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The Empire Project: Trade Policy in Interwar Canada

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Abstract

This paper uses a new dataset on the universe of Canadian imports and tariffs between 1924 and 1936, disaggregated into 1697 goods originating in 112 countries, to analyze the impact on Canadian imports of interwar Canadian trade policy, including the 1932 Ottawa trade agreements. Rather than use a dummy variable approach, we compute the impact of individual tariffs which varied substantially across goods, trade partners, and time. We perform a variety of counterfactual exercises to determine the impact of tariffs on trade flows. The overall impact of post-1929 tariff shifts, including the 1932 agreements, was relatively small, reflecting the fact that Canadian trade policy was already highly protectionist: trade agreements can have heterogeneous effects on participants because the shocks involved are different. Compared with a free trade counterfactual, the impact of the overall structure of protection on Canadian imports was large.

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1 Introduction

Adam Smith once described the British Empire as "not an empire, but the project of an empire" (Darwin, 2009, p. xi). The Great Depression provided an opportunity to make the project a reality. Previous proposals to create an imperial trade bloc had been inconsistent with Britain's post-1846 multilateral free trade policy. But now protection was universally on the rise, even in the UK itself, raising the possibility of preferential tariff arrangements between Britain and its empire. Welcoming delegates to the Ottawa Imperial Economic Conference in July 1932, Canadian Prime Minister R.B. Bennett called for "closer Empire economic association" based on tariff preferences, while cautioning that any outcome should be "compatible with those domestic considerations fundamental to the development of our natural resources. Those considerations cannot be forgotten if the Empire project is to succeed" (British Parliamentary Papers, 1931-32, p. 69).

Canada signed several bilateral trade agreements at Ottawa, including one with the UK. But pursuing Bennett's Empire project also meant discriminating against other countries, notably the United States, which was already facing Canadian retaliation against the 1930 Hawley-Smoot tariff. Canadian trade policy was increasingly hurting its most important trade partner, the United States, while favouring its second-most important partner, the UK. And a third feature of Canadian trade policy further complicated matters: Bennett's "domestic considerations" implied a rise in the overall level of protection, potentially reducing imports from everywhere.

This paper provides the first detailed quantitative study of all three facets of Canadian trade policy during the interwar period: the general rise in tariffs; the preferential trade deals with the rest of the British Empire; and the increasing discrimination against third countries, notably the United States. We not only study changes in trade policy following the onset of the Depression in 1929, but estimate the impact of the entire structure of protection in every year from 1924 to 1936. We make several original contributions. First, we construct a new dataset of Canadian imports and tariffs, covering the universe of Canadian imports between 1924 and 1936 and disaggregated into 1697 consistently defined product categories. This involved digitizing 7280 printed pages taken from contemporary primary sources, merging product categories so that they were consistently defined over time. Second, we use these data to estimate trade elasticities, allowing these to vary across sectors, trade partners, and time periods. Third, we discuss the impact of the Ottawa trade agreements on trade policy uncertainty during this period. And fourth, we embed our econometric estimates within a small open economy model of the Canadian economy, combining a simple supply side with an extremely detailed model of Canadian import demand that allows for trade diversion, incorporating substitution effects across a variety of margins. This allows us to calculate the impact on imports of Canadian trade policy, disaggregated by product, trade partner, and year.

We find that tariff changes after 1929 increased UK exports to Canada, but only by a little more than 6 percent, much less than what is implied by the existing gravity literature reporting average impacts for the British Empire as a whole (Eichengreen and Irwin, 1995; Gowa and Hicks, 2013). The increase was due to increasing discrimination against non-British countries, not lower tariffs on UK goods. Post-1929 tariff changes actually lowered imports from the rest of the Empire, and while they hit US exports to Canada the impact

was, once again, much less than what existing average gravity estimates imply (Mitchener et al., 2022). Japanese exports to Canada, on the other hand, were severely affected.

There has been little previous research on the quantitative impact of interwar Canadian trade policies, although a recent literature explores the effects of 19th century Canadian tariffs (Keay and Varian, 2024). The paper which comes closest to our own is Jacks (2014), who uses quarterly data on Canadian imports and exports by country, disaggregated into nine broad commodity categories, and deflated using the wholesale consumer price index. Using a difference in differences approach and dummy variables, the paper looks for the impact of the Ottawa trade agreements, which promoted trade within the British Empire from 1932 onward. The conclusion is that this impact was either small or non-existent, depending on the econometric specification: Ottawa had no clearly discernible impact on trade. In contrast, we use disaggregated data on 1693 goods from the universe of trade partners;¹ we estimate trade elasticities using data on nominal trade flows in a standard structural gravity framework; we calculate the impact over time of all trade policies, using commodity-level tariff data rather than dummy variables; and we do so using a detailed model of Canadian import demand which allows for substitution between imports and domestic output; between different imported goods; and between different national varieties of goods. Taking account of substitution across these different margins turns out to be essential for understanding the impact of Canadian protectionism during this period.

Our paper speaks to several literatures, most obviously that on interwar trade blocs. Traditional historians have doubted whether the Ottawa trade agreements had a big impact on British exports: based on pre-1932 trends, Drummond (1972, p. 102) guesses that they raised them by at most 3 percent. In an important cliometric contribution, Eichengreen and Irwin (1995) estimate (pre-structural) gravity models using cross-section bilateral trade data for 1928, 1935, and 1938. While they find a strong positive impact on bilateral trade flows of mutual membership of the British Empire in the 1930s, they also find a strong effect in 1928, before the Ottawa agreements of the 1930s. The implication they draw is that while the Ottawa accords did strengthen intra-imperial trade ties, the Empire effect largely reflected a long history of pre-existing commercial links.² While they do not emphasize the point, their results suggest that Ottawa nonetheless had a big positive impact on trade between members of the Empire, on the order of 50-60 percent.³ More recently, Gowa and Hicks (2013) analyze a much larger panel dataset in a structural gravity framework. They find that while imperial preferences boosted trade between the UK and its Dominions by 35 percent, they left trade between the Dominions unchanged. These studies are based on aggregate trade flows and trade bloc dummy variables; in contrast, we use detailed disaggregated information on trade and trade policy, and look at the commodity-level impact of tariff changes. Previous work has shown that doing so can uncover strong effects of trade policy that aggregate studies conceal (de Bromhead et al., 2019; Arthi et al., 2024).

¹For reasons that Section 4 will explain we do not include four of our 1697 products in the analysis.

²Consistent with this finding, and in line with the recommendations of Baier and Bergstrand (2007), Wolf and Ritschl (2011) analyze the same data in a panel setting, introducing country-pair fixed effects into the specification, and find that the creation of the Empire trade bloc had no effect on bilateral trade flows.

³They obtain a coefficient on an Empire dummy of 1.31 in 1928, and 1.67 in 1935. This suggests that being in the Empire boosted trade between members by 270 percent before Ottawa, and by 430 percent afterwards.

Second, our work is related to recent papers on the heterogenous effects of trade agreements. Baier et al. (2018) analyse "the heterogeneity of trade elasticities to *given ad valorem tariff-rate...changes*" (our emphasis), and find that as a consequence of this, economic integration arrangements have heterogenous effects across participants.⁴ Because we collect data on individual tariffs we are able to look in greater detail at what tariff changes these agreements involved. de Bromhead et al. (2019) and Arthi et al. (2024) find that imperial preferences had a strong distorting effect on the level and direction of trade in interwar Britain and India respectively, boosting intra-imperial trade flows substantially. This paper finds a more modest impact of 1930s trade policy changes in Canada. An important reason for this discrepancy is that the shocks involved (as opposed to the trade elasticities) differed across countries: Canadian trade policy was protectionist and discriminatory *before* the Great Depression, and was already having a major impact on the level and structure of imports in the 1920s. In contrast, the post-1929 British and Indian shifts in trade policy were much more dramatic. This novel source of heterogeneity would be difficult or impossible to uncover using aggregate data and trade bloc dummies alone.

Third, our paper speaks to the literature on colonial trade ties. Head et al. (2010) argue that the strong trading links between colonies and colonisers reflect "trade-promoting capital embodied in institutions and networks of individuals with knowledge of trading opportunities" (p. 12), a "sticky" determinant of trade flows that nonetheless depreciates over time once colonies become independent. Similarly, as we have seen, Eichengreen and Irwin (1995, p. 15) argue that "the prevalence of Commonwealth trade" largely reflected "commercial and financial linkages that had developed over the years". They acknowledge that preferential trade policies might have had an impact before the Ottawa accords, but their emphasis is far more on the effects of long-standing historical ties. Our results are broadly consistent with their argument: despite its discriminatory nature, we find that Canadian trade policy in the 1920s actually *lowered* imports from Britain, although it hit exports from the US and the rest of the world by more.⁵ Any disproportionate tendency for Britain to export to Canada during the 1920s was due to other factors.

Fourth, several authors have studied foreign retaliation against the American Hawley-Smoot tariff of June 1930 (Eichengreen, 1989; Irwin, 1998; 2017). In a recent contribution Mitchener et al. (2022) use quarterly aggregate bilateral trade data and retaliation dummies to identify the impact of retaliation, and conclude that it was big: around 30 percent. Our data can provide an alternative angle on this issue, by focussing on one retaliator's policies in granular detail. We find that in the Canadian case, the impact on US exports was smaller than the average impact reported by Mitchener et al.

And finally, there is an extensive literature on trade elasticities to which we contribute, heeding the call of Goldberg and Pavcnik (2016, p. 199) for more evidence based on vari-

⁴Baier et al. (2019) find that most of this heterogeneity occurs within rather than across free trade agreements.

⁵This is in contrast to the finding in Keay and Varian (2024) that pro-British tariff discrimination in the late 19th century increased British exports to the country: by the 1920s Canadian tariffs were (very slightly) increasing the share of British goods in total Canadian imports, but not their level.

ations in trade policy.⁶ Interwar Canada offers an ideal setting for this purpose, featuring substantial variation in tariffs across goods, trading partners, and time. We obtain a set of elasticity estimates based on these historical data that are on the lower end of what previous authors have found, but we also document considerable variation in these elasticities across commodities, trade partners, and time. Some of these findings speak directly relevant to the literature on trade policy uncertainty.⁷

1.1 Roadmap

As Section 2 will document, Canadian trade policy began to shift in a more protectionist and discriminatory direction from 1930 onwards. To analyze the implications of that shift, we ask: what would imports into Canada in 1929 have looked like if tariffs had changed as they actually did subsequently, with everything else remaining the same? In order to answer that question, we need a model of Canadian imports in 1929, with imports disaggregated by product and exporting country. We need the tariff rates actually imposed by Canada in 1929 (disaggregated again by product and country) so that we can replicate the actual 1929 equilibrium, which we will refer to as the benchmark equilibrium. Finally, we need Canadian tariff rates in every subsequent year. We can then shock our 1929 model, by counterfactually imposing these later tariffs on it, and seeing how imports, for every product and country, would have responded. We can thus trace out how the level and structure of Canadian imports in 1929 would have been different had the economy faced the tariffs of 1930, 1931, and so on.⁸

As we will see, Canadian trade policy was already quite protectionist prior to the Great Depression. The second counterfactual question that we ask is therefore: what would the level and structure of Canadian imports have been in each year from 1924 to 1936, if all tariffs had been counterfactually set to zero? By comparing these counterfactual imports with the actual imports in each year, we can calculate the impact of the entire structure of protection on Canada’s imports over time. In order to do this, we need models of Canadian imports in every year, similar to the one for 1929 mentioned above, which we can then shock by abolishing all tariffs imposed in the year in question.

These models, which will be described in greater detail in Section 3, involve nested CES utility functions on the demand side. These utility functions are defined over up to 1693 imported products coming from up to 112 countries, as well as an aggregate ‘domestic’ commodity produced and consumed within Canada. Because the utility functions are CES, all their parameters can be recovered, for each year, if we know the actual levels of consumption of every commodity, the relevant elasticities of substitution, and the tariff rates imposed on all imported products. We take our data on imports and tariff rates directly from the con-

⁶For example, see Broda and Weinstein (2006), Egger et al. (2012), Hillberry and Hummels (2013), Simonovska and Waugh (2014), Soderbery (2015), Caliendo and Parro (2015), Feenstra et al. (2018), and Fontagné et al. (2020).

⁷See for example Handley (2014), Handley and Limão (2017), Graziano et al. (2021), Handley et al. (2024), Alessandria et al. (2024), and Handley and Limão (2022) who provide an informative survey.

⁸Alternatively, we could ask what would the level and structure of imports have looked like in subsequent years, had the Canadian economy faced 1929 tariffs in those years, rather than the tariffs actually imposed. This was the approach taken in de Bromhead et al. (2019) and Arthi et al. (2024).

temporary Canadian trade statistics; Section 4 will introduce our new dataset and indicate how it was constructed, while the elasticities are derived in Section 6, using the econometric methods described in Section 5. The results of our counterfactual experiments are presented in Section 7, and Section 8 offers some concluding remarks.

2 Canadian Trade Policy: A Brief Overview

In this section we provide a brief introduction to Canadian trade policy during the interwar period. Unless otherwise stated, we rely on the two standard accounts provided by McDiarmid (1946) and Hart (2002).

Three major changes occurred prior to World War I that remained relevant in the interwar period. First, from 1878 onwards Canada adopted a protectionist policy promoting import substitution and industrialisation. Second, in 1898 Canada unilaterally extended tariff preferences to the United Kingdom, Bermuda, the British West Indies, and British Guiana. These preferences would soon be extended to most members of the British Empire, aside from Australia, Newfoundland, and entrepôt colonies such as Aden, Gibraltar, and Hong Kong. Third, Canada started negotiating its own trade treaties with other countries. The first treaty, concluded with France in 1893, had seen British officials involved in the negotiations, but in 1907 Canada independently negotiated a second treaty with France, and treaties with Italy and the British West Indian colonies soon followed. The result was that from 1907, there were three Canadian tariff schedules: the British preferential rate; a “treaty” or “intermediate” rate for countries concluding trade treaties with Canada and consequently enjoying most favoured nation status; and a third, general rate for other countries.⁹ This tripartite structure was retained through the interwar period.

The world war saw a temporary increase in protection for fiscal reasons, but this was reversed after 1918. During the 1920s Canada negotiated trade agreements with Cuba, Czechoslovakia, France, and the West Indies. It also agreed to exchange most favoured nation status with Belgium, Estonia, Finland, Hungary, Italy, Latvia, Lithuania, the Netherlands, Portugal, Romania, Spain, and Yugoslavia.¹⁰ The margin of British preference was further increased, and in 1928 British preferential rates were extended to Newfoundland (Macleod, 1985, p. 85). Otherwise trade policy remained relatively stable.

This changed with the onset of the Great Depression and the shift towards protection in Canada’s two most important trading partners, the United States and United Kingdom. In May 1930, with America debating what would become the Hawley-Smoot tariff, Liberal Prime Minister Mackenzie King introduced a tariff bill deepening imperial preferences and introducing countervailing tariffs on 16 US export goods accounting for around 30 percent of American exports to the country. In July the Conservatives returned to power, and tariffs on a wide range of goods were increased in September, and again in June of the following year.

⁹Treaty rates tended to be around 5 to 7.5 percent lower than general rates, but according to McDiarmid the innovation was not so important in practice: “Not until it was extended to the United States in 1935 did any important volume of trade enter under it” (p. 224).

¹⁰Some of these agreements are characterized in the secondary literature as representing fully fledged trade agreements, but this is not the case. See for example the 1924 Belgian agreement, detailed in 14-15 George V, Chapter 9, and available at <https://archive.org/details/actsofparl1924v01cana/page/20/mode/2up>. All that it involved was the mutual exchange of most favoured nation status.

Their impact was heightened by a variety of administrative devices, having to do for example with the setting of prices at which imports were valued: according to McDiarmid (1946, p. 276) such tactics may in practice have raised tariff rates by as much as 10 percent. The maximum permitted anti-dumping duty was raised to 50 percent. As in other Dominions, an across-the-board surcharge on imports was imposed by the Canadian government for revenue reasons, reaching 3 percent in 1932 (Chalmers, 1933, p. 14; Glickman, 1947, p. 144). In September 1931, Canada responded to Britain's decision to leave gold by continuing to use the old sterling exchange rate for valuation purposes, with the rate being subsequently modified on several occasions. An anti-dumping duty was also imposed on British goods (Elliott, 1955, p. 199).

The British general election of October 1931 saw a national government elected, dominated by Conservatives who were favourable to both protectionism and closer ties with the Empire. The following month the UK imposed high tariffs on a variety of goods originating outside the Empire, and in February the Import Duties Act set a 10 percent tariff on most remaining goods. Britain's colonies were exempted from this new tariff, while the Dominions were exempted until November 15 1932, pending the outcome of the Imperial Economic Conference due to begin on July 21 in Ottawa. This gave the British delegation to that conference a powerful initial bargaining position (Glickman, 1947, pp. 442-3).

In 1931, Canada had reached a trade agreement with Australia, cutting duties on specified goods to rates which were below the British preferential rate. Goods not specified in the treaty were accorded British preferential tariffs. The country's British preferences now extended to essentially the entire Empire. In April 1932 a new trade agreement was negotiated with New Zealand, increasing the preferential treatment which that country enjoyed in the Canadian market. The Ottawa Conference further deepened Imperial preferences, with the participants concluding a series of bilateral deals with each other. Canada negotiated trade treaties with the Irish Free State, South Africa, and Southern Rhodesia, but the agreement that mattered most was that with the United Kingdom.

Broadly speaking, the United Kingdom agreed to maintain or increase the preferences accorded to Canada in February, and "invited" the colonies, subject to certain specified exceptions, "to accord to Canada any preference which may for the time being be accorded to any other part of the British Empire".¹¹ For its part, Canada lowered its tariffs on a variety of British goods, and increased tariffs on imports from outside the Empire. Changes were made to 225 Canadian tariff lines, with the margin of British preference increasing in 223 of these (Canada. Dominion Bureau of Statistics, 1933, p. 485). Canada also agreed to extend its British preferences to the colonies, although the extent to which it abided by this commitment has been questioned (Miners, 2002, footnote 27, p. 74).

Canada now had deeper economic ties with one of its main trading partners, but trade barriers with its most important partner, the United States, remained high. McDiarmid (1946, pp. 284-5) notes that under Bennett British preferences were raised most in the tariff lines where the United States was particularly dominant. An opportunity to remedy this situation arose following Roosevelt's victory in 1932, with his Secretary of State, Cordell Hull, committed to lowering trade barriers. In 1934 the US passed the Reciprocal Trade Agreements Act, allowing the President to negotiate tariff agreements without the approval

¹¹The text of the agreement is available in British Parliamentary Papers (1932).

of Congress (Irwin, 1998). Under the terms of the Act, a trade agreement was negotiated between Canada and the United States in 1935, with its provisions becoming effective at the start of the following year.¹² Duties were lowered on both sides, and Canada finally granted most favoured nation status to its southern neighbour. It was, however, still entitled to discriminate in favour of the British Empire.

To summarize: interwar Canada had been pursuing a tariff policy promoting import-substituting industrialization since the 1870s, and had been discriminating in favour of Britain and (most of) the rest of the Empire since before World War I. Trade policy remained relatively stable between the war and the Great Depression. In 1930 and 1931 it raised tariffs across the board, particularly targeting goods exported by the United States, and deepened Imperial preferences. While anti-dumping measures were taken against Britain in the autumn of 1931, Imperial preferences were further deepened in 1932, following the Ottawa Conference. The United States found itself being increasingly discriminated against in the Canadian market. This trend was eventually reversed in 1935, following the signing of the Canada-US trade agreement, with tariff reductions being agreed by the two countries, and with the US receiving MFN status in Canada. Those changes became effective in 1936.

3 Theoretical Framework

As Section 4 will describe, we have constructed an extremely detailed dataset giving us Canadian imports of 1693 products from 112 countries in every year from 1924 to 1936. We have also collected tariff data at the same level of disaggregation. In order to evaluate the impact of trade policy on the level and structure of Canadian imports, we need to compare our actual import data with the imports that would counterfactually have been observed had tariffs been different. This requires a model.

While we have extremely disaggregated information on imports, we do not have correspondingly detailed domestic production data. We do however have Canadian GDP. We therefore construct, for each year t , a small open model of the Canadian economy inspired by Anderson and Neary (1996) and Broda and Weinstein (2006). The supply side is very simple. A representative household is endowed with the sole factor of production, GDP_t , which is transformed by a single production sector into two goods, an export good X_t and a domestic good D_t , via a constant elasticity of transformation production function with elasticity η :

$$GDP_t = \theta_t D_t^{(1+\eta)/\eta} + (1 - \theta_t) X_t^{(1+\eta)/\eta} \quad (1)$$

The export good is sold abroad to generate the foreign exchange needed to buy imports, while the domestic good is consumed locally; we assume that trade is balanced.

The demand side of the model is more complex, reflecting the richness of our import data. The representative household has a nested CES utility function. At the top level the household chooses between the domestic good D_t and a composite imported good I_t , with

¹²As Section 4 notes, our trade and tariff data are for fiscal years ending on 31 March, so this change occurred nine months into what we label 1935.

elasticity of substitution κ :

$$U_t = (\alpha_t D_t^{(\kappa-1)/\kappa}) + (1 - \alpha_t) I_t^{(\kappa-1)/\kappa} \quad (2)$$

The composite imported good is a CES aggregate, with elasticity γ , of up to 1693 imported goods M_{gt} :

$$I_t = \left(\sum_{g \in G_t} \beta_{gt} M_{gt}^{(\gamma-1)/\gamma} \right)^{\gamma/(\gamma-1)} \quad (3)$$

where G_t is the subset of our 1693 goods imported in year t . Finally, each good g imported in year t is a CES aggregate, with elasticity σ_g , of up to 112 national varieties m_{gct} , each originating in a separate country c :

$$M_{gt} = \left(\sum_{c \in I_{gt}} \delta_{gct} m_{gct}^{(\sigma_g-1)/\sigma_g} \right)^{\sigma_g/(\sigma_g-1)} \quad (4)$$

where I_{gt} is the subset of our 112 countries exporting good g to Canada in year t . We assume that Canada takes the world prices of traded varieties, p_{gct}^W as given; domestic prices p_{gct}^D are equal to world prices multiplied by $(1 + \tau_{gct})$, where τ_{gct} is the ad valorem equivalent tariff rate imposed on national variety c of good g in year t . As mentioned earlier, all the parameters of the model (that is, θ_t , α_t , β_{gt} , and δ_{gct}) can be retrieved given data on imports m_{gct} , tariff rates τ_{gct} , consumption of the domestic good D_t , and the elasticities in the model (η , κ , γ , and σ_g).¹³ The tariff rates can then be exogenously varied in counterfactual simulations. We hold the extensive margin fixed in all simulations, consistent with the observation that movements in aggregate trade flows occurred overwhelmingly on the intensive margin during this period: in other words, we hold G_t and I_{gt} fixed for all g and t .¹⁴ We next provide a brief description of our import and tariff data, before proceeding to estimate the elasticities of substitution between different imported varieties, σ_g .

4 Data Description and Sources

Our data are taken from the annual trade reports published by the Canadian Bureau of Statistics (Canada. Dominion Bureau of Statistics, 1925-1937). We digitized detailed import tables taken from the thirteen reports covering the fiscal years 1924-25 (ending on March 31 1925, which we assign to 1924) to 1936-7 (ending on March 31, 1937, taken to represent the calendar year 1936). In all we digitized 7280 printed pages. The import tables provide comprehensive information on import values, tariff revenues, and (in 56 percent of cases) import quantities by product and trading partner. 2784 distinct product lines were listed in the import tables we digitized, originating in 116 separate regions or countries. However,

¹³The assumption of balanced trade means that given information on imports m_{gct} we can calculate exports X_t . Perfect competition implies that the value of inputs is equal to the value of outputs in equation (1). As is standard in the literature, all units are defined so that prices in the benchmark equilibrium are equal to 1. D_t is then simply equal to GDP_t , taken from McInnis (2001), minus X_t .

¹⁴A simple decomposition of the 1929-33 trade collapse based on Kehoe and Ruhl (2013) suggests that the intensive margin accounted for 100.8 percent of the collapse.

not all product categories were reported in every year, with some appearing and others disappearing as reforms led to the separation or merging of the tariff lines of previous years. We were however able to merge the 2784 original categories into 1697 product categories which are consistently defined in every year.¹⁵ These 1697 products can be further aggregated into 100 aggregate categories, which we label industries, and 11 even broader categories which we label sectors (Table A2). We also merged the Canary Islands into Spain, Madeira and the Azores into Portugal, and Alaska and Hawaii into the United States, leaving us with 112 countries.

Countries not listed as exporting a particular product to Canada in a given year were assigned an import value of zero for that product and year. We were able to eliminate all typos and other errors by exploiting the fact that the import tables reported import values and duties not only for individual products, but for more aggregate categories; and that in each year they also reported import values in the four preceding years. As a result, when we sum import values over our 1697 goods and 112 countries, we obtain the official total Canadian import values for each year, accurate to the nearest dollar.

We dropped four of our product categories from the analysis, two involving gold and bullion, and two which reported tariff revenues but no corresponding imports. This implied dropping one of our 100 industries, and one of our 11 sectors, namely "Coins and bullion". We are thus left with 1693 products coming from 112 countries, falling into 99 industries and 10 broad sectors, the latter being listed in Table 1.

The import tables list not only the imports of each product, broken down by country, in each year, but the tariff revenue collected by country and product as well. The ad valorem tariff paid on imports of each variety (i.e. product-country combination) is computed as the ratio of the duty paid to the value of imports for that product, country, and year. We then have to assign tariff rates to countries not exporting a particular product in a given year: the vast majority of observations involve zero trade flows, and we want to include these in our regressions.¹⁶

Fortunately, the import tables report not only total import values and tariff revenues per product and country, but imports and duties broken down by tariff regime, distinguishing between imports paying the Canadian preferential rate (which, as we saw in Section 2, was payable by most members of the British Empire), the treaty or intermediate rate (payable by countries with which Canada had negotiated a trade agreement), and the general rate (all others). By adding up all imports and duties coming in under a given regime, we were able to compute up to three "regime" tariff rates per product and year: a general, a preferential, and a treaty rate. For some products imports might only have come in under one or two of these headings; for example, a product would only be associated with a preferential or treaty rate if Canada had introduced such rates for that particular product.

If a product was only imported under one regime, every country with zero exports was assigned the tariff associated with that regime. If a product was imported under more than one regime, every country with zero exports was assigned the lowest regime rate to which it was entitled. For example, if a preferential tariff rate existed for a particular product,

¹⁵Of these, 1317 were already consistently defined across years in the original sources.

¹⁶Of the 2,465,008 observations in our dataset, just 114,146 involved positive import values. Although we include all observations in our main regressions, the rich set of fixed effects that we use ensures that most observations involving zero trade flows are dropped by the PPML estimator.

and a country was exporting other products to Canada that year under the preferential regime, then we consider it to have been eligible for the preferential rate for this product also. Where we had good reason to believe that a particular tariff was specific rather than ad valorem, we made further adjustments for regime-specific unit values, with the aim of ensuring, insofar as it was possible, that differences in imputed tariff rates reflect differences in specific tariff rates rather than differences in unit values.¹⁷ As a robustness exercise, we estimate elasticities excluding observations involving specific tariffs, or only including such observations.

4.1 Some stylized facts

Canadian imports rose steadily during the 1920s, peaking in 1928, but fell precipitously from 1930 to 1932. Imports in 1932 were 68 percent lower than at the peak, and they were still 47 percent lower in 1936. As can be seen from Figure 1 exports from the United States were particularly badly hit, declining by 73 percent between peak and trough; the corresponding figure for the United Kingdom was 55 percent, with the experiences of the rest of the British Empire, and the rest of the world, lying between these two extremes. By 1936 British exports had fully recovered, whereas US exports were still 55 percent below peak.

While American exports to Canada were particularly badly hit during the Depression, the US was by far the most important exporter to Canada throughout the period, accounting for 64 percent of Canadian imports in 1924 (Figure 1). That share declined from 1930, reaching a low of 54.9 percent in 1933, before recovering to 58.6 percent by 1936. The UK was the second most important exporter, accounting for 19 percent of imports in 1924. Its share rose from 1930, reaching a peak of 24.2 percent in 1933 before falling back to 19.3 percent in 1936. The rest of the Empire saw its share of Canadian imports double between 1929 and 1936, from 5.1 percent to 10.2 percent, while the rest of the world's share was relatively stable throughout, hovering between 11 and 13 percent. We will highlight these four "regions" in much of the analysis that follows.

Figure 2 plots the shares of the ten broad sectors listed in Table 1 in total Canadian imports. As can be seen, Canadian imports were largely concentrated in four broad sectors: iron and iron products; non-metallic minerals and associated products (including coal and petroleum); fibres and textiles; and vegetable products (including grain).

The top panel of Figure 3 plots unweighted average tariffs, computed across all 1693 goods, for each of our four regions. Several features stand out. First, tariff levels were relatively stable in the 1920s. Second, there was a clear hierarchy of preferences, with the

¹⁷More precisely, when it was clear that tariffs were specific, quantity data were available, and units were consistently specified, we calculated regime-specific unit values in each year t , p_{rt} , and an aggregate unit value for all imports p_t . We then multiplied the regime-specific rates described in the text by p_{rt}/p_t . There were 26 cases in which we could not do this because quantities were missing. 25 of them concerned just two goods, "Extracts of meats and fluid beef, not medicated." and "Corn flour, hominy, cracked, evaporated or dried corn." For these two goods general rates were consistently higher than preferential and treaty rates, suggesting that a correction was probably not needed. The remaining observation, "Ale, beer, porter and stout, in bottles. [and other beer]" in 1935, has lower rates for general than for preferential imports. The reason seems to be an error in the original source regarding 72,323 gallons of beer from the United Kingdom, assigned to the general instead of to the preferential regime. In this case, we assign the lower general rate to all zero import countries.

UK facing the lowest tariffs, followed by the rest of the British Empire and foreign countries other than the United States. The US faced the highest average tariffs in every year bar 1936, the year in which it was finally accorded most favoured nation status by Canada. Third, the margin of imperial preference increased from 1930 onwards, peaking in 1934 or 1935, depending on whether you focus on the UK-US comparison, or on the difference between the average tariffs facing our other two regions. The average margin by which US tariffs exceeded British ones increased from less than 6 percentage points before the Great Depression to almost 10 percentage points in 1935. Fourth, the tariffs facing all four regions increased in 1931, as Bennett increased protection and imposed anti-dumping duties on Britain and elsewhere. Tariffs on British imports peaked in 1931, while those on foreign countries continued to rise through 1933.

The lower panel of Figure 3 shows that there was a wide variety of tariff experiences across our ten broad sectors which we will exploit when estimating trade elasticities. Tariffs on textiles and vegetable products rose substantially, while increases were more modest for categories such as wooden and miscellaneous products. In some sectors, notably animal products and textiles, tariffs rose on both British and foreign exports. In others, such as non-ferrous metals and vegetable products, tariffs remained relatively stable on imports from the Empire but rose on products from elsewhere. And for iron and non-metallic mineral products tariffs on foreign imports rose modestly, while those on British goods fell following an upward blip in 1931.

5 Econometric Specification

To specify our econometric model, we rely on structural gravity theory (e.g., Anderson (1979), Eaton and Kortum (2002), Anderson and van Wincoop (2003), and Arkolakis et al. (2012)), capitalizing on many of the developments in the empirical gravity literature (e.g. as summarized by Head and Mayer (2014) and Yotov et al. (2016)). The following is our main estimating equation, from which we will recover the key trade elasticity parameters σ_g :

$$m_{gct} = \exp[\ln(1 + \tau_{gct}) \times \beta + \psi_{gc} + \phi_{gt} + \pi_{ict}] \times \epsilon_{gct} \quad (5)$$

Here, m_{gct} denotes nominal (cf. Baldwin and Taglioni (2006)) imports into Canada of product g from exporter c in consecutive years t .¹⁸ m_{gct} enters (5) in levels because the model is estimated with the Poisson Pseudo Maximum Likelihood (PPML) estimator which accounts for possible heteroskedasticity in the trade flows data (cf. Santos Silva and Tenreyro (2006; 2011)) and which, due to its multiplicative form, also takes into account the information contained in the zero trade flows.

The key covariate of interest to us is $\ln(1 + \tau_{gct})$, the log of one plus the ad valorem tariff rate imposed on product g from exporter c at time t . Since tariffs are direct price shifters, theory implies that the coefficient on $\ln(1 + \tau_{gct})$ is only a function of the trade

¹⁸Many papers have followed the recommendation of Cheng and Wall (2005) to estimate gravity with interval data. However, more recently, Egger et al. (2022) have demonstrated that there is no need to (randomly) throw data away when the gravity model is properly specified, and they recommend using all years. We follow this recommendation when obtaining our main estimates.

elasticity, and we will recover and utilize this important parameter for our simulation analysis.¹⁹ For the sake of simplicity equation (5) only includes a single β coefficient; however, in the empirical analysis below we will allow it to vary across sectors, across countries, and over time. The separability property of the structural gravity model (e.g., Anderson and van Wincoop (2004), Costinot et al. (2012)) facilitates this, since it implies that equation (5) can be estimated separately at any desired level of aggregation. Our baseline simulations use β coefficients estimated at the sectoral level: importantly, these utilize the most disaggregated (product-level) data but impose common coefficient constraints at the sectoral level of interest. To obtain our main estimates, we use three-way clustered (by exporter, product, and time) standard errors, but we also experiment with two-way clustered standard errors in the robustness analysis and find that our conclusions do not change.

Equation (5) includes three sets of fixed effects.²⁰ ψ_{gc} denotes the vector of country-product fixed effects, which control for all time-invariant determinants of trade at the exporter-product level (also absorbing, by construction, any time-invariant country or product characteristics such as units of measurement, area, or distance from Canada). Importantly, ψ_{gc} allows us to control for any time-invariant trade cost differences across products (e.g., differential effects of distance across products). This is consistent with some of the theoretical foundations of the gravity equation, e.g., Anderson and van Wincoop (2004) and Costinot et al. (2012), and there is plenty of empirical evidence that trade costs vary across sectors and products. Including these fixed effects has the further advantage that our identification occurs purely along the time dimension.

ϕ_{gt} denotes the set of product-time fixed effects, which will absorb and control for any time-varying product changes and characteristics (e.g., global structural change or shifts across goods in Canadian demand). By construction, ϕ_{gt} will also control for any common time trends (e.g., the Great Depression). Finally, in our single-country setting, product-time fixed effects control for all Canadian inward structural multilateral resistance terms.

π_{ict} is a vector of industry-exporter-time fixed effects. The exporter-time dimension of our fixed effects ensures that we fully control for any time-varying exporter-specific determinants of trade (e.g., exporter GDP, the exchange rate between the exporter and Canada, or any bilateral treaties between Canada and the exporter).

The industry dimension ($'i'$) in our fixed effects π_{ict} is based on the categories from Table A2. From a theoretical perspective, the aim of this additional dimension in our fixed effects is to control (at least partially) for the structural outward multilateral resistance terms (OMR) in exporting countries of Anderson and van Wincoop (2003), who demonstrate that

¹⁹Depending on the theoretical treatment of tariffs, the coefficient on $\ln(1 + \tau_{gct})$ can be interpreted as either $-\sigma_g$ or $1 - \sigma_g$, where σ_g is the elasticity of substitution (see Yotov et al. (2016)). We will adopt the former interpretation, and take the absolute value of β to be an estimate of σ_g .

²⁰In Appendix 2 we experiment with alternative sets of fixed effects, which are less demanding than those used in our preferred specification (5) but which enable us to decompose the importance of various types of determinants of Canada's imports and to use larger estimating samples. Overall, our results are relatively robust to the use of alternative sets of fixed effects. See Appendix 2 for further details.

not controlling for these may lead to significant estimation biases.²¹ Fully controlling for the OMRs with fixed effects would require that the latter be of dimension product-exporter-time. However, given our focus on the imports of a single country it is not possible to include these, since they would be of the same dimension as the dependent variable. Therefore, instead of products we use industries, including fixed effects of dimension industry-exporter-time. We note that our sample includes 99 industries, which is a quite disaggregated classification, with on average fewer than 17 products in each industry.

6 Estimation Results and Analysis

We first estimate a common impact across all products of tariffs on Canadian imports and provide some sensitivity analysis (Subsection 6.1). Subsection 6.2 allows the impact of Canadian tariffs to be heterogeneous across sectors, across countries, over time, and simultaneously across countries and sectors.

6.1 Common Tariff Effects

Our main estimate of the average effect of tariffs on Canada’s imports, obtained from specification (5), appears in column (1) of Table 2. We obtain a negative, sizable, and statistically significant estimate of the average impact of tariffs on Canadian imports, implying that, on average, tariffs were an important impediment to Canadian imports during this period. In terms of magnitude, the estimate on $\ln(1 + \tau_{gct})$, (-3.576, std.err. 0.899), is comparable to corresponding estimates from the related literature.²²

The other columns in Table 2 report estimates from a series of robustness experiments. In column (2) we use two-way clustered standard errors, i.e., by exporter and product. This specification corresponds to the standard two-way clustering by pair in bilateral gravity regressions with multiple exporters and multiple importers. As expected, the estimates are unchanged. Moreover, the standard errors are also very similar.

Column (3) of Table 2 uses the OLS estimator. The estimated tariff elasticity is still negative and statistically significant, but is significantly smaller than our main estimate. Consistent with the argument of Santos Silva and Tenreyro (2006) that OLS may deliver biased estimates, this result reinforces our decision to use the PPML estimator for our main analysis.²³ In column (4) we use 2-year interval data and in column (5) we use data that are balanced across products and across countries for each year in the sample. In both cases, the

²¹They also control for any time-invariant and time-varying industry characteristics (e.g. industry size). Baldwin and Taglioni (2006) dub the omission of the multilateral resistances as the ‘gold medal mistake’ in trade gravity regressions. More recently, Felbermayr and Yotov (2021) show that simply using weighted averages of bilateral trade costs (e.g., GDP-weighted bilateral distances) leads to significant estimation and prediction biases in gravity regressions.

²²For example, see the references in footnote 6.

²³Despite being smaller, our OLS estimate implies a trade elasticity that is within the established bounds, consistent with theory, and comparable to estimates from the RBC macro literature (e.g., Backus et al. (1994) and Zimmermann (1997)) and also to some recent estimates from trade papers (e.g., Anderson and Yotov (2020) and Boehm et al. (2020)).

resulting estimates are comparable to our main estimate in column (1). In sum, the results in columns (2)-(5) of Table 2 confirm the robustness of our main estimate.

The results in Table 3 are based on specification (5), but each set of estimates is obtained with a different sample. For ease of comparison, column (1) reproduces our main estimate from the first column of Table 2. In column (2) we use the same tariff variable as in column (1), but drop observations with zero trade flows. The next two columns of Table 3 report estimates where we limit our observations to cases where there are no specific tariffs (column (3)) and where there are only specific tariffs (column (4)). The overall conclusion from Tables 2 and 3 is that our main results are robust.

6.2 On the Heterogeneous Impact of Tariffs

In this subsection we investigate how the impact of Canadian tariffs varied across sectors, across countries, and over time. All estimates are obtained from our main specification (5). The only difference is that, instead of imposing a common tariff coefficient, we allow β to vary across each of these three dimensions and some combinations of them.

We start with an analysis of variation across sectors. As discussed in the previous section, such variation is consistent with gravity theory (e.g., Anderson and van Wincoop (2004), Costinot et al. (2012)). Thus, based on our main econometric model (5) we estimate:

$$m_{gct} = \exp\left[\sum_{s \in S} \beta^s \times \ln(1 + \tau_{gct}) + \psi_{gc} + \phi_{gt} + \pi_{ict}\right] \times \epsilon_{gct}, \quad (6)$$

where the set of sectors S is given in Table 1.

The results appear in the top panel of Figure 4. Two features stand out. First, all but one of the estimates are negative. The exception is non-ferrous metals, where we obtain a positive, but small and statistically insignificant, coefficient. Second, the estimates vary significantly across the 10 sectors in our sample. The sectors with the smallest tariff effects are the three agricultural sectors (vegetable, plant, and animals), followed by wood. The sectors with the largest coefficients are iron and non-metallic minerals, followed by textiles and chemical products. We will use these elasticities to perform our baseline simulation analysis in Section 7.

Next, we investigate how the impact of Canadian tariffs varied across its major trading partners. We start by distinguishing between countries that were part of the British Empire and those that were not. To this end, we modify equation (5) by introducing an indicator variable EMP_{ct} , which takes a value of one if c was part of the British Empire in year t . We estimate:

$$m_{gct} = \exp[\beta_E \times (\ln(1 + \tau_{gct}) \times EMP_{ct}) + \beta_{NE} \times (\ln(1 + \tau_{gct}) \times (1 - EMP_{ct}))] \times \exp[\psi_{gc} + \phi_{gt} + \pi_{ict}] \times \epsilon_{gct} \quad (7)$$

We obtain a negative and statistically significant estimate of the tariff coefficient for Empire countries ($\hat{\beta}_E = -4.392$, std.err. 0.734), which is larger than the coefficient for non-Empire countries ($\hat{\beta}_{NE} = -3.279$, std.err. 0.973). The implication is that the negative impact of tariffs on imports from the Empire was stronger than the corresponding impact on imports

from non-Empire polities.

The estimates in the middle panel of Figure 4 are obtained from specification (5), but allowing the effects of tariffs to be heterogeneous across Canada’s main trading partners according to:

$$m_{gct} = \exp\left[\sum_{k \in C} \beta_k \times \ln(1 + \tau_{gct}) + \psi_{gc} + \phi_{gt} + \pi_{ict}\right] \times \epsilon_{gct} \quad (8)$$

where the set of countries C includes the United States, the United Kingdom, Germany, France, Japan, and all other countries (Other). In other words, we obtain five country-specific estimates of β plus an additional estimate for all other countries. The estimates in Figure 4 show that the impact of Canada’s tariffs was relatively homogeneous across Canada’s main trading partners with one important exception: the elasticity for the United Kingdom is significantly larger in absolute value than all other estimates. This result is consistent with the larger estimate that we obtained in our previous experiment for British Empire members, and we return to it below.

Next, we investigate the simultaneous variation of β across countries and sectors. To this end, we amend specification (5) by introducing interactions between the 5 countries and 10 sectors from Figure 4, and estimate:

$$m_{gct} = \exp\left[\sum_{s \in S, k \in C} \beta_k^s \times \ln(1 + \tau_{gct}) + \psi_{gc} + \phi_{gt} + \pi_{ict}\right] \times \epsilon_{gct} \quad (9)$$

Our results appear in Table 4. While they are obtained from a single specification, for the sake of clarity we report them in several columns. The rows of the table list the sectors, and the columns of the table list the countries that we use in this analysis. The country-sector estimates are broadly consistent with our previous findings but also uncover some new insights. For example, the estimates for Iron are largest for the US and UK, but are smaller and insignificant for the other individual countries in our specification. This accounts for the relatively large sectoral estimate for Iron that we obtained earlier. We also see some heterogeneity within countries and across sectors. For example, for both the UK and US we see large estimates for iron products, chemicals, and textiles, but relatively small and insignificant estimates for animals and non-ferrous metals.

We also study the variation of β over time, estimating:

$$m_{gct} = \exp\left[\sum_{t=1924}^{1936} \beta_t \times \ln(1 + \tau_{gct}) + \psi_{gc} + \phi_{gt} + \pi_{ict}\right] \times \epsilon_{gct} \quad (10)$$

The results are in the bottom panel of Figure 4. Two main findings stand out. First, all estimates are negative and statistically significant. Second, while most of the elasticities are not statistically different from each other, they are smaller in absolute value (i.e. less negative) during the Depression. From a policy perspective, the smaller tariff elasticities during the Depression imply that trade volumes may not have fully adjusted to higher tariffs during that period. Trade dependence and persistence are possible explanations. From a methodological perspective, our finding that trade elasticities may not be constant over

time is consistent with the sub-convex gravity theory of Carrère et al. (2020). It is also consistent with the recent literature on trade policy uncertainty (TPU), which finds that tariff elasticities may be lower at times of greater policy uncertainty (see the references in footnote 7). The Great Depression was certainly a period of heightened economic uncertainty, including greater uncertainty about trade policy, and this may explain why our elasticity estimates were lower then. The TPU literature can also help to explain our previous finding that tariff elasticities were higher in absolute terms for trade with the UK, given that Canada concluded a trade agreement with the UK in 1932, and that trade agreements can lower TPU.²⁴

In our next experiment, we therefore explore more systematically how tariff elasticities were related to Canadian trade agreements. Because we include industry-country-year fixed effects in our model, we cannot include agreement-specific dummy variables.²⁵ However, even in the presence of all fixed effects we can allow the impact of tariffs to vary across types of trade arrangements:

$$m_{gct} = \exp\left[\sum_{A \in CA} \beta_A \times (\ln(1 + \tau_{gct}) \times A_{ct}) + \psi_{gc} + \phi_{gt} + \pi_{ict}\right] \times \epsilon_{gct}, \quad (11)$$

The new term in equation (11), A_{ct} , is a dummy variable indicating whether or not country c benefited from a trade arrangement of type A in year t . We distinguish between five cases. First, there were trade agreements concluded at or immediately prior to the Ottawa meetings, with the countries attending that meeting (*OTTAWA1*). Second, since the Canada-UK agreement negotiated in 1932 committed Canada to extending to the rest of the Empire preferences which it was extending to Britain, the rest of the Empire could be regarded as having been covered by an implicit agreement from that date (*OTTAWA2*). Third, there were trade treaties concluded with countries such as France or the United States independently of the Ottawa meeting (*NO_OTTAWA*). Fourth, there were the trade treaties which merely exchanged MFN status (*MFN_TREATIES*). Table 5 lists the countries that were beneficiaries of each kind of trade agreement. And finally, there were countries which did not benefit from any kind of trade agreement with Canada (*NO_TREATY*).

Our findings are presented in Table 6. For comparison, column (1) reproduces our main estimate from column (1) of Table 2. Column (2) introduces the new estimates based on equation (11). The impact of tariffs was quite heterogeneous across types of trade arrangements. Consistent with the TPU literature, which predicts that certain agreements not only lower tariffs but also reduce uncertainty implying larger applied tariff elasticities, the elasticity estimate for other Ottawa participants is indeed larger.

The large estimate on the Ottawa interaction may explain the large UK tariff elasticity obtained in Figure 4. To test this hypothesis, we reproduce the regional analysis from the middle panel of Figure 4, but split the effects of tariffs on UK goods into the impacts before and after the Ottawa agreements. The top panel of Figure 5 reports the UK tariff elasticity obtained when only using observations prior to the Ottawa accords, i.e. up to and including

²⁴We are grateful to an anonymous referee for encouraging us to explore potential links between our results and the TPU literature.

²⁵In the Appendix we provide estimates of the impact of agreements without including the full set of fixed effects in our model. Please see Table A4 and the accompanying discussion.

1931. Consistent with the predictions from the TPU literature, we find that the pre-1932 UK estimate is significantly smaller in absolute terms than the corresponding estimate in Figure 4, and very similar to the estimates for the United States, Japan, and Germany.²⁶

The results in column (3) of Table 6 are obtained after introducing a measure of ‘tariff risk’ to the specification from column (2). Following Handley and Limão (2022), we construct $TARIFF_RISK = \left(1 - \left(\tau_{it}^{max}/\tau_{it}^{apl}\right)^{-\sigma}\right)$, where τ_{it}^{max} is the highest tariff for a given product i in a given year t , τ_{it}^{apl} is the applied tariff, and $\sigma = 4$ is consistent with what is used in the TPU literature and also with our own estimates. Two results stand out from column (3). First, the estimate on $TARIFF_RISK$ is not statistically significant. Second, the estimate on $NO_TREATY_LN_TARIFF$, capturing the effects of tariffs that are not subject to agreements, is a little smaller than in the previous column.

Motivated by this smaller coefficient, we revisit the evolution of tariff elasticities over time. The bottom panel of Figure 5 reproduces the time-varying elasticities from Figure 4, but based on the specification from column (3) of Table 6, and focusing on the coefficient on $NO_TREATY_LN_TARIFF$. The elasticities are still larger in absolute terms before 1927 and in 1936. However, once we have controlled for the possible effects of uncertainty, which should have been lowering tariff elasticities during the Great Depression, and stripped out the effects of trade agreements, which should have been raising them, the estimates for the period 1927-1935 are relatively stable compared to the corresponding results in the bottom panel of Figure 4.

The last specification in Table 6 not only controls for ‘tariff risk’, and allows for heterogeneous tariff effects across different trade arrangements, but also interacts the $TARIFF_RISK$ variable with each type of trade agreement. The only statistically significant coefficient involving the new terms in column (4) is the one on the interaction between $TARIFF_RISK$ and $OTTAWA1$. One interpretation of this result is that the effects of the agreement were stronger the larger the ‘tariff risk’. We find this result intuitive. An alternative interpretation, through the lens of the TPU literature, is that the effects of the tariff threat were smaller after credible trade agreements were negotiated in Ottawa.

7 Counterfactual Analysis

We are almost ready to analyze the impact of tariffs on the level and structure of Canadian imports using the model outlined in Section 3. The data on imports and tariffs needed to calibrate our annual models were outlined in Section 4, while Section 6 provided a range of estimates for the σ_g ’s. In our baseline results we will use the sectoral estimates in the top panel of Figure 4, assuming that σ_g is the same for all goods g falling within a particular sector S . In Appendix 3 we explore the impact of using the common elasticity estimate in column (1) of Table 2, and show that our main results go through.

In the baseline we assume a value of one for γ , the intermediate-level elasticity of substitution between goods, and again we explore the implications of varying this in the appendix. We take our estimate of η , the elasticity of transformation between exports and domestic

²⁶The pre-1932 UK estimate is also significantly smaller in absolute terms than the corresponding post-1931 UK estimate (-5.811, std.err. 0.666), which we obtain from the same specification.

output on the supply side, from Tokarick (2014).²⁷ Finally, we estimate κ , the upper-level elasticity of substitution between imports and domestic output, using data on aggregate imports M_t , domestic consumption D_t , and unweighted average tariffs τ_t , for Canada, the Dutch East Indies, India, the Netherlands, and the UK.²⁸ We obtain a point estimate for κ of 3.358, with a standard error of 0.527. While the standard error is reflected in the results plotted below, we acknowledge that with few observations to work with this is not the most reliable of estimates. In robustness exercises discussed in Appendix 3, we therefore explore the consequences of assuming that κ is equal to either 1 or 5, and find that most of our qualitative results go through.²⁹

Since our elasticities (with the exception of γ) were econometrically estimated, we do not content ourselves with estimating counterfactual scenarios using the point estimates alone. Rather, we take 1000 draws of each elasticity from normal distributions, with means and standard deviations equal to the point estimates and standard errors of our econometric estimates, and perform our counterfactual calculations 1000 times. If the draw of a particular elasticity is negative, we constrain the elasticity used in the simulation to be equal to zero.³⁰

As we saw earlier, tariffs began to rise in the spring of 1930. Our first set of counterfactuals thus focuses on the tariff changes that occurred after 1929. We ask: what would Canadian imports have looked like in 1929, had tariffs changed as they did subsequently, but everything else (in particular, Canadian endowments and the structure of demand) stayed the same? We can answer this question by taking our model of the Canadian economy in 1929 and imposing on it, first, the tariffs it actually faced in that year, τ_{gc1929} , and then (counterfactually) the tariffs of every year t between 1930 and 1936, τ_{gct} . Our simulations give us counterfactual levels of imports, under alternative tariff scenarios, of all 1693 goods from all 112 countries in 1929,³¹ but in what follows we mostly confine ourselves to reporting the effects of changing

²⁷More precisely, based on Tokarick (2014), we follow de Bromhead et al. (2019) and assume a log-normal distribution, with the mean and standard deviation of the underlying normal distribution being 0.403 and 0.468, respectively.

²⁸We simply estimate $\ln(M_{it}/D_{it}) = \alpha_i - \kappa \times \ln(1 + \tau_{it})$ where i is an index representing the five countries in our sample. For Canadian aggregate imports we use our dataset totals after dropping Coin and Bullion; Canadian exports and GDP are from McInnis (2001). The data for the UK and India are taken from de Bromhead et al. (2019) and Arthi et al. (2024) respectively, while the Dutch data are from den Bakker (2019, Table M1, p. 580). The NEI trade data are taken from various volumes of the *Jaaroverzicht*, while NEI national income is from Korthals Altes (1991, pp. 22-23). Domestic consumption is taken to be equal to GDP, scaled up by the ratio of gross output to value added, minus exports. For Canada this ratio is taken from Canada. Dominion Bureau of Statistics (1956, p. 16). For the UK and India it is taken from the afore-mentioned sources, and since there is no Indonesian input-output table available for this period we assume that the Indian ratio also applies to the Dutch East Indies. For the Netherlands the ratio is taken from den Bakker (2019, p. 653).

²⁹Briefly: lowering κ from 3.358 to 1 significantly lowers the estimated impact of tariff increases on the aggregate value of imports. The conclusion that the impact of post-1929 changes was small is therefore robust; the conclusion that the impact of the entire structure of protection was large is less so. On the other hand, the homotheticity of the utility function ensures that κ has no impact whatsoever on the share of imports coming from individual countries. The impact of tariff changes on the value of imports coming from individual countries is thus relatively robust to alternative estimates of κ .

³⁰This is obviously especially relevant in the non-ferrous metals sector. We solve the model using MPSGE (Rutherford, 1999).

³¹Or more precisely, of those goods and varieties that were actually imported in a given year, since we hold the extensive margin fixed throughout.

tariffs on total imports and imports from the four regions described in Section 4.1. For the sake of concision, we will make statements of the form "tariffs in year t increased/lowered trade flows by x percent", where " x percent" refers to the mean estimated impact, but in all cases it should be noted that this is based on a comparison of actual and counterfactual trade flows in 1929.

The top panel of Figure 6 plots the impact of changing tariffs on the total value of Canadian imports. It plots not only the mean impact across our 1000 simulations, but the 5th, 25th, 75th, and 95th percentiles, reflecting the uncertainty surrounding our elasticity estimates. As expected, post-1929 tariff changes lowered imports, other things being equal; the largest impact came in 1932, when our mean estimate suggests that tariff changes since 1929 were depressing imports by roughly 4 percent. While this is non-negligible, it is a smaller effect than previous papers using similar methods have found for India and the UK (de Bromhead et al., 2019; Arthi et al., 2024). There, post-1929 increases in protection depressed imports by roughly 9-10 percent between 1929 and 1933, accounting for between a fifth and a quarter of the aggregate trade collapse.³² In Canada, protection accounted for just 6 percent of falling imports over the same period.

The middle panel of Figure 6 focuses on total exports from each of our four regions. As can be seen, the tariff changes of 1930-31 had no discernible effect on UK exports to Canada: this was a period of increased imperial preferences, combined (in 1931) with higher tariffs on UK imports. With the signing of the Ottawa accords in 1932 the margin of preference continued to rise, and the average tariffs facing UK exports declined from their peak (Figure 3). By 1933, our mean estimate suggests that tariffs were raising UK exports by 6.4 percent relative to the 1929 benchmark, and increasing the UK's share of Canadian imports by 1.6 percentage points. The actual increase in that share between 1929 and 1933 was 9 percentage points (from 15.2 to 24.2 percent), of which tariff changes thus accounted for roughly 18 percent.

How does our 6.4 percent figure compare with earlier estimates using data on aggregate trade flows and Ottawa dummy variables? It is positive, in contrast to the findings of Wolf and Ritschl (2011) and Jacks (2014) that Ottawa had little or no impact on intra-British Empire trade generally, or on trade between Canada and the Empire specifically. On the other hand, it is much smaller than the 35 percent average increase in trade between the UK and its Dominions calculated by Gowa and Hicks (2013), or the 50-60 percent increase implied by the results in Eichengreen and Irwin (1995, p. 14). Perhaps surprisingly, it is closest to the back-of-the-envelope calculation by Drummond (1972), who guessed that British exports increased by at most 3 percent based on eyeballing aggregate trends in the data.

Figure 7 provides some additional perspective on this "Empire effect", reporting the results of a second set of counterfactual simulations. In these, we ask: what would have been the impact on 1929 Canadian imports if the tariffs facing UK exporters had been changed to the levels of subsequent years, but all other tariffs had remained constant at their 1929 levels.³³ As can be seen, higher tariffs on UK goods in 1931 would, other things remaining

³²See de Bromhead et al. (2019) and Arthi et al. (2024). It should also be noted that both those papers used lower values for κ than we do here, which would tend to lower the impact of rising protection on the value of aggregate imports, other things being equal.

³³To avoid cluttering the graphs, the mean impacts alone are reported for this and the following figure.

equal, have depressed UK exports to Canada by 6.5 percent. Subsequent reductions in the tariffs facing UK exporters lowered but never reversed that initial negative impact. Why then did Figure 6 show tariff changes leaving UK exports unchanged in 1931, and increasing them thereafter?³⁴ The answer is that the tariffs facing other countries' exporters increased by more: when assessing the impact of changing protection you need to take all relevant margins of substitution into account, rather than relying on partial equilibrium models. The positive impact of the Ottawa accords on British exports to Canada was due to rising tariffs on foreign goods, not falling tariffs on British ones.

That net positive impact never exceeded 6.5 percent: in contrast, Arthi et al. (2024) find that post-1923 Indian tariff reforms boosted UK exports to that country by almost a quarter. While tariff changes were increasing the UK's share of Indian imports by more than ten percentage points by the mid-1930s, the impact in Canada was as we have just seen much smaller. Similarly, Canadian retaliation against the Hawley-Smoot tariff (and other tariff increases affecting the US) hit American exports, but not by very much: whether the focus is on the effects of all tariffs, or just those tariffs facing US exporters, the impact was never greater than 6 percent (Figure 6 and Appendix Figure A1), accounting for just 7.5 percent of the 1929-1933 decline. This is much smaller than the back of the envelope calculation in Irwin (2011) (roughly 20 percent), or the *average* (roughly 30 percent) estimated impact of retaliation against Hawley-Smoot reported by Mitchener et al. (2022).

What about trade with the rest of the Empire? Wolf and Ritschl (2011) found no impact of Ottawa on intra-Empire trade flows in general, while Gowa and Hicks (2013) found that it had no impact on intra-Imperial trade not involving the UK. Eichengreen and Irwin (1995), on the other hand, find a fairly large positive impact on intra-Imperial trade as discussed above. According to the mean estimates plotted in the middle panel of Figure 6, post-1929 tariff changes actually reduced Canadian imports from the rest of the Empire, by between 3.5 and 6 percent. Evidently, unlike in the British case greater trade discrimination did not outweigh the negative impact of higher tariffs.

The largest impact of post-1929 Canadian tariff changes was on foreign countries other than the US, reducing their exports to Canada by almost 9 percent in 1932: 14 percent of the actual decline experienced between 1929 and 1932. This is not far from the 12 percent decline implied by the regressions in Eichengreen and Irwin (1995), which include a dummy indicating whether or not only one country in a pair was a member of the Empire. Their result is, however, statistically insignificant; neither Gowa and Hicks (2013) nor Wolf and Ritschl (2011) find any evidence of trade diversion. Figure 8 highlights the experiences of France, Germany, and Japan, the most important exporters to Canada after the UK and US. Japan was particularly badly hit: by 1936, rising tariffs were depressing Japanese exports by almost 20 percent, accounting for 32 percent of their decline since 1929.

Finally, the bottom panel of Figure 6 makes the point that the impact of changing tariffs could vary greatly across sectors. Our mean estimates suggest that they raised British exports to Canada of iron-related products by well over 20 percent, but that they lowered British textile exports for most of our period. Focusing on aggregate impacts obscures the fact that trade deals target specific goods, and can have substantial (but sometimes offsetting) effects on trade in these goods (Lampe, 2009). Our results also suggest, once again,

³⁴The mean impact from that figure is reproduced in Figure 7.

that there are significant benefits to estimating the impacts of tariff changes on individual commodities and then (if desired) aggregating up. Jacks (2014) applied his difference-in-difference methodology to trade in the same "sectors" that we focus on, using deflated aggregate trade data for each sector. Like us he finds that Ottawa increased Canadian imports of British iron products by around 20 percent, but he also finds that it raised British textile exports to Canada by between 11 and 36 percent.

Why was the impact of post-1929 protectionism in general, and the Ottawa Agreements in particular, so much smaller in Canada than it was elsewhere in the British Empire? Figure 9 suggests a simple explanation: the shifts in protection experienced in India and the UK were far more dramatic than those experienced in Canada. Tariffs had already been relatively high in Canada, and did not increase by much in relative terms; furthermore, discrimination in favour of the British Empire had been a feature of Canadian tariff legislation since the 19th century, whereas it only started to emerge in India in the 1920s, and was unknown in the UK before the Great Depression. The Ottawa accords changed tariff structures much more in some parts of the Empire than in others.

This observation suggests a third set of counterfactual experiments, in which we ask: what would imports have been like in every year had tariffs been equal to zero, and how would that have compared with what was actually observed? Focussing on our mean estimates, the top panel of Figure 10 shows that protection was already lowering total Canadian imports by more than 13 percent in the 1920s, and by over 17 percent in 1931-2. It was lowering imports from the US by more than 13 percent in the 1920s, and by 19 percent in 1932-3; and it was lowering imports from other foreign countries by over 20 percent in the 1920s, and by almost 30 percent in 1932. These are sizable effects. In contrast, there was little impact on imports from the rest of the Empire.

More surprisingly, perhaps, despite imperial preferences, Canadian protection was lowering imports from the UK by over 8 percent in the 1920s. The net impact was to boost the share of Canadian imports coming from Britain by a small amount (less than one percentage point), but to reduce the level. Any tendency for Britain to export disproportionately to Canada prior to 1929 was due to factors other than trade policy, such as trade and financial connections that had been built up over many years ((Eichengreen and Irwin, 1995; Head et al., 2010).

By 1931 Canadian protection was lowering British exports to the country by almost 10 percent. Increasing imperial preference following the Ottawa accords did increase British exports to Canada, but only to the point where the net impact of the entire structure of protection on imports from the mother country was approximately zero.³⁵ By the mid-1930s Canadian protection was neither lowering nor boosting British exports, net; but this was achieved via a combination of high protection coupled with increasing trade discrimination.

8 Conclusion

The trade agreements concluded in Ottawa in the summer of 1932 moved the British Empire project closer to reality, at least insofar as economic integration was concerned. Britain and her Dominions deepened the trade preferences accorded to each other, with a discernible

³⁵If we assume that $\kappa = 1$, the net impact was modestly positive from 1932 on: see Appendix 3.

impact on trade flows. Between 1930 and 1935, the Empire's share of British imports rose from 27 to 39 percent, with increased discrimination in favour of the Empire accounting for almost two-thirds of the increase (de Bromhead et al., 2019, p. 348). The impact went in both directions: as noted earlier, British exports to India were boosted by almost a quarter as a result of the tariff changes adopted in the sub-continent.

Bennett's Canadian Conservatives had long favoured closer economic ties with the mother country, and now found themselves hosting a summit representing a high-water mark for the British imperial project. And so it is at first sight surprising that the Ottawa agreements had so little impact on the trade of the host country itself. Granted, in the two years following the accords, changes in Canadian trade policy raised imports from the UK by over 6 percent, but this is a small figure compared with the impact of Indian trade policy. Post-1929 tariff changes actually lowered imports from the rest of the Empire. Furthermore, the only reason that UK exports were boosted at all was increasing trade diversion from other countries facing even higher tariffs. If the focus is solely on tariffs levied on British goods in isolation, their impact after 1929 was to lower UK exports, not raise them. When the focus is on the entire structure of protection, rather than on post-Ottawa changes, Canadian tariffs lowered UK exports in the 1920s: all that Ottawa accomplished was to gradually eliminate this negative effect via increasing discrimination against foreign countries.³⁶

These relatively small impacts were not necessarily due to the relevant trade elasticities being lower in Canada than elsewhere, although the estimates in Section 6 are at the low end of those obtained in other contexts. Rather, the shock implied by the Ottawa accords was smaller for Canada than for other participants at the conference. Trade deals involve specific deals on specific products, not a blanket "treatment" affecting all goods and trade partners symmetrically. Taking this into account is important when quantifying their impact.

³⁶Our econometric results, on the other hand, suggest that there may have been an additional impact of the Ottawa accords, reducing trade policy uncertainty.

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Table 1: Data Coverage: Broad Sectors

| ID | Sector Description | Sector Label |
|----|--|--------------|
| 1 | AGRICULTURAL AND VEGETABLE PRODUCTS - A. Mainly Food | Vegetable |
| 2 | AGRICULTURAL AND VEGETABLE PRODUCTS - B. Other Than Food | Plant |
| 3 | ANIMALS AND ANIMAL PRODUCTS | Animal |
| 4 | CHEMICALS AND ALLIED PRODUCTS | Chemical |
| 5 | FIBRES, TEXTILES AND TEXTILE PRODUCTS | Fibre |
| 6 | IRON AND ITS PRODUCTS | Iron |
| 7 | MISCELLANEOUS COMMODITIES | Misc |
| 8 | NON-FERROUS METALS AND THEIR PRODUCTS | Metals |
| 9 | NON-METALLIC MINERALS AND THEIR PRODUCTS | Minerals |
| 10 | WOOD, WOOD PRODUCTS AND PAPER | Wood |

Notes: This table lists the 10 broad sectors that are included in the estimating sample and the labels that we use for them in the analysis. See text for further details.

Table 2: The Impact of Canada's Tariffs: Main Estimates

| | (1) | (2) | (3) | (4) | (5) |
|-----------|---------------------|---------------------|---------------------|---------------------|---------------------|
| | Main | Cluster | OLS | Interval | Balanced |
| LN_TARIFF | -3.576 (0.899)** | -3.576 (0.836)** | -1.576 (0.245)** | -3.520 (1.004)** | -3.881 (0.878)** |
| N | 194182 | 194182 | 95909 | 92845 | 153107 |
| R^2 | | | | 0.918 | |

Notes: This table reports estimates of the common effects of tariffs on Canadian imports. Column (1) includes our main results based on specification (5). The estimates of all fixed effects, including the constant term, are omitted for brevity. Column (2) clusters the standard errors two way (by exporter and product). All other standard errors in this table are clustered three-way (i.e., by exporter, product, and time). Column (3) reproduces the results from column (1) with the OLS estimator. Column (4) uses interval data for every 2 years. Finally, column (5) uses data that are balanced across products and countries across the whole period in our sample. See text for further details.

Table 3: The Impact of Canada's Tariffs: Alternative Samples.

| | Main | No Zeros | No Specific | Only Specific |
|-----------|---------------------|---------------------|---------------------|--------------------|
| LN_TARIFF | -3.576 (0.899)** | -3.617 (0.737)** | -4.988 (0.851)** | -2.524 (1.159)* |
| N | 194182 | 95909 | 161914 | 25189 |

Notes: This table reports estimates of the common effects of tariffs on Canadian imports using different samples. All estimates are based on specification (5), and the estimates of all fixed effects, including the constant term, are omitted for brevity. Column (1) reproduces the main results from column (1) of Table 2. Column (2) only uses observations with positive imports. Column (3) excludes observations with specific tariffs. Finally, column (4) only uses observations with specific tariffs. All standard errors are clustered three-way (i.e., by exporter, product, and time). See text for further details.

Table 4: The Impact of Canada's Tariffs: Across Sectors and Countries.

| | (1) | (2) | (3) | (4) | (5) | (6) |
|--|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|
| | OTHER | USA | FRA | GBR | DEU | JPN |
| AGRICULTURAL AND VEGETABLE PRODUCTS - A. Mainly Food | -0.171 (1.155) | -1.111 (1.182) | 3.175 (.846)** | -5.261 (2.148)* | -10.37 (3.529)** | -2.098 (2.041) |
| AGRICULTURAL AND VEGETABLE PRODUCTS - B. Other Than Food | -0.795 (.564) | -3.199 (1.513)* | -1.632 (1.173) | -3.112 (2.251) | -0.344 (1.295) | -3.519 (1.429)* |
| ANIMALS AND ANIMAL PRODUCTS | -3.922 (1.282)** | 0.467 (1.539) | -8.276 (5.159) | -1.503 (1.915) | -0.157 (2.659) | -4.056 (8.269) |
| CHEMICALS AND ALLIED PRODUCTS | -2.070 (1.324) | -5.015 (1.896)** | -3.192 (1.289)* | -5.419 (1.212)** | -2.834 (1.557)+ | -22.70 (3.836)** |
| FIBRES, TEXTILES AND TEXTILE PRODUCTS | -5.150 (1.783)** | -4.239 (1.934)* | -4.975 (2.264)* | -6.821 (1.993)** | -5.377 (1.741)** | -2.888 (1.392)* |
| IRON AND ITS PRODUCTS | -6.172 (3.127)* | -7.082 (1.762)** | 2.468 (1.867) | -6.668 (1.514)** | -2.442 (2.104) | -1.308 (4.124) |
| MISCELLANEOUS COMMODITIES | -1.994 (2.151) | -6.903 (3)* | -12.94 (2.265)** | -4.291 (3.033) | -7.024 (2.31)** | -6.832 (1.466)** |
| NON-FERROUS METALS AND THEIR PRODUCTS | 2.891 (4.022) | 3.123 (2.872) | -6.060 (2.968)* | 0.289 (1.729) | -3.288 (2.306) | -0.176 (4.013) |
| NON-METALLIC MINERALS AND THEIR PRODUCTS | -4.288 (4.198) | -7.077 (4.773) | -8.657 (3.289)** | -6.316 (2.744)* | -10.90 (2.431)** | -10.28 (3.788)** |
| WOOD, WOOD PRODUCTS AND PAPER | -6.568 (2.986)* | -3.810 (2.036)+ | -3.823 (1.315)** | -5.490 (1.431)** | 3.077 (1.596)+ | 4.977 (1.361)** |

Notes: This table reports estimates of the effects of tariffs on Canadian imports across countries and sectors. The results in this table are obtained from a single specification, i.e., equation (9), but we report them in several columns for clarity. We also omit the estimates of the fixed effects and of the OMR control variable. The rows of the table list the sectors and the columns list the countries. All standard errors are clustered three-way (i.e., by exporter, product, and time). See text for further details.

Table 5: Canadian Trade Treaties

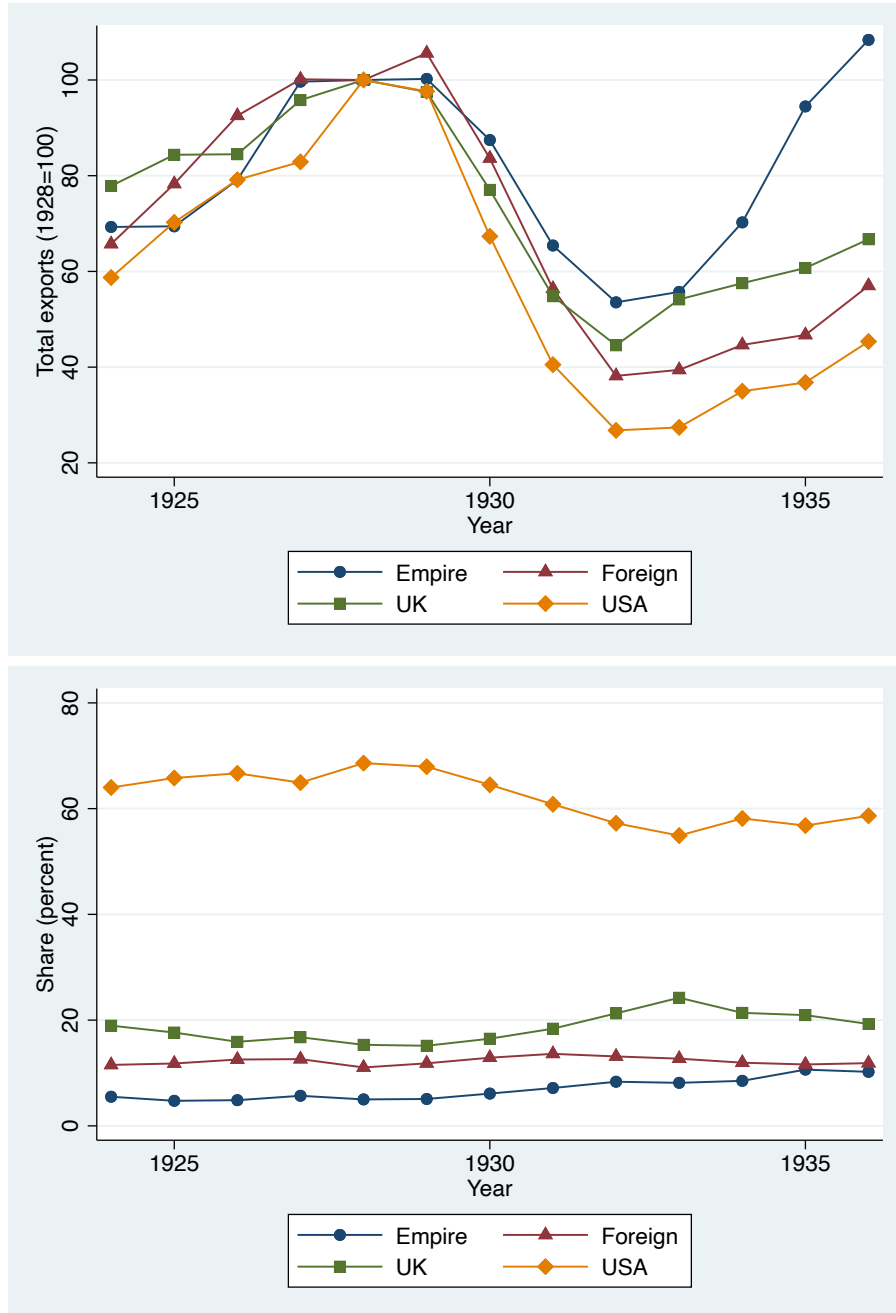
| Treaty Label | Treaty Members |
|--------------|---|
| OTTAWA1 | Australia (1931-), New Zealand, Irish Free State, British South Africa, Southern Rhodesia, United Kingdom (all 1932-) |
| OTTAWA2 | Aden, British East Africa, Gambia, Gold Coast, Nigeria, Sierra Leone, Other British West Africa, Bermuda, Ceylon, Straits Settlements, Other British East Indies, British Guiana, British Honduras, British Sudan, Falkland Islands, Gibraltar, Hong Kong, Fiji, Other Oceania, Palestine (all 1932-, as part of agreement with UK above) |
| NO_OTTAWA | Czechoslovakia (1928-), France (1923-), Poland and Danzig (1935-), United States (1936-), Australia (1925-1930), Barbados, Jamaica, Trinidad and Tobago, Other British West Indies (all 1920-) |
| MFN_TREATIES | Italy (1923-), Belgium (1924-), Finland and Netherlands (1925-), Cuba (1927-), Estonia, Hungary, Latvia, Lithuania, Portugal, Roumania, Spain, Yugoslavia (all 1928-), Germany (1933-) |

Table 6: The Impact of Canada's Tariffs, Treaties, and Uncertainty

| | (1) | (2) | (3) | (4) |
|--------------------------|---------------------|---------------------|---------------------|---------------------|
| | MAIN | AGRMNTS | RISK | INTRCT |
| LN_TARIFF | -3.576 (0.899)** | | | |
| NO_TREATY_LN_TARIFF | | -3.321 (0.943)** | -2.903 (1.137)* | -2.706 (1.085)* |
| OTTAWA1_LN_TARIFF | | -5.149 (0.919)** | -5.157 (1.050)** | -4.486 (1.072)** |
| OTTAWA2_LN_TARIFF | | -2.205 (1.461) | -0.523 (1.672) | -0.938 (1.757) |
| NO_OTTAWA_LN_TARIFF | | -2.737 (0.678)** | -2.895 (0.800)** | -2.744 (0.927)** |
| MFN_TREATIES_LN_TARIFF | | -3.110 (0.902)** | -2.166 (1.072)* | -2.032 (1.002)* |
| TARIFF_RISK | | | 0.005 (0.065) | 0.017 (0.069) |
| OTTAWA1_TARIFF_RISK | | | | 0.977 (0.411)* |
| OTTAWA2_TARIFF_RISK | | | | -0.482 (0.548) |
| NO_OTTAWA_TARIFF_RISK | | | | -0.064 (0.212) |
| MFN_TREATIES_TARIFF_RISK | | | | -0.019 (0.178) |
| <i>N</i> | 194182 | 194182 | 143045 | 143045 |

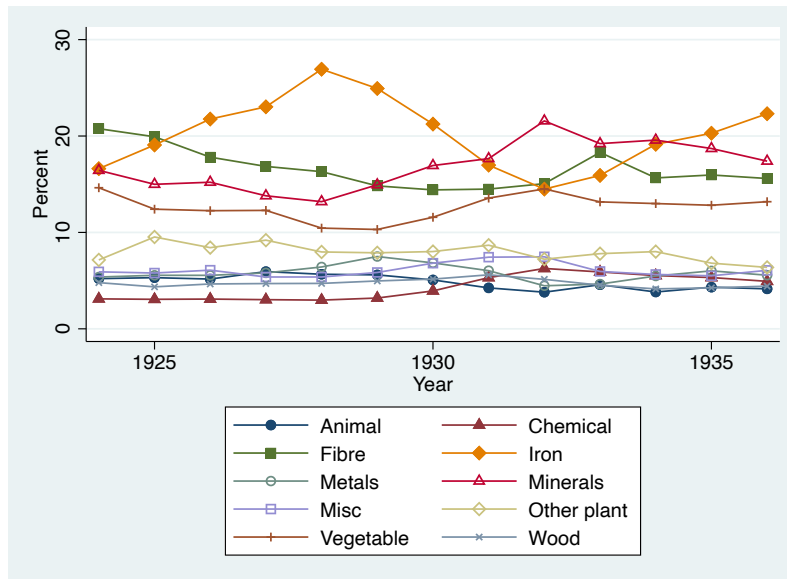
Notes: This table reports estimates of the effects of tariffs on Canadian imports across types of trade arrangements and after controlling for uncertainty. The estimates are based on specification (11), and the estimates of all fixed effects, including the constant term, are omitted for brevity. Column (1) reproduces the main results from column (1) of Table 2. Column (2) allows the tariff elasticity to vary across trade arrangements. Column (3) adds a 'tariff risk' control variable. Finally, column (4) introduces additional interactions between types of trade agreements and 'tariff risk'. All standard errors are clustered three-way (i.e., by exporter, product, and time). See text for further details.

Figure 1: Regional Exports to Canada, 1924-1936



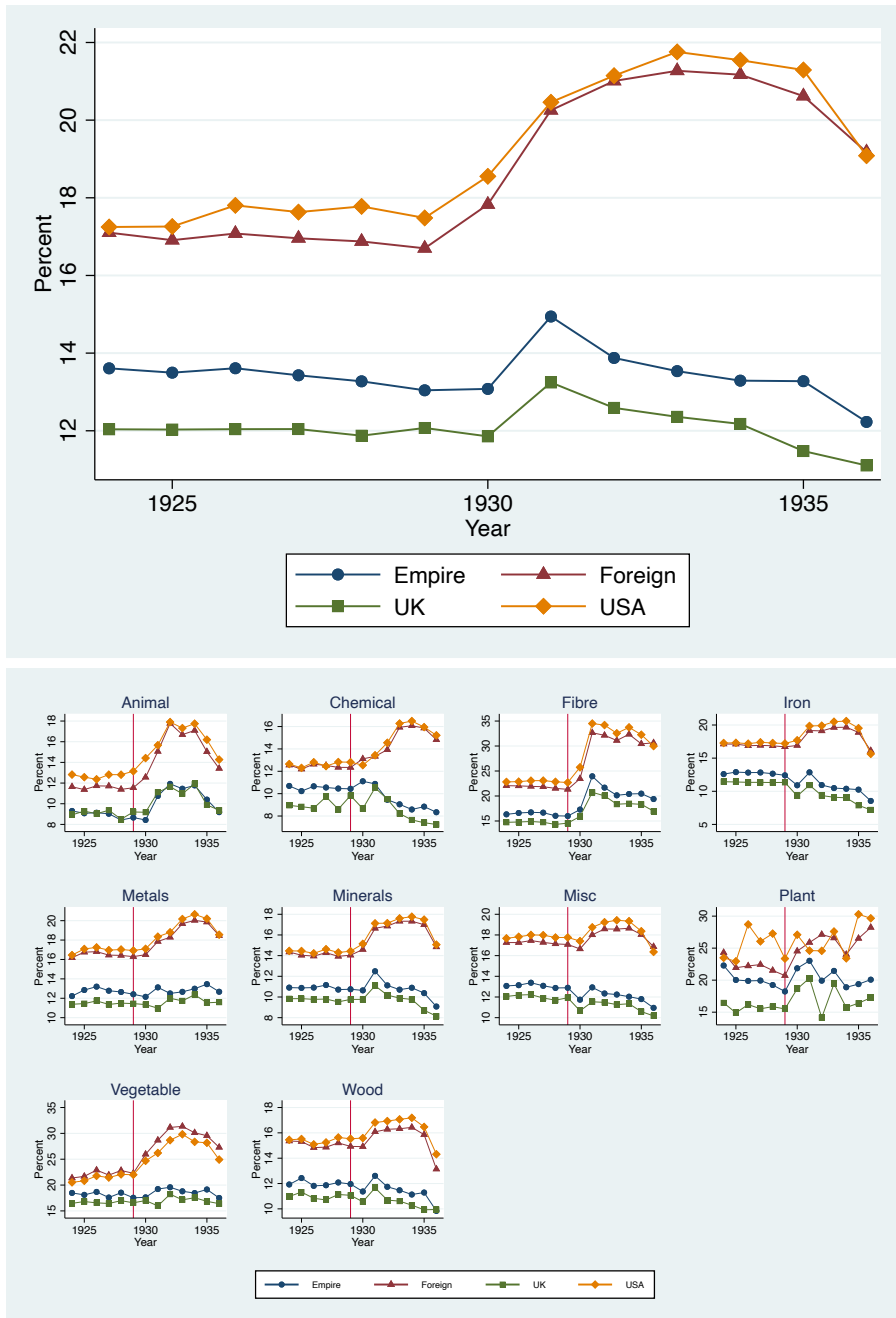
Note: This figure plots the total exports to Canada (upper panel) of the UK, USA, the British Empire exclusive of the UK, and the rest of the world, as well as their shares in total Canadian imports (lower panel).

Figure 2: Sectoral Shares in Canadian Imports



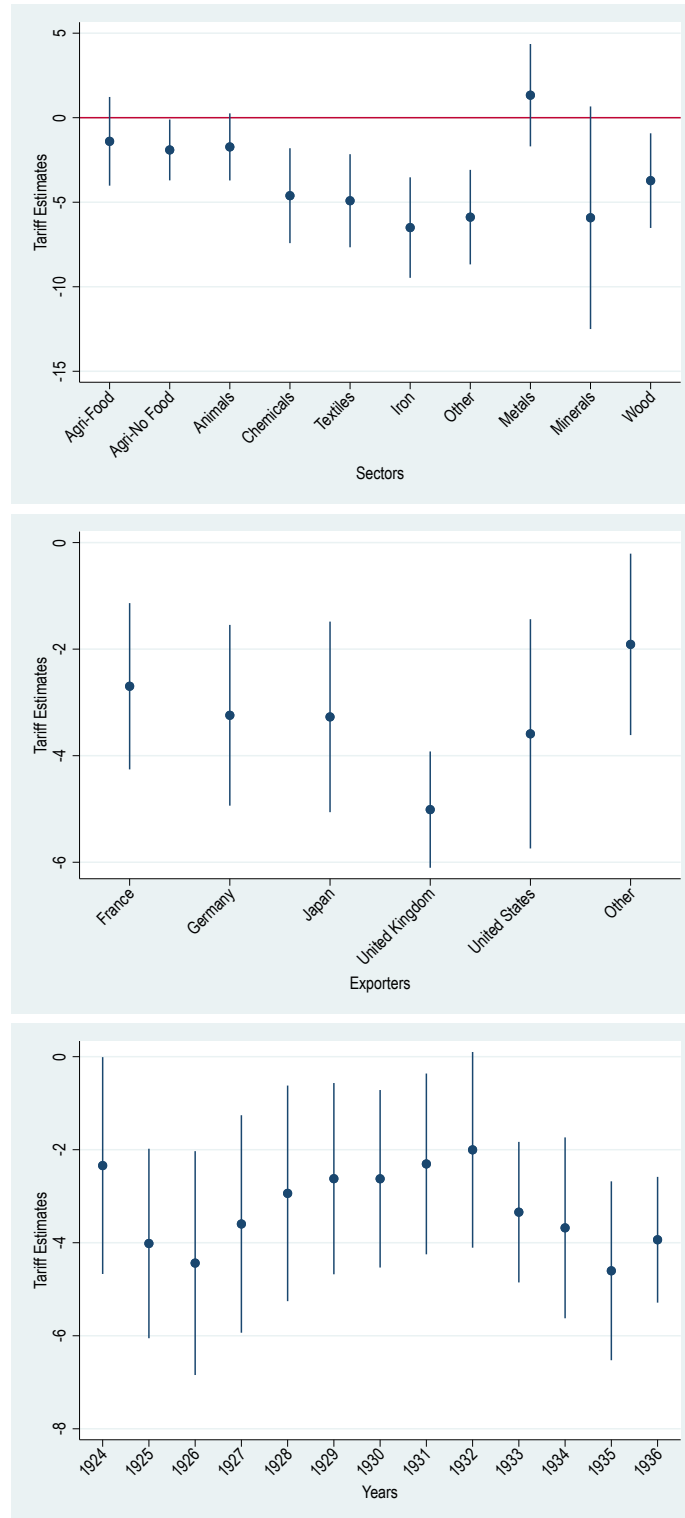
Note: This figure plots the shares of the 10 sectors listed in Table 1 in total Canadian imports.

Figure 3: Average Canadian Tariffs, 1924-1936



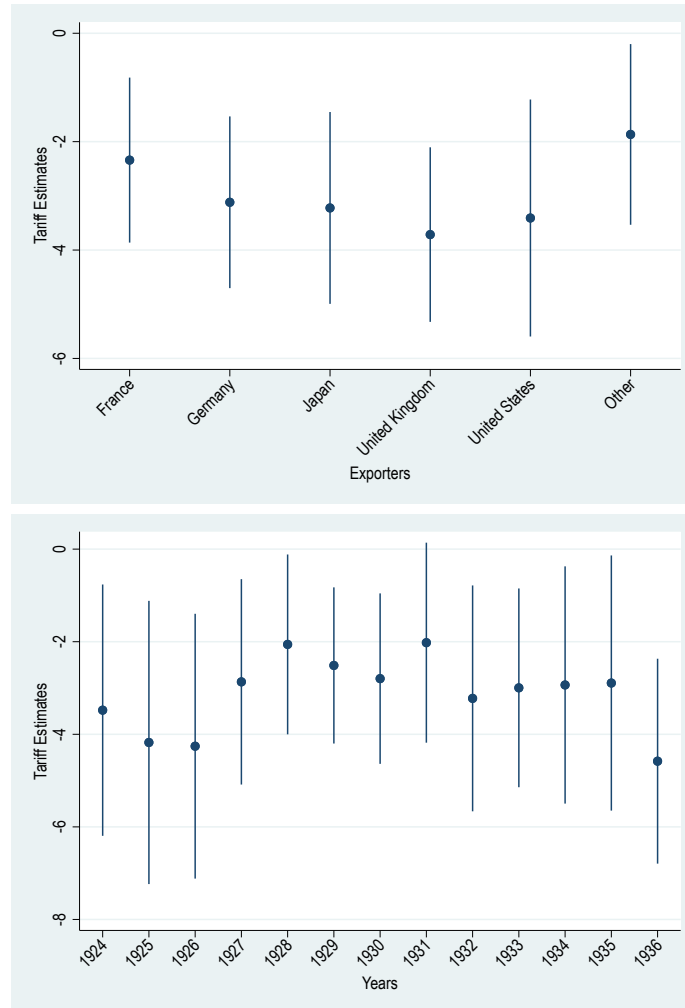
Note: The top panel plots unweighted average tariffs imposed by Canada on exports from the UK, USA, the British Empire exclusive of the UK, and the rest of the world. The lower panel plots unweighted average tariffs, by broad sector, imposed on exports from the same four regions.

Figure 4: The Heterogenous Impact of Canadian Tariffs, 1924-1936



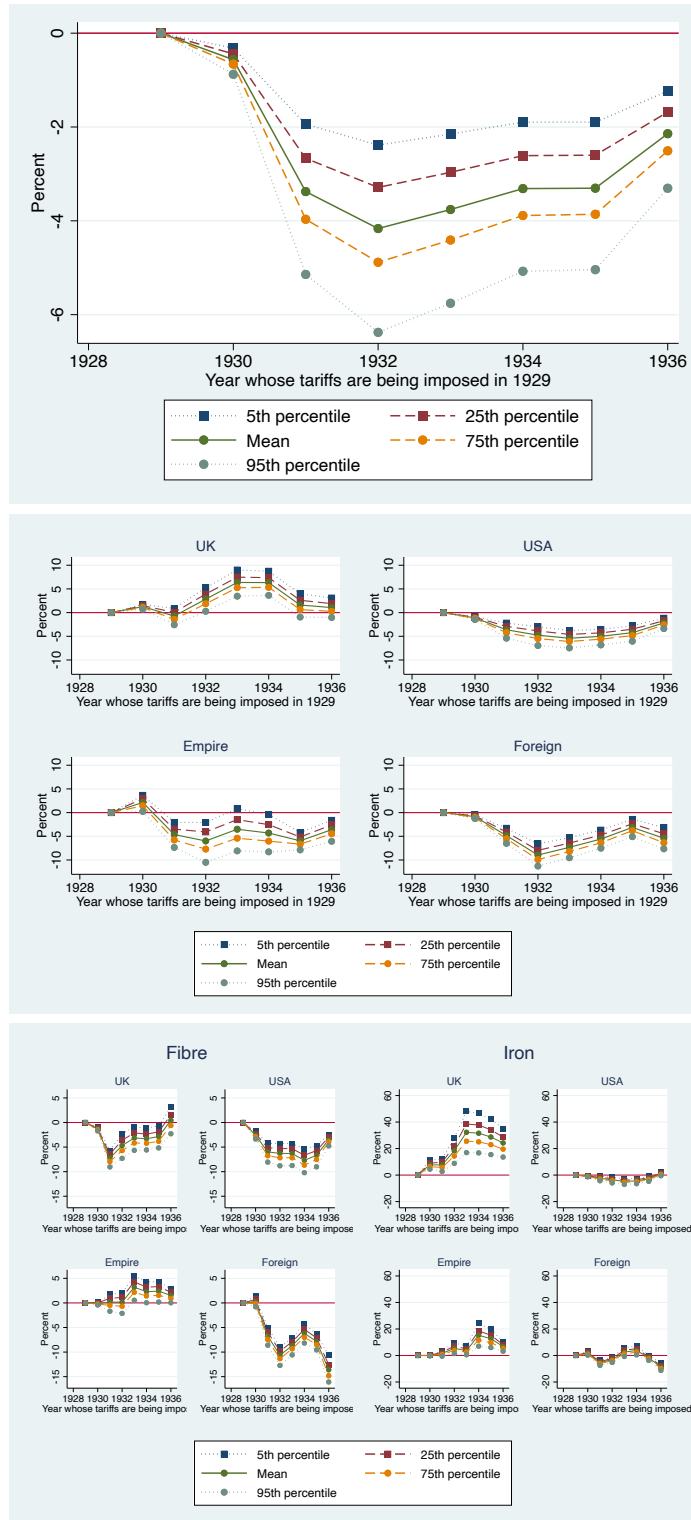
Note: This figure plots the estimated tariff coefficients discussed in the text, allowing these to vary across sectors (in the top panel), across main trading partners (in the middle panel), and over time (in the bottom panel). The results are obtained from specifications (6), (8), and (10), but we only report the tariff coefficients and associated 95 percent confidence intervals. All standard errors are clustered three-way (i.e., by exporter, product, and time). See text for further details.

Figure 5: The Heterogenous Impact of Canadian Tariffs, Revisited



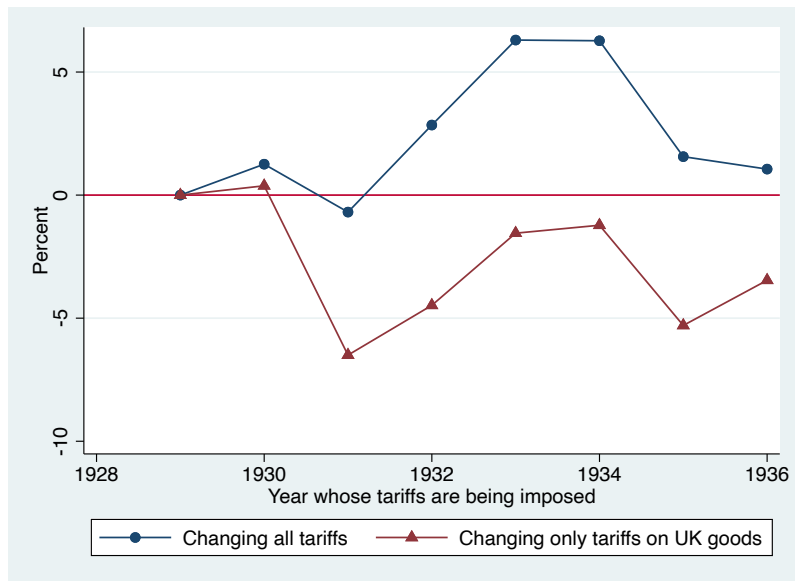
Note: The estimates in the top and the bottom panels of this figure correspond to those from the top and bottom panels, respectively, of Figure 4. The differences are that: (i) The UK tariff elasticity estimate in the top panel is obtained when only using observations prior to the Ottawa accords, i.e. up to and including 1931; and (ii) The time-varying elasticities in the bottom panel are obtained after controlling for the effects of uncertainty, and allowing trade elasticities to vary across types of trade arrangement. This figure plots the elasticities for countries without a trade agreement with Canada. All standard errors are clustered three-way (i.e., by exporter, product, and time). See text for further details.

Figure 6: Impact on 1929 Imports of Imposing Later Years' Tariffs



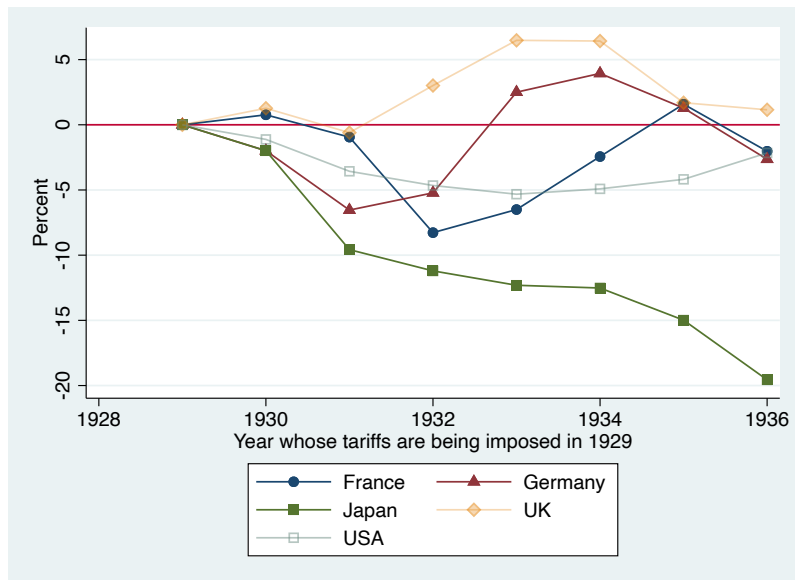
Note: The top panel plots the percentage impact on the total value of 1929 Canadian imports of imposing later years' tariffs, rather than 1929 tariffs as actually occurred. The middle panel does the same for our four regions, and the lower panel does the same for two sectors (textiles and iron products) broken down by region. See text for further details.

Figure 7: Impact on 1929 Imports from the UK of Imposing Later Years' Tariffs



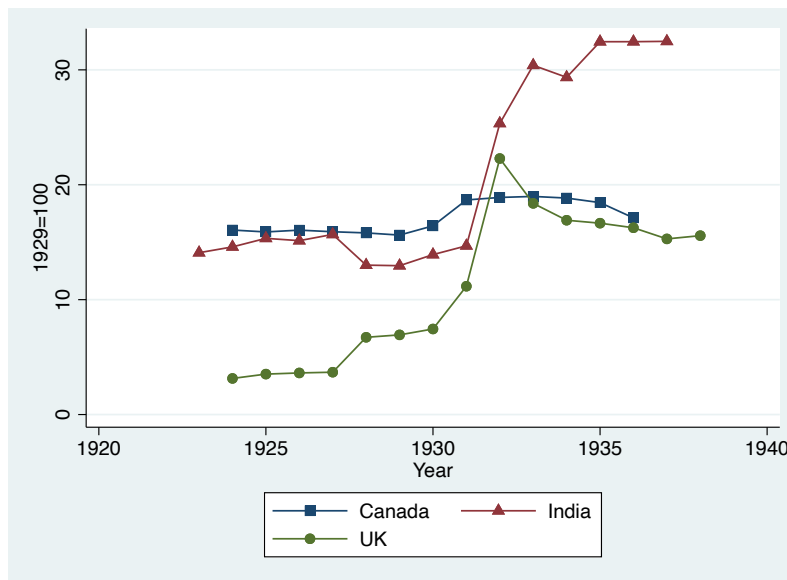
Note: This figure plots the percentage impact on the total value of 1929 Canadian imports from the UK of imposing later years' tariffs, rather than 1929 tariffs as actually occurred. See text for further details.

Figure 8: Impact on 1929 Imports from 5 Countries of Imposing Later Years' Tariffs



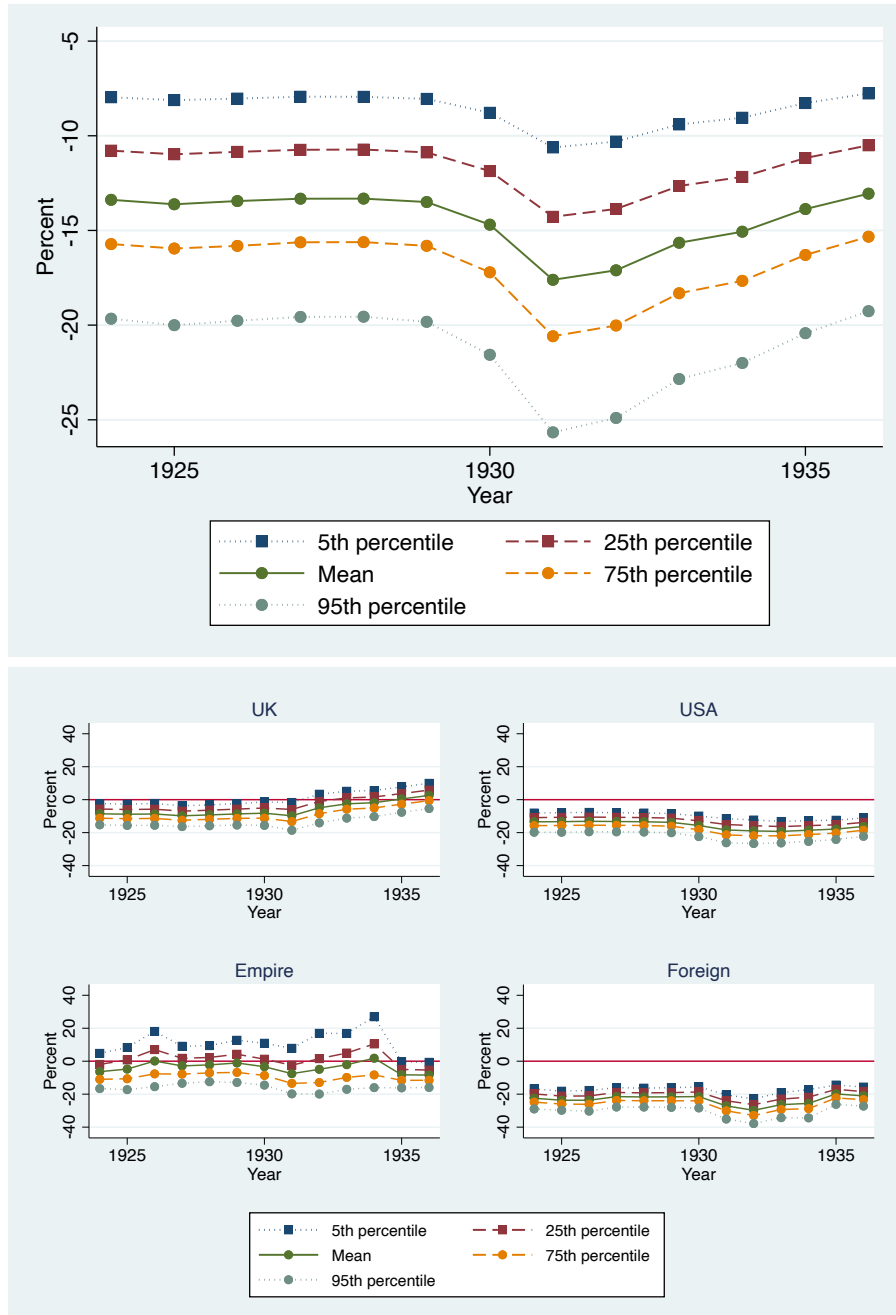
Note: This figure plots the percentage impact on the total value of 1929 Canadian imports from 5 countries of imposing later years' tariffs, rather than 1929 tariffs as actually occurred. See text for further details.

Figure 9: Unweighted Average Tariffs in Three Countries



Note: This figure plots unweighted average tariffs in Canada, the UK, and India. See text for further details.

Figure 10: Impact of Entire Structure of Protection on Aggregate Canadian Imports



Note: The top panel plots the percentage impact on aggregate Canadian imports of imposing the actual structure of protection in each year, compared with a free trade counterfactual. The lower panel does the same for aggregate imports from each of our four regions.

Appendix 1. Data

Table A1: Data Coverage: Countries

| | |
|---|---------------------------------|
| Abyssinia | Hayti |
| Aden | Honduras |
| Afghanistan | Hong Kong |
| Africa, British - East | Hungary |
| Africa, British - South | Iceland |
| Africa, British - West - Gambia | Iraq (Mesopotamia) |
| Africa, British - West - Gold Coast | Irish Free State |
| Africa, British - West - Nigeria | Italy |
| Africa, British - West - Other | Italy - Tripoli |
| Africa, British - West - Sierra Leone | Japan |
| Albania | Japan - Korea |
| Argentina | Latvia |
| Armenia | Liberia |
| Austria | Lithuania |
| Belgium | Malta |
| Belgium - Belgian Congo | Mexico |
| Bermuda | Morocco |
| Bolivia | Netherlands |
| Brazil | Netherlands - Dutch East Indies |
| British East Indies - British India | Netherlands - Dutch Guiana |
| British East Indies - Ceylon | Netherlands - Dutch West Indies |
| British East Indies - Other | Newfoundland |
| British East Indies - Straits Settlements | Nicaragua |
| British Guiana | Norway |
| British Honduras | Oceania - Australia |
| British Sudan | Oceania - Fiji |
| British West Indies - Barbados | Oceania - New Zealand |
| British West Indies - Jamaica | Oceania - Other |
| British West Indies - Other | Palestine |
| British West Indies - Trinidad and Tobago | Panama |
| Bulgaria | Paraguay |
| Chile | Persia |
| China | Peru |
| Colombia | Poland and Danzig |
| Costa Rica | Portugal |
| Cuba | Portugal - Portuguese Africa |

Continued on next page

Table A1: Data Coverage: Countries

| | |
|----------------------------------|---|
| Czechoslovakia | Roumania |
| Denmark | Russia (U.S.S.R.) |
| Denmark - Greenland | Salvador |
| Ecuador | San Domingo |
| Egypt | Siam |
| Estonia | Southern Rhodesia |
| Falkland Islands | Spain |
| Finland | Spain - Spanish Africa |
| France | Sweden |
| France - French Africa | Switzerland |
| France - French East Indies | Syria |
| France - French Guiana | Turkey |
| France - French Oceania | United Kingdom |
| France - French West Indies | United States |
| France - Madagascar | United States - American Virgin Islands |
| France - St. Pierre and Miquelon | United States - Philippine Islands |
| Germany | United States - Puerto Rico |
| Gibraltar | Uruguay |
| Greece | Venezuela |
| Guatemala | Yugoslavia |

Notes: This table lists the 112 countries that are included in the estimating sample. See text for further details.

Table A2: Data Coverage: Industries and Sectors

| ID | Industry Description | Sector Description |
|----|--|--|
| 1 | SUGAR AND ITS PRODUCTS | AGRICULTURAL AND VEGETABLE PRODUCTS - A. Mainly Food |
| 2 | OILS, VEGETABLE, FOR FOOD | AGRICULTURAL AND VEGETABLE PRODUCTS - A. Mainly Food |
| 3 | GRAINS AND FARINACEOUS PRODUCTS | AGRICULTURAL AND VEGETABLE PRODUCTS - A. Mainly Food |
| 4 | TEA, COFFEE, COCOA AND SPICES | AGRICULTURAL AND VEGETABLE PRODUCTS - A. Mainly Food |
| 5 | OTHER AGRICULTURE AND VEGETABLES (FOOD) | AGRICULTURAL AND VEGETABLE PRODUCTS - A. Mainly Food |
| 6 | FRUITS, NUTS AND VEGETABLES | AGRICULTURAL AND VEGETABLE PRODUCTS - A. Mainly Food |
| 7 | VINEGAR | AGRICULTURAL AND VEGETABLE PRODUCTS - A. Mainly Food |
| 8 | YEAST | AGRICULTURAL AND VEGETABLE PRODUCTS - A. Mainly Food |
| 9 | BEVERAGES, ALCOHOLIC | AGRICULTURAL AND VEGETABLE PRODUCTS - B. Other Than Food |
| 10 | PLANTS, SHRUBS, TREES AND VINES | AGRICULTURAL AND VEGETABLE PRODUCTS - B. Other Than Food |
| 11 | OTHER AGRICULTURE AND VEGETABLES (NO FOOD), N.O.P. | AGRICULTURAL AND VEGETABLE PRODUCTS - B. Other Than Food |
| 12 | SEEDS | AGRICULTURAL AND VEGETABLE PRODUCTS - B. Other Than Food |
| 13 | OIL CAKE AND MEAL | AGRICULTURAL AND VEGETABLE PRODUCTS - B. Other Than Food |
| 14 | TOBACCO | AGRICULTURAL AND VEGETABLE PRODUCTS - B. Other Than Food |
| 15 | OTHER AGRICULTURE AND VEGETABLE S (NO FOOD) | AGRICULTURAL AND VEGETABLE PRODUCTS - B. Other Than Food |
| 16 | GUMS AND RESINS | AGRICULTURAL AND VEGETABLE PRODUCTS - B. Other Than Food |
| 17 | OILS, VEGETABLE, NOT FOR FOOD | AGRICULTURAL AND VEGETABLE PRODUCTS - B. Other Than Food |
| 18 | RUBBER AND ITS PRODUCTS | AGRICULTURAL AND VEGETABLE PRODUCTS - B. Other Than Food |
| 19 | FISHERY PRODUCTS, N.O.P. | ANIMALS AND ANIMAL PRODUCTS |
| 20 | MISCELLANEOUS ANIMAL PRODUCTS, N.O.P. | ANIMALS AND ANIMAL PRODUCTS |
| 21 | ANIMALS, LIVING | ANIMALS AND ANIMAL PRODUCTS |
| 22 | BONE, IVORY AND SHELL PRODUCTS | ANIMALS AND ANIMAL PRODUCTS |
| 23 | HAIR AND BRISTLES, N.O.P. | ANIMALS AND ANIMAL PRODUCTS |
| 24 | MILK AND ITS PRODUCTS | ANIMALS AND ANIMAL PRODUCTS |
| 25 | OILS, FATS, GREASES AND WAXES | ANIMALS AND ANIMAL PRODUCTS |
| 26 | FEATHERS AND QUILLS | ANIMALS AND ANIMAL PRODUCTS |
| 27 | HIDES AND LEATHER | ANIMALS AND ANIMAL PRODUCTS |
| 28 | MEATS | ANIMALS AND ANIMAL PRODUCTS |
| 29 | FURS | ANIMALS AND ANIMAL PRODUCTS |
| 30 | FERTILIZERS | CHEMICALS AND ALLIED PRODUCTS |
| 31 | INORGANIC CHEMICALS, N.O.P. | CHEMICALS AND ALLIED PRODUCTS |
| 32 | DYEING AND TANNING MATERIALS | CHEMICALS AND ALLIED PRODUCTS |
| 33 | OTHER DRUGS, DYES AND CHEMICALS, N.O.P. | CHEMICALS AND ALLIED PRODUCTS |
| 34 | ACIDS | CHEMICALS AND ALLIED PRODUCTS |
| 35 | ALCOHOLS, INDUSTRIAL | CHEMICALS AND ALLIED PRODUCTS |
| 36 | EXPLOSIVES | CHEMICALS AND ALLIED PRODUCTS |
| 37 | PAINTS, PIGMENTS AND VARNISHES | CHEMICALS AND ALLIED PRODUCTS |
| 38 | DRUGS, MEDICINAL AND PHARMACEUTICAL PREPARATIONS | CHEMICALS AND ALLIED PRODUCTS |
| 39 | SOAPS | CHEMICALS AND ALLIED PRODUCTS |
| 40 | CELLULOSE PRODUCTS | CHEMICALS AND ALLIED PRODUCTS |
| 41 | PERFUMERY, COSMETICS AND TOILET PREPARATIONS | CHEMICALS AND ALLIED PRODUCTS |
| 42 | Coin and Bullion | COIN AND BULLION |
| 43 | SILK AND ITS PRODUCTS | FIBRES, TEXTILES AND TEXTILE PRODUCTS |
| 44 | FLAX, HEMP AND JUTE PRODUCTS | FIBRES, TEXTILES AND TEXTILE PRODUCTS |
| 45 | COTTON AND ITS PRODUCTS | FIBRES, TEXTILES AND TEXTILE PRODUCTS |
| 46 | ARTIFICIAL SILK (RAYON) AND ITS PRODUCTS | FIBRES, TEXTILES AND TEXTILE PRODUCTS |
| 47 | OTHER FIBRES AND THEIR PRODUCTS, N.O.P. | FIBRES, TEXTILES AND TEXTILE PRODUCTS |
| 48 | WOOL AND ITS PRODUCTS | FIBRES, TEXTILES AND TEXTILE PRODUCTS |
| 49 | MIXED TEXTILE PRODUCTS | FIBRES, TEXTILES AND TEXTILE PRODUCTS |
| 50 | TUBES, PIPES AND FITTINGS | IRON AND ITS PRODUCTS |
| 51 | FARM IMPLEMENTS AND MACHINERY | IRON AND ITS PRODUCTS |

Continued on next page

| ID | Industry Description | Sector Description |
|-----|--|--|
| 52 | MACHINERY (EXCEPT AGRICULTURAL) | IRON AND ITS PRODUCTS |
| 53 | OTHER IRON AND STEEL PRODUCTS | IRON AND ITS PRODUCTS |
| 54 | SCRAP IRON OR STEEL | IRON AND ITS PRODUCTS |
| 55 | RAW IRON | IRON AND ITS PRODUCTS |
| 56 | ROLLING MILL PRODUCTS, N.O.P. | IRON AND ITS PRODUCTS |
| 57 | VEHICLES, CHIEFLY OF IRON | IRON AND ITS PRODUCTS |
| 58 | CASTINGS AND FORGINGS, N.O.P. | IRON AND ITS PRODUCTS |
| 59 | WIRE | IRON AND ITS PRODUCTS |
| 60 | PIGS, INGOTS, BLOOMS AND BILLETS | IRON AND ITS PRODUCTS |
| 61 | CHAINS | IRON AND ITS PRODUCTS |
| 62 | TOOLS AND HAND IMPLEMENTS | IRON AND ITS PRODUCTS |
| 63 | STAMPED AND COATED PRODUCTS | IRON AND ITS PRODUCTS |
| 64 | ENGINES AND BOILERS, N.O.P. | IRON AND ITS PRODUCTS |
| 65 | SPRINGS | IRON AND ITS PRODUCTS |
| 66 | HARDWARE AND CUTLERY | IRON AND ITS PRODUCTS |
| 67 | SHIPS AND VESSELS | MISCELLANEOUS COMMODITIES |
| 68 | MUSICAL INSTRUMENTS | MISCELLANEOUS COMMODITIES |
| 69 | MISCELLANEOUS IMPORTS (SPECIAL CONDITIONS) | MISCELLANEOUS COMMODITIES |
| 70 | MINERAL AND AERATED WATERS | MISCELLANEOUS COMMODITIES |
| 71 | BRUSHES | MISCELLANEOUS COMMODITIES |
| 72 | WORKS OF ART, N.O.P. | MISCELLANEOUS COMMODITIES |
| 73 | OTHER MISCELLANEOUS COMMODITIES, N.O.P. | MISCELLANEOUS COMMODITIES |
| 74 | SCIENTIFIC AND EDUCATIONAL EQUIPMENT | MISCELLANEOUS COMMODITIES |
| 75 | AMUSEMENT AND SPORTING GOODS, N.O.P. | MISCELLANEOUS COMMODITIES |
| 76 | CONTAINERS, N.O.P. | MISCELLANEOUS COMMODITIES |
| 77 | HOUSEHOLD AND PERSONAL EQUIPMENT, N.O.P. | MISCELLANEOUS COMMODITIES |
| 78 | VEHICLES, N.O.P. | MISCELLANEOUS COMMODITIES |
| 79 | ALUMINIUM AND ITS PRODUCTS | NON-FERROUS METALS AND THEIR PRODUCTS |
| 80 | COPPER AND ITS PRODUCTS | NON-FERROUS METALS AND THEIR PRODUCTS |
| 81 | OTHER NON-FERROUS METAL PRODUCTS | NON-FERROUS METALS AND THEIR PRODUCTS |
| 82 | TIN AND ITS PRODUCTS | NON-FERROUS METALS AND THEIR PRODUCTS |
| 83 | LEAD AND ITS PRODUCTS | NON-FERROUS METALS AND THEIR PRODUCTS |
| 84 | BRASS AND ITS PRODUCTS | NON-FERROUS METALS AND THEIR PRODUCTS |
| 85 | NICKEL AND ITS PRODUCTS | NON-FERROUS METALS AND THEIR PRODUCTS |
| 86 | ZINC AND ITS PRODUCTS | NON-FERROUS METALS AND THEIR PRODUCTS |
| 87 | PRECIOUS METALS AND THEIR PRODUCTS | NON-FERROUS METALS AND THEIR PRODUCTS |
| 88 | STONE AND ITS PRODUCTS | NON-METALLIC MINERALS AND THEIR PRODUCTS |
| 89 | GRAPHITE AND ITS PRODUCTS | NON-METALLIC MINERALS AND THEIR PRODUCTS |
| 90 | PETROLEUM, ASPHALT AND THEIR PRODUCTS | NON-METALLIC MINERALS AND THEIR PRODUCTS |
| 91 | OTHER NON-METALLIC MINERAL PRODUCTS | NON-METALLIC MINERALS AND THEIR PRODUCTS |
| 92 | MICA AND ITS PRODUCTS | NON-METALLIC MINERALS AND THEIR PRODUCTS |
| 93 | GLASS AND GLASSWARE | NON-METALLIC MINERALS AND THEIR PRODUCTS |
| 94 | CLAY AND ITS PRODUCTS | NON-METALLIC MINERALS AND THEIR PRODUCTS |
| 95 | ASBESTOS | NON-METALLIC MINERALS AND THEIR PRODUCTS |
| 96 | COAL AND ITS PRODUCTS | NON-METALLIC MINERALS AND THEIR PRODUCTS |
| 97 | PAPER | WOOD, WOOD PRODUCTS AND PAPER |
| 98 | BOOKS AND PRINTED MATTER | WOOD, WOOD PRODUCTS AND PAPER |
| 99 | WOOD, MANUFACTURED | WOOD, WOOD PRODUCTS AND PAPER |
| 100 | WOOD, UNMANUFACTURED OR PARTIALLY MANUFACTURED | WOOD, WOOD PRODUCTS AND PAPER |

Notes: This table lists the 100 industries and 11 sectors that are included in our dataset. A list of the 1,697 products included in the analysis is available on request. See text for further details.

Appendix 2. Robustness: econometrics

This appendix develops our main estimates from a sequence of specifications with increasingly demanding sets of fixed effects and controls. The objective is twofold. First, we want to explore what are the factors that may lead to potential biases in our estimates of the effects of tariffs. Second, on a related note, we trace the evolution of the changes in our estimating sample when we introduce more and more demanding specifications depending on the fixed effects used. Our results are presented in Table A3. The estimates in column (1) of Panel A in Table A3 are obtained from the following econometric model:

$$m_{gct} = \exp[\ln(1 + \tau_{gct}) \times \beta_1 + \pi_c + \phi_g + \psi_t] \times \epsilon_{gct}, \quad (12)$$

which includes three sets of fixed effects – by country, product, and year. The country fixed effects (π_c) control for any time-invariant country characteristics (e.g., area) and also, given our one-country setting with Canada as the single importer, for any time-invariant bilateral trade costs between the exporter and Canada (e.g., bilateral distance). The product fixed effects (ϕ_g) control for any time-invariant product characteristics (e.g., units of measurement). Finally, the year fixed effects (ψ_t) control for any common time trends (e.g., the global depression).³⁷

Turning to the estimate of the impact of tariffs ($\hat{\beta}_1$), we see that it is negative and statistically significant, as expected, i.e., on average, tariffs were an important impediment to Canada’s imports during the period 1924-1936. In terms of size, the coefficient on $\ln(1 + \tau_{gct})$, (-3.033, std.err. 0.287), is on the lower end of the corresponding estimates from the trade literature (e.g., Eaton and Kortum (2002), Anderson and van Wincoop (2003), and Head and Mayer (2014)) but it implies an elasticity of substitution and a correspond-

³⁷The single dropped observation in column (1) of Table A3 is for U.S. exports of “*Photographs, paintings, pastels, drawings and other art work and illustrations of all kinds, n, o, p., whether originals, copies or proofs, for reproduction in periodical publications enjoying second-class mailing privileges, (From May 1, 1936)*” in 1936. The reason is that this is the only observation for which there was data on Canada’s tariffs on imports of this product category from U.S.. Because this product is only exporter by the U.S., it is dropped from the estimating sample. The coverage in terms of countries and years remains the same.

ing trade elasticity which are within the established bounds, consistent with theory, and comparable to estimates from the RBC macro literature (e.g., Backus et al. (1994) and Zimmermann (1997)) and also to some recent estimates from trade papers (e.g., Anderson and Yotov (2020) and Boehm et al. (2020)).

The estimates in column (2) of Panel A are obtained after replacing the set of country fixed effects (π_c) with a set of country-time fixed effects ($\tilde{\pi}_{ct}$), i.e, from the following econometric model:

$$m_{gct} = \exp[\ln(1 + \tau_{gct}) \times \beta_2 + \tilde{\pi}_{ct} + \phi_g] \times \epsilon_{gct}. \quad (13)$$

In addition to absorbing all time-invariant country-specific characteristics and trade costs with Canada, the country-time fixed effects also fully control for any time-varying country-specific and exporter-Canada-specific effects (e.g., GDP of the exporter, the exchange rate between the exporter and Canada, and all types of bilateral treaties between Canada and the exporters in our sample). Note also that the country-time fixed effects would absorb the year fixed effects from the previous specification. Once again, we obtain a sizable, negative and statistically significant estimate on $\ln(1 + \tau_{gct})$, $\hat{\beta}_2 = -2.847$ (std.err. 0.292), which is not statistically different from the estimate in column (1).³⁸

The estimates in column (3) of Panel A are obtained after replacing the product fixed effects (ϕ_g) from the previous specification with product-time fixed effects ($\tilde{\phi}_{gt}$), i.e, from the following econometric model:

$$m_{gct} = \exp[\ln(1 + \tau_{gct}) \times \beta_3 + \tilde{\pi}_{ct} + \tilde{\phi}_{gt}] \times \epsilon_{gct}. \quad (14)$$

The idea is to control for any time-varying product changes and characteristics (e.g., global

³⁸Due to the use of more detailed fixed effects, the number of observations decreases further with this specification and we see a drop in the number of countries in the estimating sample to 106. The coverage in terms of products and years remains the same as in the previous specification.

structural change).³⁹ Once again, we obtain a sizable, negative and statistically significant estimate on $\ln(1 + \tau_{gct})$, $\hat{\beta}_3 = -3.791$ (std.err. 0.626). The new estimate is larger but less precisely estimated and, therefore, still not statistically different from the estimates in columns (1) and (2).

The estimates in column (4) of Panel A are obtained after introducing country-product fixed effects ($\tilde{\psi}_{gc}$) in addition to the fixed effects from the previous specification. The econometric model becomes:

$$m_{gct} = \exp[\ln(1 + \tau_{gct}) \times \beta_4 + \tilde{\pi}_{ct} + \tilde{\psi}_{gc} + \tilde{\phi}_{gt}] \times \epsilon^{gct}. \quad (15)$$

The idea behind the introduction of the country-product fixed effects is that, for example, the new fixed effects will allow for and control for time-invariant trade cost differences per product (e.g., due to transportation costs). This is consistent with theory, cf. Anderson and van Wincoop (2004) and Costinot et al. (2012), and there is plenty of empirical evidence that trade costs vary across sectors and products.⁴⁰ Similar to the previous specifications, we obtain a sizable, negative and statistically significant estimate on $\ln(1 + \tau_{gct})$, $\hat{\beta}_4 = -2.650$ (std.err. 0.787).

The estimates in column (5) of Panel A are obtained after replacing the country-time fixed effects ($\tilde{\pi}_{ct}$) from the previous specification with industry-country-time time fixed effects ($\tilde{\pi}^{ict}$), where the industries i are the 99 defined in Table A2 (other than Coin and Bullion). This is our main specification:

$$m_{gct} = \exp[\ln(1 + \tau_{gct}) \times \beta_5 + \tilde{\pi}^{ict} + \tilde{\psi}_{gc} + \tilde{\phi}_{gt}] \times \epsilon_{gct}. \quad (16)$$

³⁹Due to the use of more detailed fixed effects, the number of observations decreases further with this specification and we see a drop in the number of products in the estimating sample to 1,649. The coverage in terms of countries and years remains the same as in the previous specification.

⁴⁰Due to the use of more detailed fixed effects, the number of observations decreases further with this specification and we see a drop in the number of products in the estimating sample to 1,639. The coverage in terms of countries and years remains the same as in the previous specification.

From a theory perspective, the idea behind the introduction of this latest set of fixed effects is to control (at least partially) for the unobservable multilateral resistances. Theory implies that to do this properly the fixed effects should be of dimension exporter-product-time. However, given the focus on the imports of a single country, it is not possible to include these theory-consistent fixed effects, as they would be of the same dimension as the dependent variable. Therefore, instead of products we use industries, i.e., our fixed effects are of dimension exporter-industry-time. As discussed in the main text, we are using 99 industries, which is quite a disaggregated classification with on average less than 17 products in each industry.⁴¹ The estimate on $\ln(1 + \tau_{gct})$ ($\hat{\beta}_4 = -3.576$, std.err. 0.899) is still sizable, negative, and statistically significant, and it is very similar to our main estimate, which we reproduce in the last column of Table A3.

We also estimate several robustness specifications. The results in Panel B of Table A3 are obtained from the same (restricted) estimating sample that we employed to obtain our main estimate in column (5) of Panel A. The idea is to check whether the differences across estimates from alternative specifications in Panel A were driven by the different number of observations vs. the use of alternative sets of fixed effects. Overall, the variation across the estimates in Panel B is rather similar to the corresponding pattern in Panel A. Thus, we conclude that the differences across the estimates from alternative specifications were mostly driven by the use of alternative sets of fixed effects. The estimates in Panel C of Table A3 are obtained with the constrained sample but with an alternative clustering of the standard errors, i.e., by country and product, and they are very similar to our previous results.

The specifications in Table A4 explore the implications of using dummy variables to capture the impact of trade agreements, as is common in the literature. The estimates in column (1) are obtained after aggregating the product-level data to the country level, so that the dataset is of dimension country times year. Ideally we would want to include country-

⁴¹Due to the use of more detailed fixed effects, the number of observations decreases further with this specification and we see a drop in the number of countries (to 94) and in the number of products (to 1634) in the estimating sample. The coverage in terms of years remains the same as in the previous specification.

year fixed effects, as in our main specification, but since that is impossible we use country and year fixed effects instead. We also control for (the log of) GDP and (the log of) exchange rate. The main variables of interest are the four dummy variables indicating the four types of trade agreements discussed in the text. The estimates in column (2) are obtained with disaggregated data, which allows us include country-product and product-year fixed effects.

Columns (1) and (2) of Table A4 suggest that the ‘OTTAWA’ agreements were effective in promoting Canada’s imports, with the estimated effects of these agreements being larger and more precisely estimated with the disaggregated data. However, we also see that the estimated impact of the ‘NO_OTTAWA’ treaties is negative, and becomes statistically significant when using the disaggregated data. The most plausible explanation for this, in our view, is that in our single country setting we were unable to control for country-year fixed effects, and were thus unable to control for other factors reducing imports from these countries during the years in question. For example, France was deepening integration with its empire during this time, which could have led to trade diversion, and similar factors may have been at work reducing exports to Canada during this period. For this reason, among others, we prefer our main specification which includes as many fixed effects as possible, including country-year fixed effects.

The specification in column (3) of Table A4 reproduces the results from column (2) but introduces tariffs to the specification. Two main findings stand out. First, consistent with our main analysis, the estimate on tariffs is negative, large, and statistically significant. The new tariff estimate is a bit larger in absolute value, but is not statistically different from our main estimate. Second, the estimated impacts of the Ottawa treaties become smaller, especially the one involving ‘OTTAWA1’. However, they remain positive and are still (marginally) statistically significant. Subject to the caveat above about the lack of country-year fixed effects, the implication is that the Ottawa agreements had additional benefits for trade beyond just removing tariffs.

Table A3: The Impact of Canada's Tariffs: Robustness.

| | (1) | (2) | (3) | (4) | (5) |
|---|---------------------|---------------------|---------------------|---------------------|---------------------|
| A. Full Estimating Sample | | | | | |
| LN_TARIFF | -3.033 (0.287)** | -2.847 (0.292)** | -3.791 (0.626)** | -2.650 (0.787)** | -3.576 (0.899)** |
| <i>N</i> | 238043 | 236792 | 236269 | 236050 | 194182 |
| B. Constrained Estimating Sample | | | | | |
| LN_TARIFF | -3.217 (0.313)** | -3.062 (0.315)** | -4.106 (0.697)** | -2.930 (0.800)** | -3.576 (0.899)** |
| <i>N</i> | 194182 | 194182 | 194182 | 194182 | 194182 |
| C. Alternative (country-product) clustering | | | | | |
| LN_TARIFF | -3.217 (0.373)** | -3.062 (0.365)** | -4.106 (0.640)** | -2.930 (0.818)** | -3.576 (0.836)** |
| <i>N</i> | 194182 | 194182 | 194182 | 194182 | 194182 |

Notes: This table reports estimates of the common effects of tariffs on Canada's imports. The dependent variable is the value of imports in levels. The estimator is always PPML. Panel A reports estimates that are obtained from an unconstrained estimating sample. All results are obtained from specification (5) but with different fixed effects. Specifically, the estimates in column (1) use country, product, and year fixed effects. The estimates in column (2) are obtained after replacing the set of country fixed effects with a set of country-time fixed effects. The estimates in column (3) are obtained after replacing the product fixed effects from the previous specification with product-time fixed effects. The estimates in column (4) are obtained after introducing country-product fixed effects in addition to the fixed effects from the previous specification. Finally, the estimates in column (5) are obtained after replacing the country-time fixed effects from the previous specification with country-industry-time time fixed effects. Panel B reproduces the specifications from Panel A but based on the restricted sample that was used to obtain the estimates in column (6) of Panel A. All standard errors in panels A and B are clustered three-way (i.e., by exporter, product, and time). Panel C reports results that are clustered by exporter and product only.

Table A4: Aggregate vs. Disaggregated Data & Treaties vs. Tariffs

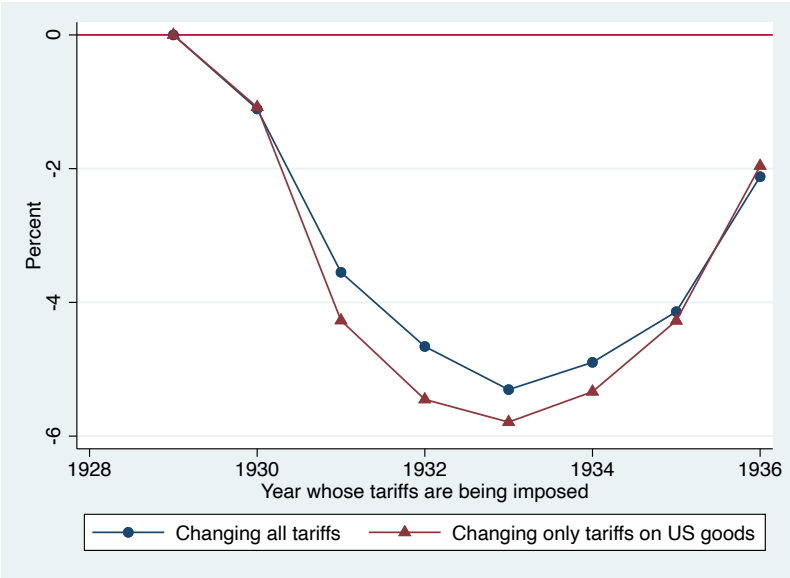
| | (1) | (2) | (3) |
|--------------|-------------------------------|---------------------|-------------------------------|
| | AGGREGATE | DISAGGREGATED | TARIFFS |
| LN_GDP | 0.840 (0.272)** | 1.594 (0.293)** | 1.537 (0.274)** |
| LN_EXCH_RATE | 0.261 (0.190) | -0.076 (0.189) | -0.012 (0.197) |
| OTTAWA1 | 0.172 (0.089) ⁺ | 0.402 (0.134)** | 0.229 (0.137) ⁺ |
| OTTAWA2 | 0.655 (0.347) ⁺ | 0.955 (0.485)* | 0.926 (0.481) ⁺ |
| NO_OTTAWA | -0.101 (0.084) | -0.221 (0.079)** | -0.232 (0.076)** |
| MFN_TREATIES | 0.136 (0.103) | -0.140 (0.128) | -0.151 (0.120) |
| LN_TARIFF | | | -3.729 (0.745)** |
| <i>N</i> | 753 | 210225 | 209881 |

Notes: This table reports estimates of the effects of Canada's agreements with aggregate and disaggregated data. The dependent variable is the value of imports in levels. The estimator is always PPML. Column (1) reports estimates that are obtained with aggregate data and country and year fixed effects. The standard errors are clustered by country and year. Column (2) reports corresponding estimates with disaggregated data and we use country-product and product-year fixed effects, and the standard errors are clustered by country product and year. Column (3) reproduces the results from column (2) but also introduces tariffs.

Appendix 3. Additional simulations

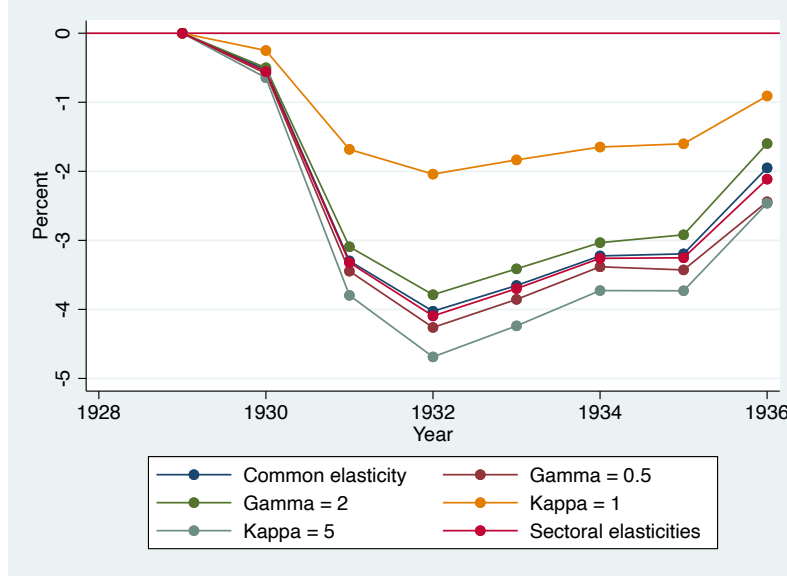
Figure A1 plots the impact on the 1929 value of Canadian imports from the United States of imposing later year's tariffs. Similar to Figure 7, it does so for two scenarios: allowing all tariffs to change as they actually did (as in Figure 6), and only varying tariffs on American goods, keeping all other tariffs constant. As can be seen, in contrast to the British case there is no great difference between the two scenarios: in neither case do tariff changes lower US exports to Canada by more than 6 percent.

Figure A1: Impact on 1929 imports from the US of imposing later years' tariffs



Note: This figure plots the percentage impact on the total value of 1929 Canadian imports from the US of imposing later years' tariffs, rather than 1929 tariffs as actually occurred. See text for further details.

Figure A2: Impact on aggregate 1929 imports of imposing later years' tariffs

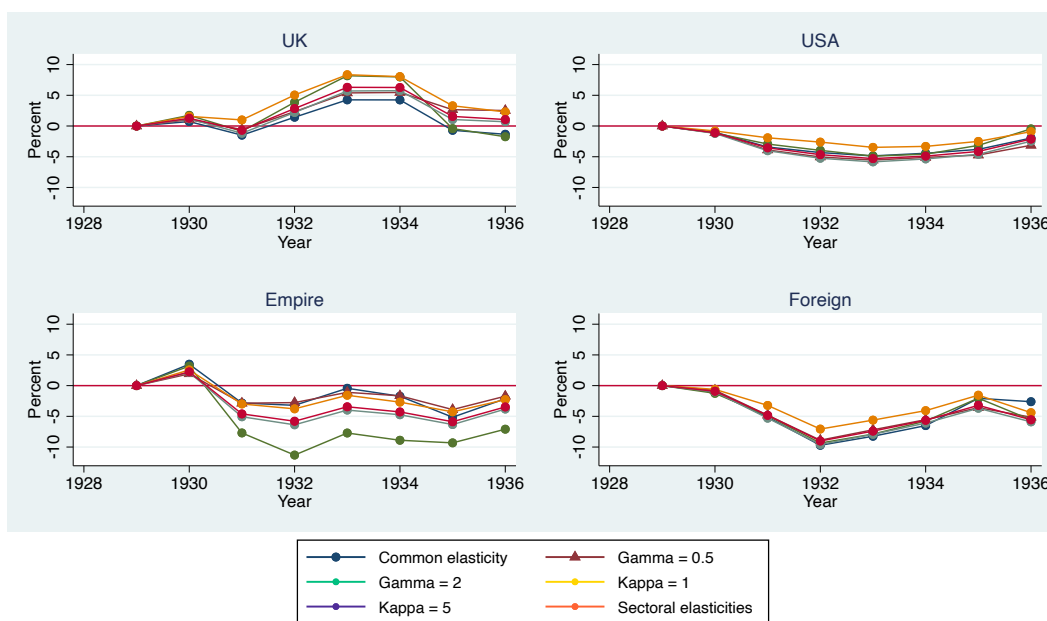


Note: This figure plots the percentage impact on the total value of 1929 Canadian imports of imposing later years' tariffs, rather than 1929 tariffs as actually occurred. See text for further details.

Figure A2 plots the impact on aggregate Canadian imports in 1929 of imposing the tariffs of later years. It does so for six elasticity scenarios. The sectoral elasticities scenario is the benchmark scenario plotted in Figure 6 in the main text, using the sectoral estimates of σ_g based on Figure 4. The common elasticity scenario imposes a uniform estimate of σ_g on all products, taken from column (1) in Table 2. The next two scenarios use the baseline sectoral estimates of σ_g , but allow the intermediate elasticity of substitution between goods, γ , to be either 0.5 or 2 (whereas it was set equal to one in the benchmark scenario). The final two scenarios take all the elasticities from the benchmark case, but vary κ , the elasticity of substitution in the upper consumption nest between domestic and imported goods. The Cobb-Douglas scenario sets $\kappa = 1$, and a final scenario sets $\kappa = 5$. As can be seen, and not unexpectedly, reducing κ from its benchmark value of 3.358 to unity reduces the impact of post-1929 tariff changes on the value of aggregate imports – they now decline by 1 percent or less. Raising κ to 5 increases the impact, but not by very much. The results are robust to

changing σ_g and γ . Overall, the conclusion in the text, that the aggregate impact of higher Canadian tariffs after 1929 was relatively small, seems robust.

Figure A3: Impact on aggregate 1929 imports of imposing later years' tariffs

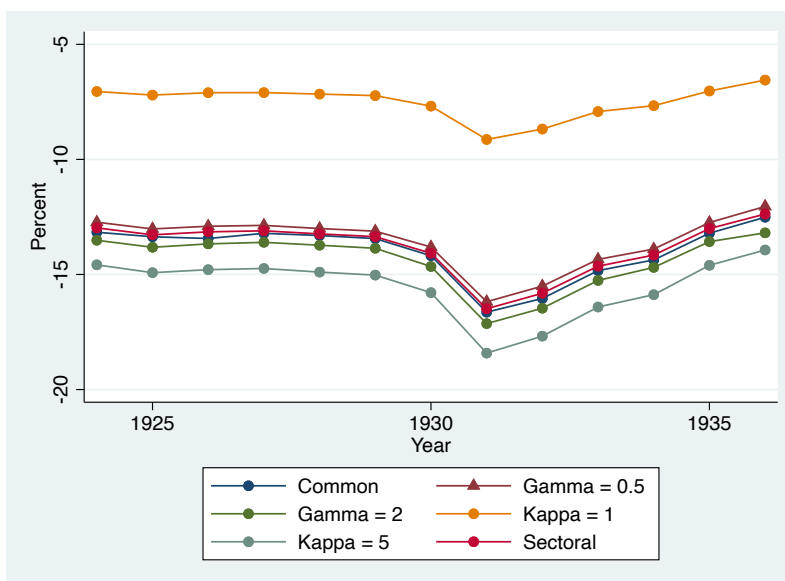


Note: This figure plots the percentage impact on the total value of 1929 Canadian imports from four regions of imposing later years' tariffs, rather than 1929 tariffs as actually occurred. See text for further details.

Figure A3 considers the same six elasticity scenarios, but plots exports to Canada of the four regions discussed in the text (the UK, the rest of the British Empire, the US, and the rest of the world). The results seem quite robust, with the exception of those involving the rest of the British Empire, and they are in any case more robust than those in Figure A2. In particular, they are relatively robust to changes in κ . The impact of tariff changes on the exports of a particular country depends mechanically on two factors: the impact on aggregate imports (Figure A2) and the impact on the country's share of those imports. The former depends on κ , as we have seen, but the latter does not – homotheticity implies that countries' shares of Canadian imports depend on σ_g , and to a lesser extent on γ , but are independent of the value of κ . As can be seen, lowering κ raises the positive impact on UK exports to Canada. This is because that positive impact depends entirely on an increase

in the UK share of Canadian imports due to rising discrimination. The negative impact of tariff changes facing UK exporters, documented in Figure 7, declines as κ falls, leaving a larger net positive impact.

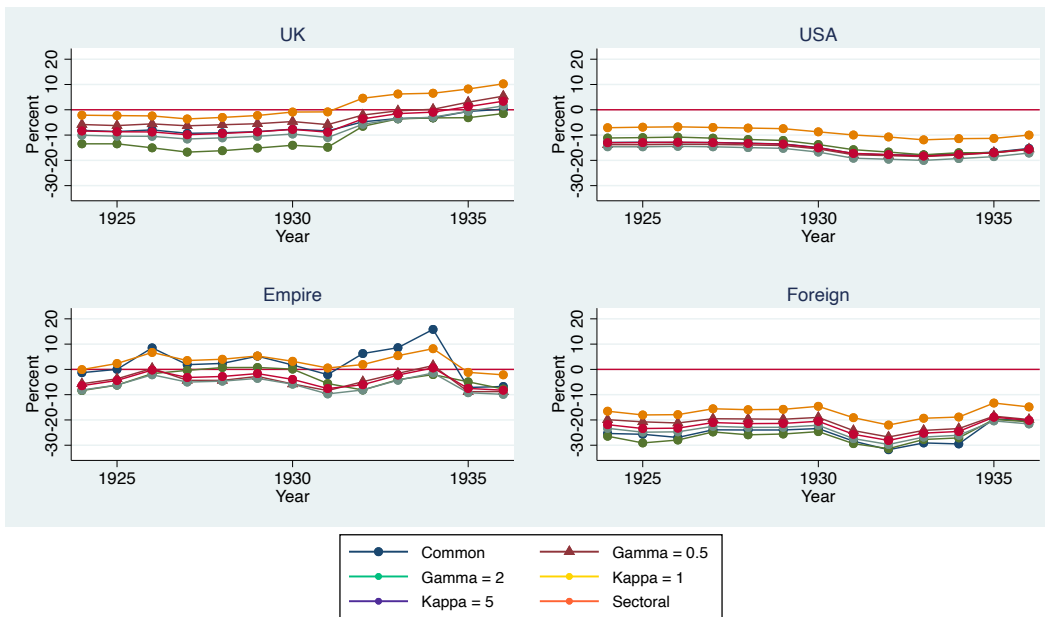
Figure A4: Impact of entire structure of protection on aggregate Canadian imports



Note: This figure plots the percentage impact on aggregate Canadian imports of imposing the actual structure of protection in each year, compared with a free trade counterfactual. See text for further details.

Figures A4 and A5 repeat the exercise, but this time look at the impact of the entire structure of protection, comparing this with a free trade counterfactual as in Figure 10. Once again, the only elasticity that really matters for the overall level of imports is κ , and lowering it to one has dramatic implications for the aggregate impact of Canadian protection. The sensitivity of exports from individual regions to κ is much lower. The main implication of assuming that $\kappa = 1$ is that the impact of Canadian protection on UK exports turns positive from 1932 on, rather than remaining largely neutral.

Figure A5: Impact of entire structure of protection on Canadian imports from 4 regions



Note: This figure plots the percentage impact on Canadian imports from 4 regions of imposing the actual structure of protection in each year, compared with a free trade counterfactual. See text for further details.