THE ZOLLVEREIN AND THE FORMATION OF A CUSTOMS UNION

Florian Ploeckl

The Zollverein and the Formation of a Customs Union

Florian Ploeckl

Department of Economics
and
Nuffield College
University of Oxford

Florian.Ploeckl@economics.ox.ac.uk

Abstract

The Zollverein, the German customs union of 1834, was the institutional centrepiece of Germany's economic unification. A bargaining model is applied to analyze the structure of its negotiation process and accession sequence. The existence of negative coalition externalities, the effect of a coalition on non-participants, led Prussia to choose sequential over multilateral negotiations. The nature of these externalities within the areas of financial revenues, trade policy and domestic political economy also explains the observed accession sequence. The choice of a customs union as institutional structure allowed Prussia to extract higher concessions from other states due to stronger coalition externalities.

1 Introduction

The founding of the Zollverein in 1834 was a major breakthrough for economic unification within Germany. Although Prussia was formally equal to the other Zollverein member states, it was clearly the most powerful member of the union. When political unification in Germany came to a conclusion with the empire in 1871, more than 30 years after the Zollverein, Prussia had achieved formal dominance over the other German states.[1] Traditionally, academic literature saw therefore the Zollverein as a precursor to political unification and interpreted this customs union 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 issues of the formation and sequencing of trade agreements 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 through which it can advance. Aghion Antras and Helpman (2007) develops a bargaining model based on an underlying cooperative game. The model provides a theoretical framework for the role of regional trade agreements in building a global free trade agreement. This paper utilizes this 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.[2]

The applied theoretical framework assumes a leading nation, which determines the negotiation structure and faces therefore the decision between pursuing negotiations in a multilateral approach or following a sequential approach. 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 that 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 financial revenues, reciprocal trade policy and internal political economy. Furthermore, I analyze the observed sequence with regard to derived regularities of the optimal sequence, detail the nature of coalition externalities for each of its members and investigate the reasons for selecting a customs union as an institutional structure.

After a short historical overview Dumke's thesis about the formation is detailed and

---

[1] The dominance was also based on a major military victory over Austria in 1866, which solved the question of Austria's role in Germany in Prussia's favor and pushed Austria out of Germany

[2] Methodologically this paper follows the Analytic Narratives approach pioneered by Bates et al. (1998)

critiqued and, additionally, the literature on trade agreement sequencing is introduced. Next, I detail the game-theoretical model, which serves as the framework for the analysis. The actual sequence is analyzed in Section 5 and the implications for the economies of scale in the customs administration hypothesis are discussed in Section 6. Section 7 analyzes the institutional choice of a customs union for the Zollverein, before the final section 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.[3] 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 station, especially in the south, begun 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*.[4] 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).[5]

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 harmonized weights and measurements as well as standardized the acceptance of multiple currencies in use throughout its territory (Henderson, 1984; Hahn, 1982). Fremdling (1982) highlights its impact on Germany's industrial structure, Shiue (2005) illustrates the effect on market integration and Ploeckl (2008) demonstrates resulting changes to the regional growth patterns.

In the second half of the 19th century the beginning historiography about the creation of the Zollverein focused on Prussia's hegemony. One particularly 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

---

[3] The HGIS Germany (http://www.hgis-germany.de/) project offers a website which illustrates Germany's political landscape during this time with a large number of interactive maps.

[4] The nature of this agreement will be discussed in more details in section 5

[5] The HGIS (http://www.hgis-germany.de/) project website has an annual series of maps, which illustrate the extent of the Zollverein during its existence.

Germany and 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) 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 (Williamson, 2003; Alesina and Spolaore, 2003) was introduced by Dumke (1976; 1994), and emphasizes huge fiscal savings due to economies of scale in customs administration. Financial gains, which resulted from these savings, were therefore the main incentive for the creation of, and participation in, the union.

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 introduced 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 ratio of customs administration. Dumke presents evidence that the actual ratios of German states corresponded to the predicted rates, which implies that for the small states revenues equaled or exceeded administration costs, making a border system unprofitable. States therefore expected to reap financial gains by joining the Zollverein. In the appendix I list the ratios of all Zollverein member states, indicating the relative financial viability of a border customs system for each. In addition to Dumke's evidence, the relative 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 not connected to the 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's revenues were not controlled by the respective parliaments, but were directly at the disposal of the ruler. This lowered their revenue constraints and allowed the reigning princes to increase their attempts to contain revolutionary tendencies. Especially the sovereigns of small states faced strong budget constraints due to the costs of building up modern administrative systems. This was compounded through the drawing of new border lines at the Congress of Vienna as well as the comparatively higher administrative costs for small states themselves.

Dumke's thesis focuses strongly on these two central points and does not concern itself with the actual formation process. The nature of the negotiation structure, multilateral or sequential negotiations, is not addressed, similar the logic behind the observed accession

sequence is not investigated. This leads to another issue, namely the set of states which became members of the Zollverein in the initial years. Dumke's argument about revolutionary tendencies explains the need for financial revenues, it does however not explain the observed set of member states. For example Bavaria, a relatively calm country when the aftermath of the French July revolution of 1830 spilled over into German states, is a relative early member, while Brunswick, which had experienced severe unrest in 1830, did not join until 1842. Similar the focus on the revenue motive, and the revolutionary threats as the source for this, does not reflect the actual motives behind tariff setting, and therefore Zollverein membership, completely. The resistance of small principalities, who aren't capable of organizing a border customs system and have limited military means, does not fit the pattern, similarly the free trade policy of Saxony and Baden imply a different motive behind their tariff policies.

3 Sequencing matters

As just shown, the literature about the Zollverein, especially the work of Dumke (1976; 1994), does not really explain the sequence of accession, nor use the information revealed through it. Similarly, the literature on modern trading systems does not give much attention to the question of sequencing.

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. Before the Zollverein, no such coherent group of disinterested experts existed in the different German states, although there were connections between administrative officials, for example through the Deutsche Bund.

The second approach is labeled "Geopolitics and Mercantilism", and reflects strategic trade theory motives. 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, but the approach lacks a structural framework and is unable to incorporate relevant coalition externalities besides international trade policy.

The third idea is the so-called "Domino Regionalism". Formalized by Baldwin (1995),[6] 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 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. It 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 are new approaches available to overcome these limitations by modeling sequencing more rigorously theoretically. I use a model recently developed by Aghion, Antras and Helpman (2007) and show in an applied case study how this framework can explain the observed structure of the Zollverein formation process.

---

[6] Baldwin's formalization echoes ideas of Viner (1950).

4 A Formation Framework

Aghion et al. applies a cooperative game theoretic approach to investigate the structure of trade negotiations, especially the role of regional trade agreements. The bargaining model therefore contains the possible outcomes of multilateral negotiations or a sequential structure, which can be seen as a series of regional agreements. Payoffs are derived by interpreting possible trade agreements as coalitions in an underlying cooperative transferable utility game. Based on these payoffs, the major focus is under which conditions the negotiations will result in global free trade, an agreement between all the actors. The main analysis uses the three-country case[7] but can easily be generalized to more players. The outcome of the bargaining game is a coalition structure represented as a partition Γ of $\{a, b, c\}$. If the partition contains a coalition, which is a set with more than one player, the involved players are interpreted as members of a trade agreement. The payoff for each coalition C in the resulting partition Γ is given by the value function $v(C, \Gamma)$. This value function stems from the underlying cooperative game and depends on the objective function of the involved actors.[8]

The first stage of the bargaining game is the decision of the agenda setter about the negotiation structure. It can choose either a multilateral approach, making simultaneous offers to all other countries, or a sequential approach, starting with an offer to only one or at most a subset of countries. Under multilateral negotiations, states weigh their received offers individually and 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 a global agreement, $\Gamma = \langle\{abc\}\rangle$, or no agreement, $\Gamma = \langle\{a\}\{b\}\{c\}\rangle$. 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 offers prior to this first rejection. If, for example, c approaches a first, which accepts, and then receives a rejection from b, the result is a coalition between c and a, $\Gamma = \langle\{ca\}\{b\}\rangle$. Under both negotiation structures the membership offer has an associated pay-off, which may contain lump sum transfers between states and is unaffected by other states joining the agreement later on. The extensive form of the bargaining game looks as follows:

---

[7] The three countries are labeled a, b, and c, with c designated the leader and therefore agenda setter.

[8] Aghion et al. uses 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 factor for the value function based on historical circumstances at the time of the Zollverein.
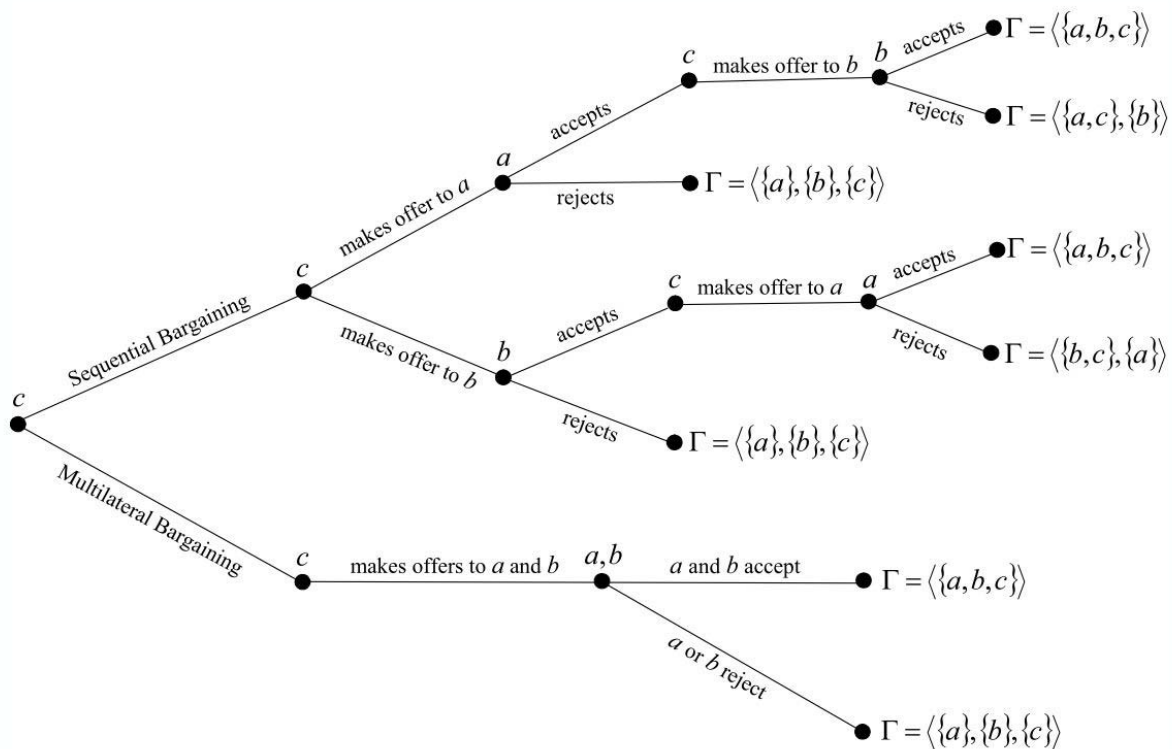
To ease notation, let $W(j)$ be country j's pay-off if there is no agreement at all. $W_{kl}(j)$ is the pay-off for country j if countries k and l form an agreement, $W(kl)$ is the joint pay-off of countries k and l, which formed a coalition, and $W(GC)$ is the joint pay-off of the grand coalition, when all states join in the trade agreement. Aghion et al. introduces two concepts based on these pay-offs:

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.

Grand Coalition (GC) Superadditivity:

There exists GC superadditivity if $W(GC) > \sum_{C \in \Gamma} W_\Gamma(C)$ for every $\Gamma \neq GC$

GC superadditivity implies that the joint pay-off of the grand coalition is larger than the sum of the pay-offs for all coalitions within 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

Coalition externalities drive certain results of the model, such as the decision between multilateral and sequential negotiations. Aghion et al. justify this modeling choice by demonstrating their existence in trade creation and diversion effects due to the formation of trade agreements.[9] Nevertheless, this choice assumes that the utility function of the relevant actor, in modern settings usually a democratic government, is predominantly concerned with public welfare. This is not reasonable for early 19th century German states, where political power rested in some cases still with individual sovereigns. Therefore, I base the actor's utility functions, which are connected to the value function of the underlying cooperative game, on historically important goals for tariff policies.

Williamson (2003), in his analysis of world tariff setting between 1789 and 1938, distinguishes three different central 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 of raising revenues to satisfy their budgetary needs. The second is based on the theory revolving around strategic tariff setting. At the time of the Zollverein, this concept focused predominantly on reciprocal market access. This implies that states change their tariffs to either elicit reciprocal responses by other countries or as a reciprocal reaction to other states. The third motive concerns the internal political economy of countries. This approach rests on a connection between trade and politics shown by the Stolper-Samuelson theorem, which has been described by Rogowski (1990). Tariff rates affect relative prices between sectors, for example agriculture and manufacturing, and therefore their relative income. Sectors therefore have an incentive to influence tariff setting, and relative tariff rates may reflect the relative strength of individual sectors.

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

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

---

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

The second area is international trade politics. Given geographical positions, a coalition might be able to obtain control over all relevant trade routes leading into a country not within the customs union. The coalition obtains in this way a certain degree of control over the tariff system of the country in question, since traders cannot evade transit tariffs on trade conducted with the state. High transit tariffs therefore have a similar effect to that of a high tariff rate of the country itself. This poses problems for a state which has the intention to secure market access through reciprocal preferential treatment and therefore wants to implement a low tariff system. The state is no longer able to offer low trade barriers to another state, and consequently cannot offer the necessary reciprocation. In the extreme, the coalition can go as far as treating all goods destined for such an outside state as regular imports into the customs union. For practical purposes, the state loses control over its customs system. The power to determine one's own tariff system is a question of political sovereignty; losing that power threatens the political situation of the sovereign. This was a real fear for the sovereigns of smaller German states in light of the mediatization process of independent states, started through the Reichsdeputationshauptschluss of 1803, where stronger states absorbed small, formally independent, territories under their reign. The rulers of the remaining small principalities only had guarantees by the Congress of Vienna to secure their dynastic rights and therefore had the fear that a loss of control over trade policy would be the first step of being absorbed by larger neighbors, in their case, especially, by Prussia.

The last issue is internal political economy. Rogowski's framework stresses the effect of tariffs on factor compensation and therefore on the relative political power of different sectors. Prussia's tariff system of 1818 is an example of this – its moderate tariffs were a compromise between the demands of agriculture, located predominantly in Prussia's east, and the industrial and commercial interests in the western parts of its territory. The Zollverein essentially took over Prussia's moderate rates, which were neither prohibitive nor free trade-oriented.[10] The adoption of these tariff rates by new member states had only minor effects on the relative strength of different sectors due to this moderation. The effect of neighbor states joining the Zollverein had less of a differential impact on sectors than it had on different regions. Regional interests played an important part in tariff choices, as Prussia demonstrates. Its customs system not only balanced commercial and agricultural interests, but also represented a compromise between the eastern and western territorial parts of Prussia (Ohnishi, 1973). The geographical structure of a number of German states, with the most prominent example of Prussia, was a combination of sometimes completely unconnected territories. This had strongly differing regional interests as a consequence. An accession of neighboring states into the Zollverein changed the relative strength of regions, shifting political power and interest. This change in the internal political economy of a state can influence its government to look more favorably on the Zollverein and thereby reduce the necessary pay-off required to convince the state to join. Since coalition externalities reduce their pay-off, states obviously have the

---

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

incentive to prevent or reduce them before they receive a membership offer. Governments had a number of options to do so. To counter effects caused through a coalition's control over roads, states had to find ways to secure access to unimpeded trade routes. Some of the possibilities were building or improving roads going through their own territory as well as coordination agreements with other states. To counter the potential international effects, states had to use reciprocal power before they were cut off. This implies that they preferred to conclude formal diplomatic agreements with foreign nations, locking in preferential treatment with regard to market access. In addition, a state might commit itself by treaty not to join the coalition, which serves as a signal to foreign states and raises the, predominantly political, cost that the agenda setter has to pay to overcome the necessary breakup of an official treaty. To counteract effects on the internal political economy, governments have limited options. Since these effects cause shifts in relative power and demands, governments would need to make concessions to specific regions and sectors. These concessions, for example tax relief, are costly from a government viewpoint; therefore, it might be more profitable to accept the externalities than to the attempt to mitigate them.

4.2 Optimal Sequence

The sequence of accessions depends on the extent of coalition externalities. The agenda setter optimizes its pay-off through the choice of a particular sequence, in case it has opted to follow sequential rather than multilateral negotiations. The choice of sequence influences the total pay-off 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 the same final coalition give the agenda setter the identical pay-off – it is therefore 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 ith state in the sequence S and let Ω denote the set of all possible sequences S. The agenda setter chooses the sequence with the largest pay-off, formally:

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

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.

The appendix contains two numerical illustrating examples.[11]

These regularities will be used to analyze the accession of each state into the Zollverein. I will show how the actual sequence followed the described characteristics of the optimal sequence; in particular, I will demonstrate the existence and nature of the externalities which determined the sequence, their strategic use, as well as the mitigation attempts by affected states. The existence of an accession sequence depends on the choice of the agenda setter for sequential negotiations. Therefore, I begin by discussing the agenda setter's selection of the bargaining structure and Prussia's choice of a sequence over multilateral negotiations.

4.3 Bargaining structure

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

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

The agenda setter will choose multilateral negotiations if the reverse inequality sign holds. This is conditional on the relevant pay-off being positive; the agenda setter will obviously not start negotiations if it doesn't profit from them. 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 sufficient,[12] but still a necessary condition for the choice of sequential negotiations.

The bargaining game contains a number of modeling choices, for example the 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 pay-offs. The agenda setter therefore knows whether an offer will be accepted or rejected. Similarly, when only

---

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

[12] The existence of negative coalition externalities is still sufficient if no positive externalities exist.

one round is played the model does not include repeated attempts to build an agreement.[13] A central difference between the two negotiation structures is the set of possible outcomes, as sequential negotiations result in a coalition of all states which accept the offer, and multilateral negotiations only lead to a global agreement, a coalition of all actors. 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 at 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 opportunity to conduct multilateral negotiations but explicitly rejected the approach. The issue of a closer commercial integration had been raised 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. Its plenum, however, never followed up on this mandate in any 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 for multilateral negotiations based on this article, demonstrate that there was an institutional framework which made multilateral negotiations between German states possible. These initial debates, held in 1819, demonstrate further that the breakdown of multilateral negotiations did not lead to smaller groups of states forming an agreement based on the existing consensus between them. Furthermore, multilateral negotiations between smaller German states during the next decade did not lead to smaller agreements when negotiations broke down.[14] This justifies the modeling choice that a single rejection leads to a breakdown of the multilateral negotiations without the formation of smaller agreements. Although multilateral negotiations were possible, Prussia explicitly chose sequential ones. 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), presents a clear example for this choice. This implies that Prussia's pay-off from a sequential approach was higher than the pay-off from a multilateral approach, which indicates the presence of negative coalition externalities in German trade negotiations at the time of the Zollverein.

---

[13] The 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 extensions here

[14] Bavaria and Wuerttemberg participated in these discussions before they formed their own union; however, their agreement was the result of separate negotiations

5 The formation of the Zollverein

The next step after selecting sequential negotiations is the choice of sequence. Each step of the actual sequence will be analyzed to show how it corresponds to the above described characteristics of an optimal sequence, demonstrating the nature of coalition externalities present in each case. The analysis begins with a discussion of two necessary components – the agenda setter and the set of actors – and is complemented at the end with a look at Germany's European neighbor states.

As already established, Prussia was clearly the agenda setter for the formation of the Zollverein. The first step towards this role was its customs system reform in 1818, which lifted internal tariff lines and established a border customs system. In the wake of this reform its government also decided to treat enclaves of other states within its territory as Prussian territory with regard to customs purposes. As compensation, the states were offered a fixed amount of financial revenues. Some states complied with Prussia's wishes, but some tried to resist for years. During the next few years Prussia remained on the outside during negotiations between other German states. It assumed the agenda setter role by convincing Hesse-Darmstadt to join its customs system, a move which jolted other German states. Once it had taken up this role, Prussia filled it by leading the negotiations, which resulted in the formation of the Zollverein, the accession of further states, as well as official trade relationships with foreign nations such as France, England and Russia (Eisenhart Rothe and Ritthaler, 1934; Henderson, 1984). Given this role as the leading nation of the Zollverein, Prussia's motivations during the negotiations reflect the reasons for the creation and formation process of this customs union. This is evident in a note (VBDZ 747) the Prussian Finance Minister, Motz, sent to his colleague Eichhorn about negotiations with Bavaria and Wuerttemberg:

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 the goods and manufacturing sector of the combined states is conditional on the required security through certificates of origin, at most with the modification that full import and export tariffs are removed only after two to three years, for now reduced by half, but on the explicitly affirmed principle of complete free trade. The advantages are an increased market for larger domestic industries and especially for our far superior manufacturing, increased trade and, in this regard, especially a better utilization of the Elbe through Magdeburg.

b. Through a possible accession of Rheinbayern to the Hessian and Prussian Zollverein besides the advantages of lower administrative costs through enlargement and better

borders along the customs line.

His first item demonstrates that Prussia's aims for the Zollverein – and customs policy in general – were more than just economic or fiscal; political calculus entered the negotiations. The statement indicates that Prussia was concerned about its influence on other German states, so the Zollverein was helping to prevent the rise of a third power in Germany besides Prussia and Austria. Additionally, Prussia was motivated by the desire to obtain a common German reaction against potential threats from France. The Zollverein was not explicitly aimed at pushing Austria out of Germany, but the economic unification without Austria allowed Prussia to do so later on (Murphy, 1991).

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

The third item illustrates the influence of fiscal and economic motives on tariff policy. His comments highlight the expected positive effects of an increase in market size, the positive effect through an increase in transit traffic and fiscal savings through economies of scale in customs administration. The reference to the utilization of the river Elbe implies that tariff rates influenced the routes taken by merchants, and it demonstrates that governments cared about, and likely profited fiscally from, these routes. The item also demonstrates a disadvantage of a free trade agreement versus a customs union, namely its need for certifications of origin. This point played a role in determining the institutional structure of the Zollverein, which will be discussed in the section on institutional choice later on.

As the agenda setter, Prussia decided which states it considered potential member states of the customs union. These decisions were based on the political and economical situation within Germany. The Congress of Vienna had, in 1815, drawn new borders for the German states and instituted the Deutsche Bund as a common political institution. This institution's decision making process gave in its Diet a full vote to a range of larger states, but operated a shared voting arrangement for its smaller member states (Angelow, 2003). A similar distinction applied to Prussia's and other large German states' conducting of trade negotiations. On one level were negotiations between at least two equal partners. Examples for this were the negotiations between southern German states during the 1820s. The other possibility was that a state surrendered its policy power to a

usually larger partner, which then controled the common tariff policy.[15] The negotiations between Prussia and the enclaves surrounded by Prussian territory are an example for the latter. These enclaves were either independent territories, for example the Anhalt duchies, or territories of other German states. This separation of states into two categories was 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. Similar was the situation of the Thuringian sovereignties, which had important trade routes running through their territory. These sovereignties, which had strong dynastic as well as geographic connections with each other, ended up pooling their membership during the Zollverein negotiations. They founded the *Zoll- und Handelsverein der Thueringischen Staaten*, a formal union between the states, and avoided being individually included under the rule of neighboring states. Prussia selected only larger states as potential full members for the Zollverein.[16] This distinction had two effects. First, Prussia was able to extract a high political price – control over the tariff system – from the small states. Second, full membership in the Zollverein became more valuable, since the number of members with veto rights was lower. The exclusion of small states from full membership therefore increased Prussia's bargaining position with large states by making the veto right a more valuable asset (Eisenhart Rothe and Ritthaler, 1934).

The first element in the sequence was the customs union with Hesse-Darmstadt. In the wake of the incorporation of some enclaves into its customs system the agreement with Hesse-Darmstadt was the first customs treaty of Prussia which involved sharing control over customs policy. This union formed the core of the later Zollverein, though legally the Zollverein of 1834 was a new institution and set institutional precedent with its structures. Hesse-Darmstadt profited considerably with regard to customs revenues, alleviating its considerable financial troubles.[17] Prussia's benefit is less obvious (VBDZ 373); Hesse-Darmstadt 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 Hesse-Darmstadt. However, the agreement had two political effects inasmuch that it put pressure on the other small German states around Hesse-Darmstadt (VBDZ 373) and served as a hindrance to the expansion plans of the Bavarian-Wuerttemberg customs union. The treaty explicitly stated that Hesse-Darmstadt should seek the accession of the neighboring Hessian sovereignties (VBDZ 379); Prussia, especially, focused attention on Hesse-Cassel

---

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

[16] More details about the individual states that became full members of the Zollverein are given in the appendix.

[17] In 1830 the Hesse-Darmstadt government officially calculated the increased net revenue at 280000 fl per year, almost 5% of its budget (Hahn, 1982b) This is in line with their expectations during the negotiations, which were around 200000-270000 fl (VBDZ 368).

(VBDZ 370) due to its position between the two major Prussian territories. Since the Hesse-Darmstadt 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 discussion about the nature of coalition externalities argued that states will attempt to mitigate them and take measures to raise their own reservation threshold. The new coalition between Prussia and Hesse-Darmstadt caused exactly such a reaction. On September 24th,1828 a large group of affected German states established the *Mitteldeutscher Handelsverein*, a formal trade agreement.(VBDZ 532) Geographically, the territories of its members covered north and central Germany, containing the major trade fairs of Frankfurt and Leipzig as well as the trade roads between these two and the major North Sea ports, the port city of Bremen was even an official member. It also covered all roads between the two main Prussian territories. The three southern states – Bavaria, Wuerttemberg, which had formed its own union, and Baden – were not involved. Baden did not border geographically with any of the *Mitteldeutscher Handelsverein* member states, an agreement that was also a reaction against externalities caused by the Bavarian-Wuerttemberg customs union, which was actively looking for further members.(VBDZ 351-3) The nature of the agreement reveals that it was designed to mitigate externalities; it was neither a customs union nor did it create a free trade area between its member states. Its content was focused on preserving the trade route access of member states and hinder the enlargement of the two newly created customs unions in Germany. The treaty had therefore two central elements – first, it intended to safeguard and improve control over trade routes by agreements to retain low transit tariffs and to instigate an intensive road improvement program.[18] Second, it contained the explicit legal commitment of its member states not to join any other customs union during the lifetime of the treaty. These two elements were proffered in order to prevent further coalition externalities in a threefold way. They fostered traffic on the roads under the control of the *Mitteldeutscher Handelsverein,* guaranteeing reliable access from and to foreign markets and therefore allowing for reciprocal trade policy, and it attempted to prevent additional coalition externalities by forcing Prussia to switch to multilateral negotiations.[19] Most of the expected effects of further accessions to the Prussian system were negative; therefore, the *Mitteldeutscher Handelsverein* member states would have achieved a higher pay-off if multilateral negotiations about a merger with the Prussian union had been successfully concluded at this stage (Haferkorn, 1933). Nevertheless, Prussia refused collective negotiations and actively pursued policies to break this agreement up, which it did

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

[19] The official conference protocol states an agreement between the member states about negotiations with all other German states on the basis of the principles of the *Mitteldeutscher Handelsverein* (VBDZ 531).

successfully with the defection of Hesse-Cassel three years later.

Hesse-Cassel, the next element of the accession sequence, had a central geographical location in Germany. It controlled the traditional German north-south trade routes as well as the important east-west connection between the major trade fairs in Frankfurt and Leipzig. In addition, a direct route between the two major Prussian territories ran through the state, which made it a desirable member of a coalition since its control of trade routes would cause strong externalities on other German states.(VBDZ 533) During the negotiations in the 1820s however, its sovereign resisted any treaty perceived to be threatening his sovereignty. The loose and neutral nature of the *Mitteldeutscher Handelsverein*, the intended road improvement program of which was also designed to foster Hesse-Cassel's transit revenues, made it therefore the natural choice of the ruling duke (Hahn, 1982). The union between Prussia and Hesse-Darmstadt, though, had strong negative externalities on the state. The higher tariff border of its direct neighbor Hesse-Darmstadt was a central factor, leading to civil unrest in the southern part of Hesse-Cassel in 1830 – the regional population blamed Hesse-Cassel's tariff policy for its miserable economic situation. Additionally, Prussia continued its road building program, which led Hesse-Cassel to fear losing transit traffic to alternative trade routes, especially the Rhine (Thimme, 1931). These factors convinced the government, though not the ruling duke, of Hesse-Cassel to defect from the *Mitteldeutscher Handelsverein* and accept Prussia's offer of membership in 1831. Although the duke resisted as long as possible, his political position became untenable and he was forced to abdicate in the fall of 1831. His son and successor signed the ratification documents within a few weeks of assuming power (Hahn, 1982). The accession of Hesse-Cassel into the Prussian custom system caused considerable negative coalition externalities on a whole range of states. This defection was a decisive blow to the *Mitteldeutscher Handelsverein*. The enlarged Prussian customs union area now split its area into two unconnected geographical blocks. It countered any attempts of the *Mitteldeutscher Handelsverein* members, as well as the Bavarian-Wuerttemberg union, to secure unimpeded trade routes between southern Germany and major trading ports in the north. By securing the accession of Hesse-Cassel, Prussia was continuing to extend its customs union with a state whose accession caused considerable negative externalities on others, but was, due to its geographical position, relatively immune to possible externalities through the accession of other states, which again follows the characteristics of an optimal sequence.

Prussia's successful work against the *Mitteldeutscher Handelsverein* included cooperation with the next element of the sequence, namely the union of Bavaria and Wuerttemberg. This union decided to cooperate with Prussia, rather than the *Mitteldeutscher Handelsverein*. This was due to the southern union neither being able to make financial contributions large enough to convince these German states, nor having enough power over them. The externalities of the southern union were fairly small and did not lower the reservation price thresholds of the states, which formed the *Mitteldeutscher Handelsverein*, low enough. The cooperation was formalized with an extensive trade agreement in 1829, which was accompanied by a road-building program, enhancing the

connections of southern Germany to the north (VDBZ 766). Since the territory of the *Mitteldeutscher Handelsverein* covered all possible routes, Prussia convinced two small Thuringian principalities, both members of the *Mitteldeutscher Handelsverein*, to allow them to create a route through their territory.[20] (Thimme, 1931) Additionally, Prussia and Bavaria pursued a closer cooperation between their respective postal services, which led to tensions with the Thurn and Taxis family, that held the postal monopoly for the Thuringian principalities and som of the other states of the *Mitteldeutscher Handelsverein*.[21] (Helbig, 1991) The following accession of Hesse-Cassel into the Prussian customs system in 1831 shifted the trade routes available to the southern union from the control of the *Mitteldeutscher Handelsverein* to the Prussian union. This exerted negative externalities on Bavaria and Wuerttemberg, which were affected particularly by increased transit tariffs through Hesse-Cassel (VBDZ 655). This led to continued negotiations between the two customs unions, which were concluded in March 1833 (Eisenhart Rothe and Ritthaler, 1934). The resulting union became the institution commonly identified as the Zollverein, since this was the central treaty that determined the institutional details for the customs union covering large parts of Germany. Bavaria and Wuerttemberg received a strong financial pay-off through the use of the population-based revenue distribution scheme (Alber 1919). They also received political concessions through the right to negotiate trade agreements with foreign powers and present them to the whole Zollverein for approval. The Zollverein, the newly enlarged coalition, exerted externalities on Saxony and the Thuringian principalities, which faced being surrounded by one custom system once the Zollverein cane into force on January 1st, 1834. Baden was affected similarly, since all its German neighbor states were now part of one common customs area. These new coalition externalities, together with the point that no other state would have had a significant impact on Bavaria and Wuerttemberg, show that this particular accession again followed the outlined characteristics of the optimal sequence.

Cooperation and potential unification between the two customs unions led to the fear of complete isolation in Saxony[22] and some of the Thuringian principalities. The fear was already evident during the early stages of the cooperation when, in 1829, Saxony and the Thuringian principality of Saxony-Weimar insisted on an exit clause in a second treaty of the *Mitteldeutscher Handelsverein*. This article allowed them to end their membership in the *Mitteldeutscher Handelsverein* early in case the two customs unions merged (VBDZ614). Since Prussia was aware of this clause (VBDZ 624), the negotiations and their successful conclusion with Bavaria and Wuerttemberg exerted negative coalition externalities on Saxony by giving them legal cover to leave the *Mitteldeutscher*

---

[20] The two principalities, Meiningen and Coburg, were bought off with direct monetary compensation as well as improvements to local infrastructure.

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

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

Handelsverein (VBDZ 862). Saxony therefore joined the Zollverein on virtually identical terms to Bavaria and Wuerttemberg, although it had a considerably stronger economic situation. As one of the most developed and industrial regions in Germany, this state was also a center for international trade, especially through its trade fair in Leipzig (Kiesewetter, 1988). This implied that Saxony's share of Zollverein imports, and therefore customs revenues, was substantially higher than its population share. The acceptance of the standard revenue distribution scheme showed that Prussia was able to use coalition externalities to extract financial concessions from Saxony. Given the geographic position, as well as economic importance, of the states which had not yet joined the Zollverein, Saxony would have only been affected by the accession of Thuringian principalities into the Zollverein. Nonetheless, given the smaller size of Thuringia and the issue that all international trade routes were now running through Zollverein territory, the potential impact was very low.

Together with Saxony, the Thuringian principalities started to become isolated with the accession of Hesse-Cassel and the treaty with Bavaria and Wuerttemberg.[23] It became complete for Thuringia when Saxony signed its treaty to join the Zollverein in late March 1833. As this agreement created even more negative coalition externalities on the principalities, Prussia was therefore able to extract significant concessions with regard to political power and membership rights. The small principalities were no longer able to insist on full individual membership, but agreed to pool together in a common institution, which reduced the possible number of veto players in internal Zollverein negotiations and prevented the value of the veto being diluted any further (Henderson, 1984). Prussia concluded the negotiations with Saxony prior to those with the Thuringian principalities, since the impact of Saxony on Thuringia was greater than the potential reverse impact, allowing Prussia to extract more political concessions.

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

---

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

the introduction of the substantially higher Zollverein tariffs as part of its membership. The comparatively larger importance of Wuerttemberg and Bavaria for Baden, rather than vice versa, explains the later accession of Baden.

After the accession of Hesse-Darmstadt, two important Hessian states, Nassau and the free city of Frankfurt, remained outside the Zollverein. Nassau was running a mildly successful tariff system, especially due to certain tolls on the Rhine (Hahn, 1982). This implied it had a fairly high reservation price, and so for a long time its politics towards Prussia was relatively hostile. The accessions of the southern German states, however, led to the fear of complete isolation, despite ready access to the Rhine. The government attempted to compensate the loss of other German markets through a trade treaty with France in 1835, which also represented a legal obstacle to Zollverein membership. The limited nature of the treaty and the distance to France meant that this trade agreement did not have much of an impact on the economic situation of the country. Coalition externalities, namely the swelling anger of local farmers who were shut out from neighboring markets in other German states through the new trade barriers around the Zollverein, however, led to a change in Nassau's position. It used a formal technicality to nullify the treaty with France and ratified an accession treaty with the Zollverein in December 1835. Additionally, it gave a number of concessions with regard to shipping on the Rhine. (Hahn, 1982)

Nassau's access to the Rhine was the only direct connection Frankfurt had to it, once its other Hessian neighbors joined Prussia and the Zollverein. Since it was an important trading hub with international connections, such a connection was important (VBDZ 765). The city already suffered through the Zollverein, since its trade fairs, the central institution for its status as a major trading city, were undermined by the fair in the neighboring city of Offenbach. This fair was located in Zollverein territory and drew business away from Frankfurt, since it saved the merchants the costs of leaving and re-entering the Zollverein. As a consequence, Nassau's accession caused considerable externalities on Frankfurt, while the loss of Frankfurt as a market would have represented the only major externality on Nassau. Nassau's accession meant that Frankfurt lost its last unimpeded access to the Rhine and was completely isolated, which led to the speedy conclusion of its own negotiations with Prussia and its formalized membership in January 1836. Frankfurt had concluded a trade agreement with the United Kingdom on May 13th, 1832, with reciprocal preferential treatment.[24] Such an agreement obviously provided an obstacle to membership, however the British government agreed to a request from Frankfurt to be released from the treaty obligations. Frankfurt's terms of membership in the Zollverein had two major specifications – first, it had to share full membership rights with Nassau and second, it did not participate in the population-based revenue system, but received a fixed sum. These two items reflect Frankfurt's nature as a city state, since its small size meant it had to give political concessions but on the other hand it had a

---

[24] British diplomats realized that such a treaty was likely not able to prevent Frankfurt from joining the Prussian tariff system eventually, a possible delay however would be costly to Prussia and therefore in the interest of Great Britain. (VBDZ 824)

considerably higher per capita trade incidence, making membership in the population-based revenue distribution scheme inappropriate (Henderson, 1984; Hahn, 1982).

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

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

Negotiations between 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, the Netherlands and Denmark, possible follower countries, illustrates why independent German states were 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 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 allies in Germany. Furthermore, this stance did not 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 agenda setters for trade policy between German states. However, neither grasped the opportunity, likely due to their decision to prefer strong protection over possible gains from trade. In addition, France and Austria seemed to have a strong preference against differential tariffs (VBDZ 772). For them, the political and geographical situation did not present as much opportunity for administrative savings as it did for Prussia. These factors combined show that the possible pay-off from trade agreements with German states for both France and Austria were considerably lower than for Prussia, since they had a lower coalition pay-off as well as considerably less opportunities to exert any kind of externality on German states. This reduced their possibilities of extracting 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 an outsider change the reservation value of the state sufficiently upwards, or reduce the joint pay-off 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 pay-off in political terms for states that had not yet joined Prussia. Another example are trade treaties, for example France's treaty with Nassau, which raised the individual pay-off due to their economic and financial benefits and lowered a possible coalition pay-off due to the costs associated with either breaking the treaty or integrating it into the customs union.

Denmark, the Netherlands and Switzerland are further neighbor states. None of them had the size or economic power to be a potential agenda setter. The Swiss received a guarantee of their absolute neutrality in 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 German states in the Zollverein to secure the adhesion of Luxembourg, once France had floated plans about a possible customs union (Henderson, 1984b). 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 Belgium.[25] An important part of this

---

[25] Belgium seceded from the Netherlands in 1830. The treaty of London in 1839, in which the Netherlands

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).

6 Grand coalition superadditivity

The complete unification of German territory in a single customs area happened more than fifty years after the formation of the Zollverein in 1834. In terms of the theoretical framework, the grand coalition did not form during the initial formation game. This has implications for the existence of grand coalition superadditivity, which, as defined above, states that the value of the 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 pay-offs in the bargaining game. If previously individual players join a coalition, their individual pay-off changes to a share of the total coalition pay-off. Cooperative game theory does not determine how these shares are created[26]; rather, it only determines upper and lower limits. A customs union like the Zollverein fits this nicely, since individual customs territories will be merged into one larger area and the pay-off is distributed to the members according to a number of rules[27] 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 pay-offs for all elements of the partition and influences, therefore, the pay-off of players that did not join any coalition. . As Aghion et al. show, Grand coalition superadditivity is a su cient condition for the outcome of free trade between all players.[28] The failure of the grand coalition to form in the case of the Zollverein therefore implies that grand coalition superadditivity did not hold at that point in time.

Grand coalition superadditivity depends on the shape of the value function, the idea of economies of scale in customs administration is therefore not a su cient condition for existence. Coalition externalities influence the value function, and therefore explain the observed failure of the grand coalition, membership of all German states in the Zollverein, to form. As shown above, coalition externalities further 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 to 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 pay-offs from joining Prussia later on. Economies of

---

[26] There exist various solution concepts to determine shares, most prominent being the Shapley Value (Shapley, 1953).

[27] In the case of the Zollverein the distribution of revenues is based on the population of each member state.

[28] It is not a necessary one, the grand coalition can form, despite the failure of grand coalition superadditivity, if externalities fulfil certain conditions

scale in customs administration are not capable to explain the initial refusal of the northern German states, since their accession would have led to administrative savings similar to those of the southern German states. However, Prussia was not able to lower its reservation values through coalition externalities, especially since its geographic situation allowed free access to foreign trade partners.

7 Institutional Choice

Following Viner's (1950) definition, a customs union has three central characteristics, no tariff barriers between its members, a uniform external tariff and a predetermined revenue distribution scheme.[29] Aghion et al. do not derive their model explicitly for such a union. 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, the revenue distribution scheme of a customs union usually involves some form of monetary transfer between member states. This corresponds well with the model, which incorporates the possibility of transferring utility between coalition partners in the transferable utility game underlying the pay-offs.

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. The model is however flexible enough to accommodate this, in particular I assume that the agenda-setting power, which includes power over the terms of the membership offers, of the leading nation also includes the power to determine the institutional structure of the resulting trade agreement. This raises the question as to why almost all negotiations between German states at the time revolved around 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 the 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 the rules of origin regulations at their borders is sufficiently strong. The relatively small size and complex, interwoven geographical positions of German states allowed for relatively cheap detours, so the savings through entering in the lower tariff rate FTA member state, forging the origin of the goods[30] and then freely exporting into the higher tariff member state, easily outweighed 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, 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. He could travel directly to Hesse-Darmstadt from

---

[29] Viner's definition is based on a general diplomatic consensus, which emerged in the 19th century due to international trade dispute settlements. (Viner 1950)

[30] The importance of certificates of origins was already mentioned during the discussion of Prussia's use of coalition externalties.

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 matter. (Müller 1984)

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 estimate 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 pay-off of a coalition is higher if the institutional structure of a customs union is chosen over a preferential trade agreement. This higher coalition pay-off, which allows the agenda setter to extract a higher pay-off for itself, explains Prussia's choice of a customs union over free trade agreements.

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, by 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 allows us to widen the scope of relevant factors from purely financial administrative savings to the inclusion of important geographical, political and trade policy factors. This demonstrates the importance of these factors for the creation of the Zollverein and allows for a consistent explanation of the formation process. Externalities drive the decision between a multilateral and sequential bargaining approach and they are the main determinants of the optimal sequence if the agenda setter chooses the sequential approach.

The Zollverein was a successful customs union, whose example allows us 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 blocks, but that for the 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.

Appendix

Table 1: Summary Statistics about Zollverein member states

State	Treaty Signature	Size	Border/Area	Population 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
Brunswick	10/19/1841	67.7	2.23	
Hannover	09/07/1851	698.7	0.58	
Oldenburg	03/01/1852	107.3	0.82	

*without/with Rheinpfalz

Thuringia (territories as of 1858)		Size		Population 1834
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

Data taken from:

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

Henderson W.O., The Zollverein, 1984

Effects of coalition externalities:

Example 1

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

Coalition	Pay-off	A	B	C	D
A	10	10	8	8	8
AB	20	12	8	5	6
AC	20	12	7	8	7
AD	20	12	7	7	8
ABC	30	17	8	5	2
ACB	30	15	7	8	2
ABD	30	16	8	4	6
ADB	30	15	7	4	8
ACD	30	15	6	8	7
ADC	30	15	6	7	8
ABCD	34	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 regularity with which states that have a stronger impact on others appear early in the sequence. The agenda setter chooses C over D, because C has an effect of -4 on D, while D only has an effect of -1 on C. This illustrates the special case, where only two states with an impact on each other are to be selected.

Example 2

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

The coalition pay-offs and externalities in this example are identical to the first, but with one exception – the highlighted pay-off for D under a coalition of A with B and C is now 5 instead of 2. This change results in a new optimal sequence, namely BC, which illustrates that the grand coalition is no longer the optimal outcome. Both examples make use of negative coalition externalities only. The joint pay-off 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 pay-off of 10. The existence of negative coalition externalities is therefore sufficient enough in both cases for the decision to negotiate as well as the choice of a sequential structure.

References

Aghion, Philippe, Pol Antras, and Elhanan Helpman. 2007. "Negotiating Free Trade." Journal of International Economics, Vol. 73, No. 1, September 2007,.

Alber, Georg. 1919. Zollverwaltung und Zollerträgnisse in Bayern seit dem Jahre 1819. München:Limmer.

Alesina, Alberto, and Enrico Spolaore. 2003. The size of nations. Cambridge, Mass.:MIT Press.

Angelow, Jürgen. 2003. Der Deutsche Bund. Darmstadt:Wissenschaftliche Buchgesellschaft.

Arning, Hilde. 1930. Hannovers Stellung zum Zollverein. Hannover:Culemann.

Baldwin, Richard. 1995. "A Domino Theory of Regionalism." in Expanding European Regionalism: The EU's New Members, Baldwin, R.P. Haaparanta and J. Kiander (eds), Cambridge University Press

Bates, Robert H., Greif, Avner, Levi, Margaret and Jean-Laurent Rosenthal. 1998. Analytic Narratives. Princeton University Press

Branchart, Albert. 1930. Österreich und die Anfänge des preußisch-deutschen Zollvereins. Marburg

Dumke, Rolf H. 1976. "The political economy of German economic unification : tariffs, trade, and politics of the Zollverein era." PhD diss. University of Wisconsin, Economics Department.

Dumke, Rolf H. 1994. German economic unification in the 19th century : the political economy of the Zollverein. München:Institut für Volkswirtschaftslehre, Universität der Bundeswehr München.

Eisenhart Rothe, Wilfried von, and Anton Ritthaler. 1934. Vorgesichte und Begründung des Deutschen Zollvereins 1815-1834 Akten der Staaten des Deutschen Bundes und der Europ¨aischen Mächte. Berlin:Friedrich List Gesellschaft Reimar

Hobbing.

Evenett, Simon. 2004. "The Sequencing of Regional Integration." Außenwirtschaft, , (2004-IV).

Fremdling, Rainer. 1982. "Vergleich der Schutzzollpolitik Frankreichs und des Deutschen Zollvereins in ihren Auswirkungen auf die Modernisierung der Eisenindustrie 1815-1870" in Die Rolle des Staates für die wirtschaftliche Entwicklung. Berlin: Duncker und Humblot.

Gillies, D.B. 1953. "Some Theorems on n-Person Games." PhD diss. Princeton University.

Haferkorn, Hans. 1933. "Bernhard August Von Lindenau, Die Zollfrage und der Mitteldeutsche Handelsverein." PhD diss. Leipzig.

Hahn, Hans-Werner. 1982. Wirtschaftliche Integration im 19. Jahrhundert : die hessischen Staaten und der Deutsche Zollverein. Kritische Studien zur Geschichtswissenschaft ; Bd. 52, Göttingen:Vandenhoeck and Ruprecht.

Helbig, Joachim. 1991. Bayerische Postgeschichte 1806-1870. München: Verlag Elise Helbig

Henderson, W. O. 1984. The Zollverein. . 3rd ed., London, Eng. Totowa, N.J.:F. Cass.

Kiesewetter, Hubert. 1988. Industrialisierung und Landwirtschaft : Sachsens Stellung im regionalen IndustrialisierungsprozeßDeutschlands im 19. Jahrhundert. Mitteldeutsche Forschungen, Bd. 94, Köln:Böhlau.

Kitchen, Martin. 1978. The Political Economy of Germany 1815-1914. London.

Krauss, Sylvia. 1987. Die politischen Beziehungen zwischen Bayern und Frankreich, 1814/15-1840. München: Beck'sche Verlagsbuchandlung. Schriftenreihe zur bayerischen Landesgeschichte ; Bd. 85

Kuehne, Ludwig. 1836. Über den deutschen Zollverein. Berlin:Duncker and Humblot.

Müller, H.P. 1984. Das Großherzogtum Baden und die deutsche Zollvereinigung : 1819 -1835/36. Frankfurt am Main:Lang.

Murphy, David T. 1991. "Prussian Aims for the Zollverein, 1828-1833." Historian, 53(2): p285ff.

Ohnishi, Takeo. 1973. Zolltarifpolitik Preußens bis zur Gründung des Deutschen Zollvereins : ein Beitrag zur Finanz-und Außenhandelspolitik Preußens. Göttingen: Schwartz.

Ploeckl, Florian, 2008. "Borders, Market Size and Urban Growth, The Case of Saxon Towns and the Zollverein in the 19th Century," Working Papers 55, Yale University, Department of Economics.

Rieder, Roland. 2006. "Playing Dominoes in Europe: An Empirical Analysis of the Domino Theory for the EU, 1962-2004." HEI Working Paper,, (11-2006).

Rogowski, Ronald. 1990. Commerce and Coalitions : how trade affects domestic political alignments. Princeton, NJ:Princeton University Press.

Shapley, L.S. 1953. "A value for n-Person Games." In Contributions to the Theory of Games. Vol. II, , ed. H.W. Kuhn and A.W. Tucker, 307–317. Princeton:Princeton University Press.

Shiue, Carol 2005. "From Political Fragmentation towards a Customs Union: Border Effects of the German Zollverein" In European Review of Economic History. 9(2)

Taylor, A.J.P. 1946. The Course of Germany History. New York.

Thimme, Paul. 1931. Straßenbau und Straßenpolitik in Deutschland zur Zeit der Gründung des Zollvereins 1825-1835. Stuttgart:W. Kohlhammer.

Treitschke, Heinrich von. 1872. "Die Anfänge des deutschen Zollvereins." Preußische Jahrbücher, 30.

Viner, Jacob. 1950. Customs Union Issue. New York: Carnegie Endowment for International Peace.

Williamson, Jeffrey. 2003. "Stolper-Samuelson, Strategic tariffs and Revenue Needs: World Tariffs 1789-1938."

Wittenberg, Richard. 1930. Braunschweigs Zollpolitik von 1828 bis zum Anschluß an den Deutschen Zollverein. Braunschweig: Gemeinnützige Schreibstube.

Zanden, J. L. van, and Arthur van Riel. 2004. The strictures of inheritance : the Dutch economy in the nineteenth century. Princeton, N.J. ; Oxford:Princeton University Press.

University of Oxford Discussion Papers
in Economic and Social History: Recent publications