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Keywords: preferential trade agreements, Anglo-French treaty of Commerce, bilateralism, political economy, qualitative choice models.
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Markus Lampe: Department of Economic History and Institutions, Universidad Carlos III de Madrid, C/ Madrid, 126, 28903 Getafe, Spain.
Email: mlampe@clio.uc3m.es
http://www.uc3m.es/portal/page/portal/dpto_historia_economica_inst/profesorado/markus_lampe

DEPARTAMENTO DE
HISTORIA ECONÓMICA
E INSTITUCIONES

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DE HISTORIA Y CIENCIAS SOCIALES
Universidad Carlos III de Madrid

Explaining Nineteenth-Century Bilateralism:
Economic and Political Determinants of the Cobden-Chevalier Network[1]

Markus Lampe

Department of Economic History and Institutions

Universidad Carlos III de Madrid

c/ Madrid, 126 (Ed. Foronda)

E-28903 Getafe (MADRID)

mlampe@clio.uc3m.es

and

Institut für Wirtschafts- und Sozialgeschichte

Westfälische Wilhelms-Universität Münster

Domplatz 20-22

D-48143 Münster

mlampe@uni-muenster.de

Abstract

This study investigates the empirical determinants of the treaty network of the 1860s and 1870s. It makes use of three central theories about the determinants of PTA formation, considering economic fundamentals from neoclassical and 'new' trade theory, political-economy variables, and international interaction due to trade diversion fears (dependence of later PTAs on former). These possible determinants are operationalized using a newly constructed dataset for bilateral cooperation and non-cooperation among 13 European Countries and the US. The results of logistic regression analysis show that the treaty network can be explained by a combination of 'pure' welfare-oriented economic theory with political economy and international interaction models.

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1. Introduction

Did nineteenth-century commercial bilateralism make any economic sense?

At first glance, it presents a fascinating experience of decentralized liberalization. David Lazer states that the Anglo-French treaty of commerce of 1860 (the Cobden–Chevalier treaty) started a 'free trade epidemic' that infected the European continent and led to a 'swift break with centuries of protection'.[2] The virus, bilateral preferential trade agreements (PTAs)[3] that stipulated preferential tariffs and unconditional most-favoured nation (MFN) treatment, was disseminated in a contagion process in which outsiders aimed for equal treatment on insiders' markets, thereby causing further outsiders to be exposed to discrimination and the incentive to sign treaties. In a period of 15 years, this led to the conclusion of 56 similar PTAs in Europe, forming an authentic 'spaghetti bowl' (Figure 1) and liberalising trade to an extent that was internationally unmatched until the end of the GATT's Tokyo round.

At second glance, numerous problems were inherent in this decentralized system, most notably the increasing tendency after 1865 to sign MFN-only treaties, in which no further liberalization was achieved. This development can be seen as a moment of fading will to liberalize, especially due to the incentive to free-ride on the unconditional MFN clause, and sheds doubt on the sustainability of the system.[4] Recently, Accominotti and Flandreau have combined these institutional weaknesses with their finding that treaties were ineffective and concluded that they were intended to be so:

> Liberalization was the cool thing to do and policymakers made a lot of noise to be noted (and succeeded quite well). At the same time they may have avoided upsetting their constituencies and managed to implement more or less meaningless liberalization efforts (again, well done). Paraphrasing Keynes, we conclude that later political scientists, economists, and economic historians, when writing enthusiastically about the Cobden–Chevalier treaty, have fallen prey to dead policymakers.[5]

At a third glance, the conclusion by Accominotti and Flandreau does not follow from an investigation of the determinants of the treaties, but is deducted to explain the results of an econometric analysis of their effects. This analysis has been challenged as expecting something from the treaties that they were not intended to deliver, namely increases in overall

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[2] Lazer, 'Free trade epidemic'.
[3] Throughout this article, the mentioned term (PTA) is used. It is defined following Panagariya, 'Preferential trade liberalization', p. 288, as a treaty that establishes 'a union between two or more countries in which lower tariffs are imposed on goods produced in the member countries than on goods produced outside'.
[4] See Pahre, *Politics*, ch. 10, and Irwin, 'Multilateral and bilateral trade policies', p. 101, for details.
[5] Accominotti and Flandreau, 'Bilateral trade treaties', p. 181.

trade, while stipulations were commodity-specific and can be shown to have had positive commodity-specific effects.[6]

Hence, it is time to have a systematic look at possible causes of the PTAs forming the 'spaghetti bowl' of the 1860s and 1870s. This will serve to assess if they were political and diplomatic theatre or motivated by meaningful determinants, either based on 'pure' economic theory or on political economy. The latter, among others, investigates the impact of interest groups behind the spread of the treaty network.

Figure 1 here

While previous research focused mainly on in-depth political history studies of the negotiations of individual treaties,[7] the present study makes empirical use of three central theories about the determinants of PTA formation. It study incorporates central ideas from the contagion simulation by Lazer and Robert Pahre's work that covers a wider context and is discussed below,[8] into the first comprehensive in-depth analysis of the determinants of the Cobden–Chevalier network based on a systematically elaborated and comparative dataset for the insiders and central outsiders in the formation of the Cobden–Chevalier network.

The results of this historical case study also facilitate systematic comparison with present-day bi- and regionalism, which is one of the most important fields of recent research in international economics. That research, mostly theoretical, deals with PTA formation in the context of the slow advancement of the last GATT/WTO rounds. It generally models PTAs only in the context of Art. 24 GATT[9] and asks whether they are 'stepping stones' to multilateral integration or 'stumbling stones' and as such pernicious to world trade and world welfare.[10] As in the 1860s and 1870s multilateralism was not on the horizon (except for the Zollverein in the context of German unification), historical decision-makers could more freely decide on bilaterally optimal treaties, especially when it came to potentially discriminatory tariff reductions and exceptions for 'sensitive' domestic branches. This should be beneficiary for the results of the present study.

After this introduction, the three most relevant testable theoretical explications of the formation and spreading of PTAs are outlined. Then, the empirical setup for testing these theories and the dataset elaborated to conduct the tests are presented, followed by the empirical re-

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[6] Lampe, 'Effects'.

[7] See appendix 4 and Bairoch, 'European trade policy', and O'Rourke and Williamson, *Globalization*, pp. 36–43.

[8] Lazer 'Free trade epidemic'; Pahre, *Politics*

[9] Art. XXIV (8) GATT 1994 allows departure from MFN-treatment if a subset of countries forms a Customs Union or Free Trade Area, '…in which the duties and other restrictive regulations of commerce… are eliminated on substantially all the trade between the constituent territories in products originating in such territories'. I.e., such arrangements have to embrace practically all trade, and not only be 'preferential'.

[10] For an overview of theories see Panagariya, 'Preferential trade liberalization'. Baldwin, 'Multilateralising regionalism', surveys the empirical aspects.

sults. Subsequently, these findings are interpreted in the light of theory and historical context. The final section concludes.

2. What determines preferential trade agreements?

Economic theories of PTAs assume that both countries have to be potentially better off with the final agreement than without it. The two main theoretical schools, 'pure' international trade theory and political-economic theories, differ in whether governments base their decision-making entirely on welfare-maximization or take into account the contributions of interest groups for tariff-setting and international trade policy cooperation.

In neo-classical models, initially without physical or political barriers to trade, unilateral free trade leads to optimal domestic as well as world welfare outcomes because it allows international specialization following differences in technology or in factor endowments. Although free trade always leads to optimal world welfare, the introduction of different market sizes can lead to outcomes in which larger countries influence the world price. This gives them the possibility to set 'optimum tariffs' in order to improve domestic terms of trade and increase domestic welfare at the cost of other countries. A possible implication in a world of several large countries is that other countries might do the same (*retaliation*), and hence an inefficient Nash equilibrium is established in which all countries (also the small ones) are worse off than without tariffs. This 'prisoners' dilemma' can be overcome by cooperative agreements on reciprocal tariff reductions that leave the bilateral trade balance unchanged. If there are more than two countries, such bilateral tariff reductions may lead to trade diversion, i.e., an increase of trade between collaborating countries at the expense of others. In neo-classical models, trade diversion can lead to highly ambiguous outcomes concerning the welfare of both countries involved, but unambiguously bilateral 'preferential' agreements lead to lower world welfare than free trade. This is why they are, at most, 'second best' solutions.[11]

Including production with increasing returns to scale operating under monopolistic competition, and consumers' love of variety, it can be shown that PTAs may be concluded to ensure access to larger markets. This may make production cheaper and widen the range of product varieties available to consumers. Nevertheless, in most of such models of the 'new trade theory' optimum world welfare will still be achieved only under unilateral, or alternatively, multilateral tariff abolishment.[12]

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[11] See Bagwell and Staiger, *Economics*.
[12] See Goyal and Joshi, 'Bilateralism'; Furusawa and Konishi, 'Free trade networks'.

Research in the political economy of trade agreements takes into account that governments' decision-making might not be based entirely on welfare optimization.[13] Approaches like the 'protection for sale' literature following Grossman and Helpman include campaign contributions of domestic-producer interest groups into the function maximized by governments and are able to explain both the existence of tariffs and preferential commercial policy cooperation on this basis: While import-competing interest groups lobby for unilateral tariffs and against their reduction, their influence might be nullified or outweighed by exporter interest-groups if bilateral cooperation promised better market access for the latter. As exporter interest-groups tend to value preferential access to bigger markets higher, their lobbying might discriminate against smaller markets and harm world-welfare optimal arrangements.[14]

Many of these models imply explanatory variables that are not empirically observable. To keep this section focused, only models that yield testable hypotheses are discussed: Baier and Bergstrand combine traditional and 'new' trade theory under the assumption of welfare-optimising governments. Their model will serve as a 'baseline model' that will be combined with two political-economy approaches: Pahre's political support theory of domestic tariff formation and resulting likelihood of PTA cooperation, and Richard Baldwin's domino-theory that models international interaction based on the potential trade-diversion effects of PTA formation on interest groups in non-participating countries. [15]

Economic fundamentals. Baier and Bergstrand provide a general equilibrium model to identify the determinants of bilateral trade agreements. Building on 'new trade theory' models by Paul Krugman and Frankel, Stein, and Wei, they differentiate between inter- and intra-continental transport costs to account for the fact that geography plays an important effect in the formation of prevalently regional PTAs. Their model includes two factors of production and two monopolistically-competitive industries that produce with increasing returns to scale. The decision to conclude a PTA is taken by social planners who maximize the welfare of their countries' representative consumer.[16]

Baier's and Bergstrand's analysis yields seven hypotheses about factors influencing the net welfare gain from a PTA and the corresponding probability that it is concluded: First, it increases for countries that are located closer to each other (i.e., it decreases with higher transport costs). Second, it increases with the remoteness of the country pair from the rest of the

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[13] See Rodrik, 'Political economy', and Bagwell and Staiger, *Economics*, for comprehensive introductions.

[14] Grossman and Helpman, 'Protection for sale' and 'Politics of free-trade agreements'; see also Aghion, Antràs, and Helpman, 'Negotiating free trade'.

[15] Baier and Bergstrand, 'Economic determinants'; Pahre, *Politics*; Baldwin, 'Domino theory'.

[16] Baier and Bergstrand, 'Economic determinants'; Krugman, 'Move toward free trade zones'; Frankel, Stein, and Wei, 'Trading blocs'.

world for trading partners on the same continent. While the former accounts for the fact that integration becomes more attractive if transportation between markets is relatively cheap, the latter hypothesis models the opportunity costs and possible welfare losses from the bilateral PTA in question that are lower if all other countries are relatively far away.

Because economies of scale increase with market size, the third and forth hypothesis are that potential welfare gains increase if both countries are large and if the difference in their economic sizes is small, while the fifth hypothesis stats that it decreases if both countries are relatively small in comparison to the rest of the world (i.e., the national income of all other countries). In the context of the 1860s and 1870s, hypotheses 3 to 5 are questionable, as economies of scale might have been rather unimportant in the context of the first industrial revolution. Less controversial in our context, the model predicts, sixth, that due to gains from inter-industry specialization larger differences in the country pair's factor endowments increase the welfare gains from a PTA. However, and this is their seventh hypothesis, it decreases if the difference between both countries' factor endowments and those of the rest of the world are comparatively high, because welfare gains from inter-industry trade with the other countries are likely to exceed those of a PTA with the partner in question.

Domestic political support, endogenous tariff formation, and PTAs. Pahre developed an empirically testable endogenous tariff and cooperation theory, which is mathematically simpler than the 'protection for sale' approach, but allows him to be much more comprehensive in stating and testing hypotheses. It does not build on the Baier–Bergstrand model, but might be combined with it argumentatively. The main virtue of this approach is that it was designed with nineteenth-century decentralized treaty making in mind.[17] The theory starts with explaining unilateral tariff-setting from a political support theory of policy-making, and then proceeds to hypothesize about the likeliness of international cooperation via trade agreements. At the domestic level, it involves the government and two economic sectors, import-competers and exporters. Sectors do not represent firms only, but include all individuals that either gain or lose from foreign trade, and hence constitute two opposing political forces. Import-competers' incomes increase when domestic prices rise in comparison to world prices, while exporters' incomes decrease because they have to pay the domestic price for inputs and charge the world price. The government takes decisions in order to maximize political support from both sectors. Support is a positive function of each sector's income, but with diminishing returns. Governments can redistribute income by imposing positive unilateral tariffs that

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[17] Pahre, *Politics*. On pp. 68–71, he compares his theory with others from political science and economics.

raise domestic prices above world prices. Domestic forces interact with the world economy in a sense that changing world prices and tariffs in other countries affect domestic politics.

When assessing the likeliness of PTAs from Pahre's approach, one has to be aware that he focuses on the national level, i.e., his dependent variable is the 'cooperativeness' of a country with certain characteristics in comparison to others, not the county pair. Nevertheless, regarding the probability of trade agreements, we might conclude from his hypotheses:[18] First, low-tariff countries are more likely to cooperate in general, but if the other country has (initially) high-tariffs a PTA will be more stable than if it is a low-tariff country.[19]

Second, regarding country size, Pahre's theory yields somewhat different outcomes than the model of economic fundamentals above. Pahre finds that at the domestic level, large countries have higher tariffs than smaller ones because they can manipulate world prices for their imports downwards through the effect of tariffs on domestic demand.[20] Although following this reasoning, small countries should be more cooperative because of their lower tariffs, they are less likely to sign trade treaties than large countries, because they have smaller markets and therefore are less attractive as 'targets' of PTAs. Although Pahre does not address this explicitly, his finding implies that the difference in market size should be the more relevant of the two economic fundamentals, since small countries might cooperate with small countries due to the relative lack of other partners, while larger ones prefer larger countries.[21]

Additional considerations concerning historical factors lead Pahre to findings on fiscal constraints, i.e., whether tariff revenue was essential for the budget, and democratization: Democracies are more likely to cooperate than autocratic states, and endogenous, i.e., weak, self-imposed and revocable fiscal constraints make treaties more likely, while exogenous, 'hard' fiscal constraints have a less clear-cut impact, which is surely less positive than that of endogenous constraints, and possibly negative.[22]

Trade diversion and international interaction. A third aspect of the formation of the Cobden–Chevalier network, the trade diversion and fear of discrimination underway during the "general treaty-mongering all over Europe"[23], can be covered using the 'domino theory of re-

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[18] Pahre, *Politics*, chs. 7–8. The summary given here skips the effects of changes in the terms of trade on 'cooperativeness' because it is difficult to frame for the country-pair and cannot be tested with the present dataset.
[19] These hypotheses imply that if trade agreements are more stable they should also be more likely to be signed.
[20] Pahre, *Politics*, pp. 88–90
[21] Ibid., ch. 8.
[22] Ibid., *Politics*, chs, 4 and 8. This does, however, not imply that democratic countries have lower tariffs. Depending on other factors, they can even have significantly higher tariffs, see Pahre's ch. 5 and O'Rourke's and Taylor's ('Democracy and protectionism') median voter/factor endowment model and their empirical results. On the impact of democracy see also Milner with Kubota, 'Why the Move?', Wu, 'Measuring and explaining', and the literature cited there.
[23] Louis Mallet to Richard Cobden, 6 Feb 1861, cited in Metzler, *Großbritannien*, p. 164.

gionalism' presented by Baldwin.[24] It analyses the effects of regional integration on industries in non-member countries and subsequent political action by their governments. Again the model abstracts from economic fundamentals – all countries are symmetric –, but can be argumentatively combined with Baier–Bergstrand. As in Pahre's theory, the government also responds to the support of interest groups, but the theory does not focus on the domestic level, but on international interaction. In Baldwin's model, there are two types of interest groups, organized firms (exporters) and non-economic anti-cooperation lobbies.[25] Organized firms base their efforts on expected gains from PTAs, because their profits depend on transport costs which are lower for intra-PTA trade than for exports to non-members, between non-members and from non-members to PTA parties. This is most simply explained by low tariffs established by the PTA in comparison to the rest of the world. In Baldwin's original model, a PTA can comprise an unlimited number of countries. The number of actual PTA members is determined by the size of contributions of non-economic interest groups which are modelled by Baldwin as marking the only difference between countries. If a 'trigger event' happens, i.e. a development inside the trade bloc that lowers relative intra-PTA trade costs (e.g., regulatory homogenization), firms in non-member countries suffer from increased relative costs and potential trade diversion, and hence increase their lobbying activities. Ceteris paribus, this will lead to accession of those countries whose non-economic anti-accession lobbies had just been big enough to impede accession before. The accession of at least one additional country increases the relative costs for exporting firms of remaining outsiders and make their accession more likely. In the end, a new equilibrium with an increased number of PTA members emerges. Unfortunately, multilateral PTA formation is not the subject of the present study. However, in a later article Baldwin stated that if the multilateral PTA is a closed club, 'the new political economy flames may find vent in preferential agreements among excluded nations.'[26] We therefore might interpret the bilateral PTAs of the Cobden–Chevalier network as 'closed PTAs' with two members. The conclusion of one PTA then will lead to the conclusion of new PTAs if the markets in question are big enough that resulting discrimination affects outsider firms' profits. As they cannot become a party of, e.g., the Anglo-French treaty, they will try to form a new PTA with each of its parties to assure (and widen) market access under equal (or better) conditions.

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[24] Baldwin, 'Domino theory'.

[25] Without going into detail, his approach is similar to the 'protection for sale' following Grossman and Helpman, 'Politics of free-trade agreements': The decision-maker has a fixed-weight linear objective function consisting of two components: welfare and contributions from interest groups. Contributions work like binding contracts. If decision-makers accept them, they will have to take into account the corresponding group's interest.

[26] Baldwin, 'Causes of Regionalism', p. 878. Cf. Yi, 'Endogenous formation', and Pahre, *Politics*, pp. 299–301.

In subsequent work, Baldwin studies a situation where different country sizes and prevalently bilateral PTA formation are likely to lead to 'hub-and-spoke bilateralism' where small countries are highly interested in concluding bilateral treaties with bigger countries, but not so much among themselves. He develops an empirical measure of 'hubness', which is $s_{ij}^X (1 - s_{ij}^M)$, where s stands for share, X for exports, M for imports, i is the country that evaluates the PTA and j is the market in question, so that s_{ij}^X is the share of i's exports that goes to j and s_{ij}^M the share of i's imports that originate in j. Higher hubness of j is said to increase i's willingness to sign a bilateral PTA.[27] In a dynamic perspective, additionally, the share of i's imports from other markets already covered by an agreement should be of importance.

Table 1 sums up the theoretical predictions (and in part the empirical findings) for the explanatory variables that can be derived from the mentioned theories.[28] Underlying data and ways of calculation are subjects of the next section.

Table 1 here

3. **Empirical determinants of the Cobden–Chevalier network**

Now, we turn to the empirical implementation of tests for the determinants of the PTA network of the 1860s and 1870s based on the theories outlined above. As all treaties of the network were bilateral, the natural level of analysis is the country-pair. The dataset includes all 13 countries visible in figure 1 plus the US, and in principle consists of 91 unique undirected dyads.[29] The dataset starts in 1857 and ends in 1875, and hence comprises 19 annual time-periods, of which only 18 are used because some variables are included with one-year lags (see below). The analysis aims to explain only unconditional MFN treaties that were signed and finally put in force between the countries in the sample, i.e. the treaties in figure 1 plus the Swiss-US PTA of 1855 are considered.[30] They are included for the year the treaty

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[27] Baldwin, *Spoke trap*, pp. 27–30.

[28] Other potential determinants of trade flows can be found in the literature and have been included in preliminary versions of this article. As none of them showed significant coefficients, they are omitted here.

[29] e.g., France–Spain and Spain–France constitute *one observation* only.

[30] Other treaties with non-European countries seem to have been concluded without too much consideration: 'In February, 1864, following the fashion at that time, a commercial treaty was concluded with Japan, and one afternoon Sir John Bowring, an old friend of Switzerland, visited Berne as an extraordinary minister of the king of the Hawaii Islands, Kamehameha V, to advance the Swiss-Honolulu relationships through the conclusion of a treaty of friendship, settlement and commerce (20 July 1864).' Frey, 'Schweizerische Handelspolitik', p. 481.
Treaties had been concluded also before 1857; most of them contained the conditional MFN clause which required additional negotiations, if preferences granted in later PTAs with other countries should be granted to previous trade partners. A mix of conditional and unconditional PTAs was in force most importantly for Sardinia/Italy in the early 1860s. This caused considerable uncertainty for partner countries, see Cova, 'Österreich(-Ungarn)', pp. 656–62, Frey, 'Schweizerische Handelspolitik', p. 470, and Henderson, *Zollverein*, p. 261

was signed, not for the year it entered into force.[31] All observations of '1' for a dyad after the year of signing of a bilateral treaty are dropped from the sample, as they are not independent since treaties had a stipulated minimum duration of 10 to 12 years. This implies that for country-pairs with an unconditional MFN-PTA in force before 1857, i.e. Austria-Hungary and the Zollverein (1853) and Switzerland and the US (1855), all observations are dropped before estimating.[32] As the network evolved in Europe, the main analysis focuses on the 13 European countries of the sample (77 dyads), and the US is additionally included for robustness checks. The estimations therefore are made with 985 and 1201 observations, respectively, instead of the theoretical maximum of 1638.

The dataset includes all economic fundamentals from Baier and Bergstrand enumerated in Table 1. These are the distance-related variables *Natural* and *Remote*, as well as the sum (*GDPs*) and difference (*dGDP*) of economic sizes, and the bilateral difference in factor endowments and country-pair's relative factor endowments in comparison to the countries not part of the dyad in question.[33] Because the US is the only non-European country in the dataset, the variable *Remote* is problematic for our analysis, as it is an interaction term between a distance-related measure and a 'same continent' dummy. It is therefore not included in the basic model, and only included in the robustness check with the US-inclusive sample, and afterwards excluded, because it is highly correlated with *Natural* (the inverse of bilateral distance). Due to the lack of comprehensive capital stock data for the 1860s and 1870s, land-labour ratios were constructed instead, i.e., hectares of cultivated area per person in the economically active population. This coincides with Ronald Rogowski's argument that land-labour ratios inform sufficiently about the position of workers in the late nineteenth century in commercial policy matters.[34] Therefore, the difference of both countries' land-labour ratios (*dLLR*) and the average difference of both countries' land-labour ratios from those of to the rest of the world (*dLLRRow*) substitute the original variables for capital and labour (*dKLR* and *dKLRow*). National income data are purchasing power parity adjusted 'real' GDP data in Baier's and Bergstrand's original article, while the present analysis uses historical national

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[31] Observations on the latter are likely distorted by formalities, e.g., treaties concluded by the Zollverein with all countries except Austria would enter into force only after the expiration of the February treaty of 1853 in 1865.

[32] As none of the treaties was effectively denounced during the period under study, there is no switch back to the non-treaty state. Therefore, signing a PTA can be treated as an 'absorbing event'.

[33] See app. 1 for the formulas.

[34] Rogowski, *Commerce and coalitions*, ch. 1. Note that O'Rourke and Taylor, 'Democracy and protectionism', demonstrate that a model without capital is not complete for 1870 to 1914. Tentative estimates with existing scattered capital stock and gross investment estimates for about half of the countries in the dataset have been undertaken, but achieved no stable results. As also stressed by O'Rourke and Taylor, this is supposedly due to the poor quality of capital stock data for the period under study, especially if they are reconstructed from relatively short gross investment data series.

accounting reconstructions of nominal GDP.[35] These data as well as geographical distances are from the same sources as in Lampe's gravity estimates; land-labour ratios have been calculated from the data compiled by B.R. Mitchell.[36]

To deal with endogeneity, all variables mentioned so far are included with their 1857 values only. This can be interpreted as governments having formed a picture about the other markets and their characteristics in that year which was not updated during the negotiation wave of the Cobden–Chevalier network. Given the sparse historical records and the absence of contemporary national accounting, this seems to fit the negotiators' state of information. Technically, this implies that 'instantaneous' data are treated as 'enduring' in the analysis, which as a consequence is based on cross-dyad differences for the variables in question only. This should not be too problematic, because differential increases in incomes or changes in factor endowments are unlikely to have caused the formation of the Cobden–Chevalier network.[37] However, the question whether 1857 was a 'typical year' merits discussion, given the accounts of a great commercial crisis in that year. However, what is essential for the present research is that economic fundamentals and trade shares were not atypical in that year. Since the pace of structural change is generally much slower than the business cycle fluctuations, we can suppose that this was the case. Referring to trade shares, the geographical distribution of import shares for six important European countries in 1857 is highly correlated with that of 1859 and the average of the years 1857-75.[38]

Furthermore, the variables from Pahre's domestic political economy-based approach as well as from the Baldwin-based international interaction theory are framed for individual countries, not for dyads. Since it takes both parties' positive judgement to conclude a bilateral agreement, I generally use the bilateral maximum or minimum of a variable, making the choice dependent which implies clearer constraints or incentives to treaty-making. E.g., because autocratic countries are predicted to be less cooperative, I use the bilateral minimum of

[35] In addition, Baier and Bergstrand, 'Economic determinants', double-value land-distance in comparison to sea-distance in *Natural* and *Remote*, while the figures used here reflect geographical 'great circle' distance only.

[36] Lampe, 'Effects'; Mitchell, *International historical statistics.*

[37] A referee raised the concern that *ex ante* trade volumes might explain the conclusion of PTAs, and hence PTAs would be endogenous to trade, which in change is to a considerable degree explained by the economic fundamentals of market size and distance, as gravity models explain. This endogeneity could not be accounted for directly using the present dataset, and the author was unable to find theoretical solutions to the problem. However, it was estimated whether 1857 trade volumes and trade potentials (residuals of a gravity model with data for 1857) had a traceable impact on PTA probability, *net* of market size and distance. The results were insignificant with coefficients tentatively pointing to a positive impact of trade on PTA probability. Cf. also the results for the *Hubness* measure below.

[38] Pearson's r=0.96 for 1857 vs. 1859 based on the shares given in Lampe, 'Bilateral trade flows', Table 11a-f (uncorrected, i.e. 'perceived trade' figures). Pearson's r with the mean for 1857 to 1875, which includes changes due to the treaties, is 0.93 for 1857 shares and 0.9 for 1859 shares; this indicates that 1859 would probably have been a more 'untypical' choice.

the democracy score, as also done in any political science studies. For details concerning other variables, see below.[39]

To test Pahre's predictions, four variables were constructed: *Autonomous bilateral tariffs*, *Endogenous fiscal constraints*, *Exogenous fiscal constraints*, and a democracy variable called *Polity2*. The impact of country sizes is subsumed under the sum and difference of national income variables of the Baier-Bergstrand setting. *Autonomous bilateral tariffs*, i.e., the tariff rates applied to commodities from non-PTA countries (in contrast to preferential rates stipulated in PTAs), have been calculated from the national tariff laws based on the 21 commodity groups of Lampe's dataset and classification (see appendix 2). For the analysis, the resulting commodity-group specific *ad valorem* rates for each country have been weighted individually with each partner country's export structure (in 1865) to model the importance of every country's tariffs to every single partner's export structure. The maximum and the minimum of both countries' bilateral average tariffs are included in the regressions, since the prediction from Pahre's model can either be that low tariffs or that high tariffs induce cooperation.

Endogenous and *exogenous fiscal constraints* have been coded into dummy variables following Pahre.[40] They enter the estimations with the maximum of both countries' value in each year. Constraints proxies are not lagged, because current, not past fiscal constraints determine PTA conclusion. Their maximum is used because otherwise the proxy would only have the value of '1' for a dyad in which both countries have a constraint, although only one countries constraint suffices to affect the probability of bilateral cooperation. The democracy proxy also follows Pahre's study, as it is the lower of both countries *Polity2*-score from the Polity IV database.[41]

To test Baldwin's political-economy theory of international interactions based on trade diversion forces, values for his *Hubness* measure have been calculated from the bilateral import and export shares for all country-pairs. As *Hubness* is measured for each country in a pair separately, it enters the analysis as the minimum and the maximum of both partners' values.

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[39] It should be mentioned that in discussions of research methods regarding the 'democratic peace', political scientists like Paul Huth have discussed widely how dyadic studies have to be cautious about the coding of country-specific variables at the country-pair level. Therefore, in cases where the true constraint in the underlying theory is not clear, as for the autonomous tariff, I have tested both minimum and maximum values to make sure my decisions do not affect the results qualitatively. 'Monadic' or 'directed dyad' approaches like those discussed in the case of the 'democratic peace' cannot be easily implemented for the current study, since bilateral treaties have no clear equivalent to the concepts of conflict initiation and escalation in that literature. It could, however, be interesting to look at trade wars in later decades this way. See Huth and Allee, 'Questions', and Rousseau et. al., 'Dyadic nature'.

[40] Pahre, *Politics*, ch. 4, esp. table 4.4. His 'endogenous??' value for the Netherlands and the 'exogenous??' value for Belgium were coded as no constraints due to being highly doubtful. The author assumes that France had an 'exogenous constraint' from 1871 to 1875 due to the reparations of the Franco-Prussian War.

[41] Jaggers and Marshall, *Polity IV Project.*

To model the amount of discrimination in the export market, *Trade partner PTA coverage* has been constructed as the share of imports in the export market in question that are covered by PTAs with third countries.[42] To avoid endogeneity problems, this variable is based on 1857 import shares as weights, but with actual treaties counted as the spread of the network evolved. Again, one-year lags are employed. Additionally, there are various problems to take into account when working with mid-nineteenth-century trade data. Lampe has shown that the historical statistics were plagued with unaccounted third-country transit, i.e., statistics re-corded direct trade partners (last land border crossed or port visited by an incoming ship), but not 'real' countries of origin or destination. In the construction of Lampe's dataset, the result-ing proximity bias was accounted for using partner transit statistics. This was done for a sam-ple of 21 commodity groups using the historical statistics for seven of the 14 countries in question.[43] For the present study, this dataset had to be supplemented with trade data for the other countries, especially for the trade between them, as trade flows from and to the seven countries of the original dataset are available there. How the original and additional data were combined is explained in appendix 3.[44] However, one might suppose that contemporary deci-sion-makers based their judgement more on 'perceived' trade flows as reported in their na-tional statistics than on the reconstruction of 'actual' trade flows. *Hubness* and *Trade partner PTA coverage* therefore have been calculated from the corrected data for 1857, and alterna-tively using 'perceived trade' from original, uncorrected trade statistics. In principle, I include both the maximum and the minimum of these variables. As we will see below, in the case of *Trade partner PTA coverage* the maximum – which represents the stronger potential for trade diversion – is clearly preferable, while for *Hubness* the results are less clear.[45] As the dataset consists of discrete duration data, the analysis is undertaken as a series of pooled *logit* models. Following the suggestion by David Carter and Curtis Signorino, a linear, a squared and a cubed time trend are included into all estimations to account for duration dependency of the underlying hazard rates.[46]

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[42] This variable relates to a homonymous variable in Mansfield and Reinhardt, 'Multilateral determinants', which counts, but does not weight PTA coverage. Import shares were calculated after deducting imports from the trade partner in question to deal with simultaneity issues. After the preparation of the present manuscript, Baldwin and Jaimovich, 'Are free trade agreements contagious?', working paper (2009), presented a similar measure labelled as 'contagion index'.

[43] Lampe, 'Bilateral trade flows'.

[44] Additionally, data for British North America (modern-day Canada) were also included but are not used in the analysis, because it was a British dependency.

[45] Tammy Holmes, 'What drives regional trade agreements that work?', working paper (2005), favours the minimum of bilateral export shares, a simpler version of *hubness*, in her estimates, thus indirectly focusing on the disadvantages of having a small market. However, I do not find such clear empirical results; see below.

[46] See Beck, Katz, and Tucker, 'Taking time seriously', and Carter and Signorino, 'Back to the Future: Modeling Time Dependence in Binary Data', mimeo (2009). *Probit* estimation does not lead to substantially different re-sults. *Panel logit* techniques are not applicable due to the small sample size especially for later cross-sections.

Estimations start with the economic fundamentals model which is then gradually extended by including first the domestic political economy and then the international interaction variables. The basic analysis is done for the European members of the Cobden–Chevalier network. As the US is the only geographical outsider in the dataset and additionally was also an outsider to the treaty-network – it did not conclude any treaties between 1857 and 1875 – for which reliable data could be constructed the same models are re-estimated with the US-inclusive dyads for robustness checks. The variable *Remote* is only included in the latter specification. The results are shown in Table 2 for the core sample and in Table 3 for all countries including the US.

All economic fundamentals coefficients are signed as expected. At the 10 per cent level, all variables except the average land-labour ratios relative to the rest of the world (*dLLRRow*) and the common market size indicator (*GDPs*) are statistically significant for the core sample. In some specifications, the bilateral difference in land-labour ratios (*dLLR*) does also hits the hurdle by a small margin. The smallness and statistical insignificance of the coefficient for *dLLRRow* might be explained by the relatively low variation across countries: all were relatively high developed in comparison to the rest of the world. Additionally, *dLLRRow* and *GDPs* are highly correlated and disturb each other's estimates. *dLLRRow* is therefore dropped from the subsequent estimates, as is *Remote*, because it is highly (negatively) correlated with *Natural*. The estimation of the reduced basic model now provides a much more precise estimate for *GDPs*, while the results for the remaining economic fundamentals are stable across all variations. A country-pair whose members are closer to each other (*Natural*), have a potentially large 'common market' (*GDPs*) and different factor endowments (*dLLR*) is more likely to conclude a PTA, while higher GDP differences (*dGDP*) make PTAs less likely (presumably to the disadvantage of smaller countries). When adding additional variables to the models, correlation between right-hand side variables leads to imprecise estimates for coefficients and standard errors of *GDPs*, which are unsatisfactorily from a theoretical point of view and statistically troubling. This refers especially to the inclusion of fiscal constraint dummies and of *hubness*.[47] With the exception of the endogenous fiscal constraint dummy, none of these vari-

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Following Mansfield and Reinhardt, 'Multilateral determinants', some political scientists use a variable called *PTA density* to capture the influence of PTAs concluded by other than the two countries of a dyad. Unfortunately, for the present dataset, 'PTA density' is highly correlated with the linear time trend (Pearson's r=0.97). Although an interesting candidate to proxy for 'contagion', this variable was not included in the regressions.

[47] *Hubness* is theoretically related to *GDPs* because it is modeled with market size in mind.
In the extended sample the estimate for *GDPs* and for *dLLR* is also sensitive to the inclusion of *PTA Coverage*. A possible explication includes a combination for two factors: First, the US had the highest national income and the second highest land-labour ratio of all countries in the sample, but did not conclude any MFN-PTAs during the observation period due to domestic reasons potentially missing in the model. This works against the economic fundamentals. Additionally, the US had in force (until 1866) a non-unconditional MFN-PTA with British

ables shows statistically significant results. The endogenous fiscal constraint dummy causes problems because 57 per cent of all observations have at least one country with a 'weak fiscal constraint' involved, and hence the dummy is likely to capture effects not related to fiscal constraints.[48] Both fiscal constraint dummies and *Hubness* are therefore removed from the favoured specifications, where the effects of national income remain as described.

Table 2 here

Table 3 here

The remaining domestic political economy variables perform well: The less autocratic the country with the lower *Polity2*-score (*MinPolity2-1*), the more likely is international collaboration in commercial policy. This is in line with Pahre's findings. Furthermore, the inclusion of *Polity* leads to a higher and more precisely estimated coefficient for the *dLLR* variable. The difference in land-labour ratios is weakly correlated (r=0.07) to the *MinPolity2-1* score and even more correlated with a polity ratio (*MaxPolity2-1/MinPolity2-1*; r=0.30). This indicates that countries with wide differences in the land-labour ratio also differ in their degree of relative democracy and autocracy. While the former variable indicates welfare gains from trade, the difference in the degree of autocracy and the degree of autocracy itself are negatively related to the conclusion of PTAs, statistically as well as theoretically (see above). Hence, in the initial estimate, *dLLR* captures partially an effect that is isolated by including the *Polity*-score.

The consistently significant and positive coefficients for bilateral autonomous tariffs indicate that higher autonomous tariffs make (partner) collaboration more likely. The estimates are finally made with the bilateral maximum (*MaxTariff-1*) because of the slightly higher explanatory power of the model including this formulation for the core sample.[49] These findings partially contradict Pahre's theory that countries with lower tariffs are more collaborative, but on the other hand sustains that high partner tariffs make collaboration more likely.

Regarding the third group of variables, those concerning international interaction, the *hubness* variable does not perform well. Neither its minimum nor its maximum show significant results in the analysis.[50] Thus, *Hubness* does not systematically model forces at work in the formation of the Cobden–Chevalier network.[51]

North America, which was coded in *PTA Coverage* because trade with British North America was included in the sample. One might expect a considerably discriminatory effect of this PTA, but in effect this was not the case because it covered only bilateral trade in raw materials which the US did normally not import from Europe.

[48] Consistent with expectations from Pahre's theory, the coefficient for the endogenous fiscal constraint dummy is positive. It is statistically significant at the 10 per cent level. The exogenous constraint dummy has the value of '1' for 68 per cent of all observations, even more than the endogenous constraint proxy.

[49] For the extended sample the contrary is true. The reason is that the US has the higher tariff rate in the majority of country-pairs it forms part of, but concluded no treaties.

[50] At first sight, the results for *hubness* calculated with perceived trade in the extended sample seem to back *hubness* as a substantial determinant of PTAs. Nevertheless, the statistical significance of the effects is spurious and

In contrast, the coefficient of the maximum of the discrimination proxy *Trade partner PTA coverage* (i.e, *MaxPartnercovered₋₁*) is positive and significant throughout. This means that potential trade diversion played an important role in the formation of the network, and that countries became more attractive 'targets' for the formation of PTAs, the more PTAs they had already concluded.

4. Interpretation of the results

The empirical analysis has shown that all three classes of theories contribute valuable insights about the formation of the Cobden–Chevalier network and can be combined in an eclectic approach. This section presents a new, systematic view of the determinants of the network based on this 'consolidated model', represented in the last columns of Tables 2 and 3. The relative weight of the respective theories in the eclectic approach can be assessed from the evolution of the goodness of fit statistics as the model is enhanced with more variables. Of the total pseudo-R² of the final model (0.18),[52] 35 per cent is due to the economic fundamentals alone, and 24 and 15 per cent are added by domestic political-economy based variables and the international interaction variable *Partner PTA Coverage*, respectively. The remaining explanatory power (26%) is due to the constant and the time dummies and indicates that further contagion-forces not captured by *Partner PTA Coverage* might have been at work, or that overall changes in the international trade like the spread of railways and industrial production over the European continent made foreign trade less costly and enhanced the potential benefits of integration.[53] In the following, I first interpret the findings for every variable and highlight connections and interactions between them. Afterwards, a general interpretation of the logic behind the Cobden–Chevalier network and its implications is presented.

The economic fundamentals, which model the welfare expectations from PTAs, have to form the basis of every interpretation of the Cobden–Chevalier network and account for the major part of the goodness of fit. Their significant and theoretically consistent coefficients

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results from suppressor effects, as can be seen when the minimum and the maximum of *hubness* are included individually, or when economic fundamentals, Pahre's variables and the time effects are dropped from the model. Coefficients are insignificant in all these estimates, and sometimes show signs opposite to those in Table 3.

[51] This contradicts results of Holmes, 'What drives regional trade agreements that work?', working paper (2005), who used bilateral export shares (a simplification of *hubness*), and found their bilateral minimum to be positively and significantly related to the formation of 'effective' PTAs in force in 2002. However, her models only include 'distance' as an economic fundamental.

[52] The goodness of fit of the models is reasonable, but far from the 0.7 obtained by Baier and Bergstrand, 'Economic determinants' with data for 1996 for the economic fundamentals alone. This most likely is due to the small sample size and the relatively low variation in the dataset, as the observations are clustered in the core of the world economy. The goodness of fit is however not too far below that obtained by Mansfield and Reinhardt, 'Multilateral determinants', in estimations with c. 150,000 observations with modern data (0.39).

[53] Cf. Lazer 'Free trade epidemic'; Nye, 'Changing French trade conditions'.

confirm the importance of welfare-oriented political decisions for the conclusions of PTAs, as highlighted by Baier and Bergstrand using data for 1996.[54] This demonstrates that now and then in principle policymakers based their decisions on the same considerations: If a PTA is to be concluded, both partners should be a) relatively nearby (*Natural*), thus avoiding physical barriers to trade resulting in higher bilateral transport costs, b) differently endowed with production factors (*dLLR*) to exploit potential gains from comparative advantages, and c) comprise a relatively big 'common market' (*GDPs*), in which ideally both individual markets should be of equal size (*dGDP*).

However, economic fundamentals do not tell the whole story. First of all, the findings for the market size related variables *GDPs* (size of the 'common market', positive coefficient) and *dGDP* (difference in individual market sizes, negative coefficient) can not only be explained by potential welfare gains from economies of scale and intra-industry trade, as suggested by 'new trade theory' Instead, based on historical accounts and theoretical contributions by Pahre and others, the author of the present study suggests a political-economy interpretation of market sizes: Additional political support achieved through a PTA depends on the potential market access for domestic exporters and the amount of increased competition on the domestic market. In principle, if PTAs are reciprocal and non-MFN, bilateral preferences will be balanced and free from externalities, and hence the size of the partner will not be important. Nevertheless, it becomes important after realistically introducing PTA negotiation costs into the political support function, i.e., costs of consultation of domestic parliamentary bodies, export commissions and interest groups. If we reasonably assume that a considerable part of these costs is fixed, then they affect the net benefits of PTAs with small countries more than those with large countries. This is especially true in combination with expectations that preferences will be transmitted to other, larger countries (and their exporters) via MFN, causes PTAs with big countries to be comparatively more attractive, especially for larger countries.[55] Hence, it is not surprising that the present results suggest and the historical evidence shows that large countries were more likely to negotiate first among each other, and only subsequently (if at all) with smaller countries. Additionally, small countries found themselves in a disadvantageous situation of having to 'accede' to the state of negotiation established by the bigger countries and only being able to bargain on issues not covered by the initial treaties.[56]

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[54] Baier and Bergstrand, 'Economic determinants'.

[55] See Horn and Mavroidis, 'Economic and legal aspects', for a deeper review of the literature.

[56] Consider, e.g. the remarks of French Foreign Minister Drouyn at the beginning of the Franco-Swiss negotiations that it was not the purpose of the current negotiations to touch the preferences it had made in its prior PTAs with the UK and Belgium. These would be transmitted to Switzerland, but French concessions would be limited

Turning to the genuinely political economy variables, the level of democracy (or the relative absence of autocracy) has significantly positive impact in all specifications. This confirms theories that highlight the positive correlation of wider suffrage and political cooperation, as well as Pahre's empirical findings. Furthermore, an additional interaction between political and economic determinants could be uncovered. Differences in land-labour ratios and in relative democracy are correlated, but show adverse signs as determinants of PTAs: While the former indicate gains from specialisation, the latter show that countries with a higher degree of autocracy are more difficult to cooperate with. Only disentangling both effects shows that each of them has a consistent influence on the formation of PTAs.

At first sight, the present findings on tariffs are contradictory to those of Pahre, who finds that countries with lower tariffs are more cooperative. Nevertheless, if we see tariffs not as 'political fundamentals', but as something that can be manipulated through international interaction, we are able to discover their strategic importance. This does not necessarily imply that tariffs were chosen at the domestic level to improve the home government's bargaining position. It simply means that high duties – however they were motivated when imposed – constituted political barriers to trade whose removal would lead to better market access for partner countries' exporters.[57] The positively signed bilateral tariffs coefficient therefore shows that political barriers to trade (like the physical barriers to trade proxied by *Natural* and *Remote*) were important determinants of PTA conclusion.

Dynamic international interaction in the formation of the PTA network is evident from the significantly positive coefficient for *Partner PTA coverage*, i.e. the maximum of every potential treaty partner's trade shares already covered by PTAs with other countries. Following Baldwin's domino theory and the historical accounts given above, one should interpret this dependence of later PTAs on former as caused by fears of bilateral trade diversion.[58] Dependence of later PTAs on former is also confirmed in recent research on post-1945 PTAs.[59]

The results for the individual variables can be joined into a general interpretation of nineteenth-century bilateralism. Especially, the strategic interaction patterns behind the results for *Partner PTA coverage* and *Autonomous bilateral tariffs* indicate that the potential of expan-

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to items not included in these treaties (Brand, *Die schweizerisch-französischen Unterhandlungen*, pp. 127–8). The French government unlikely would have undertaken the large industrial enquête it conducted in the context of the Cobden–Chevalier treaty (Dunham, *Anglo-French treaty*, ch. 7) for a treaty with Switzerland.

[57] Pahre's results can be found in *Politics*. Strategic tariff-setting occurred after 1880, when two-tier tariffs became common in Europe, establishing retaliatory duties for non-cooperative partners to force them to cooperate. This should be interpreted in the light of the problems of free riding discussed below.

[58] This is found despite the inclusion of time-dependent control variables.

[59] Egger and Larch, 'Interdependent preferential trade agreement memberships'; Manger, 'The political economy of discrimination: modelling the spread of preferential trade agreements', mimeo (2006); Baldwin and Jaimovich, 'Are free trade agreements contagious?, working paper (2009),

sion and the sustainability of the network were affected by the same forces that led to its expansion:

First, the combination of a positive influence of *Partner PTA coverage* and *Natural* (corresponding to a negative influence of distance) explains why the network was geographically constricted to Europe, and was unable not expand after the inclusion of all European countries. Higher distance decreased the probability of PTA conclusion, which led to potentially lower *Partner PTA coverage* for peripheral countries, and hence to relatively low economic welfare potentials *and* trade diversion fears outside Europe. In the real setting of the 1860s and 1870s this implies that the Atlantic Ocean, the Mediterranean Sea and the Russian Empire constituted a sort of natural border for the expansion of the network. Hence, after 1875, only newly independent states in South Eastern Europe (Romania, Serbia, Bulgaria, and Greece) could be torn into the treaty network, whose centre moved eastward.

Second, if the network was a phenomenon of European commercial integration, one might ask whether it should be seen as the predecessor of a truly common market in Europe, i.e., if it had the potential of lowering duties to zero and additionally deepen commercial cooperation in other fields. The results for political-economy variables recommend a rather sceptical attitude: Especially the finding that high autonomous tariffs made (partner) cooperation more likely casts doubt on the potential for a 'second round' of negotiations that might have deepened the results of the treaties concluded until 1875.[60]

This is not surprising considering Ethier's theory on 'MFN in a multilateral world'.[61] In his models, the unconditional MFN clause diminishes incentives to agree on preferential tariff reductions as the network of PTAs gets larger, because of two mechanisms in the political support functions: First, governments give negative weight to the fact that with more countries in the network additional bilateral preferences have to be shared with more countries, and thus are less exclusive for domestic exporters. Second, additional preferences granted to foreign exporters become more costly because they have to be transmitted to more countries via MFN. These resulting externalities lead to incentives for free-riding and evasion of further bilateral liberalization. This precisely is what could be observed in the decades after 1875, when the Cobden–Chevalier network did not collapse, but did also not advance further on the way to free trade.[62] Ethier stresses that the only feasible way to internalize such externalities lies in

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[60] Even the sustainability of the negotiated tariff reductions was uncertain, given the stipulated limited durations of 10n to 12 years with a one-year term of notice afterwards.

[61] Ethier, 'Regionalism' and 'Political externalities'; the following is essentially paraphrased from Horn and Mavroidis, 'Economic and legal aspects', pp. 263–6; cf. Pahre, *Politics*, ch. 11.

[62] Marsh, *Bargaining on Europe*; Bairoch, 'European trade policy'.

the multilateralization of negotiations.[63] However, the scope for formal multilateralism was too small in the historical context of the present study. The importance of potential trade diversion and high tariffs highlighted above indicates that it would have taken very strong political determination to multilateralize the network. This seems to have been rather unlikely in the age of 'struggle for colonies' and arms races among European powers that characterized international relations before the First World War.[64]

5. Conclusion

The research presented in the preceding sections strongly suggests that systematic economic as well as political forces were at work in the formation of the bilateral treaties of the 1860s and 1870s. Unless we assume that all contemporary policymakers fell victim to each other in their decision-making or joined a large conspiracy, we can conclude that for them, *ex ante* the PTAs of the Cobden–Chevalier network made sense (at least on average).

The results offer new insights into the forces behind the treaties. 'Pure' welfare-oriented economic theory combined with political economy and international interaction models show that trade-creation considerations interacted with strategically oriented political-economy forces to explain why the Anglo-French commercial treaty of 1860 did not remain a singular phenomenon. These insights make also clear that the driving forces behind the expansion of the network at the same time limited its geographical extension and prevented the deepening of integration.

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[63] Another possibility might have been to drop MFN at all (cf. Pahre, *Politics*, ch. 11), which would have opened the doors to concession diversion. Without MFN, a comprehensive PTA network would have been rather unlikely both in terms of wide coverage and tariff reductions. The conditional form of the MFN clause also theoretically internalizes externalities from later PTAs, but it requires renegotiation and rebalancing of concessions prior to the transmission of further preferences, which involves large transaction costs.

[64] Cf. Irwin, 'Multilateral and bilateral trade policies', p. 99–101. Gaston, 'Free trade diplomacy debate', deals with a short-lived initiative for a European congress on tariff schemes by the British Foreign Office in 1875-6. Cobden's vision to collaborate pacifically instead of investing resources in separate military capabilities and rivalries remained politically unfeasible (see Wendt, 'Freihandel').

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Appendix 1: Formulas for the calculation of the economic fundamentals[65]

Countries included in a dyad are i and j, third countries are subsumed under k. The total number of countries is N (in our case: N=14). Distance is always measured in kilometres, cultivated area (Land) in hectares and economically active population (Labour) in absolute number of persons. Accordingly, the land-labour ratio (LLR) measures hectares of cultivated area per person in the economically active population. GDP is in £ Sterling, converted at current exchange rates.

- $Natural_{ij} = \log(\dfrac{1}{Distance_{ij}})$

- $Remoteness_{ij} = Continent_{ij} * (\dfrac{\log(\dfrac{\sum_{k=1,k \neq j}^{N} Distance_{ik}}{N-1}) + \log(\dfrac{\sum_{k=1,k \neq i}^{N} Distance_{jl}}{N-1})}{2})$, with Continent$_{ij}$=1 if Continent$_i$=Continent$_j$, 0 otherwise.

- $GDPs_{ij} = \log(GDP_i) + \log(GDP_j)$

- $dGDP_{ij} = \left| \log(GDP_i) - \log(GDP_j) \right|$

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[65] Baier and Bergstrand, 'Economic determinants', pp. 38–50.

- $dLLR_{ij} = \left| \log(LLR_i) - \log(LLR_j) \right|$

- $dLLRow_{ij} = \dfrac{\left| \log\left(\dfrac{\sum_{k=1,k\neq j}^{N} Land_k}{\sum_{k=1,k\neq j}^{N} Labour_k}\right) - \log\left(\dfrac{Land_i}{Labour_i}\right) \right| + \left| \log\left(\dfrac{\sum_{k=1,k\neq i}^{N} Land_k}{\sum_{k=1,k\neq i}^{N} Labour_k}\right) - \log\left(\dfrac{Land_j}{Labour_j}\right) \right|}{2}$

Appendix 2: Calculation of ad valorem equivalents of autonomous tariffs

As most of the original tariffs were specific, e.g., in French Francs per 100kg, they had to be converted into *ad valorem* equivalents to be comparable and summarizable across the 21 commodity groups constituted for Lampe's dataset.[66] As most commodity groups consisted of more than one item, and tariff schemes varied from country to country, the rates from national tariff schemes first were mapped on the French scheme, which was the most systematic among the more detailed ones available and additionally enabled using the detailed import prices of French trade statistics to calculate the *ad valorem* equivalents. For each country, the duties corresponding to each item of the French scheme in every year between 1857 and 1875 were collected from national tariff laws, decrees, orders and circulars as reported in *Preußisches Handelsarchiv*, the Prussian official commercial periodical, and *Annales du Commerce Extérieur*, the French recompilation of consular reports. Information was cross-checked with contemporary compilations by Otto Hübner and H. Reader Lack.[67]

1865 prices from the French import statistics were then extrapolated into current prices using commodity-group specific 'inflators' calculated from the average prices in Hamburg's trade statistics (which were too summarized to be used for the valuation of individual items). To avoid biases resulting from the French structure, inside each commodity-group individual items were weighted based on French, British and Belgian import and export statistics.[68]

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[66] Lampe, 'Bilateral trade flows', app. 1.
[67] Hübner, *Zolltarife* and *Zolltarife 2nd edition*; Lack, *French Treaty*.
[68] For full titles of the trade statistics of Austria-Hungary, Belgium, France, Hamburg, the Netherlands, the Unit-

Given the different elasticities of substitution, import prohibitions have not been substituted by a general equivalent of, say, 100 per cent for all items, but enter the calculations as 1.5 times the highest tariff rate found for the item in question in other countries. E.g., import prohibitions of wheat in Spain were treated as a duty of approx. 19 per cent (1.5 times that of Portugal in 1865) and those for dyed percale and calico in France as 118 per cent (based on the Portuguese equivalent in 1857). As in Lampe's work, rates for spirits and liqueurs have been corrected for domestic excises.[69] For Austria-Hungary, Germany, the US, the UK and the Netherlands the autonomous tariff rates were calculated for each commodity group based on their customs revenue and imports statistics, as theses statistics reported items subject to preferential and non-preferential rates separately or both were the same due to generalisation of preferences.

Appendix 3: Construction of trade figures used to calculate *Hubness*

To append Lampe's original dataset with trade data between countries not covered by that sample,[70] bilateral import volumes (totals) were collected from other sources: For countries which published official foreign trade statistics for 1857, i.e., Denmark, Spain, and Sweden, these were used.[71]

For British North America, Italy, Norway, and Portugal, data from the *Faits commerciaux* series of *Annales du Commerce Extérieur* were used. Data for British North America refer to Canada; data for Italy are the sum of those for Sardinia, Sicily and Naples, Tuscany and the Roman States (port of Ancona).[72] Data for Norway are for 1856 (no estimate was reported for 1857) and were summed up with the official data for Sweden. Data for Portugal are the sum

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ed Kingdom, the United States, and the Zollverein, refer to Lampe, 'Bilateral trade flows', app. 2.

[69] Ibid., pp. 128–9, table 13, and note 90

[70] Ibid.

[71] *Tabeller over Kongeriget Danmarks*; *Estadística General del Comercio Exterior*; *Commerce-Collegii Underdåniga Berättelse.*

[72] For Sardinia, more detailed accounts reported in *Preußisches Handels-Archiv* (1859, pt. II, pp. 1–7) were used.

of the imports reported for Lisbon and Porto; data for 1857 was calculated as the average of the two fiscal years 1856/57 and 1857/58.[73]

Data for Russia were taken from two British consular reports referring to the trade of Russia and Poland, and Finland in 1857. They were summed up to represent the Russian Empire.[74]

Swiss import statistics, for which only very complicate partial direct information on quantities exists, have been reconstructed from bordering countries' export statistics (Austria-Hungary, Sardinia, France and the Zollverein) as given above. For the Zollverein, data reported by Bodo v. Borries for 1851 was extrapolated to 1857 using v. Borries' estimates for the development of German exports totals.[75]

In the cases of Italy, Sweden and Norway, and the Russian Empire, all trade between the different parts was deducted when summing up the totals to calculate shares.

To calculate the bilateral import and export shares used for the variables *Hubness* and *Trade partner PTA coverage*, the shares calculated for the imports by Austria-Hungary, Belgium, France, the Netherlands, the UK, the US, and the Zollverein/Germany were used without changes for the 'actual' (corrected) trade setting from the sum of commodity-groups constructed and corrected by Lampe. For trade between countries that are not represented by their own statistics in that dataset, shares in the total of the 14 countries in the present sample plus Canada were calculated. These shares have been interpreted as the part of bilateral imports that was visible for contemporaries and hence used as 'direct bilateral special imports' in the sense of section 6 of Lampe's dataset documentation. To these shares, the third-country 'transited bilateral special imports' that resulted from the transit correction for the seven core countries covered in the original dataset, were added, and new corrected 'total bilateral imports' shares have been calculated. These form the basis of the calculation of the 'actual trade'

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[73] No total foreign trade was reported for these fiscal years, but figures for earlier and later periods confirm the overwhelming importance of both ports.

[74] *Abstract of reports No. 7* (P.P. 1859, 2579), pp. 218-222, 246-270.

[75] v. Borries, *Deutschlands Außenhandel*, table 320.

variables in the sample. Data for 'perceived trade' was calculated from the bilateral totals given in the sources quoted above and from the original bilateral totals from the statistics used for the original dataset for its core countries.[76]

Appendix 4:[77] The Making of a Spaghetti Bowl

The treaties that formed the Cobden–Chevalier network have predominantly been the object of qualitative studies in political history. Most of them are in-depth investigations of the negotiations of individual treaties. Apart from the contagion simulation by Lazer and Robert Pahre's work that covers a wider context and is discussed below, there is no systematic assessment of the reasons for the evolution of the PTA network.[78] To lay the foundations for such an approach, the following provides a literature review focusing on central countries and treaties.

The bulk of the literature concentrates on the Cobden–Chevalier treaty. Political reasons are generally seen as decisive for its conclusion: The agreement provided a cheap alternative to political uncertainty or war in handling Anglo-French relations after the Second Italian War (1859), in which France had participated against Austria, a latent British ally. After the war, France planned the annexation of Savoy and Nice, and the treaty helped to mitigate Anglo-French tensions.[79] Factors connected to commercial interests had existed before, but neither had caused the departure of the British government from the dogma of unilateral universalism, nor a broad movement toward tariff reform or willingness to conclude a comprehensive treaty with Britain on the French side. Indeed, the treaty had to be negotiated secretly, making use of Napoleon III's special negotiation track rights to circumvent powerful protectionist interest groups in the French legislative body.[80]

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[76] For the technical terms see Lampe, 'Bilateral trade flows'.

[77] Not published, originally section 2 of the manuscript.

[78] Lazer 'Free trade epidemic'; Pahre, *Politics*.

[79] The standard reference in this context is Iliasu, 'Cobden–Chevalier commercial treaty'. See also Ratcliffe, 'Napoleon', pp. 606-13, and Wendt, 'Freihandel', pp. 31–42.

[80] Under the constitution of 1852, Napoleon III could grant preferential tariff reductions via PTAs without par-

Given this, the treaty offered the possibility to pursue commercial aims, mainly lower tariffs, first in France and the United Kingdom (especially for French wines and spirits), and later in Europe. For Britain, the treaty additionally made 'mercantilist sense', as according to British foreign trade statistics France was Britain's main trading partner on the Continent, and the one with which the UK had the largest bilateral trade deficit.[81] Some authors have tried to identify a British strategy behind the Anglo-French treaty, according to which the UK and France collaborated, or the UK employed France, to reduce tariffs all over Europe. By this, France is said to have assisted Britain to open markets in Europe, which would enable the latter to ensure its economic preponderance and political hegemony.[82] However, this trade-policy version of the theory of hegemonic stability has found few supporters and more sceptics, for two reasons:[83] First, the British government faced considerable problems in keeping pace with French treaty-making, British interests were not empirically central to the spread of the network after 1860, and France can hardly be seen *ex post* as an effective agent of British interests.[84] Second, hegemonic stability requires a 'primary sponsor', and the UK proved neither able nor willing to act as such in the context of the treaty network.[85] Hence, a British hegemonic strategy might have stood behind the initial treaty, but was surely not central to the structure and evolution of the network, since only short- or at most medium-term political goals can have been at play, which were not sustained afterwards. If the treaty-network spread after 1860, it was most likely because France, contrary to Britain, maintained its high tariffs on commodities from all countries except the UK and thus created an additional moment of

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liamentary ratification, while the lowering of the general tariff would have required parliamentary passage.

[81] Bairoch, 'European trade policy', p. 36.

[82] The argument is developed in Metzler, *Großbritannien*, esp. pp. 20–1, 109–10, 135–7, 141–50, 167–68.

[83] With Metzler as well as Wendt, 'Freihandel', pp. 46–52, and Mathis and Stiefel, 'Protektionismus' on the one side and Marsh, *Bargaining on Europe*, pp. 1–13, Pahre. *Politics*, pp. 46–7, Nye, 'Revisionist tariff history', Stein, 'The hegemon's dilemma', Coutain, 'Unconditional most-favored nation clause', and McKeown, 'Hegemonic stability theory' on the other.

[84] Marsh. *Bargaining on Europe*, ch. 3.

[85] see Irwin, 'Multilateral and bilateral trade policies', and recently, Coutain, 'Unconditional most-favored nation clause'.

discrimination. French negotiators subsequently offered to mitigate this discrimination through further bilateral treaties with the affected countries.[86]

The second-most analysed commercial treaty, the Franco-Prussian treaty of 1862, was such a 'mitigation agreement', in addition to offering a political opportunity to Prussia in its struggle with Austria about the political future of Germany and the Zollverein. Since the late 1850s, Austria had sought entry into the Prussia-led Zollverein, and had even proposed a larger 'Central European Customs Area' comprising Zollverein and the entire Habsburg Empire, in order to retain political supremacy in Germany. To make this feasible, the Austrian government had adopted a series of tariff reductions in the early 1850s. In the February treaty of 1853, Austria and the Zollverein had taken a special appointment that stipulated a broad range of exclusive mutual preferential tariffs and assured Austria that talks about its accession to the Zollverein would be held in 1860. Since then, the Prussian government, which favoured a 'Smaller German Solution', i.e., German integration without Austria, had repeatedly presented initiatives to reduce the Zollverein's tariffs even more, hoping that Austria would not be able to follow for economic reasons. These proposals had consistently been blocked by Austria-friendly and more protectionist Zollverein members from Southern Germany.[87]

Therefore, to Prussia the French proposal for negotiation of a bilateral PTA that was presented three days after the signature of the Cobden–Chevalier treaty not only offered the chance to overcome French discrimination against German exporters resulting from French preferences for British products, to put an end to repeatedly failed negotiations to reduce more than two decade-old retaliatory tariffs, and to negotiate additional preferences for German exporters. It also allowed creating an all-or-nothing situation that exposed the protectionist members of the Zollverein to the alternatives of a Prussia-led Zollverein with lower tariffs and a commercial treaty with France or dissolution of the Zollverein which would leave the benefits of the treaty to Prussia (and its followers) only. The proposed unconditional MFN clause

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[86] Britain, in change, lowered its tariffs unilaterally for all countries, thereby insisting on non-discrimination.
[87] Koch, 'Österreich', pp. 539–48; Franz, 'Vorgeschichte'; Henderson, *Zollverein*, pp. 202–55.

also undermined Austria's exclusive preferences, which would only be maintained by a – rather unlikely – accession of Austria to a Zollverein under Prussian terms, in case the treaty was ratified by the Zollverein's members. The treaty was signed by Prussia and France in 1862, but only ratified after a prolonged dispute, the 'second Zollverein crisis', in late 1864. By then, it was clear that the Zollverein would be renewed on Prussian terms. Austria had to comply with a simple MFN-PTA concluded in early 1865, just before the February Treaty expired and the Franco-Prussian agreement became effective.[88]

That the adoption of free trade policy was not a genuine interest of the Austrian government in the early 1860s was clearly visible in the prolonged Anglo-Austrian negotiations. The UK saw its high-flying aims to open the Austrian market successively reduced between 1861 and 1869, and finally had to realize that substantive advances were only possible in the shadow of an Austro-French treaty. Austria desired better relations with both France and Britain for economic and political reasons, but France was more open to assist Austria in economic matters and had a larger negotiation mass concerning tariffs. Hence, the Anglo-Austrian PTA of 1865 contained general declarations about Austrian tariff reductions, but actual lower tariff rates were substantiated in the Franco-Austrian treaty of 1866.[89]

Economic reasons were more important for several smaller European countries, which is not surprising given their more substantial reliance on foreign trade. The most active negotiator among the smaller players was Belgium. It implemented through its treaties a tariff reform that had been under discussion since at least 1856, but was now combined with negotiations for significant economic concessions from other countries. The main aim of the Belgian government was an international capitalization of the Scheldt Dues, which were levied by the Netherlands – on the basis of an international treaty – on ships heading to Antwerp, Belgium's main port, and subsequently reimbursed by the Belgian government. Due to expanding

[88] Koch, 'Österreich', pp. 550–60; Franz, 'Vorgeschichte'; Henderson, *Zollverein*, pp. 273–303,
[89] Helleiner, *Free Trade*; Marsh, *Bargaining on Europe*, pp. 49–52; Howe, *Free trade*, pp. 101–3; Metzler, *Großbritannien*, pp. 194, 241–54, 282; Mathis and Stiefel, 'Protektionismus'. To a very small degree, also the Anglo-Austrian convention of 1869 contained specific preferences.

commerce, in the 1850s the Scheldt Dues represented a burden to the Belgian budget.[90] The negotiations with France that lead to Belgium's first treaty in 1861 might be seen as a prelude to the Scheldt Dues negotiations,[91] which actually started in the negotiations with Britain and the Zollverein. The Belgian government also found a creative solution to the problem that Prussia did not want to conclude any PTAs before the ratification of its treaty with France and the renovation of the Zollverein: In March 1863, both governments signed a protocol by which Prussia only committed itself to grant unconditional MFN treatment to Belgium after the expiration of the February Treaty. By this, it could hold open the alternatives of dissolution of the Zollverein or its renovation under the terms of the Franco-Prussian treaty. Belgium granted MFN status to the current Zollverein members instantaneously and received Prussian commitment on its participation in the capitalization of the Scheldt Dues. Because anti-Prussian forces in Germany protested that by signing the protocol Belgium had taken position in favour of Prussia in the Zollverein crisis, it unilaterally extended MFN treatment to Austria in July, 1863. Already in summer of 1862, Belgium had concluded a PTA with the UK and subsequently signed MFN treaties with most other European countries.[92]

Fears of adverse trade diversion on large neighbouring markets neighbours drew Switzerland into the network. As a small country in which export industries had been able to establish themselves as one of the pillars of national self-perception, commercial matters were important in Swiss politics. After 1861, the Anglo-French and Franco-Belgian PTAs gave special treatment to third-country exporters on especially the French market. Advancing Franco-Prussian negotiations threatened to do the same for the Zollverein.[93] Unfortunately, Switzerland had low tariffs, a relatively small market and a quite complicated system of decision

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[90] Mahaim, 'Politique commerciale', pp. 216–9; Sydow, *Handelsbeziehungen*, pp. 155–7, Marsh, *Bargaining on Europe*, p. 35.

[91] Sydow, *Handelsbeziehungen*, pp. 142–8. Ibid., 157–74 deals with the difficult position of Belgium in the Second Zollverein Crisis.

[92] Marsh, *Bargaining on Europe*, pp. 29–35, 54; Howe, *Free trade*, pp. 99–100; Metzler, *Großbritannien*, pp. 164–8.

[93] Frey, 'Schweizerische Handelspolitik', pp. 470–2; Brand, *Die schweizerisch-französischen Unterhandlungen*, pp. 46–7; Ruckert, *Handelsbeziehungen*, pp. 101–2.

making and ratification. Therefore, it was not given top priority by other countries. In negotiations with France, which started officially in early 1863 and finally led to the conclusion of a treaty in June 1864, the Swiss negotiator (partially against his own beliefs) had to make use of all possible kinds of 'bargaining items', including the question of free establishment of all French citizens in Switzerland, which included removing long-standing discrimination of non-Christian citizens in certain cantons.[94] Negotiations with the Zollverein also proved difficult. They started with a provisional agreement on mutual MFN treatment in June 1865 (just prior to the Franco-Prussian PTA taking effect), went through various stages of negotiations in spring of 1868 and early 1868, and ended with a limited MFN agreement in May 1869.[95]

The Netherlands were in a similar position of low duties and a small domestic market, although they were less dependent on commodity exports and less interested in the French market. Therefore, the Dutch government was able to resist French attempts to shape the Dutch taxation system concerning excises on wines and spirits. It refused to fix internal taxes in a bilateral agreement, but granted France certain reductions in the form of an amendment to a limited treaty in force between the two countries since 1840. After additional negotiations, a formal MFN treaty was signed in 1865.[96] In Denmark, domestic political constellations and fiscal constraints made substantive trade treaties unviable after the unilateral tariff reform of 1863. In 1867, the Danish government denied negotiations about a Franco-Danish treaty of commerce because of the loss of revenue to be expected from lower tariffs, against which a potential increase in exports to France appeared as unsubstantial.[97]

Although it is impossible to sum up the forces behind the individual treaties in a systematic way, we can enumerate a sensible list of candidates. Apart from idiosyncratic political con-

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[94] See the detailed account by Brand, *Die schweizerisch-französischen Unterhandlungen*. The discriminative treatment of especially Jewish citizens had already led to the non-ratification of a commercial treaty with the Netherlands in Jan. 1863, by the parliament of the Netherlands; Frey, 'Schweizerische Handelspolitik', p. 474.
[95] Ruckert, *Handelsbeziehungen*, pp. 103–8; Frey, 'Schweizerische Handelspolitik', pp. 475–7.
[96] Smit, *De Handelspolitieke Betrekkingen*, pp. 55–75.
[97] Scharling, 'Die Handelspolitik Dänemarks', pp. 275–92. Denmark concluded only four PTAs with minor trade partners, which were all MFN-only.

stellations, first, especially smaller countries showed the aim to achieve access to or non-exclusion from important, i.e., large and near, markets. Second, lowering (potentially) important trade partners' especially high tariff barriers and solving other long-standing bilateral disagreements, often resulting from previous disputes, was important. Third, the treaties facilitated tariff reforms that had been blocked by domestic interest groups at the unilateral level. Fourth, budget constraints and low partner tariffs seem to have made PTAs less likely in some cases. In the next section, economic theory will be used to put the idiosyncratic empirical evidence presented above into an analytic framework.

Table 1: Theoretical determinants of PTAs (summary)

Variable	Direction of association	Abbreviation in subsequent tables
*Economic fundamentals (*Baier and Bergstrand, 'Economic determinants'*)*		
Natural (inverse of distance)	+	Natural
Remoteness (average distance from the Rest of the World if on the same continent, 0 otherwise)	+	Remote
Bilateral difference in factor endowments	+	dKLR / dLLR (see below)
Difference of relative factor endowment of the country pair in question and that of countries outside PTA	-	dKLRRow / dLLRRow (see below)
Economic sizes of both countries (sum of national incomes)	+	GDPs
Bilateral difference of economic sizes	-	dGDP
Economic size of countries outside PTA (Rest of the World)	-	*Excluded from the analysis*[98]
*Domestic political-economy environment (*Pahre, *Politics)*		
Autonomous tariff (as 'initiator' / as 'target')	- / +	MinTariff / MaxTariff
Economic size	(+/-)[99]	DGDP, (GDPs)
Democracy	+	MinPolity2
Endogenous fiscal constraint	+	MaxEndogenConstr
Exogenous fiscal constraint	~	MaxExogenConstr
*International interaction (*Baldwin, 'Domino theory', et. al.*)*		
Hubness	+	MaxHubness / MinHubness
Trade partner PTA coverage	+	MaxPartnerCovered / MinPartnerCovered

Sources: see text

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[98] Excluded from econometric analysis by Baier and Bergstrand because the economic size of the rest of the world was very similar across countries, and hence the difference showed a very small degree of variation.

[99] From the 'target' perspective: Negative for small countries, positive for big countries.

Table 2: Regression results (core sample)

Model	Economic fundamentals	Economic fundamentals (reduced)	…plus Domestic political-economy (MinTariff-1)	…plus Domestic political-economy (MaxTariff-1)	…plus Domestic political-economy (reduced)	…plus International interactions (actual trade)	…plus International interactions (perceived trade)	Eclectic approach (perceived trade)
Variable	Coeff. (p-value)	Coeff. (p-value)	Coeff. (p-value)	Coeff. (p-value)	Coeff. (p-value)	Coeff. (p-value)	Coeff. (p-value)	Coeff. (p-value)
Natural	1.04 (0.000)	0.99 (0.000)	0.98 (0.003)	0.92 (0,003)	0.92 (0.003)	0.83 (0.016)	0.94 (0.011)	1.00 (0.003)
dLLR	0.45 (0.084)	0.33 (0.126)	0.57 (0.017)	0.54 (0,032)	0.55 (0.019)	0.50 (0.063)	0.42 (0.137)	0.41 (0.109)
dLLRRow	-0.50 (0.375)	-	-	-	-	-	-	-
GDPs	0.17 (0.124)	0.24 (0.004)	0.16 (0.221)	0.17 (0,181)	0.34 (0.000)	0.31 (0.088)	0.17 (0.243)	0.24 (0.016)
dGDP	-0.56 (0.000)	-0.56 (0.000)	-0.71 (0.000)	-0.67 (0,000)	-0.62 (0.000)	-0.65 (0.000)	-0.68 (0.000)	-0.61 (0.000)
MinTariff$_{-1}$			2.59 (0.037)	-	-	-	-	-
MaxTariff$_{-1}$				2.08 (0,013)	2.36 (0,003)	3.13 (0.000)	3.04 (0.001)	2.94 (0.000)
MinPolity2$_{-1}$			0.23 (0.000)	0.26 (0,000)	0.22 (0.000)	0.27 (0.000)	0.24 (0.000)	0.24 (0.000)
MaxEndogen-Constraint			1.08 (0.040)	1.03 (0,055)	-	-	-	-
MaxExogen-Constraint			-0.23 (0.605)	-0.23 (0,610)	-	-	-	-
MinHubness						4.81 (0.971)	-2.40 (0.787)	-
MaxHubness						-2.60 (0.380)	3.42 (0.291)	-
MinPartner PTAcoverage$_{-1}$						-0.63 (0.731)	-0.24 (0.886)	-
MaxPartner PTAcoverage$_{-1}$						3.60 (0.000)	3.47 (0.002)	2.84 (0.001)
Time	1.47 (0.003)	1.48 (0.003)	1.67 (0.003)	1,84 (0,002)	1.79 (0.002)	1.70 (0.004)	1.65 (0.004)	1.66 (0.003)
Time²	-0.14 (0.013)	-0.14 (0.012)	-0.16 (0.009)	-0,17 (0,007)	-0.16 (0.009)	-0.18 (0.003)	-0.17 (0.005)	-0.16 (0.005)
Time³	0.00 (0.024)	0.00 (0.023)	0.00 (0.014)	0,00 (0,011)	0.00 (0.018)	0.01 (0.004)	0.01 (0.006)	0.01 (0.008)
Constant	-3.84 (0.184)	-6.06 (0.004)	-4.26 (0.225)	-5,78 (0,101)	-9,96 (0.000)	-9.55 (0.042)	-5.90 (0.141)	-6.91 (0.021)
Pseudo-r²	0.11	0.11	0.16	0,17	0.16	0.21	0.19	0.18
Log-pseudo-likelihood	-175.51	-175.88	-165.44	-163,94	-166.99	-157.06	-160.70	-161.56
N	985	985	985	985	985	985	985	985

Source: Own calculations (logistic regression with robust standard errors; dependent variable: PTA yes/no).

Table 3: Robustness check: Regression results including the United States

Model	Economic fundamentals	Economic fundamentals (reduced)	…plus Domestic political-economy (MinTariff$_{-1}$)	…plus Domestic political-economy (MaxTariff$_{-1}$)	…plus Domestic political-economy (reduced)	…plus International interactions (actual trade)	…plus International interactions (perceived trade)	Eclectic approach (perceived trade)
Variable	Coeff. (p-value)	Coeff. (p-value)	Coeff. (p-value)	Coeff. (p-value)	Coeff. (p-value)	Coeff. (p-value)	Coeff. (p-value)	Coeff. (p-value)
Natural	1.09 (0.000)	1.28 (0.000)	1.50 (0.000)	1.50 (0.000)	1.50 (0.000)	1.53 (0.000)	1.56 (0.000)	1.58 (0.000)
Remote	0.36 (0.000)	-	-	-	-	-	-	-
dLLR	0.43 (0.101)	0.27 (0.209)	0.41 (0.075)	0.28 (0.226)	0.27 (0.214)	0.20 (0.435)	0.18 (0.512)	0.13 (0.579)
dLLRRow	-0.43 (0.448)	-	-	-	-	-	-	-
GDPs	0.18 (0.117)	0.22 (0.013)	0.03 (0.823)	0.05 (0.730)	0.22 (0.012)	0.09 (0.550)	0.06 (0.685)	0.11 (0.278)
dGDP	-0.56 (0.000)	-0.58 (0.000)	-0.69 (0.000)	-0.68 (0.000)	-0.57 (0.000)	-0.59 (0.002)	-0.69 (0.001)	-0.58 (0.000)
MinTariff$_{-1}$			2.72 (0.017)	-	-	-	-	-
MaxTariff$_{-1}$				1.15 (0.153)	1.50 (0.044)	2.30 (0.005)	2.31 (0.008)	2.22 (0.006)
MinPolity2$_{-1}$			0.14 (0.003)	0.13 (0.002)	0.09 (0.013)	0.10 (0.005)	0.11 (0.008)	0.11 (0.005)
MaxEndogen-Constraint			1.01 (0.045)	1. 04 (0.049)	-	-	-	-
MaxExogen-Constraint			-0.36 (0.388)	-0.22 (0.594)	-	-	-	-
MinHubness						-4.46 (0.539)	-13.4 (0.89)	-
MaxHubness						-1.10 (0.724)	4.99 (0.116)	-
MinPartner PTAcoverage$_{-1}$						1.92 (0.175)	1.50 (0.317)	-
MaxPartner PTAcoverage$_{-1}$						3.10 (0.000)	3.44 (0.003)	3.21 (0.000)
Time	1.48 (0.003)	1.51 (0.003)	1.73 (0.002)	1.76 (0.002)	1.70 (0.002)	1.49 (0.005)	1.49 (0.005)	1.56 (0.003)
Time²	-0.14 (0.013)	-0.14 (0.013)	-0.16 (0.006)	-0.16 (0.006)	-0.15 (0.009)	-0.17 (0.003)	-0.16 (0.005)	-0.16 (0.006)
Time³	0.00 (0.023)	0.00 (0.024)	0.00 (0.010)	0.00 (0.010)	0.00 (0.019)	0.01 (0.003)	0.00 (0.007)	0.00 (0.008)
Constant	-6.27 (0.035)	-3.66 (0.053)	1.79 (0.564)	1.24 (0.689)	-3.01 (0.145)	-4.99 (0.786)	1.31 (0.672)	0.13 (0.955)
Pseudo-r²	0.15	0.14	0.17	0.17	0.15	0.21	0.20	0.19
Log-pseudo-likelihood	-176.61	-179.31	-172.20	-173.20	-176.20	-164.35	-166.15	-168.75
N	1201	1201	1201	1201	1201	1201	1201	1201

Source: Own calculations (logitistic regression with robust standard errors; dependent variable: PTA yes/no).

Figure 1: The 'Mother of all Spaghetti Bowls': The Cobden-Chevalier Network in 1875

Note: Lines represent unconditional MFN-PTAs signed between 1857 and 1875, as in Lampe, 'Bilateral trade flows', app. 2; the map is based on IEG/A. Kunz, *Europa 1871*, at http://www.ieg-maps.uni-mainz.de.