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Douglas A. Irwin
Maksym G. Chepeliev

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ABSTRACT

Britain's repeal of the Corn Laws in 1846 was the signature trade policy event of the nineteenth century. This paper provides a quantitative general equilibrium evaluation of the repeal on sectoral output and employment, factor prices and income distribution, international trade and the terms of trade, and economic welfare based on a detailed input-output matrix of the British economy in 1841. We find that the repeal left Britain's overall welfare roughly unchanged, or perhaps negligibly (0.1 percent) lower, as the static efficiency gains are offset by the adverse terms-of-trade effects of the tariff reduction. Labor and capital gained a slight amount of income at the expense of landowners (whose income fell about 3-5 percent). Combining the changes in factor payments with different consumption patterns across income groups, we find that the top 10 percent of income earners lose while the bottom 90 percent of income earners, who spent a disproportionate amount of their income on food, gain. To assess whether the model yields reasonable results, we compare the model's output, price, and trade predictions with the actual ex post outcomes.

Douglas A. Irwin
Department of Economics
Dartmouth College
Hanover, NH 03755
and Peterson Institute for International Economics
and also NBER
douglas.irwin@dartmouth.edu

Maksym G. Chepeliev
Department of Agricultural Economics
403 West State Street
KRAN #562
Purdue University
West Lafayette, IN 47907
United States
mchepeli@purdue.edu

The Economic Consequences of Sir Robert Peel:
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1. Introduction

The repeal of the Corn Laws in 1846 by Britain's parliament stands as the signature trade policy event of the nineteenth century. This hugely controversial decision eliminated duties on imported grain despite strong opposition from Britain's landowning aristocracy.[2] The repeal owes its passage to the lobbying pressure of Richard Cobden's Anti-Corn Law League and the leadership of Robert Peel, the Conservative prime minister, who split his party and sacrificed his political career by endorsing the move. This unilateral policy reform opened Britain's market to the world's grain and, along with later tariff reductions, ushered in a policy of free trade that lasted until World War I. Because of its fascinating economic, political, and social dimensions, the repeal of the Corn Laws and the subsequent move to freer trade has always attracted widespread interest among scholars across many disciplines.[3]

This paper undertakes a new quantitative general equilibrium assessment of the Corn

[1] We thank seminar participants at Dartmouth College and the University of Nottingham for helpful comments and feedback. The title is a play on John Maynard Keynes' famous 1925 essay "The Economic Consequences of Mr. Churchill."

[2] The Corn Laws originated in the mid-seventeenth century as a complex schedule of duties on imported grains designed to protect domestic farmers from low prices. The Corn Laws became an explosive political issue at the conclusion of the Napoleonic Wars in 1815, when restrictions on imports were significantly tightened. Britain was far from alone in being the only European country to enact such restrictions; Federico (2011) finds that the low price of wheat was the key reason why countries chose to limit imports.

[3] The historical literature on the Corn Laws is enormous, but two studies deserve particular note: Schonhardt-Bailey (2006) provides an excellent study of the political economy of the Corn Law repeal and Howe (1997) presents an incisive overview of Britain's trade policy during this period. Van Dijck and Truyts (2011) examine the political-economy factors behind Belgium's repeal of its corn laws. We review the economic literature later in the introduction.

Law repeal to evaluate its impact on various sectors of the British economy, on domestic income distribution, and on economic welfare. The general equilibrium model is based on the input-output table for the British economy in 1841 constructed by Horrell, Humphries, and Weale (1994). The availability of a consistent accounting of Britain's commodity production, inter-sectoral flows of goods and services, international trade, and final consumption during this period is an enormous aid to evaluating the impact of the Corn Law repeal and the broader move to freer trade.

We build two important features into our model that are relevant to mid-nineteenth century British economy. First, we take Britain as a large country in world markets that can influence the export price of its cotton textiles and the import prices of cotton and wheat. This means the repeal of the Corn Laws could have potentially significant terms of trade effects in reducing the export price of textiles and increasing the import price of cotton and wheat. Second, we combine the effects of the repeal on incomes of three factors of production (land, labor, and capital) with heterogeneous consumption patterns across different income groups. We contrast the repeal's impact on the top 10 percent of the income distribution, who earn most of the country's land and capital income, with the bottom 90 percent of income distribution, where earnings are derived mainly from wage labor and whose consumption is skewed toward food.

The general equilibrium approach helps us pose and answer in the context of a single model some of the key questions about the repeal of the Corn Laws and Britain's broader move toward freer trade: Would the terms of trade have deteriorated as a result of the tariff reduction and what would have been the consequences for aggregate welfare? How much did the Corn Law repeal harm British agriculture and reduce land rents? To what extent did the repeal

promote manufactured exports and increase real wages? How sharp were the distributional consequences of the Corn Law repeal, and was the repeal a progressive policy whose benefits flowed disproportionately to the working class? We also compare the results of our model with the ex post outcomes of prices, trade, and factor income to see how closely they line up.

We also compare our findings to those of previous work on the Corn Law repeal. Despite the historical importance of the repeal, there are surprisingly few quantitative studies of its economic impact or the consequences of Britain's broader move to freer trade in the mid-nineteenth century. McCloskey (1980) noted that Britain at this time so dominated world trade in manufactured goods, especially in cotton textiles, that the country's move to free trade and consequent export expansion would have deteriorated the country's terms of trade and reduced national income. Irwin (1988) reached similar conclusions by estimating Britain's trade elasticities for the period and evaluating the welfare impact of a tariff reduction about the size of the Corn Law repeal. Williamson (1990) and O'Rourke (1997a) employed different general equilibrium models to assess the impact of the Corn Law repeal (or decline in grain prices) on domestic income distribution among capital-owners, landowners, and laborers. Dukhlia and Nye (2004) simulated the removal of all British tariffs in the mid-nineteenth century, focusing mainly on the benefits to consumption. Ward (2004) developed a partial equilibrium model to study the implications of the Corn Laws repeal for British prices, production, and consumption of grain.

These previous studies tended to focus on one aspect of the repeal, but each also has significant shortcomings. McCloskey does not perform any numerical simulations or focus specifically on the Corn Law repeal. Irwin uses poorly estimated elasticities in an aggregate trade model that ignores income distribution and the sectoral impact of the repeal. Williamson's

general equilibrium model describes the potential income distributional consequences of the repeal, but its simple linear structure likely amplifies the impact of policy changes. O'Rourke's general equilibrium model is not linear, but examines an exogenous decline in grain prices, not a tariff reduction; it also does not evaluate the aggregate welfare or the terms of trade effects of a policy change. Dukhlia and Nye's model focuses on consumption to the exclusion of production, thereby ignoring Britain's export market power in manufactured goods, in a framework where the results are highly sensitive to model structure and parameter values (O'Rourke 1997b). Ward's (2004) partial equilibrium approach is limited to the wheat market alone and does not address income distribution or overall economic welfare.[4]

As a result, we believe that our unified framework provides a much more complete and comprehensive analysis of the Corn Law repeal. To anticipate some of our major conclusions, we find that, in terms of aggregate welfare, the static efficiency gains were negated by the deterioration in the terms of trade owing to the fact that Britain was a large county on world markets. However, the income distributional consequences of the Corn Law repeal were pronounced: landowners lost roughly 4 percent of their income while labor and capital-owners saw their incomes rise about 1 percent. Taking into account the different sources of income and the different pattern of expenditure between high- and low-income groups, we find that the repeal was a progressive, "pro-poor" policy: the welfare of the top 10 percent of income earners falls by about 1-2 percent and the welfare of the bottom 90 percent increases by about 0.5

[4] A recent paper by Heblich, Redding, and Zylberberg (2020) provides a new economic geography look at the repeal of the Corn Laws and the decline in grain prices in the late nineteenth century. Using spatially disaggregated data on England's population, they find substantial rural outmigration from grain-growing regions to urban areas, with sizeable changes in property values.

percent.

This paper is organized as follows. Section 2 describes the general equilibrium model used to simulate the removal of the Corn Laws and other tariffs. Section 3 presents the main results of the simulations under different elasticity assumptions. Section 4 compares the results to the ex post outcomes of some of the key variables of interest, such as the volume of wheat imports, domestic production of wheat, and the domestic price of wheat. Section 5 considers the impact of the general reduction in tariffs that occurred in the aftermath of the repeal. Section 6 concludes.

2. A General Equilibrium Model of the British Economy, c. 1841

Our general equilibrium model is based on the detailed input-output table for the British economy in 1841 constructed by Horrell, Humphries, and Weale (1994). This table presents the inter-industry flows of commodities, final output, exports, imports, and final consumption for 17 sectors: agriculture, mining, food, metals, soap, textiles, metal goods, bricks, other manufacturing, construction, gas, transport, distribution, domestic services, other services, public administration, and housing. Horrell, Humphries, and Weale (1994) also present information on employment and the capital stock in each of these activities.

Because of the careful construction of this table, we have made only one significant modification to it. In examining the Corn Law repeal, Williamson (1990) stresses the importance of dividing agriculture into two components: grain and non-grain (pastoral) production. The abolition of the Corn Laws affected these two agricultural sectors quite differently: the tariff on imported wheat directly protected British grain producers from foreign competition, whereas

non-grain pastoral producers (wool, hay, dairy, etc.) were more insulated from import competition. Consequently, following Williamson (1990, p. 149), we split agriculture into grain and pastoral sectors, where grain production accounts for 38 percent of total agricultural output. We also model the grain and pastoral agricultural sectors differently than Williamson. Whereas he assumes that land is a specific factor in both grain and pastoral agriculture, we assume that land is imperfectly substitutable between the two sectors; an elasticity of transformation parameter represents the degree to which land used in grain production can be converted for use in pastoral agriculture.

Thus, after separating grain and pastoral agriculture, we have an 18-sector economy with three primary factors of production: land, labor, and capital. Table 1 presents the basic sectoral data. Land is employed exclusively in agriculture, while labor and capital are freely mobile between all activities.[5] The repeal of the Corn Laws was an important shock with economy-wide ramifications: about 9 percent of total employment was in grain agriculture, and 24 percent of total employment was in agriculture (grain and pastoral). Production in all sectors is assumed to take place under constant returns to scale. To derive the shares of capital, labor and land by sectors, we first assume uniform wages and returns on capital across different activities. We then scale the values of capital, land and labor employed by each sector to match the sector-specific value added reported in Horrell, Humphries, and Weale (1994) and national average value added shares from Clark (2010, Table 13).[6]

[5] The lack of detailed sectoral data means that we cannot distinguish between skilled and unskilled workers, as Williamson (1990) does. Heblich, Redding, and Zylberberg (2020) document substantial labor outmigration from grain-growing regions in Britain in the aftermath of the repeal, consistent with significant labor mobility across regions and activities.

[6] In the year 1840, Clark (2010, Table 13) reports economy-wide factor income shares as 0.65 for labor, 0.25 for capital, and 0.10 for land. Humphries and Weisdorf (2019) also report a

We have also refined the specification of imports for the purposes of the model. We distinguish imported intermediate goods that do not compete with domestic intermediates (cotton in the textile sector), and imported intermediate goods that compete with domestic intermediates (grain as an input to the food sector and pastoral as an input to the textile industry). We are able to do this because the footnotes to Horrell, Humphries, and Weale (1994), and the appendix to the 1991 working paper version of their article, provide cell-by-cell detail on the construction of the input-output matrix.

This separation is important in two particular instances. First, raw cotton comprises £12 million of the £22.2 million in intermediate imports used by the textile sector, but cotton does not compete with domestic production, while the remaining £10.2 million consists of intermediate imports (wool, hides, flax, etc.) that do compete with pastoral production. Second, of the £21.1 million intermediate imports in the food sector, £9 million are grains that compete with the £36 million of domestically produced grain that is also used as an intermediate.

To facilitate such separation, we have refined the representation of import flows in the input-output table. In particular, Horrell, Humphries, and Weale (1994) record most imports of primary commodities used for further processing under those sectors that use these commodities as an intermediate inputs, rather than under corresponding primary commodity sectors. These include imports of grains (£9 million) used by the food industry and imports of pastoral products (£10.2 million) used as an intermediate inputs by the textile sector. We record these imports under the "Grain agriculture" and "Pastoral agriculture" respectively.

Final consumption is represented by a constant elasticity of substitution utility function

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labor share of 0.65 for 1840.

defined over all the commodities that enter final consumption. The elasticity of substitution across goods is 0.5. The Armington elasticity, representing the elasticity of substitution between domestic and imported goods, differs by sector.[7] We use the value of 2.0 for service sectors and 3.0 for other sectors, except "Grain agriculture" and "Soap, candles, dyes", where we assume a slightly higher value of 4.0. We later use rough data on earnings and consumption for two income classes – the top 10 percent and the bottom 90 percent – to provide a closer look at the distributional impact of repeal. The distribution of consumption expenditures by the bottom 90 percent of income earners is skewed toward food, which means that focusing on wage income alone might understate the gains for unskilled workers who had a larger weight of food in their consumption bundle.

A key issue is the degree to which Britain possessed market power in international trade, particularly in its exports of cotton textiles and imports of raw cotton and wheat. In 1840, Britain accounted for 37 percent of world production of textile products and 29 percent of world production of all manufactured goods, and it dominated world trade in those goods (Mulhall 1903, 365, 367). While large market shares do not necessarily imply a high degree of market power, such large shares of world production suggest that changes in Britain's exports would affect the world prices of such goods. Irwin (1988) estimated the export demand elasticity facing Britain to be -1.1 for the period around 1840. Later in the nineteenth century, for the period 1870 to 1913, Hatton (1990) finds that the long-run elasticity of export demand facing Britain was -1.8. These parameters are likely to be underestimated. If the world demand for textiles had a

[7] Bajzik et al. (2020) provide a recent meta-analysis of estimates of the Armington elasticity and find that it ranges between 2.5 and 5.1 with a median value of 3.8.

price elasticity of -1, and Britain's share of world trade in textiles was 0.35, then the implied export demand elasticity would be nearly -3.[8] As an initial reference point, we assume that the elasticity of export demand facing Britain is 5 for textiles and all other commodities.

In terms of imports, the foreign export supply of wheat and cotton was unlikely to have been perfectly elastic. Ward (2004) finds that Britain faced relatively large long-run elasticities of export supply of grain, ranging from 2 from Prussia, 5 from the United States, and 8 from France, estimated during the period 1828-46. We assume a reference elasticity of 5. In addition, most studies suggest that U.S. export supply of raw cotton was far from perfectly elastic. In the 1830s and 1840s, Britain accounted for about 55-57 percent of the world's cotton consumption (Irwin 2003). Wright (1971) estimates the elasticity of pre-Civil War land sales with respect to the price of cotton is between 0.6 and 1.5; even contemporary estimates that the response of cotton acreage with respect to the price are somewhat below 1. As a result, we assume that Britain faces an upward sloping import supply schedule for cotton (as an intermediate input to the production of textiles) with a reference elasticity of 1. All other sectors have an import supply elasticity of 5.

Thus, our model accounts for Britain's ability to influence its terms of trade with the rest of the world, both with respect to its export prices (cotton textiles) and import prices (wheat and cotton). We also check the sensitivity of our results to changes in these elasticities and other parameters. Additional details on the general equilibrium model can be found in Appendix A.

[8] This assumes the simple relationship that $\eta_{UK} = \eta / s_{UK}$, where η_{UK} is the elasticity of export demand facing Britain, η is the elasticity of world demand for the good in question, and s_{UK} is Britain's market share.

3. The Repeal of the Corn Laws: Simulation Results

Economic historians who have studied the Corn Laws have found it difficult to determine the degree to which import duties increased the domestic price of wheat. After a sliding set of duties was adopted in 1828, the Corn Laws essentially took the form of a variable import levy, the restrictiveness of which depended upon the state of domestic prices. Thus, there was no unique ad valorem tariff or specific duty on imports of wheat and the degree of protection given to British wheat producers depended upon the particular time period considered.[9]

There are various estimates of the restrictiveness of the Corn Laws just prior to repeal. Schlote's (1952, p. 61) uses annual prices of British wheat to back out the foreign price based on the duty payable from the relevant sliding scale effective in a given year. He concludes that the average tariff was about 51 percent from 1828-1841 and about 36 percent from 1842-45. Sharp (2010) argues that Schlote's method yields an upward biased measure of the tariff because it does not take into account grain released from bonded warehouses during periods of high prices. Williamson (1990) examines the price differentials between British and foreign markets, adjusted for transportation costs. In the 1830s, Williamson (1990, p. 127) finds that the Corn Laws were equivalent to a 54 percent tariff on imported grain. This tariff wedge was reduced in two stages, a reduction of 32 percentage points in 1842 and then a repeal of the remaining 22 percentage points in 1846. Finally, Sharp (2010) calculated the average tariff by dividing the revenue raised by the Corn Law duties by the value of grain imports. He finds an average tariff of 28 percent in the decades prior to repeal, but this figure is highly variable over time. Ward's

[9] Williamson (1990, p. 127) finds strong evidence that British and European wheat markets were well integrated aside from the explicit wedge between domestic and foreign prices due to the Corn Laws.

(2004) figure is almost identical.

We adopt Sharp's (2010) figure of 28 percent as a reasonable estimate of the implicit average tariff in the Corn Laws prior to repeal. For example, O'Rourke (1994) develops a counterfactual "no-repeal" wheat prices in Britain and finds that they would have been 25 to 30 percent higher in the early 1850s than they actually were after repeal. Figure 1 depicts the average import duty over time, as calculated by Sharp (2010), as well as the volume of imports. The inverse relationship between the two series is clearly evident. As the tariff rises to 40 percent and higher in the mid-1830s, imports nearly disappear; tariffs at those rates are essentially prohibitive. Between 1838 and 1842, the tariff fell to about 10 percent and imports surged in. The tariff rose again between 1842 and 1846, squeezing imports, but repeal allowed foreign grain to enter the British market again.

However, the height of the tariff on wheat may not reflect the magnitude of the price shock facing British producers and consumers as a result of a repeal of the Corn Laws.[10] Fairlie (1965) notes that principal foreign sources of wheat supply prior to 1838 were coastal Poland, Germany, and Denmark and that these regions could only supply a much larger quantity of exports to Britain at higher prices. Fairlie (1965) assumes that import prices would rise by about half of the tariff wedge. This adverse terms-of-trade effect would mute the negative repercussions for domestic agricultural producers and diminish the gains reaped by domestic consumers.

There is some evidence on how much import prices for wheat might be expected to rise

[10] Of course, in the small open economy case, import prices are fixed and domestic prices would fall by the full extent of any tariff reduction. (This is what Williamson assumed in his calculations).

after the repeal of the Corn Laws. Ward (2004) estimates of export supply elasticities of wheat for the major producers in the mid-nineteenth century are large, but not infinite. Using these elasticities in a partial equilibrium model of Britain's production and trade in wheat, Ward (2004) finds that the Corn Laws kept British prices about 27 percent higher than the cost, insurance, and freight price of imports; and their repeal would have reduced British prices by 10 percent and increased the delivered import price by 17 percent. Thus, we would expect that the decline in the domestic price of wheat would be only some fraction of the 28 percent average tariff.

Table 2 reports the general equilibrium results for a simulated repeal of the Corn Laws, which we take to be the removal of a 28 percent tariff on imported grains. The table summarizes the main results for some of the key sectors and factors of interest. We present results for a low elasticities and a high elasticities case. The low elasticity case is based on many of the elasticities discussed above, but which may be more reflective of the very short-run impact. The high elasticity case may be more plausible for the medium-term impact.

Panel A of Table 2 reports the changes in goods prices (relative to a consumer price index). The price of grain is critical because it is directly affected by repeal. We find that the domestic price of grain declines by about 4 percent, which allows the relative price of food to fall by about 1 percent. This 4 percent decline is a composite of the change in the price of domestic grain (which falls just 1 percent) and the tariff-inclusive price of imported grain (which falls 20 percent). This is the Armington composite price that affects the food sector.

Three factors account for the modest decline in the price of grain. First, the price of imported grain rises by 6 to 9 percent due to the finite elasticity of supply from Poland and other

exporting areas, so only part of the tariff reduction is passed through to the British prices. Second, the Armington elasticity of substitution, which is set at 4, implies that imported grain is an imperfect substitute for domestic grain. If the substitutability of domestic and imported grains is higher, and the Armington elasticity is set at 10 or at 50, the price of domestic grain falls 3-5 percent and the composite price falls 5-6 percent. Even with a higher elasticity, however, the composite price effect is muted because then the import price rises more (as consumers substitute to a greater extent toward imports) and a smaller fraction of the tariff reduction is passed through. Third, the share of imports in domestic consumption is only around 10-15 percent, which also mutes the impact of imported grain prices on the domestic market.

Panel B presents results for sectoral output. Despite the modest change in the relative price of grain, domestic production of grain falls about 10-12 percent. Pastoral agricultural production expands slightly (3 percent) because it can now employ land that is no longer used in grain production. Food output expands slightly (2 percent) and cotton textile output expands a modest 0.2-0.9 percent. One of the main contentions of Richard Cobden's Anti-Corn Law League was that the import tariffs prevented the expansion of British manufacturing; this appears to be the case but only to a very small degree.

Panel C focuses on international trade. The abolition of the Corn Laws allows imports of wheat to increase anywhere from 58-76 percent. This magnitude is plausible given the relationship between the tariff and imports depicted in Figure 1. As a result, exports of other goods expand in exchange for these additional imports; exports of pastoral agricultural goods become more cost competitive and expand considerably, while textile exports increase by up to 3 percent. Overall exports increase by about 4-6 percent. The terms of trade deteriorate by a slight

1-2 percent.

As Williamson (1990) emphasizes, perhaps the most important issue at stake in the debate about the Corn Laws was its effect on domestic income distribution. Our model confirms the suspicions of the classical economists, such as David Ricardo, that the Corn Laws benefitted landowners at the expense of workers and capital owners. The return to land falls by around 3-4 percent as a result of repeal, while both real wages and return to capital increase a modest 1 percent. It is unsurprising that the repeal helped labor and capital at the expense of land, but the magnitudes of the impacts might seem small given the intense political and social controversy that surrounded the repeal. To its opponents, the Corn Laws symbolized class legislation and its repeal was considered a major political victory, even if the economic consequences were perhaps exaggerated by those objected to it. That said, a 4 percent reduction in land incomes is not trivial. Of courses, because land's share of GDP was only 10 percent, there was a limit to how much income could be redistributed to other groups in society.

Finally, panel E turns to aggregate welfare. In keeping with McCloskey (1980) and Irwin (1988), who stress the potential for an adverse terms of trade effect from a tariff reduction, the aggregate effect here is indeed negative, although very small at -0.3-0.1 percent of Hicksian equivalent variation. This result arises because the expansion of trade lowers export prices of textiles and increases import prices of wheat and cotton enough to offset the static efficiency gains from trade. Thus, it appears that the impact of the repeal on domestic income distribution was a more significant outcome than any aggregate change in the gains from trade.

How do these findings contrast with the results of other simulations? In terms of grain production, both Ward's (2004) and Williamson's (1990) models suggests nearly a 7 percent

decline in domestic grain output, slightly lower than the 11-13 percent decline in our model.[11] In Ward's (2004) partial equilibrium counterfactual calculation, imports of grain nearly double, the British price would have been 10 percent lower, and import prices would be 17 percent higher. Our calculation is that these price effects are somewhat smaller.

Williamson finds that nominal agricultural rents fall 13 percent (and the rent on grain land falls 41 percent), whereas O'Rourke reports a 9 percent reduction in rents (and a 38 percent reduction in the rent on tillage land). Both are much larger effects than the 3 to 4 percent found here. This is due to the different modeling assumption of land: Williamson and O'Rourke have it as a specific factor, whereas we have it as a partially mobile factor. Williamson finds a very large real wage effect (+12 percent for unskilled workers and +2 percent for skilled workers), whereas O'Rourke reports higher real wages in the 3-6 percent range, closer to the muted effect in our simulation.

Williamson also finds that manufactured exports increase by about 17-34 percent, much higher than an increase of up to 4 percent that our model suggests. Once again, the simple linear structure of his framework, as opposed to the curvature built into our more disaggregated model, magnifies the impacts of any policy change. Even though imports of grain (in the low elasticities case) increase 58 percent, total imports increase only 4 percent, partly because grain imports are only about 15 percent of total imports and food imports decline 9 percent. Thus, the 4 percent increase in imports requires a roughly 4 percent increase in exports to pay for those imports, the balance of trade being held fixed.

[11] O'Rourke's (1997a) model finds a 75-85 percent reduction in grain output from an exogenous 29 percent decline in the price of cereals.

While incomes change differentially across different classes of earners, consumption patterns also differ by income class. Lacking detailed information on income and expenditure by household categories, we divide consumers into high-income and low-income groups and allow their income and consumption patterns to differ. Lindert (1986, Table 6) shows that the top 10 percent of income earners in England and Wales in 1867 derived 13 percent of their income from land rents, 51-87 percent of their income from capital earnings, and 0-36 percent of their income from labor earnings. Meanwhile, the lower 90 percent derived 1 percent of their income from land rents, 26-35 percent of their income from capital earnings, and 64-73 percent of their income from labor earnings. We reconcile this with the input-output table data to have the top 10 percent capture 89 percent of all land rents, 78 percent of capital income, and 15 percent of labor income. The bottom 90 percent have 11 percent of all land rental income, 22 percent of capital income, and 85 percent of labor earnings. The top 10 percent also earn 38 percent of national income, as shown in Lindert (1986, Table 6).

In terms of consumption, Feinstein (1998, Table 1) presents budget shares for working class households. In 1828/32, 65 percent of expenditures were devoted to food (16.25 percent on bread and 13.65 percent to wheat flour) and 11 percent were devoted to drink. The 1841 input-output table reports that consumption of pastoral and food commodities accounts for 42 percent of total expenditures at the national level. To reconcile these data with the input-output table accounts, we assume that bottom 90 percent spent 70 percent of their income on food, pastoral and related distribution services. We also assume that the bottom 90 percent account for 65 percent of consumption expenditures, while the top 10 percent account for the rest of demand.

With this breakout of consumers, the model suggests that the benefits of Corn Law repeal

accrued disproportionately to the bottom 90 percent, both because their income was positively affected (as opposed to the declining land rents for the top 10 percent) and because the price of their consumption goods fell. In the low elasticities case, the welfare of the top 10 percent falls 1.4 percent while the welfare of the bottom 90 percent rises 0.3 percent. In the high elasticities case, the welfare of the top 10 percent declines by the same amount (-1.4 percent) while the welfare of the bottom 90 percent rises 0.6 percent. Both the redistribution of income and the pattern of expenditures (more heavily weighted on the imported good) work to the advantage of lower income households in this case, making the repeal of the Corn Laws a "progressive" policy.[12]

4. An Ex Post Evaluation of the Corn Law Repeal

Surprisingly, none of the previous quantitative studies of the Corn Law repeal examined what happened to Britain's grain production and imports, manufactured exports, and the terms of trade after 1846. It is difficult to evaluate the results of the any model without looking at what actually happened in the aftermath of the repeal. Although assessing the results of any simulation by comparing them with an ex post outcomes is always compromised by the fact that the economy is subjected to ongoing trends and different shocks, it still seems worthwhile to check if the results come anywhere close to matching up with the magnitudes of the actual historical outcome in the years immediately after the repeal.

Table 3 presents the results from various calculations of the Corn Law repeal and the

[12] This is consistent with Faigelbaum and Khandelwal (2016) who find that trade tends to be pro-poor because lower income groups spend more of their income on tradeable (imported) goods. However, they focus on consumption expenditures without looking at the impact of trade on different income earners.

actual outcomes. Panels A and B considers the quantities, of imports of wheat and domestic production of wheat, respectively. Along with Ward (2004), we predict that the repeal would increase imports by about 70 percent. There are several different measures of how much wheat imports increased after repeal, ranging from 91 percent to 168 percent. (We use 1846 as a base in this case only because imports were close to zero in 1845.)

In the case of domestic production (Panel B), the model does very well in matching the actual outcome of the repeal. The general equilibrium model indicates that domestic grain production would fall by about 11 percent (averaging the benchmark and high elasticity scenarios). By contrast, the Williamson and Ward models predicted a 7 percent decline in production. In fact, domestic wheat production fell 13 percent between 1845 and 1849 (Fairlie 1969, 114). This is shown in Figure 2, which presents data on Britain's production of wheat and imports of wheat and wheat flour from 1830 to 1860. As the figure indicates, imports rise markedly in the aftermath of repeal, while production never recovers its 1845 peak and falls fairly steadily until the mid-1850s.[13] After 1849, wheat imports as a share of domestic consumption hold fairly steady at about 40 percent of consumption (Fairlie 1969, p. 103).

This implies that the repeal of the Corn Laws forced the agricultural sector into some significant adjustments. Vamplew (1980, p. 395) summarizes the effects on British agriculture:

> "Although repeal did not lead to a dramatic undermining of domestic prices by a flood of cheap imports, the increased importation of foreign grain prevented rising home consumption from raising prices by the pressure of demand. Many British cereal producers became caught in the price-cost squeeze as wages and rents moved upwards but prices did not. This encouraged many of them to adopt mixed farming or move out of cereals altogether into pastoral agriculture where the prospects of profits was relatively more attractive, partly because there was less competition from imports."

[13] For a short period, British producers were aided by the outbreak of the Crimean War in 1853, which led to sharply higher prices.

In terms of labor employed, census data indicate that employment in agriculture was higher in 1851 than in 1841, but van Vugt (1988) reports that "unprecedented numbers" of small, undercapitalized grain farmers emigrated to the United States in the early 1850s as a result of the repeal. Heblich, Redding, and Zylberberg (2020) document significant outmigration of labor from regions suitable for grain agriculture. Similarly, O'Rourke (1994) links the repeal to significantly lower Irish employment in agriculture (and greater emigration) over the subsequent decades.

Panels C and D consider the prices of domestic wheat and imported wheat, respectively. The simulations of Williamson and Ward indicated a larger decline in the domestic price of wheat than suggested in the model here, but it is difficult to judge these results with the actual changes in prices. As Vamplew noted, the repeal did not result in an immediate, sharp decline in domestic wheat prices even though imports were free to enter the market. Import prices and domestic prices rose in 1846 and again in 1847. The greater demand for wheat in light of the potato famine is probably responsible for this outcome, but both prices promptly collapsed after the Commercial Crisis of 1847. Unfortunately, this pattern in the data makes it difficult to determine the impact of the repeal on domestic and import prices from simple observation. We would expect the domestic price of wheat to fall and the import price of wheat to rise with the repeal of the Corn Law. In fact, between 1845 and 1847, the domestic price of wheat rose by 37 percent while the import price of wheat rose by 70 percent, consistent in relative terms with our expectation, but not very informative about the contribution of the tariff change alone. These considerations also hamper the comparison between the predicted and actual change in the import price of wheat, but the results in Ward and reported here suggest that the import price of

grain would rise by about 10 percent as a result of repeal.

Finally, the Feinstein (1998) and Allen (2007) calculation that real wages grew about 2 percent in the years after repeal is close in magnitude to that arising from our model. However, given the continued productivity growth in British industry, that does not mean the actual wage increases observed in the Feinstein and Allen series are due to the repeal.

The only existing estimate of overall welfare impact of the Corn Law repeal is that under Williamson's (1990) small country assumption in which real per capita GNP rises 1.5 percent; his model was unable to calculate the outcome in the large country case. When we approach the small country assumption in the high elasticities case, we find welfare increases 0.6 percent.

In sum, the results of the model are roughly consistent with what might have been expected from a reduction of a tariff of 28 percent on 15 percent of imports when total imports were just 15 percent of GDP. Of course, the imported good in this case loomed large in the consumption bundle of workers, about 30 percent (for bread and wheat flour) as reported by Feinstein (1998). And yet the aggregate economic effects are still moderate. The repeal of the Corn Laws was probably a larger event in the political life of Britain than its underlying economic importance would have suggested.

5. Britain's Move to Free Trade

The general equilibrium model also allows us to consider the broader removal of import barriers in the decades after 1841. As Figure 3 shows, the average tariff (as measured by customs revenue divided by the value of imports) fell from about 30 percent in the early 1840s to nearly 10 percent by 1860s. (The Budget of 1860, which included duty reductions negotiated in the

Cobden-Chevalier pact between Britain and France, was an important further step in this process.) Over this period, the average tariff was gradually reduced by about two thirds, or about 20 percentage points.[14]

Just as it is no simple task to determine the precise ad valorem tariff on imported wheat, the British tariff code was a complex array of specific duties on individual commodities that makes any generalization difficult. The Report of the Select Committee on Import Duties (1840) presents some disaggregated tariff information: duties of 20 percent on metal manufactures, soap, candles, and dyes; metal goods; brick, pottery and glass; and other manufactures; 60 percent on food, drink, and tobacco, and effectively zero tariffs on textiles, clothing, and leather goods. This crude information on sectoral tariffs allows us to simulate an average tariff reduction of about two-thirds, or 20 percentage points, on average.

Table 4 reports the main findings the reference elasticity case and the large elasticity case. In terms of overall welfare, the deterioration in the terms of trade from the unilateral tariff reduction slightly outweighs the static efficiency gains and produces a slight welfare loss of about 0.1 to 0.6 percent. Because Britain is not a price-taking "small country," it faces an upward sloping supply curve for its imports and a downward sloping demand curve for its exports and the expansion of trade reduces the terms of trade by anywhere from 3-6 percent. Grain agriculture output falls about the same as in the Corn Law repeal, while pastoral agriculture holds its own. Manufacturing output expands, and exports and imports are about 9-15 percent larger.

What actually happened to British trade during the period of this tariff reduction? Figure

[14] On this gradual decline in tariffs, see Irwin (1993) and Howe (1997).

4 shows that the share of merchandise exports and imports to GDP rose strikingly after the mid-1840s. Domestic exports rose from about 8 percent of GDP in the mid-1840s to about 13 percent by the mid-1850s. Imports grew from 13 percent of GDP at the time of repeal to more than 20 percent by the mid-1850s. This expansion in foreign trade was accompanied by a decline in the terms of trade, as shown in Figure 5. After having been stable or rising slightly over the period from 1839 to 1847, the terms of trade started deteriorating once again, falling by about 22 percent in the decade after 1846. A simple first order approximation of an exogenous decline in the terms of trade would reduce real GDP by no more than 3.5 percent, as imports were 15 percent of GDP in 1841 (Kohli 1984). However, because the decline in the terms of trade was largely due to the expansion of British production and exports, the actual welfare cost would have been much lower than this figure. In fact, if Britain had been a small country, the welfare gain would have been between 0.5-1.1 percent depending on the elasticity scenario.

The results here – a decline in welfare of around 0.1 to 0.6 percent – can be compared with two previous estimates. Harley and McCloskey (1981) employed a simple calculation to conclude that Britain would have lost at most 6 percent of national income from a reduction in its tariff of 21 percentage points (the difference between Britain's tariff in 1841 and 1881). In another quantitative evaluation of Britain's broader move to free trade, Irwin (1988) suggests that the loss was much smaller, on the order of magnitude of 1.6 to 2.0 percent of national income.

In arriving at this figure, Irwin makes use of the Basevei (1968) model, a hybrid partial-general equilibrium model that links a market for exportables and importables through a balanced trade requirement that comes about via a change in the relative price (exchange rate) of

the two goods. However, there are two major problems with this approach and the results that it yields. First, the results arise because estimates the elasticities of export supply and demand, and import supply and demand, are very crudely estimated in Irwin (1988) and appear to be implausibly low. Second, the Basevi model is biased toward generating large terms of trade effects that make it seemingly impossible for any tariff reduction to produce an improvement in economic welfare. As a check on those earlier results, table 5 provides new calculations with the Basevi model with a broader range of elasticity values. The results are similar to those found in Irwin (1988).[15] Even when the elasticities are set at much higher values, the change in relative prices is so large that the results invariably produce a loss for the economy undertaking a unilateral tariff reduction. Indeed, the overall welfare loss is higher (at 1.2 percent) than that found in our more detailed general equilibrium simulation presented here.

In contrast, the general equilibrium model employed here indicates that the welfare loss from Britain's move to free trade was negligible in the case of the reference elasticities. However, it is worth recalling that this is a purely static calculation that does not include any impact of the tariff reduction on capital accumulation and on industry or firm productivity. (There does not appear to have been an investment boom following the repeal of the Corn Laws, to judge by the share of investment in GDP, and it is difficult to relate the expansion of trade to technological progress.)

Yet, as Irwin (1988) pointed out, other countries began to liberalized their policies either in tacit coordination with Britain (as in the case of the United States, as pointed out by James and Lake 1989), or in following its example, or in formal agreements (such as the 1860 Cobden-

[15] We use equations (1′) and (2′) from Basevi (1968), whereas Irwin (1988) used variants of those equations.

Chevalier treaty between Britain and France). This foreign trade liberalization would have negated, to some extent, the adverse movement in Britain's terms of trade.[16]

Finally, it should be noted that the calculations reported in this paper do not relate to the overall gains from trade. Rather, they focus on a specific policy experiment in which some tariffs are reduced or eliminated, not a move from autarky to trade. The general findings from the latter are, of course, much larger. For example, Japan's move from autarky to open trade after 1858 is thought to have increase the country's welfare by about 8-9 percent (Bernhofen and Brown 2005). The United States closure to world trade in 1808 reduced the country's welfare by about 5 percent (Irwin 2005). Those opening and closures are more extreme policy actions – although both are (reasonably) based on the small country assumption – that should have larger impacts compared to the reduction of one tariff on a single (albeit important) good.

6. Conclusions

The repeal of the Corn Laws in 1846 stands as one of the defining moments of the nineteenth century, yet existing estimates of the impact of the Corn Laws suffer from many defects. This paper uses a carefully constructed input-output table of the British economy in 1841 created by Horrell, Humphries, and Weale (1994) in a standard applied general equilibrium model to evaluate the welfare consequences of the dramatic policy move and subsequent tariff reductions. The advantage of this approach is that we are able to deal with the repeal of the Corn Laws in a single, unified modeling framework that permits the interaction of all the important variables of interest.

[16] See Tena-Junguito, Lampe, and Fernandes (2012).

An important feature of the model is that import supplies of cotton and wheat, as well as the export demand for cotton textiles, are not perfectly elastic. As a result, Britain's terms of trade were likely to have deteriorated due to the reduction in tariffs and consequent expansion of trade. The distributional impact is fairly clear: land rents decline by about 3-4 percent, while real wages and the return to capital increase by about 1 percent. The Corn Law repeal was a progressive trade policy in that the bottom 90 percent of the income distribution benefited from the change while the incomes of the top 10 percent of earners fell. The overall welfare impact – while negative – is extremely small. The magnitude of these outcomes is roughly similar to the actual outcomes experienced by the British economy.

Appendix A. Description of the Computable General Equilibrium Model

To study the economic impacts of trade policies, a static single country computable general equilibrium (CGE) model has been developed. The model is programmed in GAMS/MPSGE modelling system (Rutherford 1995).

Following conventional CGE frameworks, producers are assumed to maximize their profits and households are maximizing utility. Enterprises are producing goods and providing services, using capital, labor, land and intermediate products. Domestic producers sell their products at the national or international markets. In the domestic market, final goods and services are purchased by households or contribute to the gross capital formation.

Capital and labor are assumed to be perfectly mobile across sectors, while constant elasticity of transformation (CET) production function is used to allocate land between grains and pastoral activities.

To represent production and consumption processes in the model, constant elasticity of substitution (CES) production functions are used. In the case of main production block, a multi-nested CES function is used (Figure A.1), which distinguishes intermediate inputs and value-added components.

The British economy is modelled as a large open economy – it is assumed that the world export demand and import supply functions for each traded commodity are elastic, so that Britain can impact world market prices. To model such assumptions in the GAMS/MPSGE modelling system, we introduce a specific factor that is used as an input in the Cobb-Douglas export and import transformation functions. This factor is owned by foreign consumer, who demands foreign exchange. By choosing the share parameters of export and import transformation functions, we are able to calibrate the export supply and import demand elasticities.

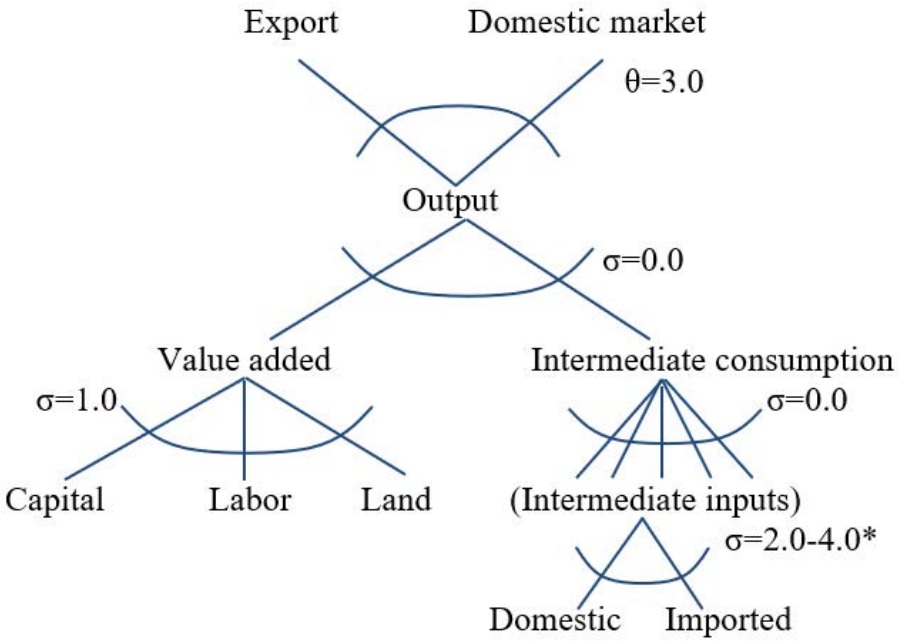


Figure A.1. Production nesting structure for all sectors in the model

Note: "σ" stands for the value of substitution elasticity in the corresponding nest; "θ" stands for the value of transformation elasticity in the corresponding nest.

*In the case of domestic-import substitution an elasticity of "0" is used for the "Textiles, clothing, leather goods" sector to account for the fact that cotton is not a substitute for domestic production.

References

Allen, Robert C. 2007. Pessimism Preserved: Real Wages in the British Industrial Revolution. Department of Economics, University of Oxford Working Paper No. 314.

Baizik, Josef, Tomas Havranek, Zuzana Irsova, Jiri Schwartz. 2020. "Estimating the Armington Elasticity: The Importance of Study Design and Publication Bias." *Journal of International Economics.*

Basevi, Giorgio. 1968. "The Restrictive Effect of the U.S. Tariff and its Welfare Value," *American Economic Review* 58: 840-852.

Bernhofen, Daniel M. and John C. Brown. 2005. "An Empirical Assessment of the Comparative Advantage Gains from Trade: Evidence from Japan." *American Economic Review* 95: 208-25.

Brawley, Michael. 2006. "Agricultural Interests, Trade Adjustment and Repeal of the Corn Laws." *British Journal of Politics and International Relations* 8:467-487.

Clark, Gregory. 2010. "The Macroeconomic Aggregates for England, 1209-1869." *Research in Economic History*, 27: 51-140.

Dakhlia, Sami, and John V. C. Nye. 2004. "Tax Britannica: Nineteenth Century Tariffs and British National Income." *Public Choice* 121: 309-333.

Fajgelbaum, Pablo D., and Amit K. Khandelwal. 2016 "Measuring the Unequal Gains from Trade." *Quarterly Journal of Economics* 131: 1113–1180.

Fairlie, Susan. 1965. "The 19th Century Corn Law Revisited." *Economic History Review* 18: 562-575.

Fairlie, Susan. 1969. "The Corn Laws and British Wheat Production, 1829-76." *Economic History Review* 22: 88-116.

Federico, Giovanni. 2012. "The Corn Laws in Continental Perspective." *European Review of Economic History* 16: 166-187.

Feinstein, Charles H. 1998. "Pessimism Perpetuated: Real Wages and the Standard of Living in Britain during and after the Industrial Revolution." *Journal of Economic History* 58: 625-658.

Harley, C. Knick, and Donald McCloskey. 1981. "Foreign Trade." In *Economic History of Britain since 1700,* edited by Roderick Floud and Donald McCloskey. New York: Cambridge University Press.

Hatton, T. J. 1990. "The Demand for British Exports, 1870-1913," *Economic History Review* 43:

576-594.

Heblich, Stephan, Stephen J. Redding, and Yanos Zylberberg. 2020. “The Distributional Consequences of Trade: Evidence from the Repeal of the Corn Laws.” Working paper.

Horrell, Sara, Jane Humphries, and Martin Weale. 1994. “An Input-Output Table for 1841.” *Economic History Review* 47: 545-566.

Howe, Anthony. 1997. *Free Trade and Liberal England*. Oxford: Oxford University Press.

Humphries, Jane, and Jacob Weisdorf. 2019. “Unreal Wages? Real Income and Economic Growth in England, 1260-1850,” *Economic Journal* 129: 2867–2887.

Imlah, Albert 1958. *Economic Elements of Pax Britannica*. Cambridge: Harvard University Press.

Irwin, Douglas A. 1988. “Welfare Effects of British Free Trade: Debate and Evidence from the 1840s,” *Journal of Political Economy* 96: 1142-1164.

Irwin, Douglas A. 1993. “Free Trade and Protection in Nineteenth-Century Britain and France Revisited: A Comment on Nye.” *Journal of Economic History* 53: 146-152.

Irwin, Douglas A. 2003. “The Optimal Tax on Antebellum US Cotton Exports.” *Journal of International Economics* 60: 275-291.

Irwin, Douglas A. 2005. “The Welfare Cost of Autarky: Evidence from the Jeffersonian Trade Embargo, 1807-09.” *Review of International Economics* 13:631-645.

James, Scott C., and David A. Lake. 1989. “The Second Face of Hegemony: Britain's Repeal of the Corn Laws and the American Walker Tariff of 1846.” *International Organization* 43, 1-29.

Kohli, Ulrich. 1984. “Terms of Trade and Welfare: Estimates.” *Kyklos* 37: 577-597.

Lindert, Peter H. 1986. “Unequal English Wealth since 1670.” *Journal of Political Economy* 94: 1127-162.

Lusztig, Michael. 1995. “Solving Peel's Puzzle: Repeal of the Corn Laws and Institutional Preservation.” *Comparative Politics* 27: 393-408.

McCloskey, Donald. 1980 “Magnanimous Albion: Free Trade and British National Income, 1841-1881.” *Explorations in Economic History* 17: 303-321.

McKeown, Timothy J. 1989. “The Politics of Corn Law Repeal and Theories of Commercial Policy.” *British Journal of Political Science* 19: 353-80.

Mitchell, Brian R. 1988. *British Historical Statistics*. New York: Cambridge University Press.

Mulhall, Michael G. 1903. *Dictionary of Statistics*. 4th edition. London: Routledge.

O'Rourke, Kevin H. 1994. "The Repeal of the Corn Laws and Irish Emigration." *Explorations in Economic History* 31: 120-138.

O'Rourke, Kevin H. 1997a. "The European Grain Invasion, 1870-1913." *Journal of Economic History* 57: 775-801.

O'Rourke, Kevin H. 1997b. "Measuring Protection: A Cautionary Tale." *Journal of Development Economics* 53: 169-183.

Peplow, Stephen. 2014. "The 1846 Repeal of the Corn Laws: Insights from a Classification Tree Approach." *International Journal of Humanities & Arts Computing* 8:187–203

Rutherford, Thomas F. 1995. Applied General Equilibrium Modeling with MPSGE as a GAMS Subsystem: An Overview of the Modeling Framework and Syntax. *Comput Econ* 14:1–46

Schlote, Werner. 1952. *British Overseas Trade from 1700 to 1930s*. Oxford: Blackwell.

Schonhardt-Bailey, Cheryl. 2006. *From the Corn Laws to Free Trade: Interests, Ideas, and Institutions in Historical Perspective*. Cambridge: MIT Press.

Select Committee on Import Duties. 1840. *Report*. House of Commons, August.

Sharp, Paul 2010. "1846 and All That: The Rise and Fall of British Wheat Protection in the Nineteenth Century," *Agricultural History Review* 58: 76-94.

Tena-Junguito, Antonio, Markus Lampe, and Felipe Tâmega Fernandes. 2012. "How Much Trade Liberalization Was There in the World Before and After Cobden-Chevalier?" *Journal of Economic History* 72: 708-40.

Vamplew, Wray. 1980. "The Protection of English Cereal Producers: The Corn Laws Reassessed," *Economic History Review* 33: 382-395.

van Vugt, William E. 1988. "Running from Ruin? The Emigration of British Farmers to the U.S.A. in the Wake of the Repeal of the Corn Laws." *Economic History Review* 41: 411-428.

Van Dijck, Maarten, and Tom Truyts. 2011. "Ideas, Interests, and Politics in the Case of Belgian Corn Law Repeal, 1834-1873." *Journal of Economic History* 71: 185-210.

Ward, Tony. 2004. "The Corn Laws and English Wheat Prices, 1815-1846." *Atlantic Economic*

Journal 32: 244-55.

Williamson, Jeffrey G. 1990. “The Impact of the Corn Laws Just Prior to Repeal.” *Explorations in Economic History* 27: 123-156.

Wright, Gavin. 1971. “An Econometric Study of Cotton Production and Trade, 1830-1860.” *Review of Economics and Statistics* 53: 111-120.

Table 1: The United Kingdom Economy in 1841

in millions of £, except where noted

Sector	Production	Exports	Imports (intermediates)	Capital	Employment ('000)
Grain agriculture	56	--	--	64	584
Pastoral agriculture	98.1	0.6	3	105	952
Mining	15	0.6	--	7	225
Food, drink, tobacco	203.2	--	21.1	41	310
Metal manufacture	17.3	5.2	1.9	16	205
Soap, candles, dyes	17.9	2.2	7	2	24
Textiles, clothing, leather goods	143.3	32.3	22.2	53	1,491
Metal goods	15.2	2.3	0.1	5	205
Brick, pottery, and glass	5.8	1.2	--	2	58
Other manufactures	15.6	--	0.5	13	162
Construction	27.3	--	4.5	0	377
Gas and water	3.7	--	--	10	2
Transport	24.5	13.3	--	131	200
Distribution	79	4.5	--	68	95
Domestic Service	34.4	--	--	0	1,244
Other Services	44.4	--	--	42	162
Public Administration	13.2	--	--	57	94
Housing	41.8	--	--	291	0
Total	523.5	67.2	62.3	907	6,390

Source: Horrell, Humphries, and Weale (1994), p. 547, with the distinction between grain and pastoral agriculture based on Williamson (1990), as discussed in the text.

Table 2: Results from Repeal of Corn Laws

A. Goods Prices

percentage change relative to consumer price index

	Low Elasticity Assumptions	High Elasticity Assumptions
Composite Grain	-4.3	-5.0
Domestic Grain	-1.2	-1.2
Imported Grain	+8.7	+5.7
Pastoral	-0.7	-1.0
Food	-0.9	-1.1
Textiles	+0.6	+0.5
Services	+0.6	+0.8

B. Sectoral Output

percentage change

	Low Elasticity Assumptions	High Elasticity Assumptions
Grain	-9.8	-12.0
Pastoral	+2.8	+3.3
Food	+2.0	+2.4
Textiles	+0.2	+0.9
Services	+0.5	+0.5

C. International Trade

percentage change

	Low Elasticity Assumptions	High Elasticity Assumptions
Imports of Grain	+58.3	+76.0
Exports of Pastoral	+9.4	+12.7
Exports of Textiles	+0.0	+2.9
Overall Exports	+4.1	+6.2
Terms of Trade	-2.5	-1.5

D. Factor Prices

percentage change relative to consumer price index

	Low Elasticity Assumptions	High Elasticity Assumptions
Labor	+0.8	+1.0
Land	-3.1	-3.9
Capital	+1.0	+1.3

E. Aggregate Welfare

percentage change in equivalent variation

	Low Elasticity Assumptions	High Elasticity Assumptions
EV – Aggregate	-0.3	-0.1
Top 10%	-1.4	-1.4
Bottom 90%	+0.3	+0.6

Note: Policy experiment is the removal of the 28% tariff on imported grains. Low elasticity assumption sets the elasticity of land transformation = 10, the elasticity of import supply of cotton = 1, the elasticity of import supply of wheat = 5, the elasticity of import supply for other goods = 5, the elasticity of export demand = 5, and the elasticity of export demand (textiles) = 5. In the high elasticity assumption, sets the elasticity of land transformation = 20, the elasticity of import supply of cotton = 3, the elasticity of import supply of wheat = 10, the elasticity of import supply for other goods = 10, the elasticity of export demand = 10, and the elasticity of export demand (textiles) = 10.

Table 3: An Ex Post Assessment of Corn Law Repeal*

A. Imports of Wheat		
Predicted:	Ward (2004)	+79%
	Irwin-Chepeliev	+67%
Actual (1846-49):	Mitchell (1988, 225)	+168%
	Fairlie (1969, 114)	+ 91%
	Sharp (2010)	+134%
B. Domestic Production of Wheat		
Predicted:	Ward (2004)	- 7%
	Williamson (1990)	- 7 %
	O'Rourke (1994)	-75-85%
	Irwin-Chepeliev	-11%
Actual (1845-49):	Fairlie (1969)	-13%
C. Domestic Price of Wheat		
Predicted:	Williamson (1990, 142)	- 7%
	Ward (2004)	-10%
	Irwin-Chepeliev	- 5%
Actual (1845-1847):	Fairlie (1969)	+37%
Actual (1845-1849):	Fairlie (1969)	-13%
D. Import Price of Wheat		
Predicted:	Ward (2004)	+17%
	Irwin-Chepeliev	+7%
Actual (1845-47):	Fairlie (1965, 574)	+70%
Actual (1845-49):	Fairlie (1965, 574)	- 8%

E. Real Wages

Predicted:	Williamson (1990)	
	Unskilled:	+12%
	Skilled:	+ 2%
	O'Rourke (1997a)	+3-6%
	Irwin-Chepeliev	+ 1%
Actual (1845-49):	Feinstein (1998)	+ 2.1%
	Allen (2007)	+ 1.6%

F. Farm Rents

Predicted:	Williamson (1990):	-12%
	Grain:	-41%
	Non-grain	+0.3%
	O'Rourke (1997a):	-9%
	Grain:	-38%
	Non-grain	+14%
	Irwin-Chepeliev	- 4%
Actual (1840-1850, nominal):	Clark (2010):	+6.2%

* The reported Irwin-Chepeliev results an average of the high and low elasticity scenarios. The reported Williamson results are for the large country assumption.

Table 4: Simulation of Britain's Free Trade Policy

Policy experiment of a 20 percentage point tariff reduction (change, %)

	Reference Elasticities	Large Elasticities	Small Country
Welfare (EV)			
Aggregate	-0.6	-0.1	0.7
Top 10%	-2.3	-2.1	-2.7
Bottom 90%	0.3	1.0	2.6
Factor Prices			
Capital	1.9	2.5	4.6
Labor	1.4	2.0	3.7
Land	-2.9	-3.9	-11.2
Terms of Trade	-5.9	-3.5	0.0
Production			
Grain Agriculture	-8.9	-11.7	-30.5
Pastoral Agriculture	1.8	2.1	5.9
Food	-2.9	-3.3	-1.9
Textiles	1.0	2.9	8.7
Services	1.0	1.1	2.0
Imports	8.8	14.5	33.0
Grain Agriculture	37.3	53.3	167.3
Food	21.9	32.1	38.8
Exports	9.8	14.9	30.6
Textiles	0.0	12.2	27.9
Metals	20.8	13.1	27.3

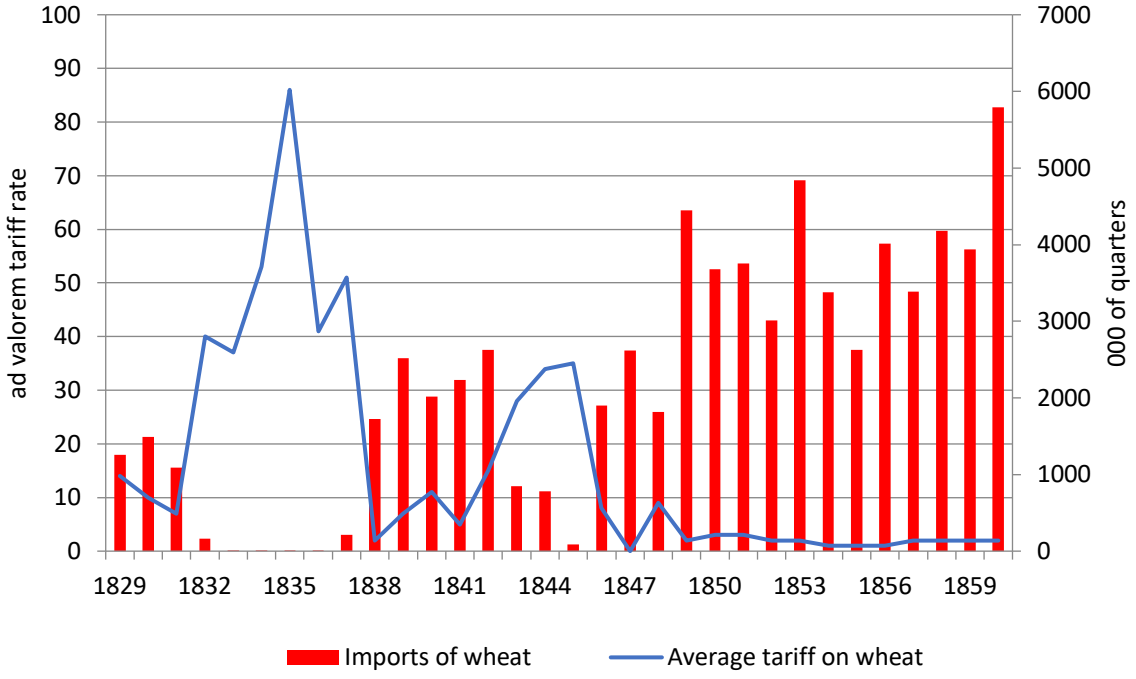
Note: Small country results assume Armington elasticities of 10.

Table 5: Basevi's Partial-General Equilibrium Model Results

Scenario	Elasticity assumptions				Implicit Depreciation	Net Welfare Effect	Net Welfare
	η_M	ε_M	η_X	ε_X		(£ million)	(% GDP)
A	-0.98	1.5	-1.1	1.43	-0.26	-11.4	-2.5
B	-2	5	-2	2	-0.20	-9.0	-2.0
C	-2	5	-5	5	-0.13	-6.3	-1.4
D	-10	10	-10	10	-0.14	-5.6	-1.2

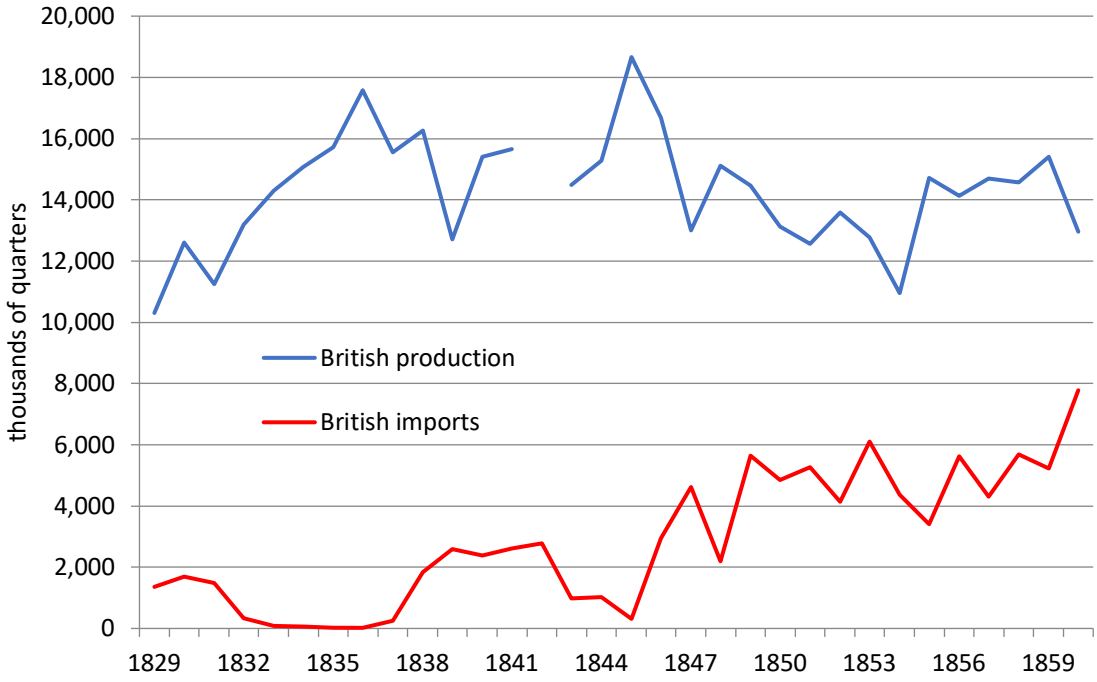
Note: The policy experiment is a tariff reduction of 20 percent. Case A uses the elasticities in Irwin (1988). Case B, C, and D uses elasticities in line with those discussed in this paper. The value of exports and imports in 1841 is taken from Mitchell (1988, p. 452); exports = £51.6m and imports = £74.0. 1841 GDP is £452.3m (Mitchell 1988, 822).

Figure 1: Average Import Tariff on Wheat and Britain's Wheat Imports, 1829-1860



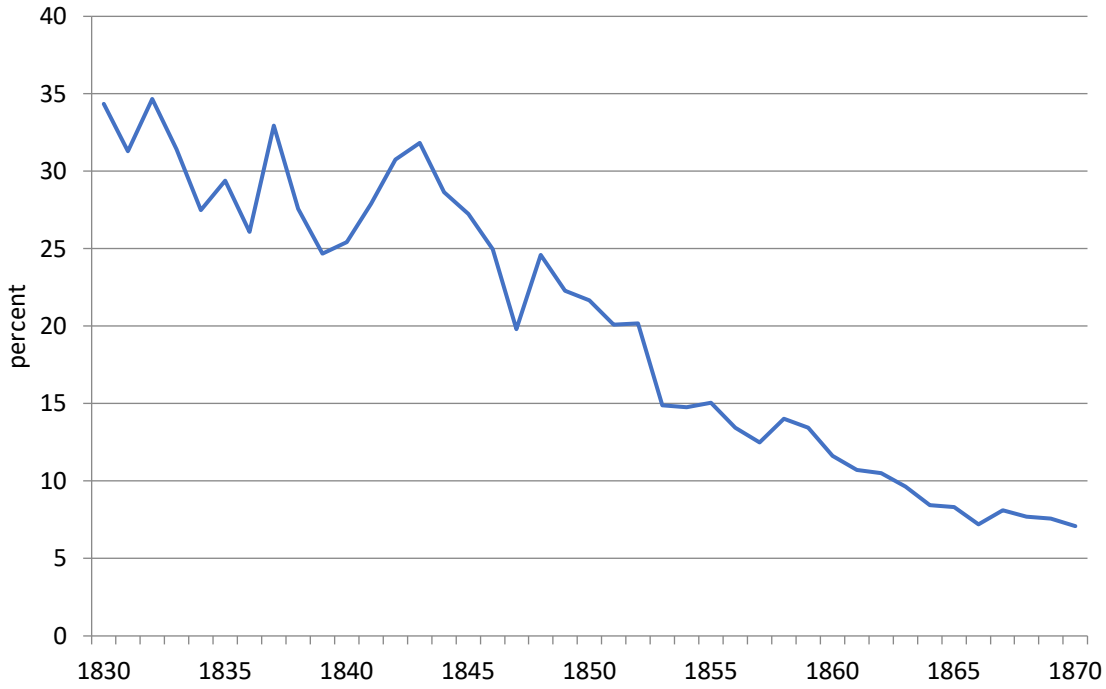
Source: Sharp (2010)

Figure 2: Britain's Imports and Production of Wheat, 1829-1860



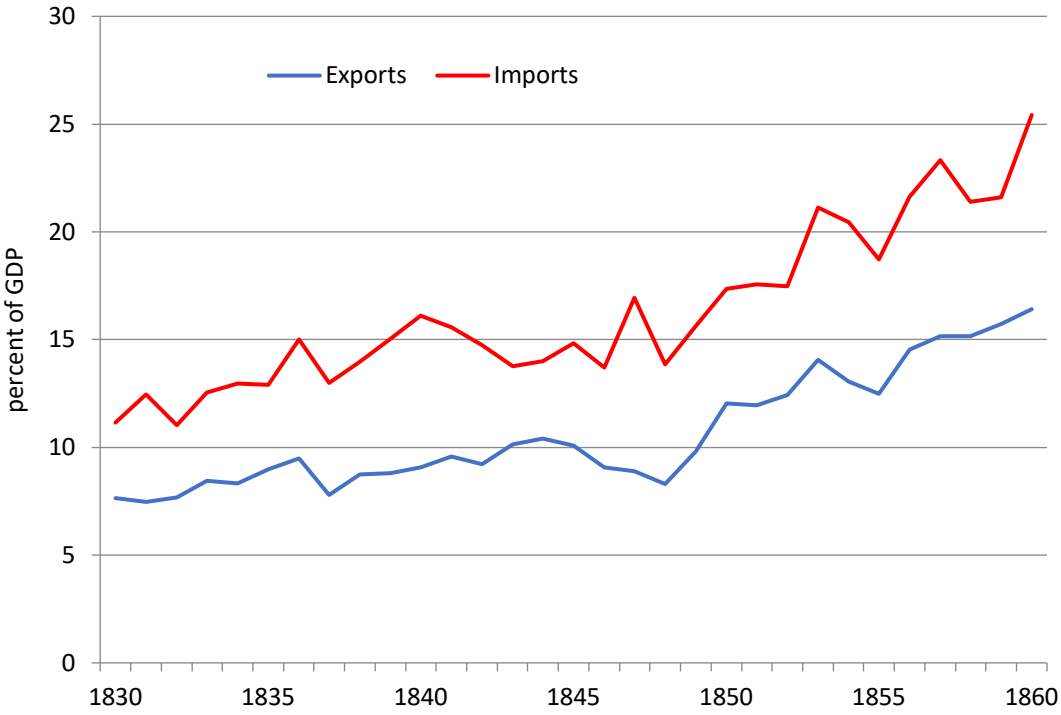
Source: Fairlie (1969), pp. 114-15. Imports: retained imports of wheat and wheat flour by United Kingdom. Production: wheat output in England and Wales "inspected" markets. No production data exists for 1842.

Figure 3: Britain's Average Tariff on Imports, 1830-1870



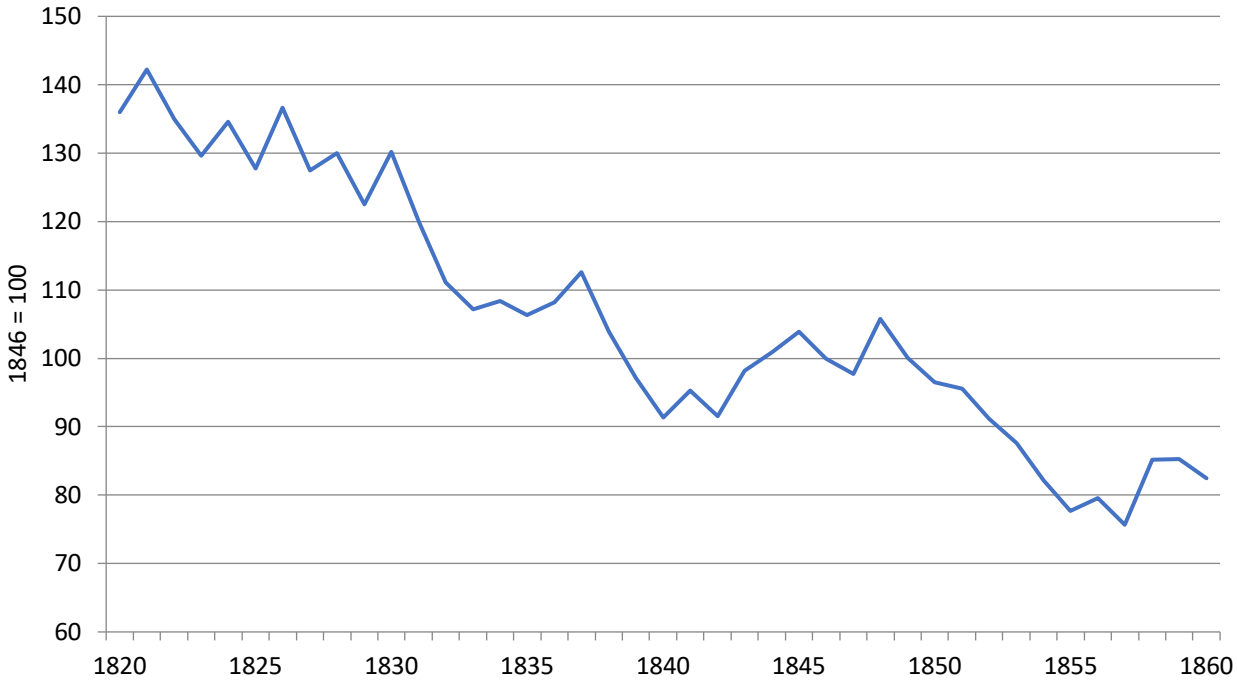
Note: Customs revenue divided by total imports. Source: Mitchell (1988, 581-82, 435).

Figure 4: Domestic Exports and Imports as a share of GDP, United Kingdom, 1830-1860



Source: GDP at market prices for United Kingdom from Mitchell (1988), pp. 831-32. Value of domestic exports and imports at current prices for United Kingdom from Mitchell (1988), pp. 451-53.

Figure 5: Britain's Terms of Trade, 1820-1860



Source: Imlah (1958), pp. 94-97.