
Most-Favored-Nation Clauses and Clustered Negotiations

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Centralization, which plays a key role in many international regimes, takes two major forms. The first is centralized monitoring and enforcement. An international institution may be responsible for collecting information on compliance or for disseminating compliance information given to it. For example, the secretariat of the World Trade Organization (WTO) collects self-reported information on compliance and oversees the dispute resolution system. Centralized enforcement has attracted substantial attention in the theoretical literature, reflecting concerns about monitoring and enforcing cooperation under anarchy.¹

The second form is centralized negotiation, where many countries bargain simultaneously within a regime. This has received some attention, largely as one of several features within the norm of multilateralism.² Important substantive examples include the General Agreement on Tariffs and Trade (GATT)/WTO, which has clustered negotiations into a few “rounds” with longer periods of no negotiations between them. This centralized bargaining, or “clustering,” is the focus of this article.

Most scholars who study the international trade regime have treated clustering as an unexceptional consequence of GATT/WTO multilateralism. This view neglects the history of the international trade regime. Such clustering is not exclusively a characteristic of the postwar trade regime, since similar clustering occurred, for example, in 1891–93 and 1904–1906. Even in the postwar period, multilateral coordination did not become an important feature of the trading system until the 1960s.³ This clustering became less important in the 1980s as the major trading

Earlier versions of this article were presented at the Rational Design conference in May 1998 and the 1998 Annual Meeting of the American Political Science Association. For comments on earlier drafts, I thank discussants George Downs, Robert Keohane, and Lisa Martin; the editors of this volume and *IO*; the anonymous reviewers; and the participants in the Rational Design conferences.

1. See Koremenos, Lipson, and Snidal, this volume.
2. Ruggie 1993.
3. See Curzon and Curzon 1976; Finlayson and Zacher 1983; and Pahre 1999, chap. 10.

nations negotiated bilaterally with one another on market opening, voluntary export restraints, and other issues.

Because clustering varies even within a single regime such as GATT, we should not view it as an inevitable consequence of that regime. Bilateral negotiations that are not clustered can have undesirable distributional effects. A most-favored-nation (MFN) clause may force a state to make concessions to one state after having already made politically costly concessions in its negotiations with another on the same issue. Clustering avoids this, making simultaneous concessions with many states possible. Consequently, clustering has distributional benefits for those who cluster.

To explain clustering I use a model of trade policy negotiations in which distribution and domestic politics interact with international regime norms. "Distribution" as defined by Barbara Koremenos, Charles Lipson, and Duncan Snidal in the framing article of the Rational Design project ("differences over which alternative cooperative agreement to implement") provides the fundamental reason for clustering. While distribution does not vary, because all trade negotiations face a distributional issue, clustering occurs only as a solution to a particular distributional problem.

Regime norms explain variation in clustering more directly. Clustering occurs when countries grant each other MFN status and negotiate with several countries over the same tariff lines. Additional variation comes from expansion of the trade treaty network to include more countries. Because this increase in number leads to greater clustering, it is consistent with Rational Design conjecture C3, CENTRALIZATION increases with NUMBER, though the causal mechanism differs somewhat.

Showing the empirical role of clustering requires looking at a period containing variation, not only in clustering but also in numbers and the MFN norm. For this reason I focus my empirical analysis on the nineteenth century, from 1815 to 1914.⁴ Countries sometimes clustered their trade negotiations during this period and sometimes did not. Virtually all treaties were bilateral, so that clustering was not simply a logical consequence of the multilateral treaty form. States negotiated treaties both with and without MFN. The number of participants in the trade regime varied over time. This variation in both independent and dependent variables permits good tests of the hypotheses.

This choice of period has additional implications. While clustering is an important feature in the design of formal institutions, I study it by looking outside formal multilateral institutions. Every bilateral treaty within a cluster meets the Rational

4. The data in this are from the Trade Agreements Database, available at (<http://www.staff.uiuc.edu/~pahre/tad.html>). This database currently contains all trade treaties signed from 1815 to 1913, except for Asian countries east of the Ottoman Empire and west of Japan (exclusive). For a treaty to be included it must make mutual reductions or bindings that directly affect bilateral trade; treaties concerning purely navigational matters or commerce alone (such as treaties granting reciprocal rights of establishment) are excluded, as are the unequal treaties signed by China and some other countries. The sources for the database are discussed on the website and include both official treaty series and secondary sources, such as diplomatic histories.

Design definition of an international institution: “explicit arrangements, negotiated among international actors, that prescribe, proscribe, and/or authorize behavior.” Clustering itself may not always meet this definition. It can be either explicitly negotiated (as in the WTO) or an emergent property of a given system.⁵ In the nineteenth century clustering was usually not explicit or negotiated, nor was it part of a formal international organization such as the WTO. However, Austria-Hungary and Germany did explicitly agree to cluster their negotiations with outsiders in the 1890s, a case thereby meeting the Rational Design definition exactly. Even when clustering does not meet the Rational Design definition of an institution, it meets the canonical definition of a regime, a norm “around which actor expectations converge in a given issue-area.”⁶ This means that my substantive focus overlaps considerably, but not perfectly, with the Rational Design definition of an institution.

My focus on the nineteenth century thus lets me investigate institutions and institutional design while also examining the historical origin of a particular design feature.⁷ Looking at a less formal regime also has advantages for case selection and research design. Most studies of centralization select on the dependent variable, looking only at multilateral international organizations in which all negotiations are centralized. This is an inappropriate approach for testing anything but a necessary condition.⁸ Second, looking at a feature only in the context of a formal institution represents a kind of selection bias because one cannot separate the underlying causal processes from the peculiarities of a given formal institution. If I were to examine centralized bargaining only in the GATT/WTO, for example, I could not separate the causal role of MFN from the specific features of the GATT/WTO, nor could I distinguish it from background variables such as hegemony, bipolarity, or the Cold War. For this reason, I approach the question of centralized negotiations in formal international organizations indirectly, by looking at centralized negotiations within a less formal regime. I return to the WTO and other formal international organizations in the final section of the article.

Clustering

Clustering is defined as a state’s simultaneous negotiations with two or more countries on the same issue. Because the negotiations address the same issue, each bilateral negotiation will be implicitly or explicitly linked to the other negotiations. Like the definition of nominal multilateralism,⁹ this definition requires only three states.

5. For the analysis of regime spread as an emergent property of the nineteenth-century trade treaty network, see Lazer 1999.

6. Krasner 1983, 1.

7. For a study of how the origins of trade institutions affect their present functioning, see McGillivray, McLean, Pahre, and Schonhardt-Bailey 2001.

8. Dion 1998; compare King, Keohane, and Verba 1994.

9. See Keohane 1990; and Ruggie 1993.

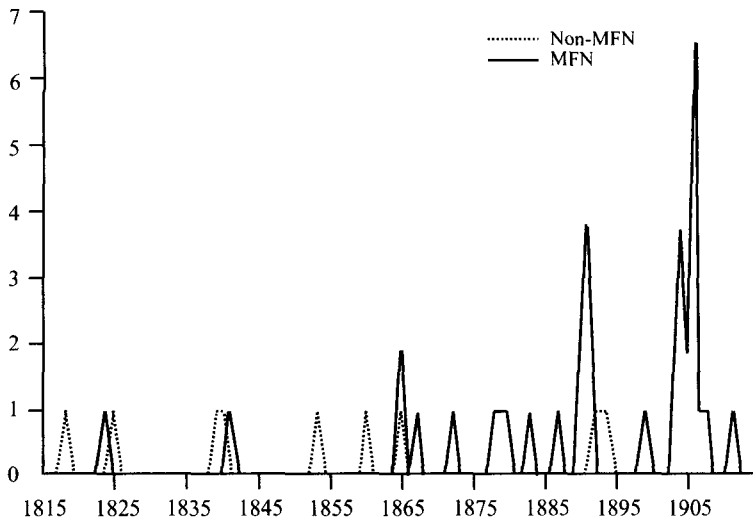


FIGURE 1. Prussian/German treaty signings by year

We often observe a substantively more important form of clustering, in which many states cluster at the same time and clusters overlap. I call such a cluster of clusters a “macro-cluster.” A GATT round is an excellent example of a macro-cluster, where many states negotiate tariff reductions simultaneously. Sometimes a new loan facility at the International Monetary Fund (IMF), such as the External Fund Facility (1974) or the facility for sub-Saharan Africa (1985), produces a similar cluster of negotiations. The IMF also helps cluster negotiations among lender countries, debtor countries, private banks, and international organizations.¹⁰

While macro-clusters may sometimes be important, my definition of clustering requires only that a single state negotiate simultaneously with several others. To explain the phenomenon, I begin with the problem in a three-state setting.

Empirically, we can see clusters by looking at the treaties signed by a single state. Consider, for example, the non-Zollverein treaties that Prussia/Germany signed in each year from 1815 to 1913, graphed in Figure 1.¹¹ Before the 1890s, Prussian treaties were infrequent and scattered in time, with no more than one treaty reached in any year except 1865. The spikes in later years reflect a flurry of treaties in 1890–91 and 1904–1906, whereas tariff treaties remained uncommon between

10. Lipson 1986.

11. The figure distinguishes MFN treaties from non-MFN treaties for reasons I explain later. While it excludes Zollverein treaties between, say, Prussia and Bavaria, it does include Prussia’s treaties with outside states that had territories within the German Confederation, such as Austria, Denmark (Holstein), Luxembourg/Netherlands, and for a time the United Kingdom (Hanover).

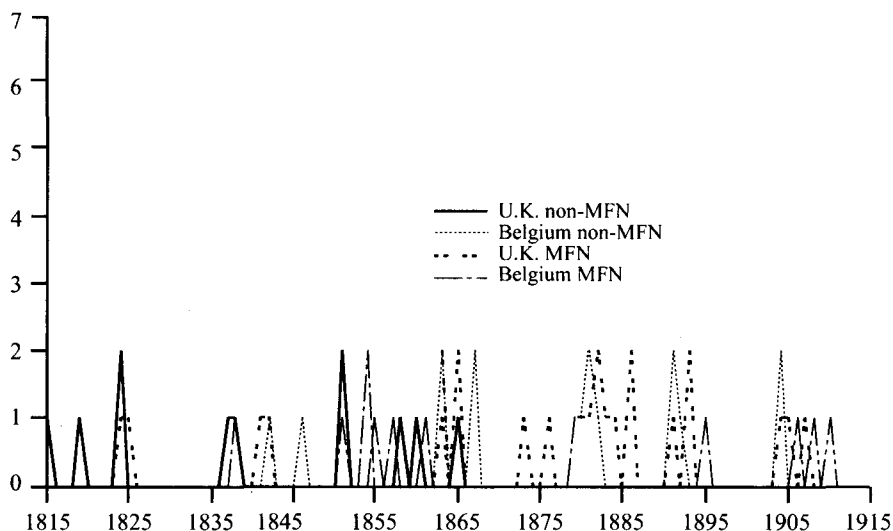


FIGURE 2. Belgian and U.K. treaty signings by year

these periods. The secondary literature identifies these two clusterings with Chancellors Leo von Caprivi and Bernard von Bülow, respectively.¹²

In contrast to Germany, Belgium and the United Kingdom did not cluster their treaties. Each country negotiated only one or two treaties a year over the course of the century (Figure 2). Both the treaties and the gaps between them appear to be randomly distributed, not clustered. With very few exceptions, such as Britain's simultaneous negotiations with France and Spain in the 1870s, the secondary literature confirms this picture.¹³

While such visual inspections help identify clustering, apparent clustering may reflect random processes by which a country occasionally negotiates several simultaneous agreements simply by chance. As I explain later, I rule out random processes by testing whether a country's annual treaty initiations are Poisson-distributed. My case study of the Caprivi cluster provides evidence that these clusters linked treaty negotiations both causally and intentionally.

Though a novel concept, clustering fits easily into conventional theories and the Rational Design framework. Clustering is a form of centralized decision making, defined by the Rational Design framers as "whether institutional tasks are performed by a single focal entity or not." The examples of centralization in the Rational Design framing article are international organizations, whereas the "focal entity" of

12. See Marsh 1999, chap. 8; Weitowitz 1978; and Werner 1989.

13. For Britain, see Marsh 1999. Belgium lacks a modern secondary literature (but Mahaim 1892), though one can piece together the details from Augier 1906; Marsh 1999; and others.

nineteenth-century clustering is one or more states that served as a focal point for negotiations. For example, the Anglo-French renegotiations of 1878–82, Caprivi's policy of tariff treaties in 1890–91, and von Bülow's negotiations of 1904–1906 each served as a focal point for a macro-cluster of treaties as several states carried on simultaneous clusters. The focal entity of each negotiation was, respectively, France, Germany, and Germany.

Of course, clustering is a decentralized form of centralized bargaining. It differs from the “unified and hierarchical control within a single organization or institution” that the Rational Design framework associates with centralized activities. It also differs from most of this volume's other articles, which focus on centralized monitoring or information gathering. This difference is most obvious in conjecture C4, CENTRALIZATION increases with the severity of the ENFORCEMENT problem. Like conjecture C4, conjecture C1, CENTRALIZATION increases with UNCERTAINTY ABOUT BEHAVIOR, and conjecture C2, CENTRALIZATION increases with UNCERTAINTY ABOUT THE STATE OF THE WORLD, also rest on the logic of monitoring and enforcement, because centralized information gathering might better ascertain whether others have defected intentionally or involuntarily. I show later that centralized bargaining works according to a different logic, one dominated by problems of distribution instead of enforcement and monitoring. Consequently, norms, distribution, and the number of actors provide more useful independent variables.

My approach most closely resembles the literature on linkage, especially multilateralism or “player linkage.” Multilateral bargains link more than one bilateral bargain, either in a formal institution or simply through common conjectures that bargains are linked. Like the Rational Design hypotheses on centralization, rational-choice theories of linkage emphasize linked enforcement, in which cheating on one partner leads to punishment by others.¹⁴ In contrast, clustering requires only linked bargaining, and states may enforce bargains independently. This resembles the prisoners of war regime, which exhibits both centralized bargaining and decentralized enforcement.¹⁵

As these examples show, this centralized bargaining process stems from individual states' decision making. States need not agree to centralize their trade bargaining, and indeed some states may be upset that others have clustered. Instead, this process reflects the choices of individual governments to launch negotiations with more than one country at the same time. In other words, clustering is a decentralized form of centralization. When several countries cluster at the same time, a macro-cluster emerges. This cluster and the states within it become a “focal entity” for decision making according to the Rational Design definition of centralization.

14. See Lohmann 1997; and Pahre 1994. While similar to player linkage, clustering concerns the number of actors and not the number of issues being negotiated (that is, scope). While such linkage may have interesting implications, this kind of linkage is not my focus here.

15. Morrow, this volume.

In short, my definition of *clustering* and the Rational Design definition of *centralization* overlap but do not coincide exactly, a point to bear in mind when applying the Rational Design framework to the clustering problem.

Explaining Clustering

Though clustering is a novel concept, three existing theories might explain it. First, transaction costs might induce states to cluster negotiations, just as they shape other problems of institutional design.¹⁶ Bernard Hoekman argues that GATT rounds solve the problems of barter in political negotiations.¹⁷ Political barter is inefficient because the market may not offer the goods a trader desires, a trader who has something to offer to one party may desire the goods of a third party in exchange, and it may be impossible to equate the marginal valuations of the goods on offer without a price mechanism. Clustered negotiations may solve these problems. A GATT/WTO round, for example, creates an agreed agenda that (1) ensures that every state finds something on offer, (2) links bilateral negotiations so that three or more parties can find feasible trades, and (3) links issues so that negotiators can equate the marginal valuations of goods across states. While conditional MFN status would also solve the barter problems, Hoekman argues that it would do so less efficiently than coordinated negotiations.¹⁸

Second, regime theories might explain clustering. Jock Finlayson and Mark Zacher argue that GATT clustering follows from regime norms of nondiscrimination, liberalization, and reciprocity.¹⁹ Clustering occurs especially at the end of a negotiating round, when third-party beneficiaries of some bilaterally negotiated tariff reduction are pressured to make additional concessions to “pay” for these benefits. Others might see clustering as a decision rule that follows from the multilateral principles of the postwar order.²⁰

Transaction-cost and regime theories may explain clustering, but neither explains variation between clustered and nonclustered regimes. Indeed, nonclustering would make sense only in terms of regime breakdown. For example, if the United States eschewed multilateral negotiations after the Tokyo Round in favor of bilateral voluntary export restraints with Japan and others, the conventional view would see this choice as a breakdown of the regime.²¹ However, such breakdown is unlikely and unexplained if other parts of the regime remain intact. These theories also fail to explain cross-national variation whenever two states are both members of the regime but only one clusters its negotiations.

16. See Koremenos, Lipson, and Snidal this volume; and Lake 1996.

17. Hoekman 1993. This argument parallels transaction-cost explanations of multilateral negotiations and multilateralism. For example, see Keohane 1984, 90; and Oye 1986, 20. For a critique, see Pahre 1994.

18. Hoekman 1993, 44–45. Compare Bagwell and Staiger 1999.

19. Finlayson and Zacher 1983.

20. Ruggie 1993; especially Burley 1993; and Goldstein 1993.

21. See, among others, Aggarwal 1985.

Finally, linkage theory might explain intertemporal variation in clustering.²² In particular, Susanne D. Lohmann's theory of linkage suggests that increasing interaction among major trading partners would lead to higher discount factors, making player linkage more likely. Yet, again, variation presents a problem. While linkage theory might explain the increasing use of clustering in the nineteenth century, it does not explain the cross-national variation we observe. Several major traders, including Belgium, the Netherlands, and the United Kingdom, certainly had high discount factors but did not cluster at any time. I argue that this variation depends critically on "distribution" and its interaction with the regime norm of MFN.

Distribution and MFN

Long informed by the Prisoners' Dilemma metaphor, theories of international cooperation have given primary attention to the monitoring and enforcement of bargains. Researchers have investigated how bilateral "hostages," international institutions, linkage, multilateralism, and relative gains make it easier or harder for states to cooperate.²³ Only recently have negotiation problems received wide attention, especially in the bargaining phase before two states reach an agreement.²⁴ The Rational Design framework, which focuses on both bargaining and enforcement, builds on these literatures.

Distributional problems are particularly salient in bargaining because negotiators disagree about how to divide the joint gains from agreement. One might view these problems as the concerns of unitary states, but the core of the strategic problem lies in domestic distributions: Politicians have an interest in satisfying both import-competers and exporters. Exporters desire lower foreign tariffs, which can be achieved only by negotiating away the domestic tariffs that import-competers favor. Politicians concerned about domestic political support would like to minimize the cost to import-competers necessary to obtain advantages for exporters. This connection to domestic political battles makes tariff treaties an interesting part of foreign policy.

Existing rules, or norms within international regimes, also affect the strategic situation in important ways. With MFN any concessions negotiated between two countries will be generalized to all other countries to which a state grants MFN status. As a result, a concession to one state today becomes a new, lower starting point for negotiations with another state tomorrow.

22. See Lohmann 1997; McGinnis 1986; Pahre 1994; Stein 1980; and Tollison and Willett 1979.

23. See Axelrod 1984; Keohane 1984; Martin 1992; Lohmann 1997; Oye 1986; Pahre 1994; Snidal 1991; and Yarbrough and Yarbrough 1986.

24. See Fearon 1998; Garrett 1992; Garrett and Tsebelis 1996; Krasner 1991; Oatley and Nabors 1998; and Snidal 1985.

The conventional view of the GATT/WTO argues that this feature of MFN encourages continual, gradual liberalization; for example, a state negotiates the steel tariff down with one country today and another country tomorrow. This assumes that states do not anticipate the consequences of the regimes they join.

Yet states do anticipate these consequences. In the 1860s Prussia wanted to negotiate a treaty with France before it negotiated with the United Kingdom. It feared that concessions to the United Kingdom would weaken its position relative to France because France would have already received Britain's concessions through MFN. Concessions to France, in contrast, would not harm any future negotiations with the United Kingdom.²⁵ Negotiating the French and British treaties simultaneously would also avoid giving away too much to the United Kingdom before turning to France.

The renewal and renegotiation of these treaties in the late 1870s supplies a further illustration. France had timed all its tariff treaties to expire in 1877, though they could be extended from year to year.²⁶ The government temporarily extended these treaties several times while negotiating with other European countries. Negotiations with Britain, France's chief trading partner, received priority. Commerce Minister Pierre Tirard, a free trader in the otherwise protectionist ministry of 1881, offered concessions on metals and machinery but not textiles, for he anticipated protectionist opposition to any British treaty. Because the British insisted on obtaining concessions on cotton textiles, they broke off talks in June 1881. They hoped that a Franco-Belgian treaty would yield Britain the tariffs they desired through MFN. This made the Belgian treaty a bellwether for the treaty system; "the conventional duties embodied in the Belgian treaty, if ratified, would single-handedly extend the liberal tariff system of the Second Empire."²⁷

These examples show that states were certainly aware of the distributional consequences of MFN treaties. This awareness made them attentive to the sequence by which they negotiated treaties with other states. I address this problem formally in the next two sections, after which I turn to the evidence.

Tariff-making with and Without MFN

Understanding the strategic problem that states face requires an analysis of MFN because each nation can impose a separate tariff on the same good from each foreign country without MFN. This means that each country A will have a tariff t_{A1B} on good 1 from country B , a different tariff t_{A1C} on goods from country C , and so on. Tariff negotiations with country B over t_{A1B} need have no relation to t_{A1C} , nor would A 's negotiations with C over t_{A1C} have any necessary implications for t_{A1B} . Each country could have in principle $m(n-1)$ tariff lines for m importable goods in a system of n countries.

25. See Davis 1997, chap. 7; and Henderson 1984.

26. Smith 1980, 182–95.

27. *Ibid.*, 191. See also Marsh 1999, chap. 6–7.

MFN changes this situation.²⁸ Now for each good i , the tariff on imports from B and C will be identical, or $t_{AiB} = t_{AiC}$. As is well known, A 's concessions to B now resemble a public good in that C may enjoy them without "paying" anything to receive them. By making these concessions public, MFN sharpens the distributional conflict in trade.

These tariffs affect the domestic political problem confronting a government. I illustrate this problem with a simple public choice model, one of a class of "politically realistic" trade policy models in which governments pay attention to both producer and consumer interests. I will not justify the functional form of the government's utility function here, though it can be derived from a model with electorally motivated tariff setting. The model simplifies existing two-country models of tariffs.²⁹

Suppose that governments choose trade policy in response to demands from domestic economic actors. These pressures may come from exporting and import-competing interests or may include consumer demands for lower tariffs. Though these groups exist on both sides of the tariff issue, the fact that consumer interests are harder to organize than producer interests biases pressure in favor of a positive tariff. In response to these pressures, each government favors some nonzero domestic tariff on each good.

In contrast, there is no home lobby arguing for foreign protectionism. Home exporters obviously seek zero foreign tariffs, and home import-competers are indifferent to the foreign tariff, so the home government faces no distributional problems in seeking zero foreign tariffs. As a result, the home government's ideal foreign tariff is zero.

With these interests in mind, I now consider a simple model with three countries and only one imported good in each country. State A has the ideal point $\{t_A, 0, 0\}$, B has the ideal point $\{0, t_B, 0\}$, and C has the ideal point $\{0, 0, t_C\}$ with $t_A, t_B, t_C > 0$. For simplicity, I assume that utility is a negative function of the distance from the outcome of the game to this ideal point. As a result, indifference curves are spheres around each player's ideal point.³⁰ Rather than show all of these spheres, Figure 3 shows a slice of each, a circle through the $t_A t_B t_C$ plane.

Because each government selects only its own tariff, each chooses its ideal point. With A choosing t_A , B choosing t_B , and C choosing t_C , the noncooperative outcome N is the point $\{t_A, t_B, t_C\}$. Figure 3 shows this point N in three-dimensional space. There are joint gains to liberalization, so all three states prefer any point that lies inside the three indifference spheres to the reversion point N . Any of these points on the plane defined by these three ideal points (inside the dotted triangle in Figure 3)

28. I treat MFN as an exogenous regime rule. There are few modern explanations of MFN, but see Bagwell and Staiger 1999. The United States saw a vibrant debate on MFN culminating in the 1920s; for a good example, see Viner 1924.

29. See Grossman and Helpman 1995; Hillman, Long, and Moser 1995; Milner and Rosendorff 1997, app. B; Milner and Rosendorff, this volume; and Pahre 1998.

30. In a more elaborate model, the indifference curves would be ellipsoids because home tariffs are more important than foreign tariffs to each government.

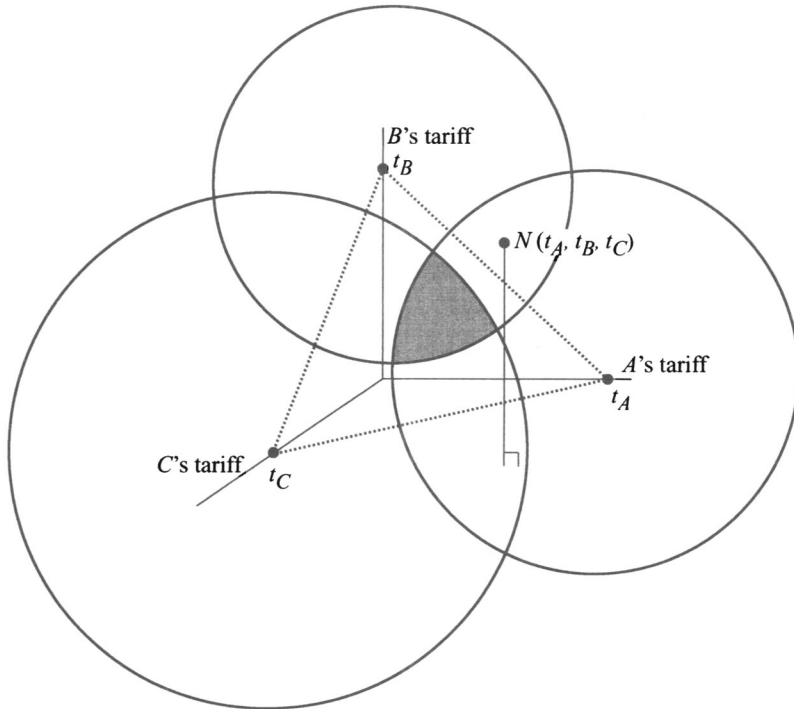


FIGURE 3. Tariff negotiations among three states

are Pareto-efficient, a triangular region known as the simplex. Inside the simplex, moving the policy toward t_A and t_B simultaneously can occur only by moving away from t_C , moving policy toward t_B and t_C simultaneously moves policy away from t_A , and moving policy toward t_A and t_C moves it away from t_B . There are many possible points of agreement on the $t_A t_B t_C$ plane that are also within the indifference curves (the shaded area in Figure 3).

This analysis implies that distributing the joint gains among these three states will present a salient problem in this strategic setting. How the states negotiate over this set of possible agreements will depend in part on the negotiating agenda they choose. In effect, different negotiating agendas decide how states move from N to an efficient point on the simplex that all prefer to N . I examine this problem in the next section.

Choosing the Agenda for Tariff Negotiations

When states can negotiate tariffs with many foreign countries, they have a choice between negotiating with one state at a time or with many simultaneously. To

understand this procedural choice, I consider tariff negotiations under two different rules, “clustered” and “seriatim.”

For ease of presentation, I assume that the outcome of any bargaining game is the Nash bargaining solution (NBS).³¹ The NBS maximizes the product of the differences between each negotiator’s payoff from the agreement and that negotiator’s payoff from the reversion point or status quo. Whenever the game is symmetric, the NBS splits the difference between the two bargainers. Since the NBS is unaffected by monotonic transformations of the utility functions, any game that can be made symmetric through such a transformation will also have a split-the-difference outcome. This feature makes the NBS very useful for the presentation here, though the results of the analysis do not require it.

As discussed in the preceding section, each state’s bliss point is a positive home tariff and zero foreign tariffs. Because the initial tariff levels do not matter for the subsequent analysis, I define the axes such that each state’s ideal tariff equals 1, or $t_A^* = t_B^* = t_C^* = 1$. For simplicity of exposition, I continue to assume that utility functions use an unweighted distance, that is, that indifference functions are spherical. Negotiations among three states, *A*, *B*, and *C*, might occur under two possible agendas:

1. Seriatim. First, *A* and *B* negotiate over tariffs. Next, *A* and *C* negotiate over tariffs. (*B* and *C* may also negotiate, but the issues surrounding this choice are best raised in the case study presented later.)
2. Clustering. *A*, *B*, and *C* negotiate simultaneously over tariffs.

I assume that state *A* can choose between the two agendas regardless of *B*’s and *C*’s interests. This is simply a notational convenience: clearly, whichever state finds itself in the position to choose the agenda, for whatever historically contingent reasons, can be labeled *A*. This state might have a first-mover advantage attributable to greater power over its interlocutors or to some domestic political process, such as legislative granting of trade negotiation authority, that makes a particular state the first to make an offer. In the case study, Germany’s market power, British aloofness from trade treaties, and the negotiating inflexibility of France’s governing coalitions combined to make Germany the focal point of trade negotiations in the early 1890s.

Sequence has an important effect on the outcomes. If states cluster the negotiations, the three-player NBS is $\{1/2, 1/2, 1/2\}$. This solution simply splits the difference between each state’s ideal point and the ideal point of its interlocutors in each dimension.

Negotiating seriatim poses a more subtle problem without a single, fully satisfactory analytical solution. To illustrate the issues I present three ways to think about the solution to the seriatim negotiation game. Though they vary in their assumptions about rational behavior, they yield qualitatively the same results; therefore, my qualitative claims are robust.

31. Nash 1950.

Consider first what would happen if the states approach each bargain myopically. This might occur if *A* and *B* do not accurately anticipate *C*'s willingness to negotiate. The NBS at the *AB* node is $\{1/2, 1/2, 1\}$, splitting the difference between *A* and *B*. This agreement at the *AB* node changes the reversion point for the subsequent *AC* negotiations. Since the NBS depends on the reversion point, the *AB* negotiations change the NBS for *A* and *C*. As a result, the NBS at the *AB* node is $\{1/4, 1/2, 1/2\}$. If *A* myopically negotiates one agreement after the other, it makes greater concessions than it would if it clustered.³²

Now suppose that *A* does not negotiate myopically but reasons through this problem with the aid of backwards induction. Though backwards induction is the normal way of solving an extensive-form game such as this, it yields an odd result. The NBS at the *AC* node is $\{1/2, 1, 1/2\}$, splitting the difference between *A* and *C*. However, this agreement at the *AC* node changes the reversion point for the *AB* negotiations, which occur first. As a result, the NBS at the *AB* node is $\{1/4, 1/2, 1/2\}$. This result strikes most people as strange because *A* gives *B* concessions right away out of the knowledge that *C* will get these concessions eventually. Odd as it is, however, it produces the same result as myopia. Because *A* prefers the higher home tariff, *A* will again prefer clustered over seriatim negotiations.

Both the myopic and backwards-induction solutions seem unsatisfactory to many people, who suggest a third approach to the game that I will call the "intuitive" approach.³³ One might expect *A* to withhold concessions from *B*, saving them for its negotiations with *C*. *B* would presumably also make smaller concessions to *A*, since it now gets less in return. Since we are intentionally considering some outcome other than the NBS, I must make an alternative assumption about the bargaining solution. I will assume that *A* offers some concession (*k*) and that *B* will make the exact same concession. We might suppose, for example, that *A* and *B* agree to $k = 1/4$, yielding agreement at $\{3/4, 3/4, 1\}$. Again, this agreement changes the reversion point for *A* and *C*, as in the myopic model.³⁴ After this agreement, *A* and *C* negotiate their NBS at $\{3/8, 3/4, 1/2\}$. In this "intuitive" approach, *A* still makes more concessions than the other states. This will happen as long as *B* insists on making concessions (*k*) equal to *A* in the range $k \in (0, 1/2)$.³⁵ While *A* makes fewer concessions than in the first two seriatim solutions, it also obtains fewer concessions in return. Again, *A* does better under clustered negotiations, obtaining more concessions from *B* and giving up fewer itself.

32. It is ironic that *A* might rationally anticipate the outcome of its own myopic behavior. One way to square this circle is to suppose that a rational institutional designer anticipates that subordinate organizations will behave in a boundedly rational way; another is that today's government might anticipate myopia on the part of a successor government.

33. Both public presentation and anonymous review of this model have yielded this reaction.

34. Using backwards induction instead of myopia for this "intuitive" approach yields the same results: *A* withholds concessions from *C* at the *AC* node in order to make them at the *AB* node.

35. If *B* does not insist on parity, *A* could get away with making sufficiently few concessions to *B* that it might end up as well off as it does under clustering; however, I cannot see any reason why *B* might be nice to *A* in this way.

All these approaches to the seriatim game therefore yield qualitatively the same result: *A* makes more concessions under seriatim negotiations than it does under clustering. For this reason, *A* will prefer clustering to seriatim negotiations. Because labeling any state as *A* is simply a notational convenience, this means that every state will prefer clustering over negotiating seriatim.

Though all states prefer to cluster themselves, they also wish others to choose seriatim negotiations. In the above analysis, states *B* and *C* clearly prefer that *A* negotiate seriatim. Yet if they were given the chance (that is, to be in the position such that they would be the state labeled “*A*”), they would clearly choose to cluster themselves. Given this strategic setting, it seems reasonable to suppose that states find clustering an attractive focal point solution to the agenda-setting problem—any other solution produces asymmetric distributional consequences, and there is no reason to expect these asymmetrical effects in what is essentially a symmetric game. Symmetry results easily when everyone clusters.

Clustering is a reasonable focal point, and alternatives to clustering would be difficult to implement. If *B* and *C* wish to prevent *A* from clustering, they must form a coalition against *A*, agreeing not to negotiate simultaneously. Presumably, each would like to negotiate last, letting it enjoy *A*'s concessions to the other before negotiating its own. The two will struggle with each other to obtain the last-mover position, and state *A* may successfully exploit these differences. We shall see such tactics in the case study.

Even if *B* and *C* were to form this coalition against *A* successfully, we would expect clustering to result. While agreeing not to negotiate simultaneously with *A*, they would presumably recognize that they had a common interest in negotiating simultaneously with outsiders *D*, *E*, and *F*. While the notational identity of the clustering states changes, the causal relationship is the same even here: MFN is a condition that produces clustering.

The conclusion that states will cluster when they negotiate MFN tariffs is affected by two background conditions, economic structure and the number of states in the trade network. Economic structure matters because *A*'s preference for clustering depends on the fact that *A* negotiates the same tariff line with both *B* and *C*. If *A* imports good 1 from *B* and good 2 from *C*, there are two relevant tariffs in *A*, t_{A1B} and t_{A2C} . The reversion point is now $\{t_{A1B}^*, t_{A2C}^*, t_B^*, t_C^*\} = \{1, 1, 1, 1\}$. As in my analysis of MFN, t_{A1B} is of interest solely to *B*'s exporters, whereas t_{A2C} is only of interest to *C*'s exporters. With clustered negotiations, the three-player NBS is $\{1/2, 1/2, 1/2, 1/2\}$, which splits the difference among all tariff dimensions.

Now consider seriatim negotiations with backwards induction (the other approaches are similar). Here, the NBS at the *AC* node is $\{1, 1/2, 1, 1/2\}$, since *A* and *C* negotiate only over t_{A1C} and t_C . These tariffs are not part of the negotiations between *A* and *B*, who split the difference on the remaining tariffs. As a result, the NBS at the *AB* node is $\{1/2, 1/2, 1/2, 1/2\}$.

This means that when *A* negotiates different tariff lines with *B* than with *C*, the clustered and seriatim outcomes are identical. Anticipating negotiations between *A* and *C* does not change the reversion point between *A* and *B* for any of the variables

over which *A* and *B* negotiate, and thus does not affect the outcome.³⁶ If *A* negotiates over a different tariff line with *B* than with *C*, *A* is indifferent between clustered and *seriatim* negotiations.³⁷ Whether this occurs is an empirical question of economic structure, not a subject of theory. There is no reason to expect clustering, especially if—as seems likely—the transaction costs of multilateralized clustering are greater than the transaction costs of bilateralism.³⁸

The second background condition is the number of states in the trade treaty network. If there are many states, it is more likely that some dyads will negotiate over the same MFN tariff lines as some other dyads. Certainly this must occur if the number of states is greater than the number of negotiated goods. In these cases, the states meet the economic structure condition for clustering and we would expect clustering to occur. A case study can determine exactly when adding a particular state to the network means that several dyads will negotiate over the same MFN tariff. Where it is not feasible to collect this information for many states, we can assume a simple correlative relationship between the number of actors and the likelihood of clustering. This hypothesis parallels Rational Design conjecture C3, CENTRALIZATION increases with NUMBER.

The analysis here leaves open the question of why states use the MFN clause to begin with. I argue extensively elsewhere that MFN must be understood as a regime norm chosen for political reasons independent of the tariff bargaining problem.³⁹ An overview of the argument here is limited by space considerations.

Discriminatory bargains and the conditional and unconditional forms of the MFN clause were available to trade negotiators in the second half of the eighteenth century. Either form of MFN had political advantages for European countries supporting newly independent states in the Americas. For example, France had political reasons for wanting a conditional MFN clause included in the Franco-American commercial convention of 6 February 1778. To keep Britain isolated from the rest of Europe, France wanted to avoid the suggestion that it was fighting a war of aggrandizement, and it preferred to pose as protecting the colonies against British oppression.

36. To see that the concessions in the *AC* negotiations do not affect the NBS, consider that the outcome of the *AC* negotiations can be washed away with a monotonic transformation of *A*'s and *B*'s utility functions without affecting the *AB* negotiation problem. Because the NBS is resistant to monotonic transformations of the utility functions, this has no effect.

37. Conditional MFN, practiced mostly by the United States in the nineteenth century, has ambiguous status here. The ostensible American insistence on additional concessions in exchange for generalizing each MFN reduction often did not matter, since the United States had a single-column tariff. Even under the Dingley two-column tariff, all trading partners received the lower tariff within a few years. For discussions, see Fisk 1903; Lake 1988; O'Halloran 1994; and Viner 1924. Such examples mean in effect that conditional MFN is more an empirical question than a theoretical one.

38. Deardorff and Stern 1992. Multilateral bargains have higher transaction costs because they include irrelevant negotiations; *A* could participate in matters that affect only *B* and *C*.

39. Pahre 2001. Two modern explanations focus on MFN-cum-reciprocity as a renegotiation-proof bargaining rule or as a way to increase the sanction against defection. Viner's classic analysis would also fit well into any modern theory of political economy. See Bagwell and Staiger 1999; Pahre 1994; and Viner 1924.

Great Britain pursued a similar policy in the 1820s when negotiating with the newly independent countries of Latin America. Unwilling to offend Spain gratuitously, Britain negotiated MFN commercial treaties with Gran Colombia and México in the early 1820s, thereby renouncing any special privileges for itself. Latin America's own policies further encouraged nondiscrimination. When Mexico declared independence in 1821, it opened its ports to all nations on equal terms. In 1822, Gran Colombia offered commerce, free residence, and full reciprocity to all countries that would recognize it.⁴⁰ Following these examples, Latin American treaties generally included MFN clauses through the century.

These concerns were largely lacking in Europe. As a result, MFN did not become a part of regular British or French practice in Europe until the 1860s, but it was common in the Western Hemisphere much earlier. This political explanation accounts for variation between MFN and non-MFN treaties, a variation that the functionalism of modern bargaining theory cannot explain. Exogenous political concerns can also explain why a norm with some undesirable implications might nonetheless persist.

In summary, this exogenous MFN norm means that states will sometimes negotiate over the same tariff line with multiple states, since any concession to one nation will be granted to others as well. MFN exacerbates the distribution problem as defined by the Rational Design framework by linking each pair's negotiations to the negotiations between all other pairs. This particular distributional problem is a necessary condition for centralized bargaining. Two background conditions, economic structure and the number of actors, further explain variation between clustered and nonclustered negotiations.

Testing the Relationship Between Clustering and MFN

The preceding section argues that the regime norm of MFN, when combined with the distributional problem of tariffs, structures the distributional problem for a state. This distributional problem then shapes international decision-making rules such as clustering or seriatim negotiations. The analysis yields the following hypothesis:

HYPOTHESIS 1. MFN IS A NECESSARY CONDITION FOR CLUSTERING.

MFN is necessary because without it state *A* would always negotiate different tariff lines with states *B* and *C*. When *A* negotiates different tariff lines, it will negotiate seriatim because of the greater transaction costs of clustering.⁴¹ At the same time, MFN is not sufficient because MFN could fail to lead to clustering if *A*

40. Williams 1972, 258–61.

41. Rephrased, this argument maintains that non-MFN is sufficient for nonclustering. A statement of this form is logically equivalent to the statement that MFN is necessary for clustering: $\langle \sim x \rightarrow \sim z \rangle \leftrightarrow \langle x \leftarrow z \rangle$.

negotiated different tariffs with *B* than it negotiated with *C*. In this case lower tariffs from *A*'s negotiations with *B* would not lead to a new starting position for negotiations with *C*, which would necessarily focus on different tariff lines. Naturally, if *A* negotiates the same tariff lines with *B* and *C*, these two variables (MFN and economic structure) are jointly sufficient for clustering.⁴² While both MFN and economic structure are easily observed in a case study, a large-*n* test of this claim requires too much information about economic structure. However, it is straightforward to test the necessity portion of this claim in a large-*n* setting, namely, that MFN is a necessary condition for clustering.⁴³

This test requires some way to capture clustering. One way to do this is by graphing a country's pattern of trade negotiations (as in Figures 1 and 2). Another approach would be to look at the distribution of treaty initiations over time. Seriatim negotiations should be Poisson distributed. This assumes that the observed number of treaties in a given year will depend on some underlying rate of treaty initiation whose realization as a count variable will vary from year to year. In contrast, clustered negotiations will not be Poisson distributed. More precisely, a test will allow me to reject the null hypothesis that these treaties are Poisson distributed at a high level of statistical significance.

To test this, I run a Poisson regression for each country's annual treaty initiations using only a constant and an error term.⁴⁴ The goodness-of-fit χ^2 tells us whether we can reject the null hypothesis that the data are Poisson distributed. Table 1 summarizes these tests, showing the confidence level at which we can reject the null hypothesis.⁴⁵ For example, the null hypothesis can be rejected at the $p < .01$ level that Austro-Hungarian MFN treaties are Poisson distributed. I can therefore feel confident asserting that Austro-Hungarian MFN treaties are not Poisson distributed.

42. I am making logical claims of the form that $(x \cap y) \rightarrow z$ and $x \leftarrow z$. MFN and economic structure are each an "insufficient but necessary part of an unnecessary but sufficient" (INUS) condition. For an influential philosophical explanation of why we would expect most causes to take this form, see Mackie 1965 and 1974; see also Kim 1971. For a probabilistic critique, see Trenholme 1975; and Friedman 1980. The INUS formulation concedes that we cannot know whether a given cause is truly necessary for a given effect without knowing all other imaginable theories that might explain that effect. This is clearly an impossible standard. Phrased differently, this formulation concedes that MFN is only a necessary condition for clustering within this theory. Since we do not have other theories of clustering, we can treat MFN as a necessary condition here.

43. Braumoeller and Goertz have recently proposed techniques for testing necessary conditions quantitatively; the dichotomous variables here allow for a simpler approach. Braumoeller and Goertz 2000.

44. Annual treaty initiations provide an adequate but not ideal measure. States cluster by negotiating simultaneously with many states, and by making sure that they reach agreement on particular tariff lines simultaneously. These agreements need not be reached in the same year, and unrelated issues sometimes drag out the final treaty. This annualized data series treats agreements reached in January and February as clustered, those reached in December and January as unclustered. These limitations can be overcome through sensitive use of the data, supplemented by qualitative evidence.

45. Because the null hypothesis of this test is that the data are Poisson distributed, the test might wrongly code some actual clustering as Poisson distributed. However, for almost all cases in Table 1 the confidence level for rejecting the Poisson null is either less than .10 or greater than .90 (these latter levels are not shown as such in the table). For these data, then, wrongly accepting the null is unlikely to be a problem. Only Serbia presents a serious question of inference in these data.

Hypothesis 1 states that MFN is a necessary condition for clustering. We should observe that all non-MFN treaty initiations are Poisson distributed. If this is a nontrivial necessary condition, we should also observe that some MFN treaties are not Poisson distributed.⁴⁶ Since the hypothesis does not state a sufficient condition, we need not expect that all MFN treaties will be non-Poisson distributed.

Table 1 shows the result of such a test for the countries of Europe, using treaty initiation data from the Trade Agreements Database. As expected, all non-MFN treaties are Poisson distributed. This is consistent with the necessary condition. MFN is substantively important and nontrivial because about half of the MFN observations exhibit clustering. It is noteworthy that the evidence in Table 1 would be inconsistent with a claim that MFN is a sufficient condition for clustering.⁴⁷ This makes the theory's successful prediction of a necessary condition all the more striking.

These Poisson data strongly confirm the hypothesis. The evidence also suggests that clustering plays an important role in the trade regime. Those countries that cluster are central to the nineteenth-century system. Austria, France, and Italy signed more treaties with more countries than anyone else. They are also central to the case study below. Denmark, Greece, and Montenegro were much more incidental to the regime.⁴⁸ In this way, the necessary condition explains the behavior we find in the most important players in the regime.

Number of Actors and Clustering

A state gains from clustering when it negotiates the same tariff line with more than one country. All else equal, adding more countries to the trade treaty regime makes it more likely that a state will negotiate the same tariff lines with several others. For example, adding southern countries to the regime meant that Germany would negotiate wine tariffs not only with Austria-Hungary and France but with Italy, Portugal, and Spain. Adding members therefore makes clustering more likely:

HYPOTHESIS 2. CENTRALIZATION (CLUSTERING) INCREASES WITH NUMBER.

Because this hypothesis follows from the distributional problems that states face under MFN, the causal mechanism differs from the mechanism behind Rational Design conjecture C3, CENTRALIZATION increases with NUMBER, which emphasizes enforcement and information-gathering purposes. This different focus may help

46. See Braumoeller and Goertz 2000. While this necessary condition would not be falsified even if none of the MFN treaties were non-Poisson distributed, such a condition would not be very interesting or useful.

47. Testing a correlative claim between MFN and clustering would raise more complicated issues, especially since both MFN and clustering are dichotomous variables.

48. The United Kingdom, though substantively important in international trade, was relatively unimportant to the treaty regime because it chose to rely on unilateral free trade accompanied by MFN treaties and only occasional bargaining over tariff lines after 1860. For details, see Marsh 1999.

TABLE 1. *Distribution of annual treaty signings*

	<i>MFN treaties</i>	<i>Other treaties</i>
Austria (-Hungary)	Not Poisson (48) $p < .01$	Poisson (23)
Bulgaria	Not Poisson (23) $p < .01$	N.A. (0)
France	Not Poisson (62) $p < .01$	Poisson (11)
Italy	Not Poisson (88) $p < .01$	Poisson (2)
Prussia/Germany	Not Poisson (37) $p < .05$	Poisson (12)
Romania	Not Poisson (16) $p < .10$	Poisson (2)
Serbia	Not Poisson (12) $p = .33$	Poisson (3)
Spain	Not Poisson (32) $p < .05$	N.A. (0)
Switzerland	Not Poisson (34) $p = .16$	N.A. (0)
Belgium	Poisson (22)	Poisson (7)
Denmark	Poisson (9)	Poisson (5)
Greece	Poisson (15)	N.A. (0)
Montenegro	Poisson (6)	N.A. (0)
Netherlands	Poisson (29)	Poisson (11)
Portugal	Poisson (14)	N.A. (0)
Sweden	Poisson (18)	N.A. (0)
Turkey	Poisson (5)	Poisson (6)
United Kingdom	Poisson (26)	Poisson (11)

Source: Treaty initiation data are from the Trade Agreements Database and are available by request from the author at (<http://www.staff.uiuc.edu>).

Note: Numbers in parentheses are the number of treaties signed in each category. The probabilities shown are the level at which I can reject the null hypothesis that the data are Poisson distributed. I can always reject this null at the .90 level or better for those cases labeled "Poisson."

explain how John E. Richards' analysis (this volume) of distributional problems in the air-traffic regime can yield the contrary hypothesis that increasing number, when combined with uncertainty, leads to decentralized monitoring and enforcement.

Testing Hypothesis 2 requires a measure of the number of actors. I will define a country's entry into the trade treaty network as the year in which it first signed a tariff treaty after 1815. This definition provides a simple operationalization of regime membership, where membership is a dichotomous variable and reflects a government's choice to enter the regime. Table 2 shows that states steadily joined the trade treaty regime throughout the century. This list generally provides a good

TABLE 2. *Membership in the European trade treaty system*

	<i>First trade treaty, 1815–1913</i>
Britain	1815
Portugal	1815
Sweden-Norway	1815
Prussia/Germany	1819
France	1826
Turkey	1838
Netherlands	1839
Belgium	1847
Russia	1847
Austria (-Hungary)	1848
Sardinia/Italy	1851
Greece	1853
Denmark	1864
Spain	1865
Romania	1875
Serbia	1879
Montenegro	1883
Bulgaria	1891

Source: Trade Agreements Database.

Note: Dates are the first year a country negotiated a trade treaty in Europe making reciprocal tariff concessions. Countries with a trade treaty in effect before 1815 are assigned a start date of 1815.

guide to each state's active participation in the regime, though it is misleading for a few countries.⁴⁹

The reasons for joining the regime vary and lie outside the theory here. A few states entered the regime as a result of gaining either national independence or foreign policy autonomy. Romania is a good example.⁵⁰ However, most countries joined the system because of a domestic political choice to negotiate tariff reductions. Turkey's entry into the nineteenth-century regime coincided with the internal reform of Mahmud II's Tanzimat, whose goals were summarized a few years into the program in the *Gülhane* (Rose Garden) rescript of November 1839.⁵¹ Austria did not sign tariff treaties until the beginning of constitutional government in 1848.⁵² Denmark joined the treaty system only with the loss of Slesvig-Holsten in 1864, when the loss of German cities led to the political consolidation of rule by

49. The early date for Portugal reflects the Methuen Treaty with Britain (Portugal denounced the treaty in 1836) and not a general policy of trade treaties. Sweden-Norway was not very active despite signing an occasional treaty throughout the century, and Russia negotiated trade treaties only very rarely until the 1890s.

50. The countries of Latin America, not discussed here, provide many more such examples.

51. See Kasaba 1988, chap. 3; Pamuk 1987; and Shaw and Shaw 1977, 71–106.

52. Braunerder and Lachmayer 1980, 112–33.

pro-export Danish aristocrats.⁵³ After having reached a domestic constitutional settlement in 1891,⁵⁴ the Bulgarian government readily joined the Caprivi cluster of 1891–92. In each of these cases domestic political change led to regime membership and contributed indirectly to clustering.

Paralleling this increase in regime membership, we see a steady increase in clustering throughout the century. France's cluster of MFN treaties in 1863–66, negotiated in the wake of the Cobden-Chevalier treaty of 1860, provides the first example. France's second cluster came in 1881–84, which renewed and extended the Napoleonic treaties after the new general tariff of 1881. This cluster included treaties with the Netherlands, Sweden-Norway, Portugal, and Spain, most of which had only recently become active trade treaty negotiators. This suggests that some clustering occurs through spread effects, as states join the regime to avoid intolerable exclusion from trade-diverting treaty regions.⁵⁵ These spread effects would be consistent with conjecture M3, MEMBERSHIP increases with DISTRIBUTION problems. States join the regime because of the severely distributional nature of trade negotiations, a feature that is exaggerated when states inside the network receive different terms than those outside it.

We may also count Hungarian autonomy in the *Ausgleich* of 1867 as raising the number of actors, since Hungary gained the right to impose its own tariffs—even on Austrian goods if it had so chosen. From 1867, therefore, Austria had to negotiate tariffs with Hungary every ten years as part of the *Ausgleich*. The first cluster of Austro-Hungarian treaties came in the same year. At the second renewal of the *Ausgleich* in 1887, Hungary tied the new common tariff to tariff reductions in any future German treaty.⁵⁶ This prompted Austria to pursue favorable treaties with its own natural markets in the Balkans. The *Ausgleich* renewal years coincided with Austrian tariff wars and treaty renegotiations with Austria-Hungary's Balkan trading partners: Romania in 1886 and Serbia in 1896 and 1906–10.

Therefore, through the decentralized decisions of many states, the number of actors increased, further centralizing the trade treaty regime. By 1904–1906, most of Europe's treaty negotiations pulsed to the rhythm of a single beat.

Distributional Effects of Clustering

If my claim is correct that clustering has important distributional consequences, states that cluster should make fewer concessions in trade treaties than those that do not cluster. Coding treaty provisions and comparing concessions is one way to test this claim, though measuring concessions is not easy. First, one could assess the actual tariff lines and how much they were reduced. The natural way to aggregate these concessions is to weight each tariff reduction by the value of imports entering

53. See Andersen 1958; and Jones 1970, 72–90.

54. See Black 1943; and Crampton 1997.

55. See Lazer 1999; and Pahre 2001.

56. von Bazant 1894, 28–29.

under that tariff line—though this import value is itself endogenous, a function of the tariff. This endogeneity complicates the task considerably. The concessions could be weighted by either their pre-concession or post-concession import value; these will consistently produce different results unless the import elasticities of all imported goods are exactly equal.

Another way to measure a trade concession is to observe the increased level of bilateral trade that results when a treaty is in effect. Under this approach the actual tariff change need not be observed; instead, the observed trade levels can be used to infer effective levels of protection. To simplify the weighting problem, I use a common metric (increased trade) to measure all concessions. With this more practical approach, my argument implies the following hypothesis:

HYPOTHESIS 3. THE EFFECTS OF A TRADE TREATY ON BILATERAL TRADE WILL BE SMALLER FOR A STATE THAT CLUSTERS THAN FOR A STATE THAT DOES NOT.

Testing this hypothesis requires finding a country for which bilateral trade data exist both before and after it began clustering. In addition, this country must have negotiated trade treaties before clustering, so that I can isolate the effects of individual trade treaties from clustered trade treaties. Finally, clustering should have no effect on bilateral trade with any country unless it has negotiated a treaty with that country.

Germany meets these requirements. Trade data begin in 1880, and Germany began clustering in 1890–91 (see Figure 1). Germany had treaties in effect with most European countries, but its first treaty with Belgium took effect only in 1882, and its sole reciprocal trade treaty with the Netherlands (1840–42) far predates unification and clustering.

I look at Germany's bilateral trade with three major trading partners that did not themselves cluster: Belgium, the Netherlands, and the United Kingdom. Figure 2, like Table 1, confirms that these were not clusterers. Excluding the major trading partners that did cluster, such as Austria-Hungary, France, and Italy, provides a cleaner test of the hypothesis since I need not worry about whether their own clustering years (that is, 1887–89 for Austria-Hungary) have an independent effect on bilateral trade.

The hypothesis predicts that clustering will reduce Germany's concessions in trade treaties. To measure concessions I use a dummy variable equal to 1 whenever Germany has a trade treaty in effect with a given country; a second dummy variable for 1890–1913 captures the clustering years. To provide a null estimate of bilateral trade, I use a modified gravity model. The basic gravity model predicts that bilateral trade equals the product of two countries' gross national products (GNP) divided by the square of the distance between them.⁵⁷ Because I fit a separate model for

57. For a review of these models and discussion of how they relate to economic theory, see Deardorff 1984.

TABLE 3. *Clustering and trade concessions (dependent variable is bilateral trade value)*

	<i>Predict</i>	<i>United Kingdom</i>	<i>Belgium</i>	<i>Netherlands</i>
German GNP	+	2.12 (0.40)	1.38 (0.44)	1.09 (0.51)
Foreign GNP	+	1.31 (0.51)	0.75 (0.21)	1.0 (0.40)
Treaty in effect	+	N.A.	0.13 (0.058)	N.A.
Clustering	— ^a	-0.084 (0.030)	-0.22 (0.064)	-0.044 (0.037)
Constant	N.A.	-0.010 (0.028)	0.023 (0.029)	-0.36 (0.040)
<i>N</i>		33	33	33
<i>F</i>		14.66	12.01	4.22
Adj. <i>R</i> ²		0.562	0.579	0.232
Durbin-Watson		2.63	1.47	1.69

Sources: Mitchell 1979; and Trade Agreements Database.

Note: Standard errors are in parentheses. All coefficients are statistically significant at the .01 level or better (one-tailed test) except for Dutch clustering and the constants; these are not significant at the .10 level. GNP and bilateral trade data are first differences of the logarithms.

^a Because the Netherlands never had a treaty in effect with Germany, the clustering variable should not be significant for the Dutch regression.

bilateral trade with each foreign country, the denominator of this equation (distance squared) will appear in the constant of the regression. Taking the logarithms of both sides, I then regress logged bilateral trade against each country's logged GNP. Thus my null expectation for bilateral trade is simply that the logarithm of Germany's bilateral trade with each foreign country will equal the sum of the logarithms of the GNPs of Germany and that foreign country plus an error term.

Initial tests found significant serial correlation in the time series. To eliminate this I took the first differences of each variable. As a result, the equations that I report model annual change in the logged bilateral trade regressed against annual change in logged GNPs.

The results are reported in Table 3. The evidence strongly confirms the hypothesis, with all coefficients significant at better than the .01 level (one-tailed test). Moreover, clustering is not significant for Dutch-German trade, exactly as predicted. The models also seem to provide reasonable fits for the data, though the adjusted *R*² and *F* measures are not nearly as good for the Netherlands equation as for the others.

As discussed earlier, these results rest on an indirect measure of tariffs and tariff concessions, namely bilateral trade values. Because trade values can depend on many economic variables, such as transport costs, some variable outside the theory could lie behind the observations. It is therefore gratifying that the variables are all signed in the right direction, though the predicted signs vary. For example, the United Kingdom dummy for clustering is negative, as expected, whereas if the estimate had been greater than zero, it might simply be picking up increased trade as a result of improvements in transportation and communications. The positive

estimate on the dummy for the Belgian treaty in effect without clustering is also exactly as expected. The theory also predicts statistical nonsignificance correctly in the case of Dutch clustering. An excluded variable, always a potential problem in simple models, would be unlikely to get this combination of results exactly right.

The data are consistent with the theoretical claim that clustering leads to higher tariffs than *seriatim* negotiations. This suggests that the spread of MFN in the second half of the nineteenth century produced higher tariffs than the nonclustered negotiations at mid-century. The historiography concurs, arguing that the treaties of the 1890s produced a period of greater protectionism.⁵⁸ While negotiated tariffs are presumably lower than nonnegotiated tariffs, this decision-making procedure had important consequences for the substance of the trade regime.

Qualitative evidence suggests much the same for earlier periods. France clustered its negotiations in the early 1880s by imposing a renegotiation deadline of 18 November 1881 on all its partners. This is closely associated with its efforts to increase its tariff without breaking away from the treaty network. In other words, France wanted its partners in cooperation to agree to a higher French tariff in the 1880s than they had negotiated in the 1860s or 1870s.⁵⁹

A different mechanism by which clustering induced higher tariffs was the widespread practice of introducing tariffs in advance of a cluster of major renegotiations.⁶⁰ Many countries raised their tariffs in advance of the renewals and renegotiations in 1903–1905. Though I have not modeled the incentives for such tariff setting, the logic is fully consistent with the model.

The historiography provides additional evidence in support of Hypothesis 2. Historians typically describe 1890–1914 as a period of increased European protectionism, which eventually included even liberal Switzerland in 1906.⁶¹ Some historians notice that this alleged protectionism was accompanied by an increase in trade treaty negotiations.⁶² Some countries, notably France, used these treaties as part of an effort to revise tariffs upwards while retaining market access in a few sectors. Likewise, Germany and Sweden signed two significant treaties that guaranteed each country some protection while liberalizing only a few sectors such as iron ore, paving stones, and timber. I argue in the following section that these two trends go together, that clustering made these treaties less liberal than their often nonclustered predecessors.

58. See Lindberg 1983; Marsh 1999, chap. 8; and Matis 1973, 51.

59. Marsh 1999, 137.

60. Another trick that states used to combine protectionism with MFN treaties was greater tariff differentiation. Sweden used differentiation of iron export duties to good effect to force Germany to make major concessions. See Lindberg 1983; and Werner 1989, chap. 1.

61. Examples of the historiography include Coppa 1970 and 1971; Friedman 1978; Lindberg 1983; Howe 1997; Marsh 1999; Platt 1968; Rogowski 1989; Smith 1980; Weitowitz 1978; and Werner 1989.

62. Examples include Marsh 1999; and Weitowitz 1978.

Clustering and the “Comet Year” of 1892

While the Poisson tests uncovered a nonrandom distribution of treaties, no statistical test can show that states intended to cluster. Similarly, the quantitative evidence in the preceding section demonstrates only a correlation, not necessarily a causal link to the MFN clause. Showing intention requires more qualitative evidence, which I provide in this section.

My central claim is that MFN is necessary for clustered negotiations. Testing this hypothesis requires selecting on the dependent variable⁶³—that is, finding a case of clustered negotiations and then looking to see if the MFN clause was necessary for it. The case should also reveal that decentralized negotiations between many states can be causally linked, that is, clustered. In a strategic model such as mine, showing causality further requires evidence that decision makers understood the dangers of seriatim negotiations under MFN. I also need to show that decision makers intended to cluster negotiations, recognizing that this would avoid the problems of MFN.

The case selection issue comes first. Several clusters present themselves, including France’s clusters of 1863–66 and 1881–84, the Caprivi–Méline cluster of 1890–92, and the von Bülow cluster of 1904–1906. Minor powers also clustered their negotiations, but these generally coincided with major-power clusters and are derived from them. The most substantively interesting of these is the 1890–92 cluster because it stemmed from contemporaneous but causally distinct decisions in Austria-Hungary, France, and Germany. This case was also chosen because of the data-availability issues discussed in the preceding section, making both quantitative and qualitative analysis of the same cluster possible.

The French had arranged for their existing treaties to expire together in 1892, a date the German-speakers labeled the *Kometenjahr* (comet year). Domestic debates over the treaties and rising protectionism led France to adopt the Méline tariff of 1892, which established a supposedly nonnegotiable minimum tariff. In fact these duties could be negotiated downward, and were. France concluded treaties with sixteen countries from 1891 to 1893, though the concessions exchanged were much less significant than in earlier treaties.

While aware of French debates, German clustering occurred in a different context. Chancellor Caprivi sought a new foreign policy (*Neue Kurs*) distinct from Otto von Bismarck’s. Trade treaties would mark his government’s greater concern with economic issues. Treaty negotiations also posed an opportunity to attract labor support for the government, support that was especially attractive after the repeal of the *Sozialistengesetz* (anti-Socialist law) in 1890.

In contrast to France and Germany, Austria-Hungary did not have domestic political reasons for treaty negotiations in 1890–92. The Caprivi–Méline cluster thus occurred when the Dual Monarchy would not otherwise have negotiated treaties, for Austro-Hungarian negotiations typically occurred around the decennial renewal years of the 1867 Ausgleich (that is, 1877, 1887, 1897, and 1907). This

63. Dion 1998.

makes Austria-Hungary a useful control case, for its decision to cluster in 1890–92 must follow exclusively from MFN bargaining considerations and not merely domestic political calculations.

Having chosen this case, the next question is whether politicians worried about the distributional effects of MFN. It is not surprising that they did. The Austrian protectionist Joseph Neuwirth described MFN “as a gift to all states that neither can nor want to make mutual concessions, a clause through which every tariff reduction granted to one state immediately and *ipso facto* becomes applicable to all other states.”⁶⁴ Supporters of MFN could not disagree with this assessment, though they naturally viewed nondiscrimination more favorably than did Neuwirth—even seeing it as an advantage. Because of the MFN clause, according to Foreign Minister Marschall, most of Germany’s “concessions in cooperative treaty negotiations with Italy are obtained not only through concessions made directly to Italy but also with an eye on those concessions obtained indirectly through the Austro-Italian treaty.”⁶⁵

Wine tariffs, which played an important role in many of the negotiations, provide a good illustration of how these concerns manifested in practice. Britain well knew that the MFN wine duties that it had given to France also gave cheap Italian wines low-tariff access to the British market. Instead of being grateful, Italy’s government could—and did—ask for still more reductions in these wine duties in exchange for lower tariffs on English exports. Spain had similar views. It was willing to trade reductions in its tariffs only for still more concessions on wines, particularly a structure of duties that treated heavier Iberian wines more favorably than the existing system based on alcohol content. The *seriatim* model captures this concern, whereby earlier concessions to one party become a new baseline for negotiations with third parties.

Germany, another wine importer, faced the same strategic problem. The Interior Ministry in Berlin opposed lowering any wine tariffs for Austria-Hungary because they would reduce the basis for future negotiations with Italy, Spain, and France.⁶⁶ As argued earlier, having MFN treaties and negotiations cover the same tariff lines are jointly sufficient for clustering. These conditions are met here, and wine did indeed provide important subject matter throughout the Caprivi cluster.

Problems around MFN also drove Austrian policy. In the early 1890s the imperial-and-royal government could not decide whether talks with Germany or the Balkan countries should be concluded first. Hungary wanted access to Germany and opposed opening markets to the Balkans, whereas Austria wanted cattle imports

64. “als eine Gratisprämie für alle Staaten, die Gegenkonzessionen nicht machen können oder wollen, eine Klausel, durch welche jede Zollverabsetzung, die irgend einem Staate für irgend eine Konzession gewährt wird, sofort und *ipso facto* auch allen anderen Staaten zugute kommt.” Cited in von Bazant 1894, 34–35.

65. “daß bei kooperativen Handelsvertragsverhandlungen mit Italien . . . das Maß unserer Konzessionen, nicht nur durch die uns direkt angebotenen italienischen Konzessionen, sondern auch durch die Aussicht bestimmt wird, weitere Konzessionen indirekt durch den österreichisch-italienischen Vertrag zu erhalten.” Cited in Weitowitz 1978, 144.

66. See Marsh 1999, chap. 5–6; and Weitowitz 1978, 58–59.

from Serbia and Romania but feared competition from Germany. Both sides feared that concluding any one treaty would make concluding later treaties more difficult.⁶⁷ MFN exacerbated the internal divisions over policy, for it would erode the concessions that each half of the monarchy would obtain in its preferred export market. For example, Germany could enjoy the Balkan market that Austria had opened, just as Serbia and Romania could obtain access to Germany on terms equivalent to Hungary's.

The solution to this internal dilemma lay in an informal agreement known as the "Montsche Proposition," a proposal by the German chargé in Vienna (Monts) that Germany and Austria-Hungary would not negotiate any treaties without coordinating with the other state. This meant that Hungary could consent to Balkan treaties since the negotiations would be linked to Hungary's own efforts to open Germany. Similarly, Austria could make concessions to Germany while working together on the Balkans, Italy, or Switzerland. Rolf Weitowitz argues that this arrangement "made it possible to appease the opposing interests of agrarians and industrialists in Austria-Hungary. This made it easier for the Vienna government to grant Germany industrial concessions, in the well-founded hope of obtaining tariff advantages in third markets."⁶⁸

The agreement also put pressure on the Balkan countries. Their food exports could only gain access to Germany if their country also signed a trade treaty with Austria-Hungary. As a result, their treaties were negotiated and signed close to each other. Serbia signed its treaties with Austria-Hungary and Germany on the same day, 9 August 1892. Romania reached agreement with Germany on 23 October 1893 and with Austria-Hungary on 21 December 1893. The German connection made it unnecessary for Austria to postpone closing its negotiations with Germany until after having reached treaties with Serbia and Romania.

Concerns about MFN are also found in negotiations over industrial tariffs. The problems of MFN concessions were especially important for Belgium because of its small size and central location. It was always careful during the Austro-German-Belgian negotiations to see that France could not take advantage of the treaty tariffs. Anticipating an eventual MFN treaty with France, Belgium was also concerned to limit its concessions to Germany on the iron and textile tariffs that would be the focus of Franco-Belgian negotiations. The same concerns led Belgium to negotiate with France and Britain at essentially the same time, delaying the easier British talks until the outline of the French treaty was established.⁶⁹

Clustering MFN treaties had other effects outside the narrower limits of the model. Because states knew that MFN treaties would shift the reversion point in

67. Weitowitz 1978, 55–56.

68. "denn sie ermöglichte, die widerstreitenden Interessen der Agrarier und Industriellen in Österreich-Ungarn zu beschwichtigen. Der Wiener Regierung wurde es hierdurch leichter gemacht, Deutschland industrielle Konzessionen zu gewähren, in der begründeten Hoffnung, Zollvorteile auf dritten Märkten zu erlange." Weitowitz 1978, 56.

69. See Marsh 1999, chap. 8; and Weitowitz 1978, 115–16.

negotiations with third parties, they had an incentive to keep the outcome of any negotiations secret. Once the first group of Austro-German treaties were made public in December 1891, there was a danger that third states would simply demand MFN treaties with Germany and Austria-Hungary to obtain the already given treaty tariffs. These partners addressed this problem by putting their tariff line concessions in a secret protocol. After reaching this secret agreement, these two then presented a common front in negotiations with Italy, Switzerland, and Belgium in the summer of 1891. By keeping these tariff lines secret, concessions that Germany and Austria-Hungary had already made to each other could be offered anew to these countries.⁷⁰

Such secrecy was only one reason why other states did not want a government to cluster its negotiations with them. As the theory predicts, a country should oppose, on distributional grounds, being brought into a cluster. Austria-Hungary and Germany had various means to bring reluctant interlocutors along; the size of the German market, in particular, posed a potent source of power.⁷¹ While Switzerland opposed simultaneous negotiations with Vienna and Berlin, it feared exclusion from the treaty network, especially if Italy were to sign a treaty whose benefits would be denied the Swiss. When this exclusion seemed a real possibility, Bern commenced common negotiations with Austria-Hungary and Germany in the fall of 1891.⁷² The Belgian negotiator, Greindl, apparently did not even know about Austro-German coordination at first. After receiving common demands from the partners, he naively asked whether it might not be more advantageous for Belgium to receive separate lists of demands from Germany and Austria-Hungary. This objection was met by referring to the political friendship of the Dual Alliance countries and their wish for common negotiations.⁷³

Because this alliance excuse was not available, Austro-German coordination against Italy provides evidence that distributional concerns were important. Out of respect for its partner in the Triple Alliance, the Dual Alliance had decided not to give Italy the same treatment as Switzerland, Belgium, and the Balkan countries. When given a choice in August 1891 between separate Austrian and German negotiations or a conference *a trois*, Italy naturally chose separate talks. The logic behind this choice follows directly from the earlier analysis. However, Italy's decision did not keep the German and Austrian commissioners from consulting each other in secret, a deception made easier by Italy's having agreed to conduct all these negotiations in Munich.⁷⁴

When Prime Minister Rudinì discovered this deceit, he threatened to break off negotiations. Caprivi calmed him in telegrams explaining that common negotiations were necessary because of German domestic politics and the tightness of the Dual

70. Weitowitz 1978, 83–84, 154–55.

71. Lindberg makes exactly this argument for Sweden a decade later. Lindberg 1983.

72. Weitowitz 1978, 91, 104.

73. *Ibid.*, 114–15.

74. *Ibid.*, 136, 143.

Alliance; linking any Austro-Italian trade treaty to foreign policy would help ratification of the Italian treaty in Germany. Rudinì satisfied himself with a paraphrase of their secret treaty of October 1891—though Austria-Hungary and Germany did not give Italy a copy of the treaty itself. The Germans' account of these negotiations makes the connection to MFN clear: "What he [Rudinì] calls "pressure" and "threats" is just nothing but the indivisible connection between the various treaties, created by the idea of cooperation and MFN, which he has himself recognized by accepting our condition."⁷⁵ Again, this follows the logic of the theory.

Finally, the theory predicts that all this clustering would lead to treaties that make smaller concessions than nonclustered treaties. As we would expect, the concessions made in the Caprivi cluster were not particularly far reaching. Belgium's concessions can stand for many others. Germany received twenty-four tariff-line concessions in the Belgian treaty, mostly on industrial goods, and obtained eighteen additional tariff bindings. Belgium reduced only seven tariff line items, two of which responded to Austro-Hungarian demands. German agriculture was particularly disappointed in its hopes for greater access to the Belgian market. All these concessions were sufficiently small that an upward revision of the Belgian tariff in 1895 was consistent with the letter of these treaties. Such results add substantive meaning to the quantitative test in the preceding section, which found that Belgian-German clustering was associated with a smaller effect on German imports than earlier nonclustered treaties.

In summary, this case study confirms both the hypotheses and the underlying logic of the model. The qualitative evidence also fleshes out the quantitative findings of the preceding section, which covers the same states in the same period. This case also shows some of the steps that practical statesmen take in response to the strategic problems highlighted by the model. While these tactics are richer than those found in any model could be, they reflect the same strategic logic. The resulting policies of nondiscrimination, combined with threats of exclusion, careful attention to sequence and timing, and efforts at secrecy, play important roles in the negotiations of the early 1890s. As events show, states facing a clusterer have few choices available to them, making it easier for them to cluster when MFN provides the incentive.

Conclusions: Implications for the GATT/WTO Regime

The Rational Design framework represents a laudable move from the study of "cooperation" in the abstract to more concrete features of international cooperation and organizations such as centralization, membership, scope, and flexibility. I join

75. "Was er 'Pression' und 'Drohung' nennt, ist also nichts anderes als der durch die Kooperationsidee und die Meistbegünstigung geschaffene, untrennbare Zusammenhang der verschiedenen Verträge, den er selbst mit Annahme unserer Bedingung anerkannt hatte." Cited in Weitowitz 1978, 144.

this movement by arguing that regime norms and domestic politics can interact to produce centralized bargaining within an international regime or formal organization.

I have argued that MFN is a necessary condition for clustering, that clustering becomes more likely as the number of states in the trade network increases, and that states that cluster make fewer concessions than states that do not. The second of these claims is identical to Rational Design conjecture C3, CENTRALIZATION increases with NUMBER. My first major hypothesis, that MFN is necessary for clustering, is not formally a part of the Rational Design conjectures. However, it lends itself to a future Rational Design agenda, and would be consistent with a conjecture that centralization increases with distributional problems. Quite aside from MFN, my analysis also suggests an additional link between distribution and centralization based on a synthesis of two Rational Design conjectures. While I did not test it formally, my analysis of clustering supports conjecture M3, MEMBERSHIP increases with DISTRIBUTION problems. The distributional problems of MFN tariff bargaining encouraged new states to join the regime. For reasons also found in conjecture C3, this increased number of players produced more centralization (clustering).

Beyond its theoretical agenda, this article has some substantive implications. Its evidence helps reconcile two contending views of the nineteenth-century trade system. Many historians view the 1890s as a return to protectionism, evidenced by the Méline tariff and the supposed breakdown of the 1860s treaty system. In contrast, political scientists see continued openness under hegemony, led by Britain's refusal to engage in Tariff Reform. My analysis suggests a middle ground, continued openness undergirded by new treaties that did not reduce tariffs by as much as previous treaties had. Severe distributional conflicts within a cooperative regime limited the openness achieved.

Limited openness is also evident in other trade institutions characterized by clustering or other centralized bargaining. Because the GATT system clustered negotiations into rounds, it long seemed that this decision-making rule stemmed from regime norms such as reciprocity or multilateralism.⁷⁶ While I have not analyzed these norms directly, I have shown that reciprocity is not essential to explaining GATT clustering. Clustering certainly can follow from MFN clauses, economic structure, and the number of actors.

The distributional argument here suggests a rethinking of the negotiated tariff concessions of GATT. Although the GATT system successfully produced fifty years of liberalization, liberalization occurred slowly. Much of Western Europe achieved comparable liberalization in the 1860s alone.⁷⁷ A historical perspective raises the question of whether GATT somehow encouraged states to make small concessions or to liberalize only in a series of small steps.

76. For two otherwise different examples among many, see Curzon and Curzon 1976; and Ruggie 1993.

77. Marsh 1999.

Though this claim must remain speculative for now, the theory suggests that GATT's slow pace stemmed from clustering MFN negotiations. The first three rounds (Annecy, Torquay, and Geneva) made especially slow progress under conditions closest to those of the model. Gilbert Winham argues that MFN forced each state to attempt negotiations with all the relevant players simultaneously.⁷⁸ These negotiations made concessions more difficult since they would be generalized to third parties.

According to Winham, the Kennedy Round avoided these problems by moving to linear tariff reductions. This focused negotiations on exceptions to the basic cuts rather than on the basic offer. It therefore represents a novel agenda-setting rule, one that poses an alternative to clustering in its nineteenth-century form. Liberalization in the subsequent Dillon and Kennedy Rounds proceeded much faster than before. Future research could extend the theory of clustering to consider a linear tariff-cutting rule as well as the political effects of the GATT reciprocity norm.⁷⁹

Though I drew examples from the nineteenth century, the analysis has testable implications for contemporary negotiations in trade and other issue areas. In the United States clustering seems to have broken down in the late 1970s and much of the 1980s. Bilateral negotiations over voluntary export restraints, structural impediments to trade, export subsidies in agriculture, intellectual property rights, and bilateral investment treaties dominated the policy agenda. These issues were not characterized by MFN treatment, so the theory predicts they were unclustered.

In contrast the theory predicts that quota negotiations in the textiles regime are likely to be clustered. In this case if the United States negotiates seriatim, it might concede a greater quota to Taiwan and then have to negotiate the same quota with Hong Kong.⁸⁰ Negotiating with Hong Kong and Taiwan simultaneously—that is, clustering—would give the United States a distributional advantage. The regime rules of the Multi-Fibre Arrangement and its predecessors do exactly this.⁸¹

Finally, contemporary regionalism should affect clustering. Preferential trading areas—such as the European Union, North American Free Trade Agreement, and MERCOSUR (Southern Common Market)—grant members better-than-MFN treatment. This effectively removes MFN status between members and outsiders, though each outsider still receives the same treatment as every other outsider. This discrimination between members and nonmembers pulls the rug out from under centralized bargaining. I would expect clustering to occur within these institutions, where all members are treated equally. Clustering would be less attractive between regions. Regionalization takes away an important motive for global negotiations, such as a proposed new round of the WTO.

78. Winham 1986, 62–63.

79. See Finlayson and Zacher 1983; and Bagwell and Staiger 1999.

80. Of course, quota negotiations would require a different kind of model than one focused on tariff setting.

81. Aggarwal 1985.

This argument does not address decision making between rounds, in particular, the workings of the dispute settlement mechanism.⁸² These dispute procedures should be unaffected by regionalism, which subjects centralized bargaining and centralized enforcement to different pressures even within a single international organization.

These contemporary examples raise more questions than can be answered here. The theory and the historical evidence presented here show that clustering has important distributional effects in a trade regime; they also help to explain the slowness of GATT liberalization. Clustering, far from being a “technical” characteristic of a regime, is an important political strategy with significant distributional consequences.

82. See Rosendorff and Milner, this volume.