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Deliberate Surrender? The Impact of Interwar Indian Protection

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Deliberate Surrender? The Impact of Interwar Indian Protection

Abstract

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JEL Classification: F13, F14, N75

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Deliberate Surrender? The Impact of Interwar Indian Protection*

Vellore Arthi,[†] Markus Lampe,[‡] Ashwin Nair,[§] and Kevin Hjortshøj O'Rourke[¶]

July 29, 2021

Abstract

What is the impact of trade policy in developing countries? We address the question in the context of interwar India, whose trade policies have been accused of harming British export interests. We quantify the impact of trade policy on the value and composition of Indian imports, using novel disaggregated data on both trade policies and imports for 114 commodity categories coming from 42 countries. Indian trade elasticities were generally larger than those in the United Kingdom at the same time. We find that even though Indian protection lowered total imports, it substantially boosted imports from the UK. Trade policy had a big impact on trade flows.

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1 Introduction

What is the impact of trade policy in developing countries? The answer depends on the sizes of the relevant trade elasticities, but estimates of these vary widely.[1] There are relatively few estimates for developing countries, and those that exist also wary widely;[2] nor is there any reason to suppose that estimates from rich countries will automatically carry over to the developing world. As Goldberg and Pavcnik (2016, p. 181) point out, "trade elasticity estimates may vary by sector, time, and country. This makes careful empirical work that exploits trade policy variation in order to identify the trade elasticity/ies more important."

The 1930s offer a promising setting for researchers interested in the impact of trade policy, since the decade saw dramatic fluctuations in both tariff and non-tariff barriers to trade. India is a rare example of a very poor developing nation that adopted protectionist policies during the 1930s. Indian tariffs targetted cotton textiles and other manufactured goods that had traditionally been imported from Britain: Dewey (1978, p. 36) states that higher Indian tariffs "ejected Lancashire from its largest export market".[3] If this was, as Dewey claimed, the "deliberate surrender of the largest export market in the world for a staple British manufacture", it would be a striking example of a colonial power permitting policies that damaged its own export interests.

Not everyone agrees with Dewey's assessment: Chaudhuri (1983, p. 869) suggests that Imperial Preference may have boosted Britain's share of Indian imports, while Rothermund (1988, p. 110) argues that the quotas on Japanese cotton exports to India enabled the British "to recover a great deal of the ground that they had lost both to Indian and to Japanese competition in previous years". Empirical evidence is required to discriminate between such assertions, but while there is an abundant historical literature on the politics of Indian interwar trade policy, there has been much less work on the consequences of that policy.[4] The only quantitative study of the impact on trade flows of Indian interwar protection that we are aware of is Wolcott (1991), who estimates partial equilibrium import demand curves for British cotton textiles and concludes that 82% of the decline in the Indian demand for British cotton textiles was due to

[1] For a recent contribution see Boehm, Levchenko and Pandalai-Nayar (2020). Anderson and van Wincoop (2004) and Head and Mayer (2014) provide excellent surveys.

[2] Imbs and Mejean (2017) find that sectoral trade elasticities are typically much higher in developing than in developed countries, while Sequeira (2016) finds very low trade elasticities in a study of southern Africa.

[3] For similar views see Drummond (1972, pp. 123-4) and Sandberg (1974).

[4] For recent contributions see Stubbings (2019) and Casler and Gaikwad (2019).

the increase in the tariff from 11 to 25%: Indian protection hit British exports severely.

In this paper we extend the analysis in several ways. First, we look at the impact of Indian protection not just on imports of cotton textiles, but on imports more generally. We do so using a newly created dataset giving imports into British India of 114 consistently-defined commodities from 42 countries over the 15 years 1923-4 to 1937-8.[5] Generating these data required typing information on imports of 202 sub-categories of goods from 63 countries or sub-regions. Second, we look at imports not just from the UK but from the 41 other countries in our dataset, and we take account of Indian trade policies affecting those countries also. Using data on trade and trade policy that is disaggregated by commodity and country allows for a far more precise estimate of the impact of protection. Third, we estimate trade elasticities for six broad categories of goods, and find that these elasticities were typically higher than those in Britain at the same time. And fourth, we embed our elasticities in a model that allows for substitution between varieties of the same goods coming from different countries, substitution between different goods, and substitution between imports in general and domestically produced goods. We find that Indian protection depressed overall imports (our median estimate is that protection lowered imports by around 10%), but substantially *boosted* imports from the United Kingdom. Our median estimates suggest that total British exports to India were increased by over 20%, and UK cotton cloth exports to the country by roughly 50%: these impacts were equivalent to around 2% of aggregate UK exports, and 10% of UK cotton cloth exports, to *all* destinations. Permitting India to set its own trade policy did *not* imply a deliberate surrender of British export markets.

Our work contributes to a small but growing literature quantifying the impact of interwar tariffs and quotas. Surprisingly, despite their outsize reputation, existing empirical work quantifying their effects has typically found smaller effects than might have been expected, given the prominent role assigned to protectionism in many historical accounts of the Great Depression.[6] Furthermore,

[5]The data will be made available to researchers at https://cepr.org/content/trade-depression.

[6]Irwin (2012) provides an excellent survey. To take one example, Irwin (1998) finds that the bulk of the 1929-33 US trade collapse was due more to the GDP collapse of the period than to an increase in trade frictions. To take another, Eichengreen and Irwin (1995) find little evidence that imperial and regional trade blocs distorted the geographical pattern of trade during the 1930s: the countries involved had already traded disproportionately with each other in the 1920s, prior to the introduction of discriminatory trade policies. Madsen (2001) and Kitson and Solomou (1990) provide dissenting voices. See also, *inter alia*, Estevadeordal, Frantz and Taylor (2003), Gowa and Hicks (2013), and Wolf and Ritschl (2011).

most empirical work on the subject has focussed on rich countries, particularly the United Kingdom and United States. In this paper we quantify the impact of trade policy in a developing country and find that it was big. The article also contributes to a recent literature using tariffs to estimate trade elasticities (e.g. Caliendo and Parro (2015), Fajgelbaum et al. (2020), and Imbs and Mejean (2017)), but does so using evidence from a very different historical context.

We begin with a brief description of Indian trade policy during the period. Section 3 outlines our theoretical framework and introduces the key elasticities which matter for our results. Section 4 describes the data which are used to estimate those elasticities in Section 5. Section 6 derives the main results of our paper and Section 7 concludes.

2 Indian trade policy[7]

Indian import tariffs had traditionally been low, reflecting the country's colonial status and the liberal inclinations of the British imperial power. Land, opium, and salt provided the bulk of the Indian government's revenues in the nineteenth century: customs duties only accounted for 10% of government revenue in 1860-61, and just 5% ten years later (Kumar, 1983, p. 916). On the eve of World War 1 India was still virtually a free-trading country, and such tariffs as were levied were designed to raise revenue rather than to protect domestic industries.

The war was an important turning point. The war effort required revenue, and Indian tariffs were accordingly increased: customs duties accounted for 20% of Indian government revenue during 1916-20 (Mukherjee, 2001, pp. 731-2). The war also "produced a landslip in official attitudes to protection" (Dewey, 1978, p. 45). Total war highlighted the desirability of developing Indian heavy industry, while the belief in *laisser faire* was shaken. Even more importantly, perhaps, Indian nationalist demands were strengthened by the country's contribution to the war effort. In August 1917 the Secretary of State for India, Edwin Montagu, stated that the UK favoured "the progressive realization of responsible government in India as an integral part of the Empire."

In 1919, a British Joint Select Committe stated that "Nothing is more likely to endanger the good relations between India and Great Britain than a belief that India's fiscal policy is dictated from Whitehall in the interests of the trade of Great Britain. That such a belief exists at the moment there can be no

[7] A lengthier account is provided in Arthi et al. (2020).

doubt...Whatever be the right fiscal policy for India, for the needs of her consumers as well as for her manufacturers, it is quite clear that she should have the same liberty to consider her interests as Great Britain, Australia, New Zealand, Canada and South Africa." It thus proposed (and the government subsequently agreed) that the British government "should as far as possible avoid interference on this subject when the Government of India and its Legislature are in agreement" (U.K. Parliamentary Papers, 1919, p. 11).

This recommendation, accepted by the British government in 1921, that Britain acknowledge India's right to "fiscal autonomy" took the form of a "convention" rather than a statute, since the latter would have limited "the ultimate power of Parliament to control the administration of India" and "the power of veto which rests in the Crown". Indian historians have pointed out that the Government of India was supposed to consult the British government before tabling fiscal policy proposals, and have argued that the British government *de facto* retained significant control over Indian trade policy (Mukherjee, 2001, pp. 734-5). Yet the succeeding two decades saw the gradual development of far more interventionist trade policies on the sub-continent.

In 1922 the Indian Fiscal Commission recommended protection for Indian industries on classic infant industry grounds (U.K. Parliamentary Papers, 1922 Sess II).[8] Protection was to be resorted to "with discrimination", since indiscriminate protection "would protect industries unsuitable as well as suitable, and would impose on the consumer a burden in many cases wholly gratuitous" (p. 49).[9] In 1923 the Indian government accepted this recommendation, and a Tariff Board was set up to implement it.

The new Tariff Board's first task was to consider the case for protection of the iron and steel industry. In June 1924 tariffs were introduced ranging from 15 to 25% ad valorem.[10] In 1927 protection for the industry was extended for a further 7 years, and importantly the duties were now "differential", which is to say that they were in many cases lower for goods "of British manufacture". This legislation marked a break with the past: previous attempts to introduce

[8] That is to say, Indian industries concerned would have to possess "natural advantages", require protection to be able to develop in the first place, and would eventually be competitive in world markets.

[9] Somewhat confusingly, therefore, the proposed policy was described by contemporaries as one of "discriminatory protection". Notably, 5 Indian members of the 11-member Commission argued for an unqualified commitment to protection (U.K. Parliamentary Papers, 1922 Sess II, pp. 175-212). Roy (2017) provides a sympathetic account of the policy of discriminatory protection.

[10] Several specific tariffs were also introduced.

Imperial Preferences of any kind had fallen foul of Indian nationalist opinion (which objected in this instance also, albeit unsuccessfully).

Protection for the Indian cotton industry also increased over time in response to worsening market conditions and concerns about unfair competition (due to inferior labour conditions) from East Asia.[11] In April 1930 duties on British piece goods were increased to 15% , with duties on foreign piece goods being raised to 20%.[12] By the end of September 1931 these duties had been raised to 25% and $31\frac{1}{4}$% respectively.[13]

In 1932 an Anglo-Indian trade deal granted tariff preferences to a large range of UK exports, and in some cases to exports from British colonies (as opposed to Dominions). These margins were generally 10% *ad valorem*, although in some cases (notably motor cars) the margin was $7\frac{1}{2}$%. The agreement did not prevent India from raising tariffs in the future so long as these preference margins were maintained (U.K. Parliamentary Papers, 1931-32; Drummond, 1972, p. 131).

In December 1931 Japan quit the gold standard and the yen started to depreciate. On August 30, 1932 the Indian duty on *all* non-British cottons was increased from $31\frac{1}{4}$ to 50% (the Indo-Japanese trade treaty of 1904, which had granted most-favoured-nation status to Japan, made it impossible to single out Japanese goods for special attention).[14] In April 1933 India gave Japan six months notice of its intention to denounce the 1904 treaty, which would allow it to discriminate against Japanese imports; later in the same month the Indian Governor General was given the power to impose safeguard duties. On the 7th of June the tariff on non-British cotton goods was increased to 75%.

Japan reacted to the increased tariff on non-British goods, in part by boycotting Indian raw cotton, but also by opening trade negotiations with India (Drummond, 1972, pp. 132-4; Rothermund, 1988, pp. 109-10; Chatterji, 1992, pp. 378-80). The outcome was a trade agreement which came into effect on January 8, 1934. This lowered the Indian duty on foreign piece goods to 50%, in exchange for quotas on Japanese exports of piece goods to India linked to

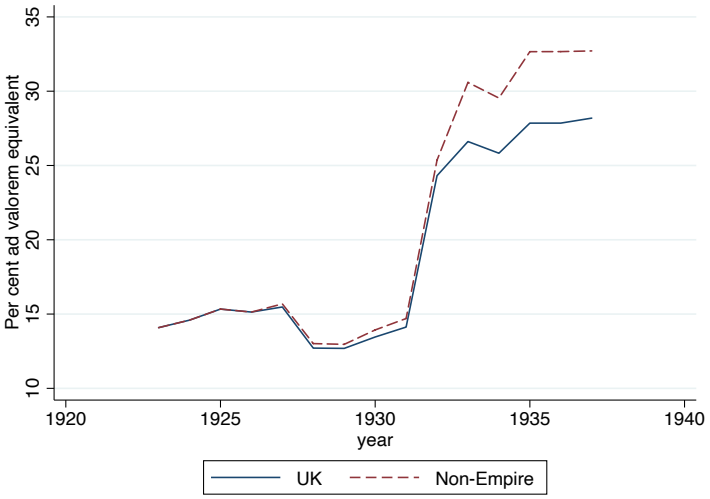
[11] An excellent and concise account is given in Indian Tariff Board (1932, pp. 1-8), on which we largely draw.

[12] The legislation also specificied a minimum specific tariff of $3\frac{1}{2}$ annas per pound on all imported plain grey piece goods, no matter what the origin, which was non-discriminatory enough to get the measure passed by an Indian Legislature hostile to Imperial Preference (Act XVII of 1930).

[13] Indian Finance (Supplementary and Extending) Act, 1931.

[14] Not unreasonably, the Japanese protested against the fact that tariffs on British goods were not being increased. This was dismissed by the British who took the view that preferences in India on British goods were not inconsistent with the UK's treaty obligations to Japan, presumably since British goods were not of "foreign origin" (Chatterji, 1992, p. 378).

Figure 1: Average Indian tariffs, 1923-4 to 1937-8



Source: see Section 4.2.

Japanese imports of Indian raw cotton (Chatterji, 1992, p. 395).

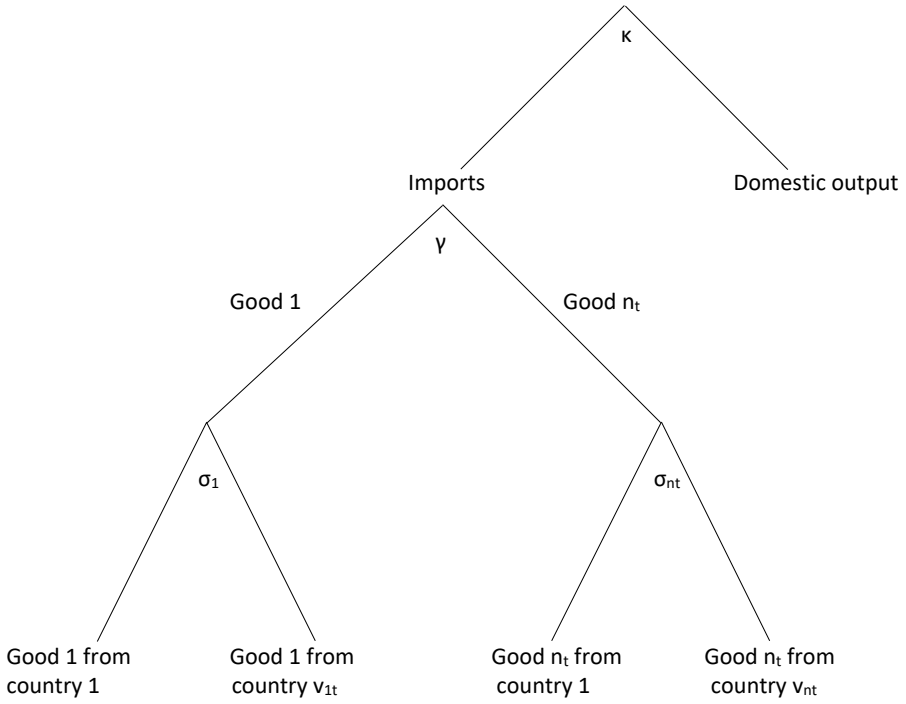
The Tariff Board granted substantial protection to a further nine industries during this period.[15] Figure 1 plots the unweighted average tariff imposed on goods coming from the UK, and from countries outside the British Empire, over the period. It shows that the big increase in protection occurred in 1932, with average tariffs increasing from roughly 15 to 25%, and that the gap between tariffs on British and "foreign" goods started widening in the subsequent year. What was the impact of these trends on the overall value and composition of Indian imports?

3 Theoretical framework

As the previous section has made clear, Indian trade policy became increasingly protectionist, and also more complicated, over the course of the 1920s and 1930s. Tariffs were increased on a wide range of goods, and they were raised more on imports from "foreign" countries than on British imports. Higher tariffs lowered imports, and a partial equilibrium analysis will necessarily conclude that they

[15] These were sugar, paper, matches, salt, heavy chemicals, plywood and tea-chests, sericulture, magnesium chloride, and gold thread. Rice and wheat were also singled out for protection (Tomlinson, 1979, pp. 61-2).

Figure 2: Nested utility function



lowered UK exports to India. But tariffs which discriminated in favour of UK goods may have induced substitution towards British imports, potentially giving British exporters a larger share of a shrinking pie. What was the net effect of these countervailing forces?

In order to answer this question we need a model of the Indian economy: ideally a general equilibrium model with many goods originating in many countries being imported, and with corresponding domestic sectors producing these goods in India. We have data on Indian imports of 114 goods from 42 countries, which will be described in Section 4, but we lack Indian production data at the same level of disaggregation. We therefore construct a model with a very simple supply side, but with a much richer demand side based on Broda and Weinstein (2006), whose notation we largely use.[16]

In particular, in each year t we consider a representative agent characterized by a nested CES utility function, represented in Figure 2.[17] At the top level

[16]The model is similar in structure to that used by de Bromhead et al. (2019)

[17]To be precise therefore, we actually construct 15 models, one for each year.

they maximize utility by choosing between a domestically produced good D_t and an aggregate import good M_t, with the elasticity of substitution between these two goods being denoted by κ:

$$U_t = (\alpha_{Dt} D_t^{(\kappa-1)/\kappa} + (1-\alpha_{Dt}) M_t^{(\kappa-1)/\kappa})^{\kappa/(\kappa-1)} \tag{1}$$

At the second level the aggregate import good M_t is a CES composite of up to 114 imported goods $g \in G_t$ where G_t is the set of all goods imported in period t. The elasticity of substitution between goods is denoted by γ, while M_{gt} represents total imports of good g in year t:

$$M_t = (\sum_{g \in G_t} \alpha_{gt} M_{gt}^{(\gamma-1)/\gamma})^{\gamma/(\gamma-1)} \tag{2}$$

In our baseline we assume that $\gamma = 1$, but in Online Appendix 4 we show that our results are not very sensitive to this parameter. Finally, at the third level each of the imported goods M_{gt} is an Armington aggregate of up to 42 varieties, with each variety of a good coming from a particular source country. The Armington elasticity of substitution betwen the different national varieties of good g is denoted by σ_g;[18] in the equation below m_{gct} represents imports of good g from country c in year t, while $I_{gt} \subset C$ is the subset of all countries C supplying good g to India in year t:

$$M_{gt} = (\sum_{c \in I_{gt}} \beta_{gct} m_{gct}^{(\sigma_g-1)/\sigma_g})^{\sigma_g/(\sigma_g-1)} \tag{3}$$

The model's supply side is extremely simple and resembles that used by Anderson and Neary (1996): a single factor of production (which we can think of as GDP) is transformed into an export good X_t and a domestically-consumed good D_t, via a constant elasticity of transformation production function (with the elasticity of transformation equal to η):

$$GDP_t = (\alpha^D D_t^{(1+\eta)/\eta} + (1-\alpha^D) X_t^{(1+\eta)/\eta})^{\eta/(1+\eta)} \tag{4}$$

[18] In principle there are thus 114 σ's to be estimated. As discussed in Section 5.1 below, data constraints force us to assume that they are equal across goods within each of 9 broad commodity categories.

The export good is sold to provide the foreign exchange used to buy imports (we assume that trade is balanced). To keep the analysis simple, and in line with the evidence provided in Section 4.1, we assume that the extensive margin of trade is fixed (i.e. that I_{gt} and G_t are fixed $\forall g, t$).

When protection increases, the main determinants of the impact on the total value of imports will be the ease with which the consumer can substitute towards the domestically produced good, and the ease with which the economy can meet this additional demand for D. The key elasticities determining the response of aggregate import values to an increase in protection will thus be χ and η, although all of the elasticities matter to some extent. On the other hand, the fact that preferences are homothetic implies that χ and η are irrelevant to the *share* of trade coming from a particular country, such as the UK. The key elasticities determining that will be the σ_g's, although γ will also matter.

In order to calibrate the model we need information on benchmark imports of all goods from all countries in all years, as well as information on the consumption of the domestic good and estimates of the elasticities. The next section describes the data we use, while Section 5 derives the elasticities.

4 Data

In order to calibrate the model we need four types of information: imports by commodity and country; trade policy (chiefly tariffs, but also information on non-tariff barriers to trade) by commodity and country; Indian consumption of the domestic good D; and the elasticities described in Section 3. In this section we describe the data sources used to obtain the first three of these items, which are also used to derive the elasticities in Section 5.

4.1 Trade data

The basic problem with historical trade data is that the trade classifications used by the relevant national authorities are consistent neither across countries nor over time. However, it is sometimes possible to construct import data that correspond to SITC categories: doing so requires that the trade categories reported at the time fall entirely within particular SITC categories and that the available data allow us to capture all imports falling within a given SITC category. We collected data on all Indian imports, between 1923-4 and 1937-8,

in 35 distinct 3-digit SITC categories.[19] These categories were chosen because of their importance in world trade generally, and also because it was possible to consistently calculate import values for each.[20] In order to accomplish this we hand collected import data from various volumes of the "Annual Statement of the Sea-Borne Trade of British India with the British Empire and Foreign Countries".[21] For each year we collected import values for up to 202 individual product categories from 63 countries/sub-regions. In principle this implied collecting 190,890 datapoints, although product categories tended to change over time, some vanishing and others appearing, implying that the actual number of datapoints collected was rather smaller. In addition, many observations were zero.[22] We were able to aggregate the 202 individual product categories to produce import data for 114 product categories that are consistently defined over time.[23] It is these 114 categories which can in turn be aggregated up to our 35 SITC 3-digit categories. For example, our good number 261001, "Silk, raw", was constructed using eight separate items which appear in the trade statistics between 1923 and 1937, namely "Silk, raw", "Silk. Waste", "Textiles. Silk. Raw and cocoons", "Textiles. Silk. Waste and noils", "Textiles. Silk. Silk, raw and cocoons", "Textiles. Silk. Waste products, including duppion", "Textiles. Silk. Silk, raw and cocoons, Hand reeled" and "Textiles. Silk. Silk, raw and cocoons, Other Sorts". A complicating factor for this good was the fact that the statistics reported an increasingly detailed disaggregation over time, two items at the beginning, and four at the end. It is due to such time-varying disaggregation that we had to aggregate the 202 narrower product categories into a broader

[19] Indian trade statistics were compiled for fiscal years, beginning on April 1 and ending on March 31. We are using the original Standard International Trade Classification, Revision 1, based on Statistical Office of the United Nations (1951, 1953).

[20] That is, sub-categories of trade we needed to compute these values fell neatly within our 3-digit SITC categories, rather than spanning two or more categories; and we were able to capture all of the imports within each 3-digit category.

[21] Prior to financial year 1937-38, the statistics in these volumes referred to the trade not only of British India proper, but of Burma as well. They thus excluded trade between British India and Burma. From 1937-38 onwards, the trade statistics of Burma were published separately. This meant that the Indian statistics included the trade of British India with Burma, and excluded the direct trade of Burma with other countries. The figures recorded in the 1937-38 volumes were therefore not comparable with those for the earlier volumes. To make the figures comparable across volumes, we additionally hand collected trade data from the Annual Statement of the Sea-Borne Trade and Navigation of Burma for 1937-38. We used these statistics to net out trade between British India and Burma, and to add trade between Burma and the rest of the world to the Indian totals, for each good in our sample.

[22] Where no imports of a particular good from a particular country were listed in the trade statistics we simply assumed that imports were equal to zero.

[23] These 114 categories are the narrowest for which it was possible to generate consistent data over time.

and consistently defined set of 114 product categories. Thankfully, there are also series which are presented consistently over time, and for which there is only one original trade statistics item corresponding to one of our 114 product categories. Examples of such categories include "Cotton, raw" and "Wool, raw".

When estimating elasticities we will distinguish between nine broader categories of goods (see footnote 30 below). Online Appendix 1 provides full details of how we aggregated the original published trade statistics to produce our final dataset, while Online Appendix 2 lists the 42 partner countries used in our analysis.

Figure 3 shows that the total value of imports in our sample, and the total value of imports in the official trade statistics, track each other closely. Our sample captures between 54% and 67% of all Indian imports. Figure 4 shows that our sample does a good job of matching the British Empire's share of total Indian imports.[24]

The trade collapse of 1929-33 occurred along the intensive rather than the extensive margin. In 1928-29 there were 817 varieties (particular goods from particular countries) in our dataset; in 1932-3 the number had declined, but only to 792, a fall of just 3%. When we decompose the trade collapse as in Kehoe and Ruhl (2013), the intensive margin accounts for 100.8% of the fall in trade between 1928-9 and 1932-3. Our modelling strategy as outlined above thus focusses on the intensive margin.[25]

4.2 Trade policy data

Tariff information was obtained from various volumes of the Indian Trade Journal. The tariff rates for a given year were published in the supplement to the Trade Journal's final volume of the previous year. We also looked at amendments made to the Indian Tariff Act which were mentioned in the Indian legislation from this period to check for any changes in tariff rates that came into effect in the middle of the year. To account for these mid-year changes we took a weighted average of rates in place prior to and after the change with the weights determined by the month in which the changes took effect.[26]

[24] Data for 1937-8 are missing as a result of the reorganization of Burmese and Indian trade statistics.

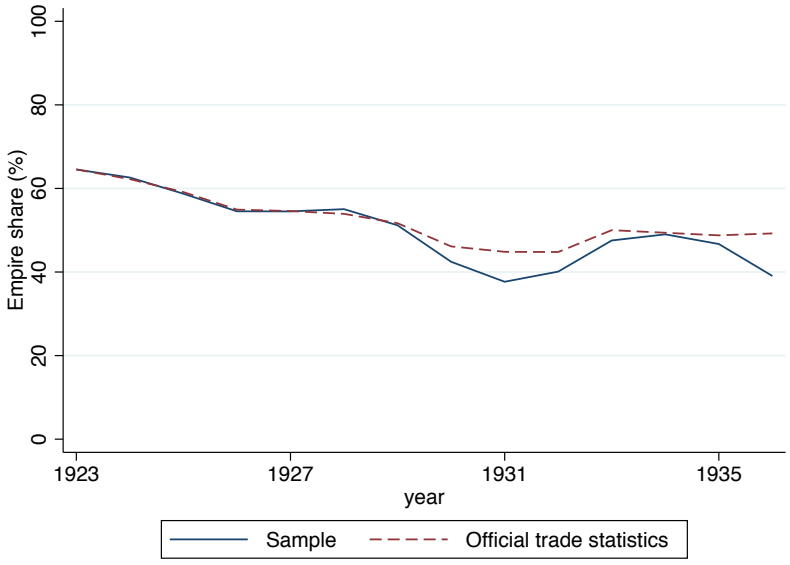
[25] The figure is 97.5% for 1928-9 to 1936-7. This partly reflects the fact that the data for these two years come from different volumes of the trade statistics; the later volume systematically reported data for fewer national varieties, with some supplier countries being included in the 'Other' category. Even so, it is clear that the action was entirely on the intensive margin.

[26] Our trade policy data are thus for calendar years starting on January 1, while our trade data are for fiscal years starting on April 1. Since trade policy might be expected to influence

Figure 3: Total and sample Indian imports, 1923-4 to 1937-8

Source: Annual Statement of the Sea-Borne Trade of British India with the British Empire and Foreign Countries.

Figure 4: Total and sample Empire share of Indian imports, 1923-4 to 1936-7



Source: Annual Statement of the Sea-Borne Trade of British India with the British Empire and Foreign Countries.

While tariff rates for some product categories mentioned in the Indian Trade Journal corresponded well with the product categories in the import data, there were cases where the tariff rates were for either a broader or a narrower product category relative to the categories in our import data. For example, tariff information was given for "Grain and pulse, all sorts, including broken grains and pulse, but excluding flour" which was broader than the corresponding import product categories. In this case the rates were applied to all individual products falling under the Grain and Pulse category, unless there were specific exemptions.

Alternately, in cases where tariff information was given for narrower product categories, an unweighted average of the rates was used for the broader import categories. For example, tariff information was given for "Cotton twist and yarn, and cotton sewing or darning thread, of counts above 50s" and "Cotton twist and yarn, and cotton sewing or darning thread, of counts below 50s" which are narrower than the product category "Textiles. Cotton. Twist and Yarn" in our import data. In this case the rates used for Cotton, Twist and Yarn are an unweighted average of the rates of the two categories mentioned above.

While tariffs were mainly *ad valorem*, for certain goods there were specific rates in place and for some goods there was a mix of both specific and *ad valorem* rates. Specific rates were expressed in *ad valorem* terms by dividing the specific rates by the unit value of imports (import value divided by import quantity). Information on non-tariff barriers (in particular the quota agreement with Japan) were obtained from the sources used in Section 2, and are listed (along with the information we use on boycotts and cartels) in Online Appendix 3.

4.3 Consumption of the domestic good D

The Net Domestic Product (NDP) of British India (not including Burma) is taken from Sivasubramonian (2000, pp. 429-30). However, as mentioned in footnote 21 above, our trade data include imports into Burma. Hlaing (1964, p. 143) provides NDP data for Burma for the years 1921-22, 1926-27, 1931-32, 1936-37, and 1938-39. This allows us to adjust "Indian" NDP upward so as to include Burma for these five years, and we compute adjustment factors for the intervening years via geometric interpolation (the combined total is around 5%

trade flows with a lag we decided to use calendar year tariff data as a base case. In Online Appendix 4 we show that using fiscal year tariff data makes little difference to our results.

higher than the NDP for British India alone). In order to compute consumption (and production) of the domestically produced and consumed good D we simply subtract the total value of imports from NDP. We make one adjustment to the data: since our import data only cover a (large and representative) sample of all Indian imports, we scale NDP down by an equivalent amount so as to match the actual import/NDP ratio when calibrating our CGE models.[27]

4.4 Other data

In our regressions estimating the σ_i's we also controlled for exchange rates and the nominal GDP of trade partners. Nominal exchange rates were calculated as annual averages of closing daily exchange rates and were taken from Global Financial Data.[28] Nominal GDP was taken from Klasing and Milionis (2014), adjusted for interwar borders using the adjustment coefficients from Broadberry and Klein (2012).

5 Estimating the elasticities

In this section we describe how we estimate the elasticities embedded in the model described in Section 3. In order to take account of the fact that they are estimated imprecisely we perform systematic sensitivity analysis when doing counterfactual analysis (Hillberry and Hummels, 2013, 1243-4).[29] That is, we repeatedly draw values for these elasticities from normal distributions, with means equal to the point estimates of the elasticities, and standard deviations equal to the standard errors of the coefficients. We are therefore interested in both the point estimates and standard errors of all elasticity estimates in what follows.

5.1 Estimating the σ_g's

Our import data are c.i.f., and valued at world prices inclusive of transport and other trade costs not related to Indian trade policies. We are not interested in

[27] That is to say, we work with a scaled down model of the Indian economy, which captures between 54% and 67% of all imports, excludes the other import sectors, and scales down the size of the domestic economy so as to match the actual baseline openness of the Indian economy in each year.

[28] https://www.globalfinancialdata.com/index.html, accessed June 2013.

[29] Lai and Trefler (2002) use econometric methods to estimate the mean and standard errors of welfare gains associated with trade liberalization.

these costs since we are holding them fixed in our analysis. Following Anderson and Yotov (2016), and Baier, Kerr and Yotov (2018), we should ideally be estimating

$$ln(V^W_{gct}) = ln(M_{gt}) + ln(Y_{gct}) - ln(Y_{gt}) - \sigma_g ln(1 + t_{gct}) - \sigma_g \sum_{i=1}^{n} ln(b_i)\delta_{igct}$$

$$-(1 - \sigma_g)ln(P_{gt}) - (1 - \sigma_g)ln(\Pi_{gct}) + u_{gct} \tag{5}$$

where $V^W_{gct} = p^W_{gct} \times m_{gct}$ is the value, at world prices p^W_{gct}, of imports m_{gct} of good g from country c in year t; M_{gt} is the total imports from all countries of good g in year t; Y_{gct} is the output of good g in country c in year t; Y_{gt} is world output of good g in year t; t_{gct} is the *ad valorem* tariff imposed by India on imports of good g from country c in year t; $b_i - 1$ is the *ad valorem* equivalent of facing non-tariff barrier i; δ_{igct} is an indicator variable taking the value 1 if imports of good g from country c face barrier i in year t, and zero otherwise; P_{gt} is the inward multilateral resistance term for good g in India in year t; Π_{gct} is the outward multilateral resistance term for good g in country c in year t; and u_{gct} is the error term. Ideally we should be estimating σ_g separately for each of our 114 goods g.

There are three practical problems which we face. The first is that we only have import data for India, implying that we cannot include all the desired fixed effects (in particular, those varying by good, country, and year). We therefore incorporate fixed effects which vary by good and year, d_{gt}. These control for M_{gt}, Y_{gt}, and P_{gt} in equation (5). Intuitively, by controlling for the total imports of particular goods in particular years we are focussing on the margin of substitution between different national varieties of the same good, which is what we want to do when estimating the σ_g's. We also include fixed effects which vary by good and country, d_{gc}. By including such variety fixed effects we are ensuring that identification occurs along the time dimension alone, an important consideration given the possibility that some varieties may have faced systematically higher tariffs over time than others. Finally, we include country-specific time trends in all regressions.

Second, we lack data on foreign output of individual goods (Y_{gct}). We therefore include foreign GDP in the regression (i.e. we replace Y_{gct} with GDP_{ct} in equation (5) above). We also control for the bilateral exchange rate, E_{ct}.

Third, we should ideally be estimating σ_g separately for each of our 114 goods g, but we lack the degrees of freedom to do this. We therefore follow de Bromhead et al. (2019) in estimating across nine categories of goods h, assuming a common elasticity σ_h for all goods within a category (i.e. $\sigma_g = \sigma_h \forall g \in h$). The nine categories are grain, animal products, machinery, minerals, textiles, miscellaneous inputs, miscellaneous industry, food oils, and colonial goods.[30]

Our estimating equation is thus:

$$\begin{aligned} ln(V_{gct}^W) = \alpha_h ln(GDP_{ct}) + \beta_h ln(E_{ct}) - \sigma_h ln(1 + t_{gct}) \\ - \sigma_h \sum_{i=1}^{n} ln(b_i)\delta_{igct} + d_{gt} + d_{gc} + d_c \times trend + u_{gct} \end{aligned} \tag{6}$$

where good g is a member of goods category h, and where $d_c \times trend$ represents country-specific time trends. The non-tariff barrier that we consider is the quota on textile imports from Japan, which came into effect in 1934. We also consider three control variables which enter into the econometric specification as if they were non-tariff barriers. These are the League of Nations trade sanctions against Italy which operated from November 1935 to June 1936 (we let a dummy variable be equal to one in 1936 for all imports coming from Italy in that year); the various cartel arrangements of the period involving India or Indian producers; and the boycott of UK cotton cloth which began in 1930. We allow the latter to have a differential impact in 1930 and subsequent years, including two variables in the regression for this purpose. We follow Santos Silva and Tenreyro (2006) and use a PPML estimator to estimate (6). Since we are including both $114 \times 42 = 4,788$ good times country fixed effects, and $114 \times 15 = 1,710$ good times year fixed effects, as well as country-specific time trends, we estimate the equations using the ppmlhdfe estimator available in Stata (Correia et al. 2019a,b).[31]

[30] 'Grain' includes barley, wheat and rice (SITC categories 041-043); 'Animal' includes butter and meat (SITC categories 012 and 023); 'Machinery' includes SITC categories 711, 712, 714-716, and 721; 'Minerals' includes metals, coal and petroleum (SITC categories 311-313, 681, and 682); 'Textiles' includes both yarn and cloth (SITC codes 651-653); 'Miscellaneous inputs' includes such items as fertilisers, rubber, hides and skins, raw cotton and silk, and hair (SITC codes 211, 231, 261-263, 271, and 561); 'Miscellaneous industry' includes vehicles and rubber manufactures, including tyres (SITC codes 629, 713, and 732); 'Food oils' includes oils and oilseeds of various kinds (SITC codes 221 and 412); and 'Colonial' includes coffee, sugar, tea and tobacco (SITC categories 061, 071, 074, and 121).

[31] Our standard errors are clustered by country.

In common with other papers using tariff data to estimate trade elasticities, our estimates suffer from potential endogeneity problems.[32] To some extent these problems are mitigated by our abundant use of fixed effects. These control, among other things, for changes in tariffs on particular goods (d_{gt}), trends in protection targeting particular countries ($d_c \times trend$), and systematically higher tariffs on some varieties than on others (d_{gc}). But while fixed effects can mitigate the problem, we acknowledge that they cannot eliminate it. We did however check whether tariff changes after 1931 were correlated with rising imports in the preceding period, on the basis that if import trends before and after 1931 were correlated this would bias our estimates. There is no evidence that this was a problem: regressing the log change in tariffs between 1931 and 1933 on the log change in imports between 1928 and 1931 yielded a coefficient of just -0.0031 (with a standard error of 0.0018) and an R^2 of 0.005.

Our estimates of equation (6) are given in Table 1. Italian sanctions were extremely effective, and the boycotts lowered imports of British cotton cloth, but we found no effect of cartels on trade flows. The key elasticities are the coefficients on the tariff variable, which are our estimates of the σ_h's. We were unable to estimate these for three commodity categories (grain, animal products, and miscellaneous inputs) for the simple reason that there was no between-country variation in tariff rates for those products (i.e. there was no discrimination involving these goods). For the other six categories the estimates seem sensible: the elasticities range from a minimum of 4.0 (textiles) to a maximum of 23.1 (miscellaneous industry). The coefficients on the quota and tariff variables in column (5) jointly imply (from equation 6) that the quota on Japanese piece goods was equivalent to a 19.1% *ad valorem* tariff.[33] The tariff reduction (from 75% to 50%) on cotton cloth imports agreed under the 1934 Anglo-Japanese trade agreement was thus effectively nullified by the quota.[34][35]

Table 2 compares our Indian trade elasticities with those obtained for the UK by de Bromhead et al. (2019). Consistent with Imbs and Mejean (2017), the Indian elasticities are in general larger (food oils being a striking exception).

[32] See for example the papers listed in the recent Handbook chapter by Caliendo and Parro (2021, p. 22).

[33] Similarly the boycott was equivalent to a 15.6% tariff on British cloth in 1930, and a 23.9% tariff in subsequent years.

[34] Our estimate suggest that taking both tariffs and the quota into account, Japanese cotton cloth exports faced an *ad valorem* tariff equivalent of 78.7%.

[35] The coefficients on GDP are mostly statistically insignificant, and two are negative. GDP is a poor proxy for countries' outputs of particular products given that countries specialize in different goods.

Table 1: PPML gravity estimates by category, 1923-4 to 1937-8

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Narrow category	Grain	Animal	Machinery	Minerals	Textiles	Misc. inputs	Misc. industry	Food oils	Colonial
Log(1 + tariff)			-5.735	-4.306	-4.046		-23.05	-8.583	-5.384
			(1.504)	(1.104)	(0.801)		(4.331)	(3.957)	(3.982)
Quota on Japanese piece goods					-0.707				
					(0.195)				
Cartel				-0.171		-0.262			-0.656
				(0.507)		(1.784)			(0.563)
Italian sanctions			-0.982	-0.942	-0.983	-3.742	-0.630	-2.273	
			(0.0566)	(0.0761)	(0.103)	(0.355)	(0.114)	(0.149)	
1930 cotton cloth boycott					-0.585				
					(0.123)				
1930 cotton cloth boycott LR impact					-0.867				
					(0.178)				
Log(GDP)	4.129	-0.242	0.871	0.225	0.662	0.221	0.933	-2.076	4.082
	(4.202)	(0.873)	(0.341)	(0.483)	(0.649)	(0.820)	(0.520)	(1.498)	(1.528)
Log(exchange rate)	5.342	0.730	0.0986	0.0260	0.779	-0.274	-0.0994	1.048	-0.0363
	(2.742)	(0.695)	(0.0576)	(0.125)	(0.355)	(0.899)	(0.538)	(0.488)	(0.237)
Constant	-27.60	-1.151	-11.26	-4.230	-6.497	-5.319	-8.241	15.87	-38.05
	(42.25)	(9.210)	(3.936)	(5.165)	(7.327)	(9.508)	(6.414)	(13.02)	(15.26)
Observations	383	390	5,880	5,385	5,208	1,880	915	512	1,206

Note: Dependent variable is the value of imports by good, country, and year. Estimates control for good*country and good*year fixed effects, and for country-specific time trends. Estimates computed using ppmlhdfe. Robust standard errors clustered by country in parentheses.

Table 2: Indian versus UK trade elasticities

Narrow category	Grain	Animal	Machinery	Minerals	Textiles	Misc. inputs	Misc. industry	Food oils	Colonial
India			-5.735	-4.306	-4.046		-23.05	-8.583	-5.384
			(1.504)	(1.104)	(0.801)		(4.331)	(3.957)	(3.982)
UK	-9.567	-3.908	-4.533	-2.477	-1.861	-4.905	-7.995	-23.47	-1.468
	(4.829)	(1.489)	(1.951)	(0.743)	(3.350)	(2.787)	(2.509)	(3.098)	(0.533)

Source: Table 1 and de Bromhead et al. (2019), Table 2, p. 343. Robust standard errors clustered by country in parentheses.

For the three categories for which we were unable to calculate Indian elasticities (grain, animal products and miscellaneous inputs) we used the British estimates in our counterfactual analysis. This should not matter for the results: the σ_h's matter when calculating the impact of tariff discrimination, but there was no discrimination for these three categories of goods which is why we could not calculate the elasticities in the first place. We also calculated the σ_h's using OLS rather than PPML, and Online Appendix 4 shows that while this mattered for the values of individual elasticities (particularly machinery and minerals), estimating the elasticities using OLS had virtually no impact on the counterfactual results reported in Section 6.

5.2 Choosing values for γ

We would have liked to estimate γ. This would have involved estimating equation (6) for all nine categories of goods and extracting the goods times country (variety) fixed effects, as in Ottaviano and Peri (2012). Since we are unable to estimate equation (6) for three categories of goods, where there was no cross-country variation in tariffs, we cannot implement this procedure. We therefore assume that γ, the mid-level elasticity of substitution between different Armington aggregates of imported goods, is equal to 1, but in Online Appendix 4 we show that our results would be essentially unchanged if we let γ be equal to either 0.5 or 2.

5.3 Estimating κ

Similarly, we were unable to estimate κ, the upper level elasticity of substitution between imports and domestic expenditure, using the methods of Ottaviano and Peri (2012), and this for the same reason as above. We therefore ran the OLS regression

$$ln(m_t) = -\kappa ln(1 + t_t) + u_t \tag{7}$$

where m_t is the value of imports in year t expressed as a share of total private expenditure on both domestic and imported goods, u_t is the error term, and t_t is the unweighted average tariff estimated for our sample of goods. The method produced an estimate of κ of 1.073, with a standard error of 0.376.[36]

[36]Total private expenditure on domestic goods was calculated by multiplying GDP by the ratio of gross output to GDP at factor cost in 1951-2, and then subtracting the value of total

5.4 Choosing values for η

Finally, we need to choose values for η, the supply-side elasticity of transformation between domestic output and exports. Here we proceed as in de Bromhead et al. (2019): we use the fact that $\eta = \varepsilon_S/(1-\alpha^X)$, where $\alpha^X = 1-\alpha^D$ is the share of exports in total production, and assume (based on Tokarick 2014) that the log of ε_S is normally distributed, with mean 0.403 and standard deviation 0.468.

6 Counterfactual results

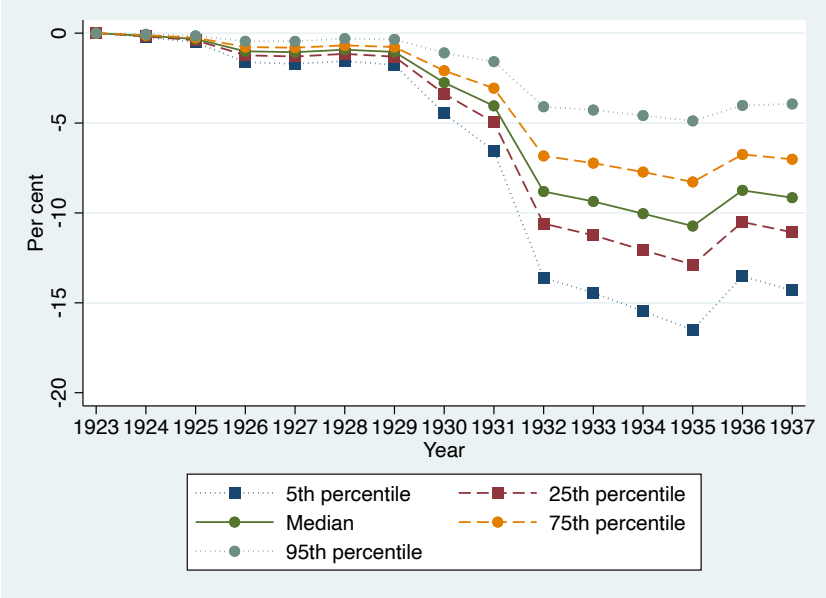
In this section we explore the impact of the changes in Indian trade policy following the establishment of the Tariff Board on the recommendation of the Indian Fiscal Commission. Since the first tariffs recommended by the Board came into effect in 1924, we focus on the impact of trade policy changes from that year onwards. To this end we first embed the elasticities described in the previous section into the model outlined in Section 3. We then solve the model for each fiscal year from 1923-4 to 1937-8 inclusive, using the tariffs and quotas that were actually in place in every year. Finally, we solve the model for each year, assuming counterfactually that trade policy was identical to what it was in 1923 throughout (that is, that *ad valorem* tariffs in each year were the same as in 1923, and that no quotas were in place).[37] By comparing these counterfactual, constant-policy equilibria with the actual equilibria we can infer the impact on trade flows of the shifts in trade policy that took place after 1923. We repeat this procedure 1000 times, each time drawing new elasticity values from normal distributions whose means and standard errors were decribed in the previous section.[38] The result is 1000 estimates of the impact of trade policy on trade flows for each year, allowing us not only to calculate the impact of policy, but to assess how tightly estimated that impact is.

exports (both government and private). Gross output was taken to be equal to GDP at factor cost plus total material inputs into all sectors. The 1951-2 input-output data are taken from Ramana (1969, pp. 46-7). Sources for interwar GDP are as given in Section 4.3 of the text. The aggregate Indian trade data are taken from the Annual Statement of the Sea-Borne Trade of British India.

[37] Because we are only interested in the impact of trade policy, we assume that the 1930 boycott and Italian sanctions campaign would still have taken place, and that existing cartels would have remained in place unchanged.

[38] In the case of η we draw 1000 replications of the log of ε_S and calculate η using the formula in Section 5.2.

Figure 5: Percentage impact of post-1923 shift in protection on total Indian imports



6.1 The impact of trade policy on the total value of imports

We begin with the impact of tariffs and quotas on the total value of Indian imports. Figure 5 plots the percentage impact on imports from 1923 to 1937. In each case the figure shows the percentage by which actual imports differed from what they would have been, had trade policies remained fixed at their 1923 level. It plots not only the median estimated impact across all 1000 repetitions for each year, but the 5th, 25th, 75th, and 95th percentile impacts also. In this manner it indicates how sensitive our results are to the fact that our elasticities are imprecisely estimated.

As can be seen from Figure 5, by the 1930s protectionism was lowering Indian imports by roughly 10% on average, although the effect is imprecisely estimated (mostly reflecting the imprecision with which we estimated κ). The median estimate for 1934 was 10%, while the 25th and 75th percentile impacts were 7.7 and 12.1% respectively.[39] The value of Indian private imports fell by

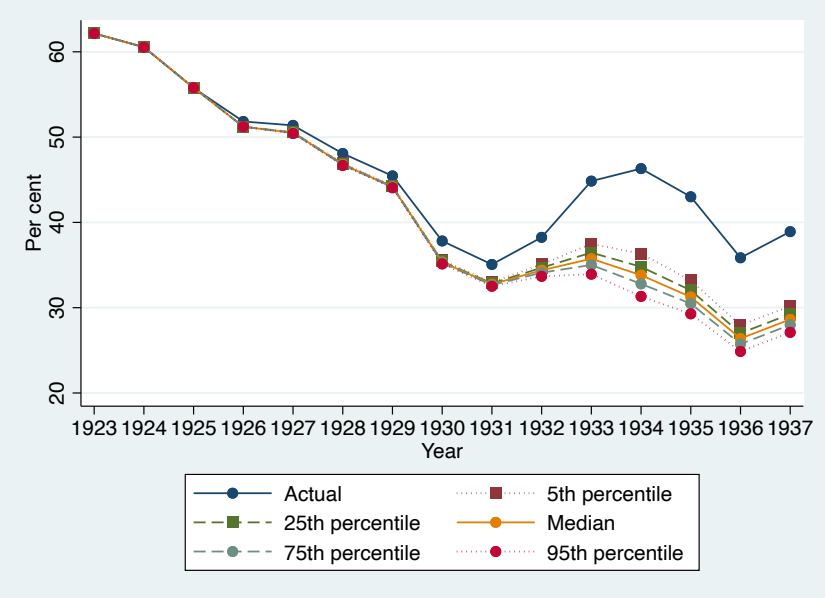
[39]The 5th and 95th percentile impacts were 4.6 and 15.5% respectively. The gap between these upper and lower bound estimates depends not just on the standard error of the elasticity

42% between 1923 and 1934, so our median results indicate that protection accounted for about a quarter of that decline. India was a developing economy and a colony, very different from the rich industrial economies that have been the focus of previous analysis. It is striking therefore that the results are so similar to those obtained by Irwin (1998) for the United States, and de Bromhead et al. (2019) for the UK.

6.2 The impact of trade policy on the share of Indian imports coming from the UK

The previous subsection showed that protection lowered Indian imports during the 1920s and 1930s. But tariffs did not just increase during this period, they did so in a discriminatory fashion. Not only did UK exports face lower tariffs than non-British countries, but Japanese textile producers were subjected to quantitative restrictions from 1934 onwards. What was the impact of trade discrimination on the UK's share of Indian imports?

Figure 6: Percentage impact of post-1923 shift in protection on the UK share of Indian imports



estimates, but on the size of the shock being imposed on the model, which is why the gap is so much smaller before 1930.

Figure 6 plots the UK's actual share of Indian imports between 1923 and 1937, as well as the counterfactual share that it would have enjoyed had Indian protection remained at its 1923 level. Once again the figure plots not only the median counterfactual share for each year, calculated across the 1000 replications, but the 5th, 25th, 75th, and 95th percentile impacts also. As can be seen, the actual and counterfactual shares remain fairly close until 1931 but diverge sharply thereafter. In 1934, to take the same example as in the previous subsection, the UK accounted for 46.3% of Indian imports. However, if protection had remained at its 1923 level, the UK would only have accounted for 33.8% according to our median estimate. Reflecting the fact that the σ_g's, which are what really matter for the UK share, are relatively precisely estimated, our estimates of the counterfactual UK share do not vary greatly across replications. The 25th and 75th percentile counterfactual shares are 34.8 and 32.8% respectively, while the 5th and 95th percentile estimates are 36.3 and 31.3% respectively. By the mid-1930s protection was boosting the UK share of Indian imports by more than ten percentage points, or by more than a third. This is a large effect.

6.3 The impact of trade policy on the value of UK exports to India

Indian protection increased the UK's share of a shrinking pie. What was the net impact on total British exports to India? Figure 7 plots the percentage impact of the post-1923 shift in Indian protection on UK exports to India. As can be seen, the fact that UK exporters to India faced higher tariffs was less important than the fact that foreign exporters faced even higher levels of protection. The net impact on total UK exports to India was strongly positive. Our median estimate suggests that Indian protection boosted UK exports to that country by 23.2% in 1934, a substantial effect, with 25th and 75th percentile estimates of 18.8 and 28.2% respectively.[40] This positive impact reflects the fact that different national varieties of similar goods were highly substitutable for each other (Table 1), which more than compensated British exporters for the decline in total Indian imports.

Far from hurting the UK textile industry, Indian protection greatly benefited it (Figure 8). Our median estimate suggests that total UK exports of cotton cloth were 55.1% higher in 1934 than they would have been if protection had remained at its 1923 level (with 25th and 75th percentile estimates of 40.3 and

[40] The 5th and 95th percentile impacts were 12.3 and 35.5% respectively.

Figure 7: Percentage impact of post-1923 shift in protection on total UK exports to India

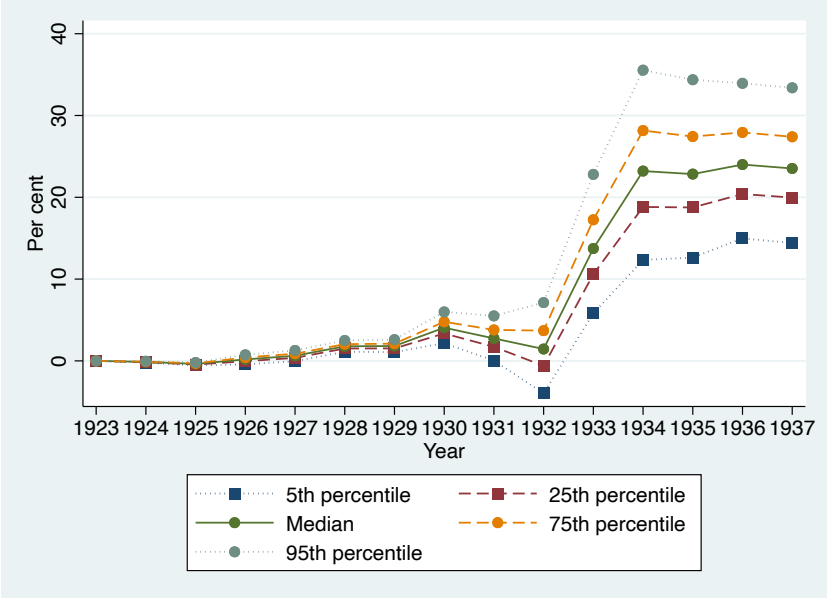


Figure 8: Percentage impact of post-1923 shift in protection on total UK cotton cloth exports to India

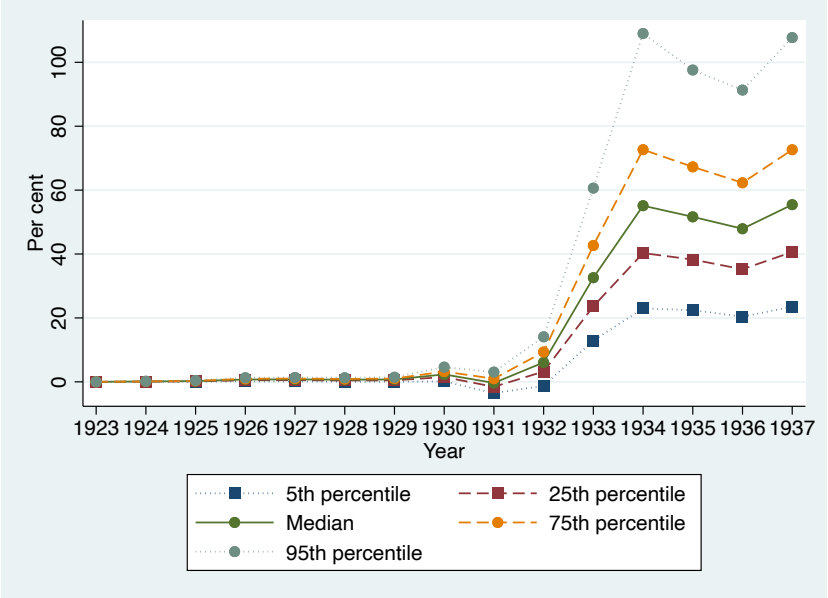
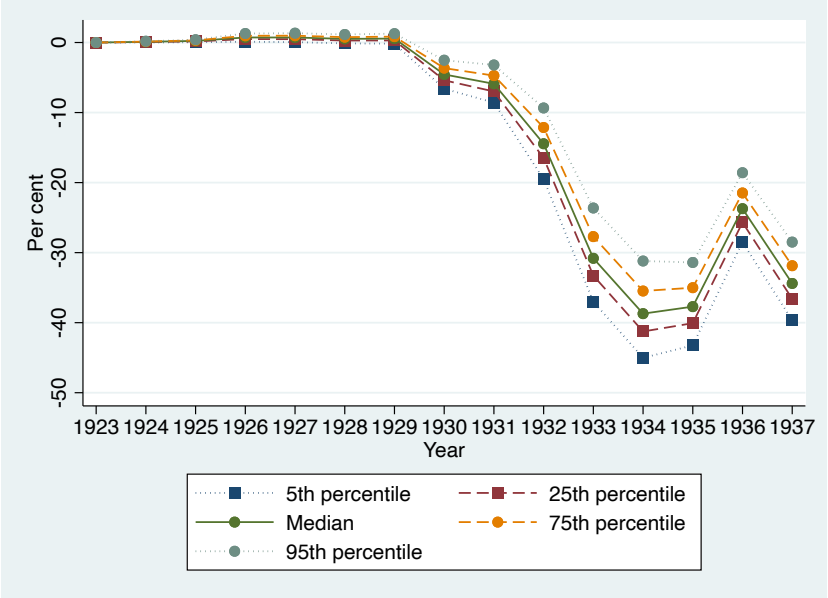


Figure 9: Percentage impact of post-1923 shift in protection on total Japanese exports to India



72.7% respectively).[41]

India was an important market for the UK: in 1934 it took over 9% of total UK exports, and 20% of its cotton cloth exports.[42] Our estimated impacts are thus equivalent to 2% of total UK exports, and to more than 10% of total UK cotton textile exports. Whether or not the Indian fiscal autonomy convention was a "self-denying ordinance" from the British point of view, Indian trade policy in the 1930s was highly beneficial to the imperial power.

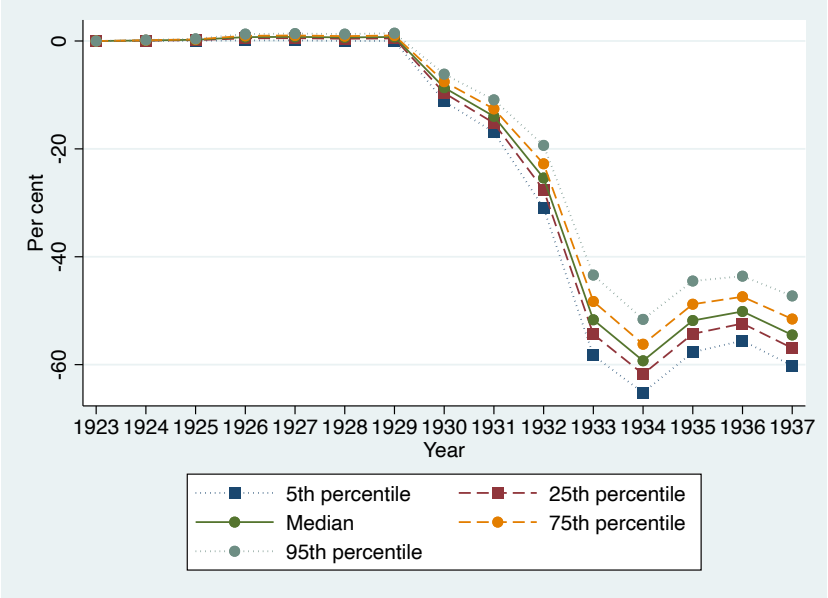
6.4 Impact on Japan

Indian protection lowered imports, by a little more than 10% according to our median estimates, but Lancashire seems to have substantially benefited. The big losers were those countries outside the British Empire that now faced discrimination, such as Japan. Figure 9 plots the impact of Indian protection on aggregate Japanese exports to that country. Our median estimates suggest that

[41] The 5th and 95th percentile impacts are 23 and 109% respectively.

[42] Statistical Office of the Customs and Excise Department (United Kingdom) (1937, pp. 175-177) (totals); U.K. Parliamentary Papers (1934-35, pp. 830-831) (cottons).

Figure 10: Percentage impact of post-1923 shift in protection on total Japanese cotton cloth exports to India



protection lowered total Japanese exports to India in 1934 by 38.7%. The impact is relatively precisely estimated.[43] Figure 10 plots the impact on Japanese cotton cloth exports: in 1934 protection was reducing these by a median of 59.3%.[44]

These were very substantial effects, large enough to have a noticeable impact on total Japanese exports. India accounted for almost 11% of total Japanese exports in 1934, and for almost 14% of its cotton textile exports.[45] Our estimated impacts are thus equivalent to 4% of total Japanese exports, and over 8% of total Japanese cotton cloth exports.

7 Conclusion

It seems as though Indian nationalists were right, and that those British historians who bemoaned the impact of interwar Indian protection on the UK were

[43] The 5th, 25th, 75th and 95th percentile estimates are 31.2, 35.5, 41.3 and 45% respectively.

[44] The 5th, 25th, 75th and 95th percentile estimates are 51.6, 56.2, 61.7 and 65.2% respectively.

[45] Department of Finance (Japan) (1935, pp. 111-156 (cotton piece goods), 396 (total exports)).

wrong. Partial equilibrium analysis may suggest that Indian protection must have lowered UK exports to that country, but this ignores the fact that Indian protection was discriminatory, and that elasticities of substitution between UK and non-British varieties of the same goods were high. Far from hurting the UK, Indian protection during this period substantially helped it: granting India fiscal autonomy did not imply the delibrate surrender of a key British export market.

Most existing studies have found that the protection of the 1930s had only modest effects on the volume and geographical composition of international trade. This study reaches a very different conclusion. To be sure, protection only explains a quarter of the Indian trade collapse, but discriminatory trade policy had a large impact on the composition of India's imports, and on different countries' exports to that market. This in turn played an important role in exacerbating the geopolitical tensions of the time. In particular, given our results it is hardly surprising that Indian protectionism was a major additional irritant in Anglo-Japanese diplomatic relations, at a time when international tensions were rising anyway (Osamu, 2000).

We hope that we have demonstrated the usefulness of general equilibrium approaches using high-resolution historical data. Using a large new dataset on both trade and trade policy we have found that trade elasticities in a large, developing country, India, were generally larger than in the United Kingdom at the same time. Our findings stand in direct contrast both to the conclusions of contemporary British observers, and to more recent empirical findings from partial equilibrium analysis. Discriminatory trade policy in the 1930s had a substantial impact on the size and composition of trade flows.

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Online-only Appendices

Appendix 1. Commodity classification

The data collection process initially involved collecting information on the 202 individual items falling within 35 3- digit SITC categories over the period 1923/24- 1937/38. However, a number of series which existed in the first year of the sample were discontinued or reclassified in subsequent years. Likewise, new categories were created over time, as imports of particular products were reported in a more disaggregated fashion. Consequently, not all series were consistently observed over the entire sample period.

Our aim was to create the most disaggregated dataset possible, given the changing classifications in the data. This required tracking these changing classifications over time, and figuring out the minimum level of aggregation required to produce series for categories of goods that were consistently defined over time. This had to be done manually rather than algorithmically, in the sense that the classifications in every year had to be read by us, and decisions about aggregation made on that basis.

For example, one of our 114 goods is "Refined Sugar", which is a fairly broad category. Imports of different types of refined sugar were reported over the course of the fourteen years in our sample. For example, "Sugar below 23 Dutch Standard but not below 16 Dutch Standard" and "Sugar, 23 Dutch Standard and above" were reported as separate categories during 1930/31- 1937/38 and we would have preferred to work with these as separate categories in our analysis. However, this was not possible since from 1923/24- 1929/1930 these two categories were included in a broader category titled, "Sugar, 16 Dutch Standard and above". We therefore had to aggregate the imports of all refined sugar items from each country in each year, creating a new good classification "Refined Sugar". Imports of this expanded category could be measured consistently over time, whereas imports of "Sugar below 23 Dutch Standard but not below 16 Dutch Standard" and "Sugar, 23 Dutch Standard and above" could not.

We went through a similar procedure for each of the 202 individual items in our sample. For some items no aggregation was necessary as the items were consistently reported across the sample period at the 202- level (for example, "Wool, raw"). For other series the fact that the classification changed regularly meant that the only way to ensure a consistent series was to aggregate a large number of items. For example, the 16 separate items covering machinery

and millwork (excluding prime movers or electrical machinery) over the sample period, had to be aggregated up to one series "Machinery and Mill-work. Machinery, not being prime movers or electrical machinery" (good 716001 in our dataset). Since we were aggregating import values rather than quantities, there was no problem regarding different units. Finally, to generate a tariff rate for each of our 114 goods we calculated an unweighted average of the tariff rates of each of the constituent series.

Table 3 lists the top 10 goods by import value in 1923/24, 1930/31 and 1937/38. As can be seen the lists are dominated by cotton manufactures and machinery.

Each of our 114 goods g falls into one of the 35 SITC categories s which we started with when constructing the dataset. We are using the original Standard International Trade Classification, based on Statistical Office of the United Nations (1951; 1953), since this is more appropriate for this period than more recent revisions. On average there are 3.25 goods per SITC category, but the range is relatively wide (standard deviation of 3.76 goods and a maximum of 13 goods per SITC category). For example, "Iron or steel, Sheets and plates" is included with 12 other goods in SITC 681, "Iron or steel". The good "Grain, wheat" is the only good in SITC 041. Of the 35 3- digit SITC categories in our dataset, 20 contain one good, 9 contain between 2 to 6 goods and 6 contain more than 6 goods. Table 4 lists the top 10 3- digit SITC categories in our sample by import value.

Out of these 34 SITC groups we construct 9 narrow categories which are used when estimating the σ_h's. 'Grain' includes barley, maize, wheat and rice (SITC categories 041–044); 'Animal' includes butter, eggs and meat (SITC categories 011, 012, 023, and 025); 'Machinery' includes SITC categories 711, 712, 714-716, and 721; 'Minerals' includes metals, coal and petroleum (SITC categories 311–313, 681, and 682); 'Textiles' includes both yarn and cloth (SITC codes 651–653); 'Miscellaneous inputs' includes such items as fertilisers, rubber, hides and skins, raw cotton and silk, and hair (SITC codes 211, 231, 261–263, 271, and 561); 'Miscellaneous industry' includes vehicles and rubber manufactures, including tyres (SITC codes 629, 713, and 732); 'Food oils' includes oils and oilseeds of various kinds (SITC codes 221 and 412); and 'Colonial' includes coffee, sugar, tea and tobacco (SITC categories 061, 071, 074, and 121).

The maximum number of goods g per narrow category is 29 (for machinery) while the minimum is 2 for animal (just bacon and hams and butter). Full

Table 3: Top 10 goods by import value, 1923/4-1937-8

Rank	Name of good	Import value (£)
	1923-4	
1	Textiles. Cotton. Manufactures. Piecegoods. Grey unbleached	230495305
2	Textiles. Cotton. Manufactures. Piecegoods. Total of White (bleached)	154280628
3	Machinery and Mill-work. Machinery, not being prime movers or electrical machinery.	136491138
4	Refined Sugar	135495900
5	Iron or steel. Sheets and plates	87694242
6	Textiles. Cotton. Manufactures. Piecegoods. Printed	81006827
7	Cotton. Twist and Yarn	79256805
8	Textiles. Cotton. Manufactures. Piecegoods. Dyed Goods	61138025
9	Kerosene	44163650
10	Textiles. Cotton. Manufactures. Piecegoods. Woven coloured	34230453
	1930-31	
1	Refined Sugar	95032489
2	Machinery and Mill-work. Machinery, not being prime movers or electrical machinery.	80233630
3	Textiles. Cotton. Manufactures. Piecegoods. Grey unbleached	68664068
4	Textiles. Cotton. Manufactures. Piecegoods. Total of White (bleached)	61996389
5	Motor vehicles and parts thereof	49683956
6	Kerosene	46932916
7	Iron or steel. Sheets and plates	39689845
8	Cotton, raw	33503168
9	Cotton. Twist and Yarn	30836081
10	Textiles. Artificial Silk	30387577
	1937-38	
1	Machinery and Mill-work. Machinery, not being prime movers or electrical machinery.	123184373
2	Cotton. Twist and Yarn	96073065
3	Cotton, raw	70907830
4	Motor vehicles and parts thereof	61566381
5	Textiles. Cotton. Manufactures. Piecegoods. Total of White (bleached)	48541354
6	Textiles. Cotton. Manufactures. Piecegoods. Printed	32033391
7	Textiles. Cotton. Manufactures. Piecegoods. Dyed Goods	27978136
8	Electrical Machinery	27954546
9	Textiles. Artificial Silk	23650060
10	Artificial Silk Yarn	22693186

Table 4: Top 10 SITC categories by import value, 1923-4-1937/8

Rank	SITC	Import value (£)
	1923-4	
1	652	568161581
2	681	177780906
3	061	151451626
4	716	139220374
5	651	98071503
6	313	84368595
7	653	56580281
8	721	43683788
9	682	41943173
10	732	27873604
	1930-31	
1	652	200908781
2	061	108654772
3	681	96611826
4	313	90364540
5	716	82501535
6	653	59425682
7	651	52937582
8	721	50090473
9	732	49683956
10	263	33504005
	1937-38	
1	652	138342580
2	651	137820965
3	716	126515086
4	681	75158202
5	263	70907830
6	721	68930479
7	313	62189296
8	732	61566381
9	653	50808510
10	711	25993929

details of the classification of each item in our sample can be found in Appendix Table 1, available at https://cepr.org/content/trade-depression.

Table 5 presents an extract from Appendix Table 1, which lays out the structure of the data as originally collected, and details how it was aggregated. We take the example of the 3-digit SITC category 682, "Copper". In the first column we list the individual items as they were reported in the trade statistics (i.e. at the 202 level of disaggregation), such as "Metals and Ores. Copper. Unwrought. Tiles, ingots, cakes, bricks and slabs". The ID 682-009 is the one used for this item in our original dataset. The second column lists the name of the item as reported in the trade statistics. The third column shows a numerical ID for the good g to which the item in question belongs, in this instance "Copper. Unwrought" (given in the fourth column). There are 114 of these goods. The fifth column lists the 3-digit SITC code s to which the item and good in question belong (in this case 682). The seventh column lists the narrow category h to which the item, good, and SITC code belong (in this case 4, minerals: the narrow categories are listed from 1–9 in the same order as they appear in the regression tables).

Table 5: Extract from Appendix Table 1

ID	Full Name Item	Good Dataset ID	Good	SITC 3-digit	Narrow category
682-001	Implements, apparatus and appliances, and parts thereof. Electrical, including telegraph and telephone apparatus, not being machinery. Bare copper wire (electrolytic), other than telegraph and telephone wires	682001	Bare copper wire (electrolytic), other than telegraph and telephone wires	682	4
682-002	Metals and Ores. Brass, bronze, and similar alloys and manufactures thereof. Unwrought	682002	Brass, bronze and similar alloys and manufactures thereof	682	4
682-003	Metals and Ores. Brass, bronze, and similar alloys and manufactures thereof. Wrought.Mixed or yellow metal for sheathing	682002	Brass, bronze and similar alloys and manufactures thereof	682	4
682-004	Metals and Ores. Brass, bronze, and similar alloys and manufactures thereof. Wrought. Rods	682002	Brass, bronze and similar alloys and manufactures thereof	682	4
682-005	Metals and Ores. Brass, bronze, and similar alloys and manufactures thereof. Wrought. Sheets	682002	Brass, bronze and similar alloys and manufactures thereof	682	4
682-006	Metals and Ores. Brass, bronze, and similar alloys and manufactures thereof. Wrought. Tubes	682002	Brass, bronze and similar alloys and manufactures thereof	682	4
682-007	Metals and Ores. Brass, bronze, and similar alloys and manufactures thereof. Wrought. Wire	682002	Brass, bronze and similar alloys and manufactures thereof	682	4
682-008	Metals and Ores. Brass, bronze, and similar alloys and manufactures thereof. Wrought. Other sorts	682002	Brass, bronze and similar alloys and manufactures thereof	682	4
682-009	Metals and Ores. Copper. Unwrought. Tiles, ingots, cakes, bricks and slabs	682003	Copper. Unwrought	682	4
682-010	Metals and Ores. Copper. Unwrought. Other sorts	682003	Copper. Unwrought	682	4
682-011	Metals and Ores. Copper. Wrought. Braziers and sheets	682004	Copper. Wrought	682	4
682-012	Metals and Ores. Copper. Wrought. Braziers	682004	Copper. Wrought	682	4
682-013	Metals and Ores. Copper. Wrought. Rods	682004	Copper. Wrought	682	4
682-014	Metals and Ores. Copper. Wrought. Sheets	682004	Copper. Wrought	682	4
682-015	Metals and Ores. Copper. Wrought. Tubes	682004	Copper. Wrought	682	4
682-016	Metals and Ores. Copper. Wrought. Wire excluding telegraphic and telephonic wire	682004	Copper. Wrought	682	4
682-017	Metals and Ores. Copper. Wrought. Other manufactures	682004	Copper. Wrought	682	4

Online Appendix 2. List of countries used in the analysis

Table 6 provides a list of the 42 countries used in our analysis and indicates how they were described in the original sources. In some cases, we had to type in data for several regions to calculate the data for one country. In the case of Spain, we summed over Canary Isles and Spain; in the case of British Malaya, we summed over the Federated Malay States, British Borneo and the Straits Settlements; and in the case of Dutch East India we summed over Sumatra, Dutch Borneo, and Celebes and Other Islands.

Table 6: Countries in dataset

Countries in dataset	As described in original sources
Algeria	Algeria
Argentina	Argentine Republic (including Atlantic Coast of Patagonia)
Australia	Australian Commonwealth
Austria	Austria
Belgium	Belgium
Brazil	Brazil
British Malaya (all federated and non federated)	Federated Malay States; British Borneo; Straits Settlements (incl. Labuan)
British West Indies (Bermudas, Barbados, Jamaica, Trinidad/ Tobago, Others)	Bermudas; British West India Islands
Canada	Canada - Atlantic and Pacific Coast
Chile (including Pacific Coast of Patagonia)	Chile (including Pacific Coast of Patagonia)
China (exclusive of Hong Kong and Macau)	China (exclusive of Hong Kong and Macau)
Colombia	Colombia
Cuba	Cuba
Czechoslovakia	Czechoslovakia
Denmark	Denmark
Dutch East India	Java; Sumatra; Celebes and other Islands; Borneo (Dutch);
Dutch West Indies	Dutch West Indies
Egypt	Egypt; Anglo-Egyptian Sudan
France	France
Germany	Germany
Hong Kong	Hong Kong
Hungary	Hungary
Italy	Italy; Fiume
Japan	Japan; Formosa
Luxemburg	Luxemburg
Mexico	Mexico
Netherlands	Netherlands
New Zealand	New Zealand (including Nauru and British Samoa)
Norway	Norway
Persia	Persia; Henjam Island
Poland (including Dantzig)	Poland (including Dantzig)
Roumania	Roumania
Russia	Armenia; Russia - Northern; Russia - Southern; Georgia; Russia - Pacific Ports in Asia
Spain	Spain; Canary Islands
Sweden	Sweden
Switzerland	Switzerland
Turkey, European and Asiatic	Turkey. European and Asiatic
Union of South Africa (incl. South West Africa)	Cape of Good Hope; Transvaal; Natal; Protectorate of South-West Africa;
United Kingdom	Channel Islands; United Kingdom
United States of America	United States of America - Pacific Coast; United States of America - Atlantic Coast
Venezuela	Venezuela
Yugoslavia	Serb-Croat Slovene State (Jugoslavia)

Online Appendix 3. Non-tariff barriers to trade, boycotts and cartels

Table 7 lists the commodities in our dataset that were affected by the voluntary export restraint on Japanese piece goods that came into effect in 1934. The "quota" dummy variable in the regressions reported in Table 1 takes the value 1 for the goods and years indicated in the table (for Japan only).

Table 7: Non-tariff barriers to trade

Commodity	Description of commodity	Years
652002	Textiles. Cotton. Manufactures. Piecegoods. Grey unbleached	1934-
652003	Textiles. Cotton. Manufactures. Piecegoods. Total of White (bleached)	1934-
652004	Textiles. Cotton. Manufactures. Piecegoods. Printed	1934-
652005	Textiles. Cotton. Manufactures. Piecegoods. Dyed Goods	1934-
652006	Textiles. Cotton. Manufactures. Piecegoods. Woven coloured	1934-
652007	Textiles. Cotton. Manufactures. Piecegoods. Fents of all descriptions |	1937-

Source: U.K. Parliamentary Papers (1933-34, pp. 471-478, especially Protocol, Article 7, p. 477); U.K. Parliamentary Papers (1937-38, pp. 397-403, especially Protocol, Article 8, p. 401).
Note: good 652001 is cotton canvas, and is not mentioned in the aforementioned sources.

What about the boycotts? Brown (1977, p. 129) argues that the 1930-31 "piece-goods trade boycott clearly had a marked effect since the decline in imports was greater than that of other commodities and affected British goods more than those from other countries". Chatterji (1992, pp. 164-5) argues that while it is difficult to disentangle the impact of boycotts from all the other factors influencing Indian imports during the period, boycotts were a "factor working against Lancashire during the inter-War years". He quotes British officials who in 1932 were of the opinion that the boycott had had "very considerable effects" on British cotton sales, which had slumped more than imports in general; a particular worry was that boycotts might have permanent effects, by shifting tastes towards locally produced cloth.

Table 8 codes the boycotts of UK cotton cloth in the short run (1930) and long run (1931 and subsequently). In all cases the "cotton cloth boycott" dummy variables in the regressions reported in Table 1 take the value 1 for the goods and years mentioned (for the U.K. only).

Table 8: Boycotts

Goods	Name	Years (1930)	Year ("Long run")
652001	Cotton. Manufactures. Canvas	1930	1931-
652002	Textiles. Cotton. Manufactures. Piecegoods. Grey unbleached	1930	1931-
652003	Textiles. Cotton. Manufactures. Piecegoods. Total of White (bleached)	1930	1931-
652004	Textiles. Cotton. Manufactures. Piecegoods. Printed	1930	1931-
652005	Textiles. Cotton. Manufactures. Piecegoods. Dyed Goods	1930	1931-
652006	Textiles. Cotton. Manufactures. Piecegoods. Woven coloured	1930	1931-
652007	Textiles. Cotton. Manufactures. Piecegoods. Fents of all descriptions	1930	1931-

Sources: Brown (1977), pp. 127-129, 186, 283; Chatterji (1992, 164-5); Wolcott (1991).

In addition to trade policy, Indian industries were also involved in a number of cartels which may have influenced trade flows during this period. Indian producers joined an international tea agreement in 1930. This was not renewed in 1931 and 1932, but from 1933 up to the Second World War it attempted to freeze the market share of the three participating countries, India, Ceylon and the Dutch East Indies (Gupta, 2001; Suslow, 2005). The tea agreements seem to have been moderately successful in 1930 in slowing the decline in tea prices, and to have stabilized and reflated tea prices after 1933, a period when prices for similar goods such as cocoa and coffee continued to fall (Gupta, 2001; Rowe, 1965, pp. 90, 148-51). Since the agreement mostly affected Indian producers and exporters of tea, its effect on tea imports remains unclear in the literature. The International Rubber Regulation Agreement of 1934 only came into force as international recovery after the Great Depression was already underway, and India was a fairly minor player in this market in comparison to Malaya, the Dutch East Indies, Ceylon and Indochina (Rowe, 1965, pp. 90, 152-4), so the consequences of the export quotas agreed upon by the contracting parties on the structure of Indian imports remains unclear as well. India was also probably affected by the Achnacarry and subsequent agreements in the petroleum industry (United States Congress, Senate, 1952), as well as by the Chadbourne sugar agreement, which India joined together with the UK in late 1937 (Dye and Sicotte, 2006).

Table 9 below provides data on how these cartels were coded in our dataset. International producer cartels in which British India was a member were coded from Suslow (2005, Appendix 1). This was supplemented by information on primary goods, and especially international sugar cartels, in Dye and Sicotte (2006), US Secretary of Agriculture (1933), and Rowe (1965), and by information on the Achnacarry and subsequent agreements in the petroleum industry, in United States Congress, Senate (1952). We only include formal cartel agreements concluded by British India domestic producers, trade organizations, or the government. Cartels have to be in force at least 6 month in the corresponding year to be coded as dummy=1. Only cartel members included in our country sample are mentioned in the table.

Table 9: Cartels

Cartel	Goods	Name	Countries	Years
Rubber (crude)	231001	Rubber, raw	British Malaya (all federated and non federated); Dutch East India	1934-
Tea (1)	74001	Tea	Dutch East India	1930
Tea (2)	74001	Tea	Dutch East India	1933-
International Agreement Regarding the Regulation of Production and Marketing of Sugar (Chadbourne)	61001	Refined Sugar	Austria, Belgium, Brazil, China (excl. Hong Kong, Macao, Kwantung), Cuba, Czechoslovakia, Dutch East India, France, Germany, Hungary, Poland (incl. Dantzig), Russia, Union of South Africa (incl. South West Africa), United Kingdom, United States of America, Yugoslavia	1938
	61002	Beet Sugar		
	61003	Unrefined Sugar		
	61004	Molasses		
International Petroleum Cartel (Achnacarry)	312001	Crude Petroleum	All except Russia (Soviet Union)	1929-
	313001	Fuel Oils		
	313002	Kerosene		
	313003	Lubricating Oils		
	313004	Refined Petroleum. Other sorts		
	313005	Paraffin Wax		
	313006	Pitch and Tar		

Sources: Suslow (2005); Dye and Sicotte (2006); US Secretary of Agriculture (1933); United States, Senate (1952); Rowe (1965).

Online Appendix 4. Robustness

Alternative estimates of the σ_g's

Table 10 presents alternative estimates of the σ_g's. The first row reproduces the baseline results from Table 1. These regressions were estimated using PPML, and used calendar year tariffs. The second row uses fiscal year tariffs. The third and fourth rows repeat the exercise using OLS instead of PPML.

As can be seen, replacing calendar with fiscal year tariffs makes relatively little difference. However, using OLS significantly reduces the elasticities for machinery and minerals (the latter now has the wrong sign, though it is statistically insignificant) and increases the elasticity for miscellaneous industry.

What really matters, however, is the impact of changing these elasticities on our results regarding trade flows. We therefore re-ran our simulations using six sets of elasticities. These are: the benchmark elasticities used in the body of the paper; the three other sets of elasticities in Table 10;[46] the benchmark elasticities, but with the value of γ lowered from its benchmark value of 1 to 0.5; and the benchmark elasticities, but with γ raised to 2.

Figure 11 shows the estimated impact of post-1923 protection on aggregate trade flows (India's total imports, and the UK's and Japan's aggregate exports to that country) under each of these six elasticity scenarios. As can be seen, our results are not particularly sensitive to the elasticities used, except insofar as total UK exports are concerned. Depending on the elasticities , the impact could have been 4-5 percentage points lower than under the benchmark scenario, or roughly 10 percentage points higher. Figure 12 performs the same exercise for UK and Japanese exports of cotton cloth to India. Once again the Japanese results are relatively insensitive to the elasticities used, and the UK results more so. In all cases, however, the estimated impact of protection on trade flows is very large, and our qualitative results survive.

[46] The incorrectly signed minerals elasticities in Table 10 are simply set equal to zero.

Table 10: Alternative estimates of the σ_g's

Narrow category	Machinery	Minerals	Textiles	Misc. industry	Food oils	Colonial
PPML, calendar year tariffs	-5.735	-4.306	-4.046	-23.05	-8.583	-5.384
	(1.504)	(1.104)	(0.801)	(4.331)	(3.957)	(3.982)
PPML, fiscal year tariffs	-5.970	-5.740	-4.897	-29.09	-11.43	-4.770
	(1.803)	(1.862)	(0.835)	(5.675)	(4.355)	(3.987)
OLS, calendar year tariffs	-1.199	1.407	-3.478	-34.01	-8.925	-7.079
	(1.557)	(1.851)	(3.178)	(6.321)	(17.27)	(4.677)
OLS, fiscal year tariffs	-0.213	0.886	-3.513	-36.41	-9.170	-6.505
	(2.112)	(1.695)	(3.740)	(8.800)	(22.22)	(5.103)

Note: Dependent variable is the value of imports by good, country, and year. Estimates control for good*country and good*year fixed effects, and for country-specific time trends. Estimates computed using ppmlhdfe and reg2hdfe. Robust standard errors clustered by country in parentheses.

Figure 11: Impact of protection on aggregate trade with different elasticities

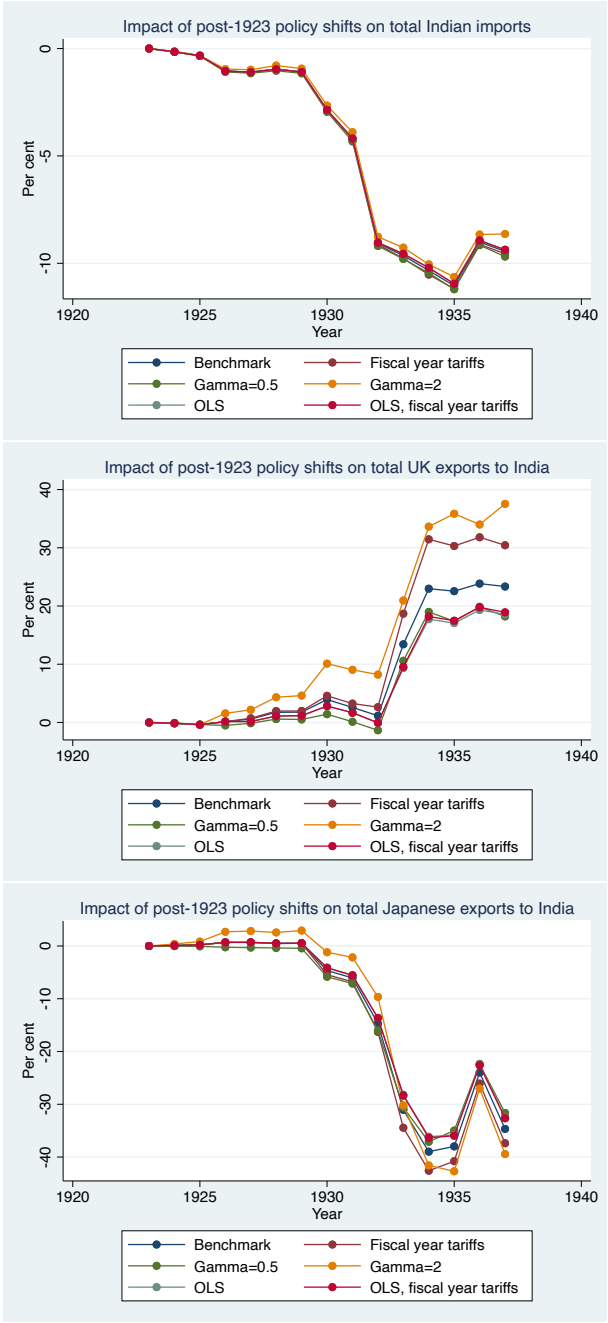

Figure 12: Impact of protection on cotton cloth exports to India with different elasticities