DAE
7/10/07
1:00 PM

Trade Restrictiveness and Deadweight Losses from U.S. Tariffs, 1859-1961[1]

Douglas A. Irwin
Department of Economics
Dartmouth College
Hanover, NH 03755

This Draft: 17 June 2007

Abstract

This paper uses detailed tariff data to calculate the Anderson-Neary (2005) trade restrictiveness index (TRI) for the United States in 1859 and annually from 1867 to 1961. The TRI is defined as the uniform tariff that yields the same welfare loss as an existing tariff structure. The import-weighted average tariff understates the TRI by about 70 percent over this period. This approach also yields annual estimates of the static welfare loss from the tariff structure; the largest losses occur in the early 1870s (about one percent of GDP) but they fall almost continuously thereafter to less than one-tenth of one percent of GDP by the early 1960s.

1. Introduction

One of the easiest ways to measure a country's formal trade barriers is the import-weighted average tariff rate, which can be readily calculated by dividing the revenue from import duties by the value of total imports. Unfortunately, this measure has four critical shortcomings that make it a poor indicator of the tariff's height and static welfare cost. First, the average tariff is downward biased: goods that are subject to high tariffs receive a low weight in the index, and goods that are subject to prohibitive tariffs will not be represented at all. Second, the average tariff understates the welfare cost of a given tariff structure by ignoring the dispersion in import duties across goods. Third, the average tariff lacks any economic interpretation: an average tariff of 50 percent may or may not restrict trade more (or generate deadweight losses larger) than an

[1] I wish to thank Celia Kujala for excellent research assistance. I am also indebted to Marcelo Olarreaga and seminar participants at the U.S. International Trade Commission, the World Trade Organization, and Dartmouth College for very helpful comments and advice.

average tariff of 25 percent. Fourth, the average tariff will not reflect the impact of non-tariff barriers, such as import quotas, in restricting trade. Given these problems, economists as far back as Loveday (1929) have searched for better measures of tariff levels and indicators of trade policy.

Anderson and Neary (2005) recently developed several indices of trade barriers that have a well-defined theoretical basis in terms of economic welfare and the volume of trade. The trade restrictiveness index (TRI) refers to the uniform tariff which, if applied to all goods, would yield the same welfare level as the existing tariff structure. The mercantilist trade restrictiveness index (MTRI) refers to the uniform tariff that would yield the same volume of imports as the existing set of tariffs. The TRI has several advantages over the average tariff: it has a clear interpretation in terms of economic welfare and summarizes in a single metric the effects of varying import duties in a way that the average tariff cannot.

This paper calculates a highly simplified, annual trade restrictiveness index for the United States during a long period of its history (1859, 1867-1961) based on a broad classification of imports derived from the U.S. tariff schedule. During this period, America's trade barriers consisted almost exclusively of import duties, not non-tariff barriers such as import quotas or voluntary export restraints that would otherwise make a tariff-based TRI quite misleading. The results indicate that the TRI and import-weighted average tariff are highly correlated over time, but the average tariff understates the TRI by about 70 percent, on average. The results also show reveal how the static deadweight losses from U.S. tariffs have evolved over time. In the late 1860s and early 1870s, a time when the average tariff was around 30 percent, the deadweight loss from the tariff structure amounted to about one percent of GDP. These deadweight losses fell steadily over time and, by the end of World War II, were less than one-tenth of one percent

of GDP. These welfare costs, which were relatively small because of the small share of trade in GDP, declined over time because an increasing share of imports were given duty-free status in the U.S. market and the remaining tariffs on dutiable imports were reduced.

2. The Trade Restrictiveness Index

Anderson and Neary (2005) present the complete details on the theory behind the trade restrictiveness index. The standard average tariff measure and the trade restrictiveness index are both simply weighted averages of individual tariff rates. The weights in the average tariff measure are the actual import shares, whereas the weights in the TRI are the marginal costs of the tariffs evaluated at an intermediate price vector.[2]

A major obstacle to implementing the TRI is that the requisite tariff weights are not observable in practice. Thus, there is a substantial gap between the ideal tariff index in theory and that which is computationally feasible. For example, Anderson and Neary implement the concept of the TRI using a computable general equilibrium model to find the single uniform tariff that replicates the welfare cost of divergent duties across different goods. Unfortunately, there are daunting obstacles to calculating the TRI in this way: computable general equilibrium models are data intensive and require estimates of numerous parameters, as well as critical assumptions about the structure of production and consumption.[3]

---

[2] Alternatively, the weights in the TRI are the derivatives of the balance of trade function while the weights for the average tariff are the derivatives of the trade expenditure function; see Anderson and Neary (2005, 51ff). For different attempts at reweighting the standard average tariff measure, see Lerdau (1957) and Leamer (1974).

[3] Indeed, O'Rouke (1997) finds that the TRIs computed within a CGE model are highly sensitive to the assumptions about model specification.

Feenstra (1995, 1562) shows that, under the special assumption of linear demand, a simplified TRI can be calculated without resorting to complex general equilibrium simulations. In his formulation, the TRI can be expressed as:

$$(1) \qquad TRI = [\frac{1}{2}\sum_{n} \partial Cn / \partial pn)(pntn)^2 \; / \frac{1}{2}\sum_{n} (\partial Cn / \partial pn)(pn)^2]^{1/2}$$

where the TRI is a weighted average of the squared tariff rates on each of n goods, with the weighs ($\partial C_n/\partial p_n$) being the change in import expenditures as a result of a one percent change in the price, evaluated at free trade prices. Kee, Nicita, and Olarreaga (2006) rewrite this equation as:

$$(2) \qquad TRI = [\sum_{n} sn\varepsilon ntn^2 \; / \sum_{n} sn\varepsilon n]^{1/2} \qquad ,$$

where s_n is the share of imports of good n in GDP, ε_n is the elasticity of import demand for good n, and t_n is the import tariff imposed on good n. To be theoretically consistent with the Anderson-Neary index, Kee, Nicita, and Olarreaga (2006) estimate GDP-maximizing elasticities of import demand, which measure the change in the share of good n in GDP when the price of the good increases by one percent. They use these elasticities in equation (2), along with the observed import shares to represent the marginal change in import expenditures, and thereby calculate TRIs for 88 countries using data from the 1990s.

Equation (2) is a highly simplified, partial equilibrium version of the TRI designed to capture the first-order effects of trade barriers. The measure ignores cross-price effects on import demand and other general equilibrium effects and implicitly assumes that world prices are

given.[4] Despite these simplifications, this equation for the TRI is computationally straightforward and indicates that the TRI depends on the tariff structure, the elasticities of import demand, and the share of imports in GDP.

The reduced-form TRI in equation (2) also yields a linear approximation of the static deadweight loss from tariff protection identical to that in Johnson (1960). The formula for the deadweight loss as a share of GDP is

(3) $$DWL / GDP = \frac{1}{2}\sum_{n} s_n \varepsilon_n t_n^{\,2} \quad ,$$

where the deadweight loss depends upon the weighted average of the tariff, the variance of the tariff, and the covariance of the tariff and the import demand elasticity (Kee, Nicita, and Olarreaga 2006).

3. Implementing the TRI for the United States

This section describes the calculation of a TRI for the United States for a long period of its history, for 1859 and annually from 1867 to 1961. The TRI series is calculated using a limited disaggregation of U.S. imports based on the tariff schedule, and then compared with the results using highly disaggregated import data for selected years. This annual TRI series can be compared to the existing import-weighted average tariff that also goes far back in U.S. history.

The annual data on the U.S. tariff structure are based on the classification of imports into roughly 17 categories based on the tariff schedules that were in continuous use (with some

[4] Broda, Limao, and Weinstein (2006) present some evidence that the small country assumption may not be appropriate. Dakhlia and Temimi (2006) note that the TRI is not uniquely defined for the large country case.

modifications) from the Tariff of 1883 until the 1960s. Table 1 presents the average tariff by schedule for the years 1867, 1890, 1925, and 1950.[5] Although these tariff averages mask the dispersion of rates within each tariff schedule, there is still significant variation in the average duties across the classifications. The tariff data underlying the estimates of the TRI in this paper also include two to four additional categories of imports: duty-free goods throughout the entire sample; manufactures of rayon (a new schedule starting in the Tariff of 1930); coffee and tea, which were large and taxable imports for several years after the Civil War; and duty-free goods subject to special duties starting in the 1930s.[6]

Thus, the tariff schedule for each year consists of about 16 to 18 different categories of imports. The structure of the tariff rates across these schedules is very similar over time. In other words, there was a great deal of persistence in the structure of import duties over time: the goods that received high tariffs in the late nineteenth century were the same in the mid-twentieth century as well. The Spearman rank correlation of the tariffs in effect in 1890 with those in 1910 was 0.96, 0.61 in 1920, 0.82 in 1930, 0.94 in 1940, and 0.74 in 1950.

The TRI calculation also requires estimates of elasticities of import demand. Kee, Kicita, and Olarreaga (2006) undertake the enormous task of estimating more than 375,000 tariff-line import demand elasticities (i.e., those for 4,800 goods in 117 countries) using data from 1988 to 2002. This estimation requires annual data on aggregate factor endowments as well as detailed

---

[5] Data on imports and customs revenue by tariff schedule were presented in the annual reports of the Treasury Department and also reported in the Statistical Abstract of the United States. These data can be extended back to 1867 based on the various compilations in Congressional documents (in particular, U.S. Senate 1894).

[6] Some free list commodities were subject to special duties under the Revenue Act of 1932 and Section 446 of the Tariff Act of 1930.

information on the prices and values of imports. Even then, the available time series data are so short that estimation is feasible only by exploiting a cross-country panel of data.

This data-intensive exercise is virtually impossible to replicate using historical data for the United States.[7] Rather than attempt to estimate the import demand elasticities, two approaches are taken. First, Stern, Francis, and Schumacher (1976) present a wealth of estimates of disaggregated import demand elasticities. On their table 2.3, they report the "best" elasticity estimates for categories of goods at the three-digit level that provide a reasonable match to the categories in Table 1, where they are reported. Although this approach is imperfect, these elasticities probably give a general indication about the magnitude of the elasticities across different sets of goods. Second, arbitrary values for the elasticities can be assumed and the sensitivity of the results to changes in these values can be examined. One justification for this approach is that all the elasticities estimated by Kee, Nicita, and Olarreaga (2006) fall within narrow bounds: the estimates lie almost entirely within the interval of -1 to -3.[8] Given our strong prior that the elasticities will fall between -1 and -3, a baseline assumption could be that the elasticity is -2, with robustness checks for different configurations of values.

Kee, Nicita, and Olarreaga (2006) decompose the TRI into the import-weighted tariff, the

---

[7] Lipsey (1963) presents import price and volume data for various categories of imports for the period 1879 to 1923, but these do not match up with the tariff categories. Another consideration is that the estimated elasticities depend upon a particular econometric functional form. As Marquez (1994, 1999) points out, there are various methodologies for estimating aggregate trade elasticities and each one can yield quite different results.

[8] Across all countries, the average elasticity in the sample is -2.46 with a standard deviation of 10.58. The average elasticity is more elastic for large countries, but less elastic for richer countries, and is more elastic at higher degrees of disaggregation. For the United States, the estimated elasticity at three-digit level of import disaggregation is -1.14 while at the six-digit level of disaggregation it is -1.74 (weighted average).

variance of the tariff rates, and the covariance of the tariff rates and the import demand elasticities. The TRI increases with each of these factors. When the elasticities from Stern, Francis, and Schumacher (1976) are used in calculating the TRI, the covariance between the tariffs and import demand elasticities is uniformly negative. This reflects the historically important revenue-raising function of the tariff, which implied that high tariffs were imposed on goods with low elasticities of demand, as is clearly the case with the high duties on imports of sugar, tobacco, and alcoholic beverages.[9] Alternatively, when the import demand elasticity is assumed to be uniform across import categories, the elasticity does not affect the calculation of the TRI. In this case, the covariance between the elasticities and the import tariffs is zero, an assumption that will overstates the TRI for the United States in this period.

The final ingredient is the ratio of imports to GDP.[10] This share is very small during this period (around 5 percent overall). It should be noted that "imports for consumption" are used rather than "total imports" (which include goods later reexported) and that this refers only to imports of merchandise goods and not total goods and services.

A. An Annual TRI Index

Table 2 presents the TRI calculation and other summary statistics for selected years. (The annual TRI calculations are reported in an appendix.) Figure 1 displays the TRI along with the average tariff on imports. This figure reveals that the average tariff on imports and the trade

---

[9] Customs duties provided the federal government with about half of its revenue from the Civil War until the introduction of the income tax and about 10 percent of its revenue in the 1920s, after which it fell steadily.

[10] Annual data on nominal GDP is from Johnston and Williamson (2006). Imports for consumption is also presented in U.S. Bureau of the Census (1975), series U-207.

restrictiveness index are highly correlated with a correlation coefficient of 0.93.[11] This is similar to the finding of Kee, Nicita, and Olarreaga (2006), who report a cross-sectional correlation of 0.88 between the import-weighted average tariff and the TRI for 88 countries in the 1990s. Both the average tariff and the TRI are quite volatile over time, and much of the volatility is due to the effect of changes in import prices on the ad valorem equivalent of specific duties, which constituted about two-thirds of all import duties throughout this period (Irwin 1998a).

Figure 2 shows the annual deviation of the TRI from the average tariff measure. Because the import-weighted average tariff does not capture the variance of the tariff rates across goods, the standard measure can understate the TRI by a significant margin. For the United States during this period, the TRI exceeds the average tariff by about 69 percent, on average. The deviations are relatively small when the average tariff is high. The largest deviations are found during periods of significant tariff changes, such as the 1910s and the 1930s, when tariff rates were adjusted and import price movements were large. Previous calculations have also found deviations of similar magnitudes: for the United States in 1990, Anderson and Neary (2005, 286) calculate that the TRI is about 50 percent higher than the average tariff, and Kee, Nicita, Olarreaga (2006) found that the import-weighted average tariff understates the TRI by 66 percent, on average, across many countries.[12]

This TRI calculation is based on the elasticities in Stern, Francis, and Schumacher

---

[11] The correlation between the TRI and Lerdau's (1957) fixed-weight index for 1907 to 1946 is 0.90.

[12] For the United States in the 1990s, they found that the TRI was 15.2 percent when the imported weighted average tariff was 3.9 percent, so the TRI was larger by a factor of nearly four. For the United States in 2003, Kee, Nicita, and Olarreaga (2006) find that the TRI was 5.3 percent when the average tariff was 1.6 percent.

(1976), but the TRI appears to be relatively insensitive to changes in the elasticity values across goods. For example, randomizing the elasticities between the values of -1 and -3 for the different categories never changes the TRI by more than plus or minus two percentage point.

These findings give us some perspective on the longstanding concern that the average tariff measure is significantly biased. As Rodriguez and Rodrik (2001, 316) noted: "It is common to assert . . . that simple trade-weighted tariff averages or non-tariff coverage ratios - which we believe to be the most direct indicators of trade restrictions - are misleading as indicators of the stance of trade policy. Yet we know of no papers that document the existence of serious biases in these direct indicators, much less establish that an alternative indicator 'performs' better (in the relevant sense of calibrating the restrictiveness of trade regimes)."[13] The results here suggest that the standard average tariff measure is highly correlated with the TRI, but that it understates it by a considerable (and variable) margin.

B. Annual Deadweight Loss Estimate

Table 2 reports the deadweight loss calculation for selected years. Figure 3 plots the annual deadweight loss from the tariff as a percent of GDP using the Stern, Francis, and Schumacher (1976) elasticities, and also depicts the losses with uniform elasticities of -1 and -3. During this period, the United States did not employ many non-tariff barriers on imports (such quotas) so that this should represent the bounds on the total loss as a result of trade barriers. After 1961, however, the deadweight loss from tariffs alone would be a misleading indicator of

[13] Rodriguez and Rodrik conclude that "an examination of simple averages of taxes on imports and exports and NTB coverage ratios leaves us with the impression that these measures in fact do a decent job of rank-ordering countries according to the restrictiveness of their trade regimes."

the costs of U.S. trade restrictions because of the increasing use of voluntary export restraints.[14]

Figure 3 suggests that the deadweight loss from tariffs is highest in the late nineteenth century, amounting to about one percent of GDP in the late 1860s and early 1870s. The deadweight loss declines to about one half of one percent of GDP by 1910. While the precise figure for the deadweight loss depends upon the elasticities of import demand, by the end of World War II the deadweight loss had fallen to such a low level that the elasticities do not affect the magnitude of the loss to any important degree.

How does the temporal pattern of deadweight losses conform to our understanding of the evolution of U.S. trade policy? It is not surprising that the highest costs of America's tariff policy came immediately after the Civil War. High and comprehensive duties on imports were imposed during the war and remained in place for several years after the war in order to raise revenue for the federal government. Only a tiny share of imports were allowed to enter the country without paying any duties. The welfare loss was much lower in 1859, when tariff rates were lower and much more uniform (only ad valorem duties were used from 1846 to 1860).

The first major post-Civil War change in the tariff code occurred in 1873, when coffee, tea, and other consumption items were put on the duty-free list. Because imports of these commodities were quite large (coffee and tea alone accounted for 8 percent of U.S. imports in 1870), the share of U.S. imports that entered duty free rose from less than five percent prior to 1870 to nearly 30 percent. As a result, the deadweight cost of the tariff dropped significantly in

---

[14] An export restraint on cotton textiles from Japan was negotiated in the late 1950s, and later extended to other countries, and limits on steel exports from Japan and the European Community were imposed starting in 1969. Such restrictions proliferated during the 1970s and 1980s. Limited agricultural price supports were introduced in the 1930s, but production and export subsidies did not become exceedingly large until the 1980s.

the early 1870s.

The next significant change was the McKinley tariff of 1890, which temporarily put sugar on the duty-free list, followed by the Wilson-Gorman Tariff of 1894. Both of these acts helped push up the share of duty-free imports to about 50 percent of total imports and further reduced the welfare losses from the tariff, although this was partially reversed by the Dingley Tariff of 1897. The TRI and deadweight losses fell further during the 1910s as a result of the drastically reduced duties in the Underwood tariff of 1913 and a rise in the share of duty-free imports from 40 percent to 70 percent. Increased import duties in 1922 and 1930 (the Fordney-McCumber and Hawley-Smoot tariffs, respectively) and import price deflation in the early 1930s produced a higher TRI and larger deadweight losses in the interwar period. But the decline in the U.S. tariff after the passage of the Reciprocal Trade Agreements Act of 1934 and higher import prices reversed this short-term trend (Irwin 1998a). By the late 1940s, the TRI and the deadweight losses were at extremely low levels.

Thus, many of the changes in the TRI over time have been the result of shifting large categories of imports on (and off) the duty-free list. Figure 4 shows several large discrete jumps in the share of imports that receive duty-free treatment. This suggest that the TRI and the average tariff on imports are not good measures of trade "protection" in the sense of sheltering domestic producers from import competition. Many U.S. imports do not compete with domestic production (such as coffee, tea, silk, tropical fruits, etc.) and are sometimes allowed to enter without paying any duties, depending upon the revenue requirements of the government. Thus, a substantial portion of imports may not subject to any trade limitations at all even as imports that compete with domestic producers are severely restricted. Even if the overall TRI is low, imports

of goods that affect domestic producers could still be burdened with heavy barriers. [15]

C. Aggregation Bias

The calculations presented above are based on the disaggregation of imports into 16 to 18 categories based on the tariff schedule. As a check on whether the degree of aggregation matters for the calculated TRI and deadweight losses, highly disaggregated import data were used to calculate TRIs for selected years: 1880, 1900, 1928, and 1938. These results are reported on Table 3. Rather than assign particular elasticity values of the thousands of items in the import data, a uniform elasticity of -2 has been assumed in this exercise (in each reported case in Table 3, so like comparisons are made).

The results show that disaggregation – essentially adding more variance to the tariff structure – matters a great deal for the calculated TRI and associated deadweight loss, up to a point. Moving from the simple average tariff to roughly 15+ import categories increases the TRI and the DWL by almost a factor of two in each case. However, moving from 15 categories to more than 2,000 categories increases the TRIs and DWLs somewhat more, but not much more. This seems to imply that the gains from further disaggregation are limited, at least in these cases.

D. Comparison with Other Results

How do the TRI and DWL calculations compare with other existing estimates for the

---

[15] The McKinley tariff of 1890 illustrates the distinction between overall trade restrictions and trade protection. This tariff generally increased protective tariffs on dutiable imports, such as iron and steel and textiles, but the TRI and the deadweight loss fell substantially after its enactment because it gave duty-free status to large swath of imports (Irwin 1998b). The average tariff on dutiable imports might be a better broad indicator of trade protection in the sense of assisting import-competing producers.

United States? There are only three existing estimates of the TRI for the United States, two using data from the 1990s and another from 2003, only one of which reports a deadweight loss (Table 2). For the mid-1990s, Kee, Nicita, and Olarreaga (2006) find the average U.S. tariff of about 3.2 yields a 7.4 percent TRI and a deadweight loss of about 0.04 percent of GDP. Their highly disaggregated import data yield a very high TRI for a low average tariff, but their result is generally consistent with the present finding that by the early 1960s the low level of U.S. tariffs had reduced the deadweight loss to less than one tenth of one percent of GDP.

Looking further back in history, there are several other estimates of the costs of protection for the U.S. economy, also summarized on Table 2. Stern (1964) calculated that the welfare cost of tariffs for the United States in 1951 was about 0.07 percent of GDP, somewhat higher than the TRI-based estimate here of 0.04 percent of GDP in that year. Estimates by Magee (1972) and Rousslang and Tokarick (1995) put the welfare costs of U.S. tariffs in 1971 and 1987, respectively, at 0.04 percent of GDP. And most recently, the U.S. International Trade Commission (2007) put the aggregate cost of U.S. import restrictions at 0.03 percent of GDP for 2005.[16] All of these figures are remarkably close to the cost calculations presented here for the late 1950s and early 1960s, which are about 0.04 percent of GDP.

The surprising feature of these figures is that they are so small. As Paul Krugman (1997, 127) has written: "Just how expensive is protectionism? The answer is a little embarrassing, because standard estimates of the costs of protection are actually very low. America is a case in

---

[16] For the year 2003, when the Multi-Fiber Arrangement was still in effect, the U.S. International Trade Commission (2004) estimated that the welfare gains from removing all measurable U.S. import restraints would amount to 0.2 percent of GDP. This cost grossly overstated the cost of tariffs alone because the overwhelming component of the welfare cost is the quota rents that were transferred to foreign exporters as a result of the quantitative restrictions on textiles and apparel imports.

point. . . . The combined costs of these major restrictions to the U.S. economy, however, are usually estimated at less than half of 1 percent of U.S. national income." However, what has been true for the past few decades has not always been true. In the heyday of America's high tariff policy in the late nineteenth century, the static welfare cost was closer to one percent of GDP - and the associated redistribution of income was much higher (Irwin 2006) - which is one reason why the political debate over trade policy was much more intense a century ago than today. By the mid-twentieth century, the deadweight loss was only about one-tenth of one percent of GDP, which not only makes the historical figures of one percent of GDP seem much larger, but partly explains why, after the early 1930s, trade policy was no longer a leading political issue in the country as it had been in the late nineteenth century.

Such findings have prompted economists, such as Feenstra (1992) and Panagariya (2002), to question whether the costs of protection could really be so low. A fundamental reason for the relatively low cost of protection in the United States is that it has always had a large domestic economy that was not very dependent upon international trade. Another reason is that for most of its history the United States used import tariffs as opposed to more distortionary trade policy instruments, such as import quotas and import licenses. For example, the cost of U.S. trade restrictions was much higher in the 1970s and 1980s than decade before or after because quantitative restrictions and voluntary export restraints were used to limit imports of automobiles, textiles and apparel, iron and steel, semiconductors, and other products (de Melo and Tarr 1992, Feenstra 1992). Foregone quota rents are generally orders of magnitude larger than the tariff-induced distortions to domestic resource allocation.[17] For example, from 2002 to

[17] De Melo and Tarr (1992) examined trade protection for the steel, automobiles, and textile industries in the mid-1980s and found that $14.7 billion of the $21.1 billion economic loss

2005, the International Trade Commission's (2004, 2007) estimate of the cost of U.S. import barriers fell from $14.1 billion to $3.7 billion almost entirely as a result of the expiration of the Multifiber Arrangement and consequent elimination of quota rents.

Of course, the standard static welfare estimates of the costs of protection have many well-known limitations that are worth repeating. These estimates understate the deadweight losses by ignoring the costs of rent-seeking (Krueger 1974), the dynamic gains from trade in terms of productivity improvements, the benefits of product variety (Broda and Weinstein 2004), the endogeneity of protection (Trefler 1993, Lee and Swagel 1997). On the other hand, the estimates here do not account for any improvement in the terms of trade as a result of import tariffs (Broda, Limao, Weinstein 2006). Furthermore, the low costs of protection do not imply that the gains from trade are small; indeed, the gains from trade could be enormous. Rather, it simply suggests that, in general, formal U.S. trade barriers are at a very low level.

4. Conclusions

This paper presents a simplified trade restrictiveness index for the United States during a long period in its history when import tariffs were the only major policy impediment to international trade and formal non-tariff barriers (such as import quotas) were not prevalent. The results show that the commonly used import-weighted average tariff is highly correlated with the Anderson-Neary (2005) trade restrictiveness index, although the former understates the latter by about 70 percent, on average. The paper finds the static deadweight loss from import tariffs declined secularly, from about one percent of GDP after the Civil War to less than one tenth of

---

was due to quota rents, only $6.4 billion (0.16 percent of GDP) due to the domestic distortionary cost.

one percent of GDP by the end of World War II. This decline in the welfare cost of tariffs is due to the rising share of imports that were given duty free access to the U.S. market and the decline in rates of import duty.

References

Anderson, James E., and J. Peter Neary (2005), Measuring the Restrictiveness of International Trade Policy, Cambridge: MIT Press.

Broda, Christian, and David Weinstein (2004), "Globalization and the Gains from Variety," NBER Working Paper No. 10314, February.

Broda, Christian, Nuno Limao, and David Weinstein (2006), "Optimal Tariffs: The Evidence," NBER Working Paper No. 12033, February.

Dakhlia, Sami, and Akram Temimi (2006), "An Extension of the Trade Restrictiveness Index to Large Economies," Review of International Economics, 14, 678-682.

De Melo, Jaime, and David Tarr (1992), A General Equilibrium Analysis of U.S. Foreign Trade Policy, Cambridge: MIT Press.

Feenstra, Robert C. (1992), "How Costly Is Protectionism?" Journal of Economic Perspectives 6, 159-178.

Feenstra, Robert C. (1995), "Estimating the Effects of Trade Policy." In Handbook of International Economics, Vol. 3, edited by Gene Grossman and Kenneth Rogoff. Amsterdam: Elsevier.

Irwin, Douglas A. (1998a), "Changes in U.S. Tariffs: The Role of Import Prices and Commercial Policies," American Economic Review, 88, 1015-1026.

Irwin, Douglas A. (1998b), "Higher Tariffs, Lower Revenues? Analyzing the Fiscal Aspects of the 'Great Tariff Debate of 1888,'" Journal of Economic History 58, 59-72.

Irwin, Douglas A. (2007). "Tariff Incidence in America's Gilded Age," Journal of Economic History 67, forthcoming.

Johnson, Harry (1960), "The Cost of Protection and the Scientific Tariff," Journal of Political Economy 68, 327-345.

Johnston, Louis D. and Samuel H. Williamson (2006), "The Annual Real and Nominal GDP for the United States, 1790 - Present," Economic History Services, April 1. URL : http://eh.net/hmit/gdp/

Kee, Hiau L., Alessandro Nicita, and Marcelo Olarreaga (2006), "Import Demand Elasticities and Trade Distortions," World Bank Working Paper, October.

Kee, Hiau L., Alessandro Nicita, and Marcelo Olarreaga (2006b), "Estimating Trade Restrictiveness Indices," World Bank Policy Research Working Paper No. 3840, February.

Krueger, Anne O. (1974), "The Political Economy of a Rent Seeking Society," American Economic Review 64, 291-303.

Krugman, Paul (1997), Age of Diminished Expectations, 3rd edition, Cambridge: MIT Press.

Leamer, Edward E. (1974), "Nominal Tariff Averages with Estimated Weights," Southern Economic Journal 41, 34-46.

Lerdau, E. (1957), "On the Measurement of Tariffs: The U.S. Over Forty Years," Economia Internazionale 10, 232-244.

Lee, Jong-Wha, and Phillip Swagel (1997), "Trade Barriers and Trade Flows across Countries and Industries," Review of Economics and Statistics, 79, 372-82.

Loveday, Alexander (1929), "The Measurement of Tariff Levels," Journal of the Royal Statistical Society 92, 487-529.

Magee, Stephen P. (1972), "The Welfare Effects of Restrictions on U.S. Trade," Brookings Papers on Economic Activity, 3, 645-701.

Marquez, Jaime (1994), "The Econometrics of Elasticities or the Elasticity of Econometrics: An Empirical Analysis of the Behavior of U.S. Imports," Review of Economics and Statistics 76, 471-481.

Marquez, Jaime (1999), "Long-Period Trade Elasticities for Canada, Japan, and the United States," Review of International Economics 7, 102- 116.

O'Rourke, Kevin (1997), "Measuring Protection: A Cautionary Tale," Journal of Development Economics 53, 169-83.

Panagariya, Arvind (2002), "Cost of Protection: Where Do We Stand?" American Economic Review 92, 175-179.

Rodríguez, Francisco, and Dani Rodrik (2001), "Trade Policy and Economic Growth: A Skeptic's Guide to the Cross-National Evidence." In NBER Macroeconomics Annual 2000, edited by Ben Bernanke and Kenneth S. Rogoff. Cambridge: MIT Press.

Rousslang, Donald J., and Stephen P. Tokarick (1995), "Estimating the Welfare Cost of Tariffs: The Roles of Leisure and Domestic Taxes," Oxford Economic Papers 47, 83-97.

Stern, Robert M. (1964), "The U.S. Tariff and the Efficiency of the U.S. Economy," American Economic Review 54, 459-470.

Stern, Robert M., Jonathan Francis, and Bruce Schumacher (1976), Price Elasticities in International Trade: An Annotated Bibliography, London: Macmillan.

Trefler, Daniel (1993), "Trade Liberalization and the Theory of Endogenous Protection: An Econometric Study of U.S. Import Policy," Journal of Political Economy 101, 138-60.

U.S. Bureau of the Census (1975). Historical Statistics of the United States, Bicentennial Edition. Washington, D.C.: Government Printing Office.

U.S. Department of the Treasury (1923), Annual Report, Washington, D.C.: GPO.

U.S. International Trade Commission (2004), Economic Effects of Significant U.S. Import Restraints, Publication 3701, Fourth Update, June.

U.S. International Trade Commission (2007), Economic Effects of Significant U.S. Import Restraints, Publication 3906, Fifth Update, February.

U.S. Senate (1894), "Imports and Exports. Part I. Imports from 1867 to 1893, inclusive." Senate Report No. 259, Part 1, 53rd Congress, 2nd Session, Congressional Serial Set vol. 3182.

Data Appendix

Year	Imports of merchandise for consumption (millions $)	Nominal GDP (billions $)	Imports/ GDP (percent)	Import-weighted average tariff (percent)	TRI (percent)	DWL/GDP (percent)
1859	317	4.38	7.2	15.4	17.9	-0.22
1867	378	8.33	4.5	44.6	47.0	-0.85
1868	345	8.14	4.2	46.6	49.0	-0.84
1869	394	7.85	5.0	44.8	47.6	-0.96
1870	426	7.79	5.5	44.9	47.7	-1.04
1871	500	7.68	6.5	40.5	44.6	-1.10
1872	560	8.21	6.8	38.0	43.0	-1.06
1873	663	8.68	7.6	27.9	35.6	-0.80
1874	568	8.43	6.7	28.3	35.4	-0.70
1875	526	8.05	6.5	29.4	36.2	-0.72
1876	465	8.21	5.7	31.3	38.6	-0.70
1877	440	8.27	5.3	29.2	37.0	-0.61
1878	439	8.31	5.3	29.0	37.0	-0.58
1879	440	9.36	4.7	30.3	38.1	-0.56
1880	628	10.40	6.0	29.1	37.3	-0.70
1881	651	11.60	5.6	29.8	37.4	-0.67
1882	717	12.20	5.9	30.2	37.8	-0.71
1883	701	12.30	5.7	30.0	37.7	-0.68
1884	668	11.80	5.7	28.5	35.8	-0.61
1885	579	11.40	5.1	30.8	41.3	-0.75
1886	624	12.00	5.2	30.4	37.1	-0.60
1887	680	13.00	5.2	31.5	38.0	-0.64
1888	707	13.80	5.1	30.6	37.4	-0.61
1889	735	13.80	5.3	30.0	36.9	-0.61
1890	766	15.20	5.0	29.6	40.9	-0.81
1891	845	15.50	5.5	25.7	40.4	-0.84
1892	804	16.40	4.9	21.7	41.5	-0.82
1893	833	15.50	5.4	23.9	43.7	-1.00
1894	630	14.20	4.4	20.6	40.3	-0.67
1895	731	15.60	4.7	20.4	34.0	-0.51
1896	760	15.40	4.9	20.7	32.5	-0.48
1897	789	16.10	4.9	21.9	33.4	-0.49
1898	587	18.20	3.2	24.8	38.2	-0.42
1899	685	19.50	3.5	29.5	41.6	-0.53
1900	831	20.70	4.0	27.6	38.3	-0.56
1901	808	22.40	3.6	28.9	39.5	-0.61
1902	900	24.20	3.7	28.0	41.4	-0.64
1903	1008	26.10	3.9	27.9	42.0	-0.68
1904	982	25.80	3.8	26.3	39.3	-0.52

1905	1087	28.90	3.8	23.8	37.0	-0.46
1906	1213	30.90	3.9	24.2	36.4	-0.43
1907	1415	34.00	4.2	23.3	35.0	-0.45
1908	1183	30.30	3.9	23.9	35.7	-0.43
1909	1282	32.20	4.0	23.0	36.4	-0.43
1910	1547	33.40	4.6	21.1	33.8	-0.46
1911	1528	34.30	4.5	20.3	32.6	-0.40
1912	1641	37.40	4.4	18.6	30.4	-0.34
1913	1767	39.10	4.5	17.7	29.6	-0.33
1914	1906	36.50	5.2	14.9	25.4	-0.29
1915	1648	38.70	4.3	12.5	22.3	-0.18
1916	2359	49.60	4.8	9.1	18.8	-0.13
1917	2919	59.70	4.9	7.0	16.4	-0.11
1918	2952	75.80	3.9	5.8	14.0	-0.06
1919	3828	78.30	4.9	6.2	13.5	-0.07
1920	5102	88.40	5.8	6.4	14.2	-0.09
1921	2557	73.60	3.5	11.4	19.8	-0.11
1922	3074	73.40	4.2	14.7	25.3	-0.23
1923	3732	85.40	4.4	15.2	27.4	-0.28
1924	3575	87.00	4.1	14.9	25.5	-0.22
1925	4176	90.60	4.6	13.2	24.0	-0.23
1926	4408	97.00	4.5	13.4	25.1	-0.24
1927	4163	95.50	4.4	13.8	25.8	-0.25
1928	4078	97.40	4.2	13.3	25.2	-0.23
1929	4339	103.60	4.2	13.5	25.7	-0.24
1930	3114	91.20	3.4	14.8	27.1	-0.21
1931	2088	76.50	2.7	17.8	32.0	-0.24
1932	1325	58.70	2.3	19.6	34.8	-0.23
1933	1433	56.40	2.5	19.8	35.3	-0.26
1934	1636	66.00	2.5	18.4	32.2	-0.21
1935	2039	73.30	2.8	17.5	31.2	-0.22
1936	2424	83.80	2.9	16.8	30.2	-0.22
1937	3010	91.90	3.3	15.6	27.9	-0.21
1938	1950	86.10	2.3	15.5	26.8	-0.13
1939	2276	92.20	2.5	14.4	26.5	-0.14
1940	2541	101.40	2.5	12.5	25.6	-0.14
1941	3222	126.70	2.5	13.6	29.5	-0.19
1942	2780	161.90	1.7	11.5	27.8	-0.11
1943	3390	198.60	1.7	11.6	28.2	-0.12
1944	3887	219.80	1.8	9.5	25.8	-0.10
1945	4098	223.10	1.8	9.3	26.2	-0.11
1946	4825	222.30	2.2	9.9	26.5	-0.13
1947	5666	244.20	2.3	7.6	17.8	-0.06
1948	7092	269.20	2.6	5.7	12.3	-0.03
1949	6592	267.30	2.5	5.5	10.7	-0.02
1950	8743	293.80	3.0	6.0	11.9	-0.04
1951	10817	339.30	3.2	5.5	10.0	-0.03

1952	10747	358.30	3.0	5.3	10.8	-0.03
1953	10779	379.40	2.8	5.4	10.6	-0.03
1954	10240	380.40	2.7	5.2	10.1	-0.02
1955	11337	414.80	2.7	5.6	10.8	-0.03
1956	12516	437.50	2.9	5.7	10.9	-0.03
1957	12951	461.10	2.8	5.8	10.6	-0.03
1958	12739	467.20	2.7	6.4	12.9	-0.04
1959	14994	506.60	3.0	7.0	12.1	-0.04
1960	14650	526.40	2.8	7.4	12.9	-0.04
1961	14658	544.70	2.7	7.2	12.5	-0.04

Sources: Imports for consumption: U.S. Bureau of the Census (1975), series U-207. Nominal GDP: Johnston and Williamson (2006). Import-weighted average tariff: U.S. Bureau of the Census (1975), series U-211.

Note: The elasticity values reported in Table 1 are used in the calculation of the TRI and the DWL.

Table 1: Average Import Duties (percent) and Import Demand Elasticities, by Tariff Schedule, selected years

	1867	1890	1925	1950	Elasticity of Import Demand
Schedule A Chemicals, oils, paints	34.6	32.0	29.3	15.5	-2.53
Schedule B Earthenware and glassware	45.8	57.2	43.5	26.5	-2.85
Schedule C Metals and manufactures	27.2	35.4	34.3	13.0	-1.68
Schedule D Wood and manufactures	21.8	16.1	22.4	3.6	-1.40
Schedule E Sugar, molasses, & manufactures	68.7	63.0	62.8	10.5	-0.66
Schedule F Tobacco & manufactures	130.6	80.1	50.7	24.8	-1.13
Schedule G Agricultural products	26.9	25.6	23.3	10.7	-1.13
Schedule H Spirits, wines, & beverages	119.5	68.5	42.4	25.1	-1.64
Schedule I Cotton manufactures	40.1	39.9	30.7	23.8	-3.94
Schedule J Flax, hemp, jute, & manufactures	35.1	25.3	17.9	6.4	-1.14
Schedule K Wool & manufactures	50.7	61.0	43.7	23.9	-3.92
Schedule L Silk & silk goods	58.6	49.5	53.1	30.6	-3.92
Schedule M Pulp, paper, & books	30.7	19.3	23.6	9.9	-0.69
Schedule N Sundries	32.4	24.7	38.3	18.2	-1.66

Source: for years 1867 to 1889: U.S. Senate (1894), for years 1890 to 1961, annual report of the U.S. Department of Treasury and Statistical Abstract of the United States. Elasticities of import demand are from Stern, Francis, and Schumacher (1976), table 2.3, p. 22. The import demand elasticity for duty-free imports is -1.66.

Table 2: Average Tariffs, Trade Restrictiveness Indices, and Welfare Losses, selected years

	Average Tariff on Total Imports	Average Tariff on Dutiable Imports	Coefficient of Variation of Tariff Rates	Share of Imports Duty Free	Merchandise Imports/GDP Ratio	TRI	DWL (millions)	DWL/GDP (percent)
1859	15.4	19.6	0.38	21.1	7.2	17.9	$9.4	0.22
1867	44.6	46.7	0.65	4.5	4.5	47.0	$71	0.85
1875	29.4	40.7	0.53	27.8	6.5	36.2	$58	0.72
1885	30.8	46.1	0.57	33.2	5.1	41.2	$86	0.75
1890	29.6	44.6	0.55	33.7	5.0	40.9	$123	0.81
1900	27.6	49.5	0.55	44.2	4.0	38.3	$116	0.56
1910	21.1	41.6	0.55	49.2	4.6	33.8	$153	0.46
1922	14.7	38.1	0.52	61.4	4.2	25.2	$167	0.23
1929	13.5	40.1	0.54	66.4	4.2	25.7	$244	0.24
1931	17.8	53.2	0.63	66.7	2.7	32.0	$180	0.24
1938	15.5	37.8	0.48	60.7	2.3	26.8	$115	0.13
1946	10.3	25.3	0.70	61.0	2.2	26.5	$292	0.13
1950	6.1	13.1	0.58	54.5	3.0	11.9	$105	0.04
1960	7.2	12.2	0.61	39.5	2.8	12.9	$208	0.04

Other TRI Estimates

	Average Tariff on Total Imports	Average Tariff on Dutiable Imports	Standard Deviation of Tariff	Share of Imports Duty Free	Imports/GDP	TRI	DWL (millions)	DWL/GDP (percent)
1990	4.0	5.0	4.1	32.8	8.5	6.1	NA	NA
mid 1990s	3.2	≈5.0	6.1	≈35	≈8.5	7.4	$4,738	0.04
2003	1.6	4.9	NA	67.9	11.4	5.3	NA	NA

1990: Anderson and Neary (2005, 286), general equilibrium, assumed elasticities of substitution, 1200 import categories, two composite final goods, no quotas.
mid 1990s: Kee, Nicita, and Olarreaga (2006), partial equilibrium, estimated import demand elasticities, 4625 tariff lines, does not include import quotas
2003: Kee, Nicita, and Olarreaga (2006b), partial equilibrium, estimated import demand elasticities, 4625 tariff lines, does not include import quotas

Non-Comparable Estimates

	Average Tariff on Total Imports	Average Tariff on Dutiable Imports	Standard Deviation of Tariff	Share of Imports Duty Free	Imports/GDP	TRI	DWL (millions)	DWL/GDP (percent)
1951	5.5	12.5	NA	55.4	3.2	NA	$238	0.07
1971	6.1	9.2	NA	33.6	4.0	NA	$493	0.04
1985	3.8	5.5	NA	30.9	8.1	23.7	NA	NA
1987	3.5	5.2	NA	32.9	8.5	NA	$1,900-3,000	0.04-0.06
2005	1.4	4.6	NA	69.6	13.5	NA	$3,700	0.03

1951: Stern (1964, 465), partial equilibrium, tariffs only, no terms of trade effects, does not include import quotas
1971: Magee (1972, 666), partial equilibrium, tariffs only, no terms of trade effects, does not include import quotas
1985: de Melo and Tarr (1992, 200), general equilibrium, uniform tariff yielding same welfare distortionary cost as existing import quotas (excluding rents)
1987: Rousslang and Tokarick (1995), general equilibrium, tariffs only, no terms of trade effects, does not include import quotas
2005: U.S. International Trade Commission (2007), general equilibrium, dynamic, no terms of trade effect

Table 3: Effects of Aggregation on TRIs and DWLs, selected years

Assumption: elasticity of import demand = -2.0

Year	Number of Import Lines	TRI (percent)	DWL/GDP (percent)
1880	1	29.1	-0.5
	17	37.3	-0.8
	1,290	44.2	-1.2
1900	1	27.5	-0.3
	16	39.4	-0.6
	2,390	42.7	-0.8
1928	1	13.3	-0.1
	15	24.6	-0.3
	5,505	32.5	-0.4
1932	1	19.4	-0.1
	16	40.8	-0.4
	5,248	43.8	-0.5
1938	1	15.5	-0.1
	17	25.0	-0.2
	2,882	33.8	-0.2

Source: Disaggregated import and tariff data is available in the Foreign Commerce and Navigation yearbooks published by the Department of Commerce.

Figure 1: Average Tariff on Imports and Trade Restrictiveness Index, 1867-1961

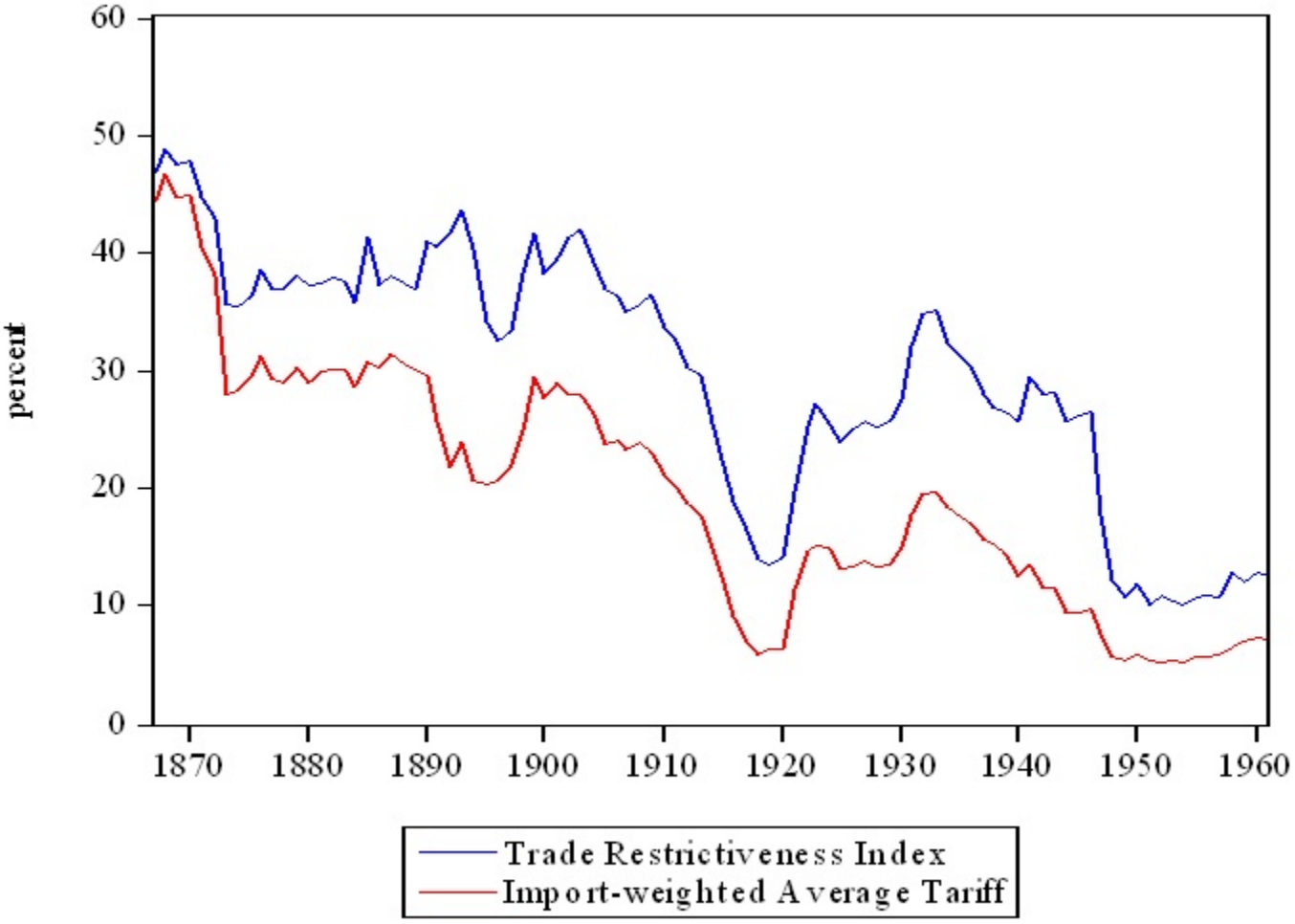
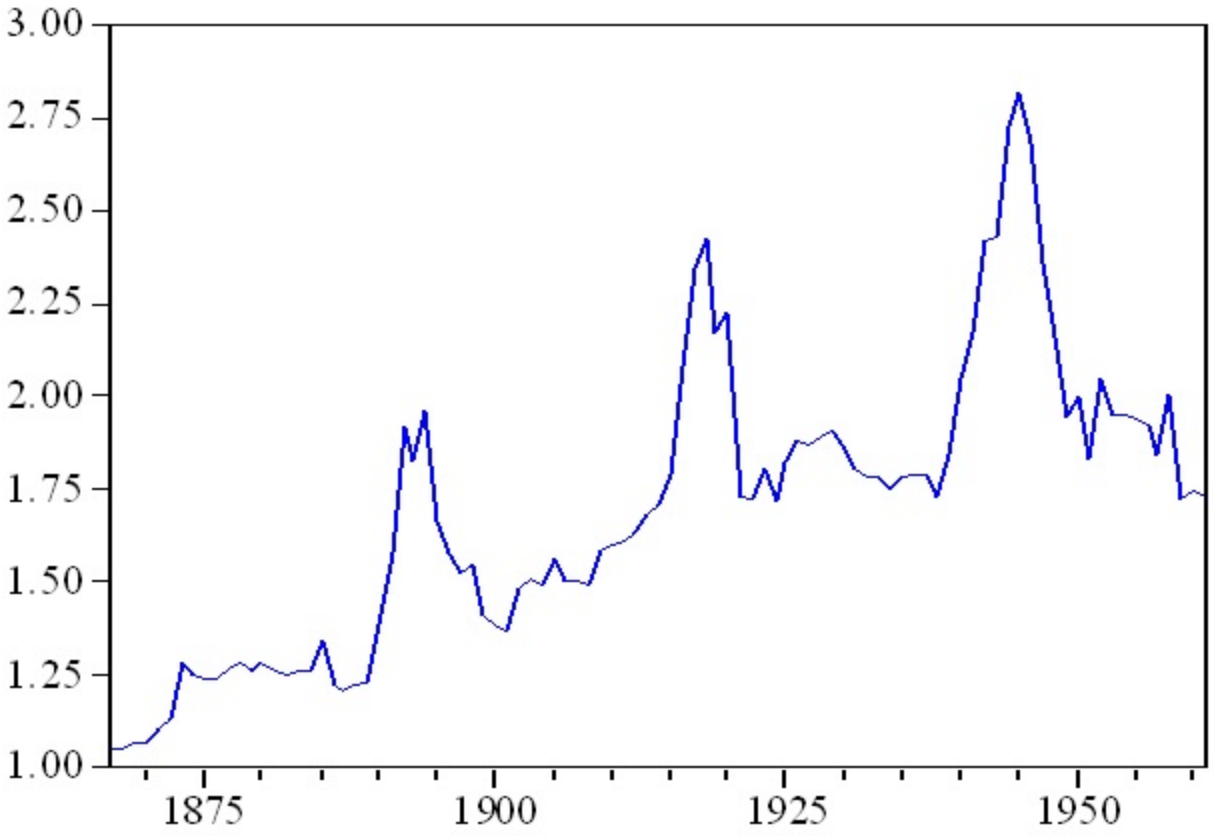


Figure 2: Ratio of Trade Restrictiveness Index to the Average Tariff, 1867-1961



Source: Calculated from data in appendix.

Figure 3: Deadweight Loss from Import Tariffs

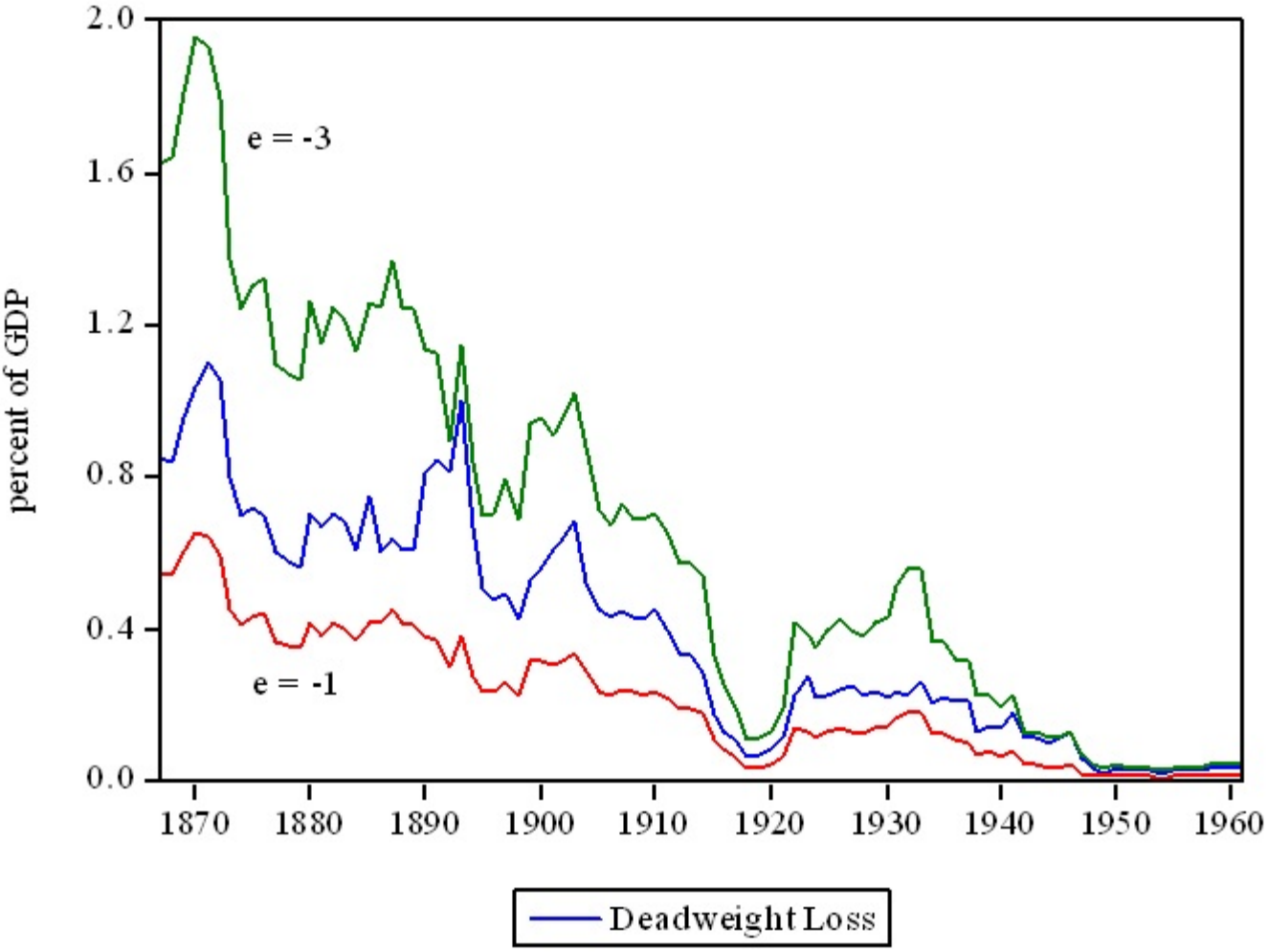
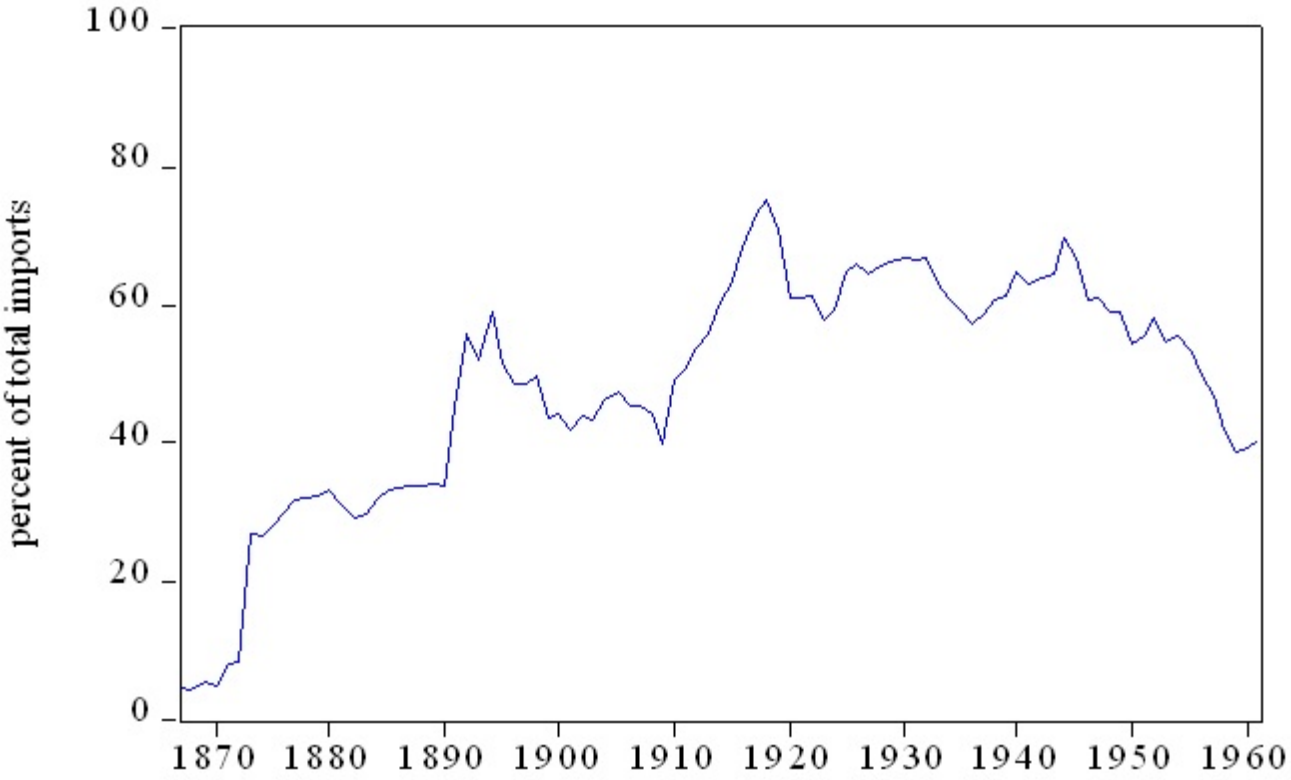


Figure 4: Share of Duty-Free Imports in Total Imports, 1867-1961



Source: U.S. Bureau of the Census (1975), series U-207, 208