in Berlin-Schlachtensee. Leipzig,.

HAHN, H.-W. (1982): *Wirtschaftliche Integration im 19. Jahrhundert : die hessischen Staaten und der Deutsche Zollverein*, Kritische Studien zur Geschichtswissenschaft ; Bd. 52. Vandenhoeck and Ruprecht, Goettingen, von Hans-Werner Hahn. 24 cm. Revision of the author's thesis (doctoral)–Justus-Liebig-Universität Giessen, 1979. Includes indexes.

HENDERSON, W. O. (1984): *The Zollverein*. F. Cass, London, Eng. ; Totowa, N.J., 3rd edn., by W.O. Henderson. maps ; 23 cm. "First published in the series Cambridge studies in economic history."–T.-p. verso.

KIESEWETTER, H. (1988): *Industrialisierung und Landwirtschaft : Sachsens Stellung im regionalen Industrialisierungsprozess Deutschlands im 19. Jahrhundert*, Mitteldeutsche Forschungen, Bd. 94. Boehlau, Koeln, von Hubert Kiesewetter. ill. ; 24 cm. Revision of the author's Habilitationsschrift, Freie Universitaet Berlin, 1985. Includes indexes.

KITCHEN, M. (1978): *The Political Economy of Germany 1815-1914*. London.

KRAUSS, S. (1987): *Die politischen Beziehungen zwischen Bayern und Frankreich, 1814/15-1840*. Beck'sche Verlagsbuchandlung, München, von Sylvia Krauss. 25 cm. Schriftenreihe zur bayerischen Landesgeschichte ; Bd. 85 [i.e.87] Source material in German and French. Includes index.

KUEHNE, L. (1836): *Ueber den deutschen Zollverein*. Duncker and Humblot, Berlin.

MUELLER, H. P. (1984): *Das Grossherzogtum Baden und die deutsche Zollvereinigung : 1819 - 1835/36*. Lang, Frankfurt am Main.

- MURPHY, D. T. (1991): "Prussian Aims for the Zollverein, 1828-1833," *Historian*, 53(2), p285ff.
- OHNISHI, T. (1973): *Zolltarifpolitik Preussens bis zur Gruendung des Deutschen Zollvereins : ein Beitrag zur Finanz- und Außenhandelspolitik Preußens*. Schwartz, Goettingen.
- RIEDER, R. (2006): "Playing Dominoes in Europe: An Empirical Analysis of the Domino Theory for the EU, 1962-2004," *HEI Working Paper*, (11-2006).
- ROGOWSKI, R. (1990): *Commerce and Coalitions : how trade affects domestic political alignments*. Princeton University Press, Princeton, NJ.
- SHAPLEY, L. (1953): "A value for n-Person Games," in *Contributions to the Theory of Games*, ed. by H. Kuhn, and A. Tucker, vol. II, pp. 307–317. Princeton University Press, Princeton.
- SHIUE, C. (2005): "From Political Fragmentation towards a Customs Union: Border Effects of the German Zollverein," *European Review of Economic History*, 9(2), 129–62.
- TAYLOR, A. (1946): *The Course of Germany History*. New York.
- THIMME, P. (1931): *Strassenbau und Strassenpolitik in Deutschland zur Zeit der Gruendung des Zollvereins 1825-1835*. W. Kohlhammer, Stuttgart, Von Paul Thimme. illus. (maps) 24 cm. Beiheft 21 zur Vierteljahrschrift für sozial- und wirtschaftsgeschichte. Hrsg. von prof. dr. H. Aubin Issued also as the author's thesis, Munich, 1930.
- TREITSCHKE, H. v. (1872): "Die Anfaenge des deutschen Zollvereins," *Preussischen Jahrbuecher*, 30.

- WILLIAMSON, J. (2003): "Stolper-Samuelson, Strategic tariffs and Revenue Needs: World Tariffs 1789-1938," .
- WITTENBERG, R. (1930): *Braunschweigs Zollpolitik von 1828 bis zum Anschluss an den deutschen Zollverein. (19. oktober 1841)*. Gemeinnützige Schreibstube, Braunschweig, Von Richard Wittenberg ... illus. (map) 20 1/2cm. Lebenslauf.
- ZANDEN, J. L. v., AND A. v. RIEL (2004): *The strictures of inheritance : the Dutch economy in the nineteenth century*. Princeton University Press, Princeton, N.J. ; Oxford, Jan Luiten van Zanden and Arthur van Riel ; translated by Ian Cressie. ill. ; 24 cm. The Princeton economic history of the Western world.

Appendix A

State	Treaty Signature	Size	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	0.25/0.27*	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
Braunschweig	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	
Thuringia (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	

Size is given in German "Meilen", which equal around 7.5 km

Source:

Dumke R., *German Unification in the 19th Century: the political economy of the Zollverein*, 1994

Henderson W.O., *The Zollverein*, 1984

Appendix B

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

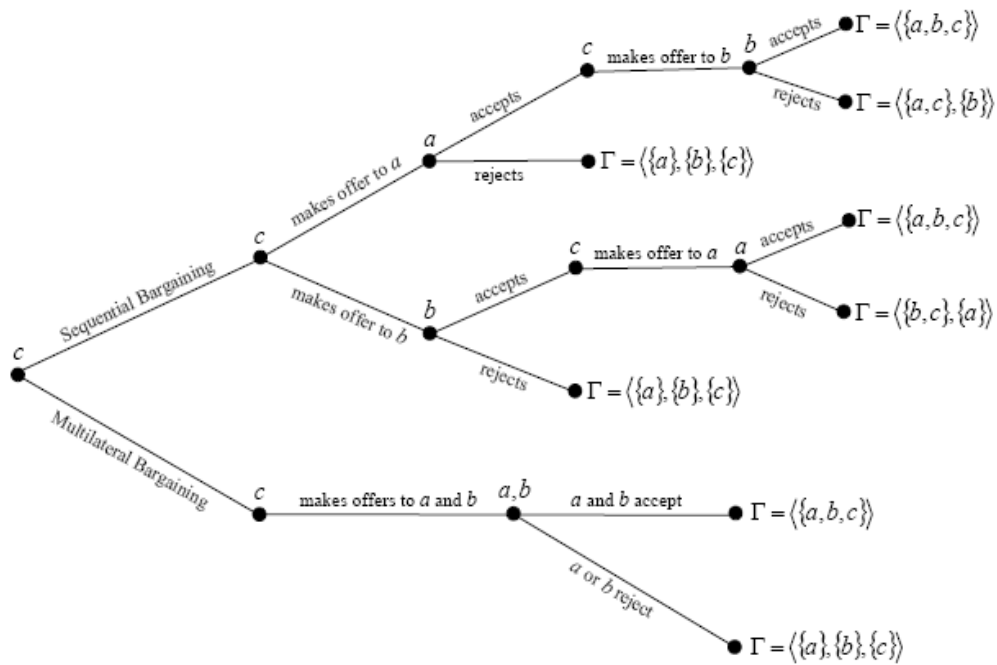


Figure 1: Game tree

This is Figure 1. taken from Aghion, Antras and Helpman, 2006

Appendix C

Example 1

Country A is the agenda setter, the columns represent the formed coalition, the joint payoff of the coalition, as well as the payoffs for the individual countries

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	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	19	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 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 first regularity.

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 second regularity.

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 payoffs and externalities in this example are identical to first one with one exception, the highlighted payoff 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 is no longer the optimal outcome.

Both Examples make use of negative coalition externalities only. The joint payoff of the grand coalition is such that the agenda setter is indifferent between multilateral negotiations and no negotiations at all; the agenda setter receives in both cases a payoff is 10. The existence of negative coalition externalities is therefore sufficient in both cases for the decision to negotiate as well as the choice of a sequential structure.