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TRADE RESTRICTIVENESS AND DEADWEIGHT LOSSES FROM U.S. TARIFFS, 1859-1961

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ABSTRACT

This paper calculates the Anderson-Neary (2005) trade restrictiveness index (TRI) for the United States using nearly a century of data. The results show that the standard import-weighted average tariff understates the TRI, defined as the uniform tariff that yields the same welfare loss as the existing tariff structure, by about 75 percent. The static deadweight welfare loss from the U.S. tariff structure is about one percent of GDP after the Civil War, but falls almost continuously thereafter to less than one-tenth of one percent of GDP by the early 1960s. On average, import duties resulted in a welfare loss of 40 cents for every dollar of revenue generated, slightly higher than contemporary estimates of the marginal welfare cost of taxation.

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1. Introduction

Economists have long sought to have a single numerical measure that summarizes the stance of a country's trade policy. The easiest way 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 because it ignores 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 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.[1] 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

[1] For different attempts at reweighting the standard average tariff measure, see Lerdau (1957) and Leamer (1974).

summarizes in a single metric the effects of varying import duties in a way that the average tariff cannot.

However, there is a substantial gap between the ideal tariff index in theory and that which is computationally feasible. A major obstacle to implementing the TRI is that the requisite tariff weights - the marginal costs of the tariffs evaluated at an intermediate price vector - are not observable in practice. Therefore, Anderson and Neary calculate 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. This method of determining the TRI is daunting: 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.[2]

As an alternative, Feenstra (1995) developed a simplified partial-equilibrium version of the TRI that can be calculated without resorting to complex general equilibrium simulations. Kee, Nicita, and Olarreaga (2008, 2009) have used this approach to evaluate the trade restrictiveness of tariff policy for 88 countries in the early 2000s. They find that the TRI and the import-weighted average tariff are highly correlated (correlation coefficient of 0.75), but that the TRI is about 80 percent higher than the average tariff because of the variance in tariff rates and the covariance between tariffs and import demand elasticities. They also calculate the static deadweight loss due to existing tariff regimes and finds that the welfare costs range from zero (Singapore) up to 3.05 percent of GDP (Egypt).

Kee, Nicita, and Olarreaga provide an excellent snapshot of recent trade policies across

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

countries, but what about trade policy across time? Because of the extensive liberalization of trade policy in recent decades, the TRIs and deadweight losses are quite small for most countries, reflecting the generally low level of trade barriers. This is unlikely to have been the case as one goes back further in time, however, when trade barriers were more extensive. Unfortunately, there is little existing information about the restrictiveness of trade policy or the magnitude of the welfare costs of protection at different points in time.[3] Although historical analysis is usually hampered by the lack of readily available data, the United States has sufficient information on import duties to make feasible a rough calculation of the TRI and the resulting deadweight losses for nearly a century.

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. This period covers the classic era of high trade protectionism, when America's trade barriers were formidable, including the Smoot-Hawley tariff of 1930, through the period of trade liberalization after World War II. Throughout this period, U.S. import restrictions consisted almost exclusively of import duties, not non-tariff barriers such as import quotas or voluntary export restraints that would make a tariff-based TRI quite misleading. The results are very similar to Kee, Nicita, and Olarreaga's in two important respects: the TRI and import-weighted average tariff are highly correlated over time (correlation coefficient of 0.92), just as they were across countries, and the average tariff understates the TRI by about 75 percent, on average, similar to that found across countries.

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[3] For a non-TRI-based attempt at measuring the restrictiveness of trade policies in the early twentieth century, see Estevadeordal (1997).

The results also show how the static deadweight losses from U.S. tariffs evolved during a long period for which no estimates of the costs exist. In the decades after the Civil War, a time when the average tariff was around 30 percent, the deadweight losses from the tariff structure were considerable, amounting to about one percent of GDP. These losses fell steadily to less than one-tenth of one percent of GDP by the end of World War II. These welfare costs are relatively small largely because of the small share of trade in GDP. They declined over time because an increasing share of imports were given duty-free status and the remaining tariffs on dutiable imports were gradually reduced. Import duties also played an important public-finance role at this time; from 1867 to 1913, import duties raised about half of the federal government's revenue. The results here suggest that about 46 cents of deadweight loss were incurred for each dollar raised in revenue, making import duties only slightly less efficient than modern methods of revenue raising through income and sales taxes.

2. A Trade Restrictiveness Index for the United States

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 derivatives of the balance of trade function, which are not observable. However, Feenstra (1995, 1562) has shown that, under the special assumption of linear demand, a simplified TRI can be expressed as:

$$(1) \qquad TRI = \left[\frac{1}{2}\sum_n \partial C_n / \partial p_n)(p_n \tau_n)^2 \; / \; \frac{1}{2}\sum_n (\partial C_n / \partial p_n)(p_n)^2\right]^{1/2} \quad ,$$

where the TRI is a weighted average of the squared tariff rates on each of n goods (τ_n), with the weights ($\partial C_n/\partial p_n$) 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 (2008) rewrite this equation as:

$$(2) \qquad TRI = [\sum_n s_n \epsilon_n \tau_n^2 / \sum_n s_n \epsilon_n]^{1/2} \quad ,$$

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 τ_n is the import tariff imposed on good n.

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 interactions and implicitly assumes that world prices are given.[4] Despite these simplifications, this expression for the TRI has the virtue of being computationally straightforward and depends on the tariff structure, the elasticities of import demand, and the share of imports in GDP.

A. Historical Data on U.S. Import Tariffs

In this paper, a TRI is calculated using a limited disaggregation of U.S. imports based on the tariff schedule from 1867 to 1961. The annual data are based on the classification of imports into roughly 17 categories based on the tariff schedules that were in continuous use (with some

[4] Dakhlia and Temimi (2006) note that the TRI is not uniquely defined for the large country case.

minor modifications) from the Tariff of 1883 until the 1960s.[5] (Later in the paper, the results will be compared with the results using highly disaggregated import data for selected years.) Data on imports and customs revenue by tariff schedule were presented in the Annual Report of the Treasury Department and in the Statistical Abstract of the United States. These data can be extended back to 1867 based on various compilations in Congressional documents (in particular, U.S. Senate 1894). The antebellum trade data do not fit neatly into the categories set up in the 1883 tariff, but this has been done for 1859 to provide a comparison with the pre-Civil War period.[6] The U.S. government stopped reporting these data in 1961, hence this terminal point. In fact, calculating a tariff-based TRI after this year would be problematic because of the use of quantitative restrictions (import quotas and voluntary export restraints) as a part of U.S. trade policy from the late 1960s until the expiration of the Multifiber Arrangement in 2005.[7]

Table 1 presents the average tariff by schedule for the years 1867, 1890, 1925, and 1950. Although these tariff averages mask the dispersion of rates within each tariff schedule, there is

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

[6] The results for 1859 should be representative of the entire period from 1846 until that year because the Walker Tariff of 1846 was only changed slightly in 1857 and included only eight different ad valorem rates of duty, thereby minimizing tariff variance.

[7] The Multifiber Arrangement restricted developing country exports of textiles and apparel. A Short-Term Arrangement restricting cotton textiles exports from developing countries was instituted in 1961, and was replaced by the Long-Term Arrangement in 1962 and the Multifiber Arrangement (MFA) in 1974. In addition, voluntary restraint agreements on imported steel were negotiated in the late 1960s and persisted until the early 1990s. By contrast, import quotas and export restraint arrangements were extremely rare prior to this time.

still significant variation in the average duties across the classifications. However, the structure of the tariff rates across these schedules was persistent over time, i.e., 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.

B. Elasticities of Import Demand

The TRI calculation also requires estimates of elasticities of import demand.[8] Unfortunately, estimating these elasticities is virtually impossible for the period considered by this paper because disaggregated import price and quantity data either do not exist or do not match up with the tariff categories.[9] Rather than attempt to estimate the import demand elasticities, existing studies of these elasticities must be turned to. Stern, Francis, and Schumacher (1976) present a wealth of disaggregated import demand elasticities from different studies estimated for sample periods ranging from the 1950s through the early 1970s. They

[8] To be theoretically consistent with the Anderson-Neary index, Kee, Nicita, and Olarreaga (2008) 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.

[9] Lipsey (1963) presents import price and volume data for various categories of imports for the period 1879 to 1923, but they 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. Kee, Kicita, and Olarreaga (2008) 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 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.

report the "best" elasticity estimates for categories of goods at the three-digit SITC level that provide a reasonable match to the tariff classification in Table 1, where they are reported (column A). The TRI calculations using these best-guess estimates will be considered as a benchmark. The results will be compared with those using the import demand elasticities estimated by Shiells, Stern, and Deardorff (1986), Ho and Jorgenson (1994), and Kreinin (1973) in columns B, C, and D, respectively. These alternative elasticity estimates are also reported at a level of aggregation that comes close to matching the tariff categories used here.

There is no doubt that this approach is a highly imperfect substitute for estimating historical elasticities. The import demand elasticities could have changed a great deal over time, due to changes in consumer preferences and the availability of different goods. And yet there are two reason why the lack of good historical elasticity estimates should not preclude an attempt at the calculation of a historical TRI. First, the existing estimates probably give a reasonably good indication about the general size of the elasticities across different sets of goods. Most of the different estimates of import-demand elasticities are similar in magnitude across goods, and most tend to fall within a fairly tight distribution, usually on the narrow interval from -1 to -3.[10] In addition, aggregate trade elasticities estimated for historical periods are roughly comparable in magnitude with the estimates for more recent periods.

Second, it turns out that the calculated TRI is very insensitive to the elasticities used. Anderson and Neary (2005, 293) observe that varying the elasticities is "not very influential" in

[10] Even the highly disaggregated import demand elasticities estimated by Kee, Nicita, and Olarreaga (2008) mainly fall within these narrow bounds. They find that the estimated (weighted average) elasticity for the United States at a three-digit level of import disaggregation is -1.14 while at the six-digit level of disaggregation it is -1.74.

affecting the TRI because, as equation (2) indicates, the elasticities appear in both the numerator and denominator and hence cancel each other out.[11] Indeed, the component of the TRI that depends upon the elasticities is very small in the U.S. case. As Kee, Nicita, and Olarreaga note, the TRI can be decomposed into three components: the average tariff, the variance of the tariff, and the covariance of the tariff rates and the elasticities of import demand. This can be expressed as:

$$(3) \qquad TRI = \left[\bar{\tau}^2 + \sigma^2 + \rho\right]^{\frac{1}{2}},$$

where $\bar{\tau}^2$ is the import-weighted average tariff, σ is the import-weighted variance of the tariff rates ($\sum s(\tau - \bar{\tau})^2$, and $\rho = \text{cov}(\epsilon_n/\bar{\epsilon}, \tau^2)$, where $\epsilon_n/\bar{\epsilon}$ is the import-weighted average elasticity (i.e., the elasticity for good n, re-scaled by the average elasticity). The trade-restrictiveness of a system of tariffs is increasing in the average tariff, the variance of the tariff rates, and the covariance of the tariffs and the import-demand elasticities (i.e., trade is more restricted when higher duties are imposed on imports for which demand is more elastic). The import-demand elasticities only matter for the covariance term and, in practice, as we shall see, the covariance is a very small factor relative to the average tariff and variance of the tariff in determining the TRI. In other words, we can still come up with a reasonable approximation of the TRI even without good information about the elasticities.

The final ingredient is the ratio of imports under each tariff classification to GDP.[12] The

[11] In their general equilibrium model, with CES preferences for final goods, the TRI is a function of the mean and variance of the tariffs alone, and both of these are independent of the elasticities, which therefore do not matter at all.

[12] Annual data on nominal GDP is from Johnston and Williamson (2006).

total share is very small during the period from 1867 to 1961, about 5 percent on average. It should be noted that "imports for consumption" are used rather than "total imports" (which include goods later reexported) and that this includes only imports of merchandise goods and not total goods and services.

C. An Annual TRI Index

Table 2 presents the benchmark TRI calculation, denoted TRI-A for its use of the Stern, Francis, and Schumacher (1976) "best" estimates of elasticities in column A of Table 1, and other summary statistics for selected years.[13] Figure 1 displays TRI-A broken out by the three components in equation 3. The lower line is the TRI calculated as simply the standard import-weighted average tariff. The next lines add tariff variance and the tariff-elasticity covariance to the TRI. The tariff variance contributes most to the TRI beyond the average tariff, while the covariance term is very small in comparison. Thus, the TRI depends almost entirely upon the mean and variance of the tariff rates, which are independent of the import demand elasticities, rather than the covariance of the tariff rates and elasticities. If the covariance between the tariff rates and the elasticities is positive, the TRI is slightly higher than the average tariff and tariff variance; if the covariance is negative, the TRI is slightly lower than the average tariff and tariff variance. For nearly a third of the sample, concentrated in the late nineteenth century, the covariance between the tariffs and import demand elasticities is negative. This may reflect the historically important revenue-raising function of the tariff, which implies that high tariffs should be imposed on goods with low elasticities of demand, as is clearly the case with the high

[13] The annual TRI calculations are reported in an appendix.

duties on imports of sugar, tobacco, and alcoholic beverages.[14]

The TRI-A is highly correlated with the standard import-weighted average tariff. The correlation coefficient is 0.92, similar to the 0.75 correlation coefficient between the average tariff and the TRI across many countries in the early 2000s found by Kee, Nicita, and Olarreaga (2008).[15] 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-A from the average tariff measure. Because the import-weighted average tariff does not include the variance of the tariff rates across goods, the average tariff can understate the TRI by a significant margin. Over this period, TRI-A exceeds the average tariff by about 75 percent, on average. Other calculations have found deviations of similar magnitudes: Anderson and Neary (2005, 286) calculate that the TRI is about 50 percent higher than the average tariff for the United States in 1990, and Kee, Nicita, Olarreaga (2008, 679) found that the TRI is about 80 percent higher than the import-weighted average tariff, on average, across many countries. In this case considered here, 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. In addition, the

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[14] 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.

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

deviations are relatively small when the average tariff is high, but become more pronounced when the average tariff is relatively low.

Figure 3 displays the different calculations of the TRI based on the four estimates of elasticities from Table 1. The TRI estimates are very close in magnitude and only occasionally deviate from one another by more than 5 percentage points. Once again, this is due to the fact that the TRI depends almost entirely on the mean and the variance of tariff rates, rather than the tariff-elasticity covariance. This figure reveals that the average tariff on imports and all the TRIs are highly correlated. The correlation coefficient of the average tariff and the calculated TRI are 0.83 for TRI-B, and 0.88 for TRI-C, and 0.93 for TRI-D.

These findings give us some perspective on the longstanding concern that the average tariff measure is significantly biased. As Rodríguez 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)."[16]

The results here suggest that the standard average tariff measure is highly correlated with a better measure of trade restrictiveness, but that it understates it by a considerable margin. Therefore,

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[16] Rodríguez 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 conclusion of this exercise is that calculating something like a TRI is useful because the average tariff ignores the variance in tariff rates across different goods.

3. The Annual Deadweight Loss from U.S. Tariffs

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

$$(4) \qquad DWL / GDP = \frac{1}{2}\sum_{n} s_n \varepsilon_n \tau_n^{\,2} \ .$$

Kee, Nicita, and Olarreaga (2008) show that this formula can be divided into the three elements that define the TRI, namely, the tariff average, the tariff variance, and the tariff-elasticity covariance:

$$(5) \qquad DWL / GDP = \frac{1}{2}\bar{\tau}^{2}\bar{\varepsilon} + \frac{1}{2}\sigma^{2}\bar{\varepsilon} + \frac{1}{2}\rho\bar{\varepsilon} \ .$$

Unlike the TRI, the calculated deadweight loss is sensitive to the elasticities of import demand. However, it is sensitive to the average elasticity, not so much to the covariance between the tariffs and the elasticities, which once again will be a small component of the calculation.

The standard static welfare calculation of the costs of protection have many well-known limitations that are worth repeating. They ignore general equilibrium and cross-price effects. The calculations understate the deadweight losses by ignoring the costs of rent-seeking (Krueger

1974), the dynamic gains from trade in terms of productivity improvements (Pavcnik 2002), the benefits of product variety (Broda and Weinstein 2004), and the endogeneity of protection (Trefler 1993, Lee and Swagel 1997). On the other hand, the calculation may overstate the deadweight losses because they do not account for any improvement in the terms of trade as a result of import tariffs (Broda, Limão, Weinstein 2008). Still, with these caveats in mind, such welfare calculations are still routinely made and it should be interesting to see how historical estimates compare with more recent estimates.

A. Historical Calculations for the United States

Table 2 reports the deadweight loss calculation for selected years. Figure 4 plots the annual deadweight loss from the tariff as a percent of GDP using the three components in equation 5. Once again, the average tariff and the tariff variance dominate the deadweight loss (DWL) calculation, and the contribution of the tariff-elasticity covariance is negligible. The figure suggests that the DWL from tariffs was highest in the late nineteenth century, amounting to about one percent of GDP in the late 1860s and early 1870s. By 1910, the DWL declined to about one half of one percent of GDP. By the end of World War II, the DWL had fallen to almost negligible levels.

Figure 5 shows the variation in the DWL calculation depending upon the different elasticities used. These calculations are bounded by DWLs that assume average elasticities of -1 and -3. Therefore, without solid information on the average elasticity of import demand, one cannot have a great deal of confidence in a precise figure that accurately represents the DWL of the tariffs at any given moment. The figure indicates that it is more appropriate to refer to a

broad range within which the welfare loss is likely to fall. For example, in the late nineteenth century (the 1880s and 1890s), the calculated deadweight loss falls in the range of 0.5 to 0.9 percent of GDP. This range, however, narrows considerably with time; by the 1920s, the differences in the calculations are negligible. As noted earlier, the United States did not employ many non-tariff barriers on imports (such quantitative restrictions) during this long period so that these figures should represent a reasonable confidence interval on the total static deadweight loss as a result of trade barriers.[17]

How does the time-series pattern of deadweight losses contribute to our understanding of the evolution of U.S. trade policy? It is not surprising that the highest costs of U.S. tariff policy came immediately after the Civil War, the heyday of America's late nineteenth century high-tariff policy. 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.[18] Only a tiny share of imports was allowed to enter the country without paying any duties. If the static welfare cost was about one percent of GDP, the associated redistribution of income was obviously much higher - at about eight percent of GDP, according to Irwin (2007). This large redistribution and associated deadweight loss may be one reason why the political debate over trade policy was much more intense in the late nineteenth century than it has been since. By the mid-twentieth century, the deadweight loss had fallen to about one-tenth of one

[17] Of course, as noted earlier, after 1961, the deadweight loss from tariffs alone would be a misleading indicator of the costs of U.S. trade restrictions because of the increasing use of export restraints agreements, first in textiles and steel and later other goods.

[18] 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).

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. Simply put, the economic stakes were no longer as high.

The first major change in the tariff code after the Civil War 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 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 Smoot-Hawley tariffs, respectively) and import price deflation in the early 1930s produced a higher TRI and somewhat larger deadweight losses in the interwar period. Given the attention to trade protection in the interwar period, however, the increase in the deadweight loss is relatively small in comparison to the late nineteenth century. Indeed, although the imposition of the Smoot-Hawley tariff in 1930 and import price deflation helped increase the TRI from 26 percent

in 1929 to 35 percent in 1933, the DWL rises only slightly and generally remains around 0.23 percent of GDP. This figure is small primarily because dutiable imports as a share of GDP were just 1.4 percent of GDP in 1929, prior to the tariff increases, while total imports (dutiable and duty free) were only 4.1 percent of GDP. But the decline in the U.S. tariff due to higher import prices and the liberalization brought about by the Reciprocal Trade Agreements Act of 1934 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 big changes in the TRI and DWLs over time have been the result of shifting large categories of imports on (and off) the duty-free list. Figure 6 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 often 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 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.[19]

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[19] 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 because the legislation 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.

B. Comparison to Recent Calculations

How do the historical DWL calculations compare with more recent estimates for the United States? Kee, Nicita, and Olarreaga (2008) report the only available TRI-based DWL calculation for the United States for the early 2000s. They find that the import-weighted average tariff of 3.0 percent and the TRI-equivalent of 10.7 percent produces a deadweight loss of about $11 billion, or 0.09 percent of GDP (2004). This result is 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.

Other non-TRI-based estimates of the costs of protection for the U.S. economy, which are also summarized on Table 2, also provide a comparison to the estimates here and bring them up-to-date. Figure 7 compares the estimates presented in this paper with the scattered existing calculations over recent years and illustrate how the figures for the 1950s and early 1960s converge to the more recent estimates. Stern (1964) was the first person ever, to my knowledge, to calculate the welfare cost of tariffs for the United States. For the year 1951, he found that the cost was about 0.05 percent of GDP, virtually identical to the TRI-based estimate here of 0.04 percent of GDP. 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.[20]

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[20] For the year 2003, when the Multifiber 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

All of these later figures are remarkably close to the cost calculations presented for the late 1950s and early 1960s. Thus, the long time-series of estimates here augments the small handful of deadweight loss calculations for recent years and provides nearly a century's perspective of how the costs have declined over time to arrive at their currently low level.

A surprising feature of these recent figures is their small size. 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 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."

Of course, what has been true in recent decades has not always been true. Still, such findings have prompted economists, such as Feenstra (1992) and Panagariya (2002), to question whether the costs of protection could really be so low.

There are two fundamental reasons for the relatively low cost of protection reported here. First, the United States has always had a large domestic economy that was not very dependent upon international trade. The ratio of merchandise imports to GDP has historically been very low in comparison to other countries, at about 6 percent, even during the post World War II period when import tariffs were low. Only since the early 1970s did the U.S. import share begin to increase to its current level of about 14 percent.

Second, for most of its history, the United States has not used highly distortionary trade policy instruments, such as import quotas and import licenses, to block trade. Instead, it has

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restrictions on textiles and apparel imports.

usually employed import tariffs, which - compared with the alternatives - are a much more efficient method of restricting trade. The problem with import quotas is that the foregone quota rents are orders of magnitude larger than the tariff-induced distortions to resource allocation. For example, the cost of U.S. trade restrictions was much higher in the 1970s and 1980s than decades before or after because quantitative restrictions and voluntary export restraints were used to limit imports of textiles and apparel, automobiles, iron and steel, semiconductors, and other products (de Melo and Tarr 1992, Feenstra 1992).[21] The most costly measure was the Multifiber Arrangement (MFA) that restricted developing country exports of textiles and apparel and generated large quota rents. From 2002 to 2005, the International Trade Commission's 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 MFA as a result of the Uruguay Round negotiations.

Finally, it should be emphasized that the low costs of protection do not imply that the gains from trade are small; indeed, the gains from trade could be enormous. Rather, these results simply suggests that, in general, formal U.S. trade barriers have been at a very low level in recent decades.

C. Aggregation Bias

The calculations presented above indicate that the mean and variance of tariffs are the most important contributing factors to the TRI and DWL. The precise results have been based

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

on the disaggregation of imports into 16 to 18 categories in the tariff schedule. However, as one further disaggregates the tariff code, the variance of tariffs is likely to increase, as Arce and Reinert (1994) suggest. As a check on the extent to which aggregation matters for the calculated TRI and DWLs, the most highly disaggregated import data available was used in calculations for selected years (1880, 1900, 1928, and 1938). These results are reported on Table 3. Rather than assign a particular elasticity value to each of the thousands of items in the import data, a uniform elasticity of -2 has been assumed in each case reported in Table 3 to ensure comparability. When the elasticities of import demand are assumed to be uniform across import categories, the tariff-elasticity covariance is implicitly set to zero (in which case the particular elasticity chosen does not affect the calculation of the TRI). As noted earlier, the tariff-elasticity covariance is only a tiny component of the TRI and for much of the early sample the covariance is negative, meaning that assuming a zero covariance between the elasticities and the import tariffs will slightly overstate the TRI in earlier samples and slightly understate it in later samples.

The results show that disaggregation – essentially adding more variance to the tariff structure – matters a great deal for the TRI and DWL, but only up to a point. Moving from the simple average tariff to about 16 import categories increases the TRI and the DWL by almost a factor of two in each case. However, moving from 16 categories to more than 2,000 categories increases the TRIs and DWLs somewhat more, but not much more. This seems to imply limited gains from further disaggregation, at least in these cases. Yet is also suggests that any particular calculation that does not disaggregate to the fullest possible extent will understate, to some extent, the TRI and DWL.

D. Average Welfare Cost per Dollar of Revenue

From 1867 until the introduction of the income tax in 1913, import duties raised about half of the revenue received by the federal government. The important role of the tariff in public finance raises the question of its efficiency as a revenue-raising tax. Figure 8 presents the average DWL incurred from import duties per dollar revenue raised by those duties. The average welfare cost per dollar of revenue for this period is 46 cents for 1867-1913 and 40 cents for 1867-1961. (The pre-Civil War tariff code (1859) was highly efficient in having a welfare cost per dollar of revenue of just about 20 cents.) The spike in the figure around 1890 is due to the McKinley tariff of that year, which reduced the tax base (dutiable imports) and raised tax rates. Behind these average figures is a great deal of variance in the average welfare cost across different sections of the tariff schedule. Imports that were taxed a low or moderate rates (metals, leather) had welfare costs of about 20 to 30 cents per dollar revenue, while highly taxed imports (silk, spirits) had welfare costs of 80 cents or more per dollar revenue.

While there does not appear to be any historical estimates of the excess burden associated with taxes a century ago, this figure can be compared - with caution - to contemporary estimates of the marginal welfare cost of taxation.[22] There are many estimates of the marginal excess burden per additional dollar of tax revenue in the public finance literature, but those of Ballard, Shoven, and Whalley (1985) have been widely cited in the case of the United States. Their central estimate is 33 cents per dollar of revenue, but the estimates range from 17 cents to 56 cents, depending upon the elasticity of labor supply and the savings elasticity. In their central

[22] Rousslang (1987) compares the revenue costs of U.S. tariffs in the 1980s with other taxes.

case, the marginal excess burden is 46 cents for capital taxes, 23 cents for labor taxes, 31 cents for income taxes, and 39 cents for consumer sales taxes.

While the average welfare cost per dollar revenue a century ago is roughly comparable to the marginal welfare cost more recently, any direct comparison is problematic. In particular, the average cost of tariffs is likely to be significantly lower than the marginal cost of those tariffs, invalidating the comparison. Still, although in principle a consumption or sales tax should raise more revenue with less distortion than a tariff, import duties were probably much easier to collect and enforce in the late nineteenth century than other methods of taxation.

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 it understates the index by about 75 percent, on average. This reinforces the conclusion that the variance of the tariff rates is a key consideration in the restrictiveness of a country's trade regime.

In addition, the paper presents annual estimates of static deadweight loss from the U.S. tariff code for nearly a century. These annual calculations stand in sharp contrast to the isolated handful of estimates for individual years in the post-World War II period. Unlike the low deadweight loss estimates in recent decades, the results here indicate that the losses were quite large in the years immediately after the Civil War, at about one percent of GDP. Since then, they

have declined secularly to less than one tenth of one percent of GDP by the end of World War II. This decline in the welfare cost of U.S. import tariffs is due to the rising share of imports that were given duty free access to the domestic market and the decline in rates of import duty. Historically, the cost of protection has been low for the United States because international trade has been a relatively small part of the overall economy and import tariffs are much less distortionary than other trade interventions, such as import quotas or import licences. In addition, import duties seems to have been a relatively efficient means of raising revenue: the average welfare cost per dollar revenue raised was about 40 cents during the period considered in this paper, somewhat higher than current estimates for the modern tax system.

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Data Appendix

Year	Imports of merchandise for consumption (millions $)	Nominal GDP (billions $)	Imports/ GDP	Import-weighted average tariff (percent)	TRI (A)	DWL/GDP (percent)
1859	317	4.38	7.2	15.4	18.4	-0.26
1867	378	8.33	4.5	44.6	47.6	-1.08
1868	345	8.14	4.2	46.6	51.4	-1.10
1869	394	7.85	5.0	44.8	50.1	-1.25
1870	426	7.79	5.5	44.9	49.9	-1.33
1871	500	7.68	6.5	40.5	47.9	-1.49
1872	560	8.21	6.8	38.0	46.4	-1.49
1873	663	8.68	7.6	27.9	38.8	-1.13
1874	568	8.43	6.7	28.3	38.9	-0.99
1875	526	8.05	6.5	29.4	39.6	-1.02
1876	465	8.21	5.7	31.3	42.0	-0.96
1877	440	8.27	5.3	29.2	40.4	-0.81
1878	439	8.31	5.3	29.0	40.5	-0.78
1879	440	9.36	4.7	30.3	41.2	-0.74
1880	628	10.40	6.0	29.1	40.4	-0.93
1881	651	11.60	5.6	29.8	37.4	-0.69
1882	717	12.20	5.9	30.2	40.7	-0.91
1883	701	12.30	5.7	30.0	41.2	-0.92
1884	668	11.80	5.7	28.5	39.1	-0.83
1885	579	11.40	5.1	30.8	43.8	-0.96
1886	624	12.00	5.2	30.4	40.6	-0.83
1887	680	13.00	5.2	31.5	41.3	-0.87
1888	707	13.80	5.1	30.6	40.9	-0.83
1889	735	13.80	5.3	30.0	40.6	-0.85
1890	766	15.20	5.0	29.6	40.9	-0.81
1891	845	15.50	5.5	25.7	40.4	-0.85
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	52.0	-0.42
1899	685	19.50	3.5	29.5	54.6	-0.53
1900	831	20.70	4.0	27.6	52.2	-0.56
1901	808	22.40	3.6	28.9	49.3	-0.52
1902	900	24.20	3.7	28.0	53.8	-0.57
1903	1,008	26.10	3.9	27.9	52.8	-0.58

1904	982	25.80	3.8	26.3	39.3	-0.52
1905	1,087	28.90	3.8	23.8	37.0	-0.46
1906	1,213	30.90	3.9	24.2	36.4	-0.43
1907	1,415	34.00	4.2	23.3	35.0	-0.45
1908	1,183	30.30	3.9	23.9	35.7	-0.43
1909	1,282	32.20	4.0	23.0	36.4	-0.43
1910	1,547	33.40	4.6	21.1	33.8	-0.46
1911	1,528	34.30	4.5	20.3	32.6	-0.40
1912	1,641	37.40	4.4	18.6	30.4	-0.34
1913	1,767	39.10	4.5	17.7	29.6	-0.33
1914	1,906	36.50	5.2	14.9	25.4	-0.29
1915	1,648	38.70	4.3	12.5	22.3	-0.18
1916	2,359	49.60	4.8	9.1	18.9	-0.13
1917	2,919	59.70	4.9	7.0	16.4	-0.11
1918	2,952	75.80	3.9	5.8	14.0	-0.06
1919	3,828	78.30	4.9	6.2	13.5	-0.07
1920	5,102	88.40	5.8	6.4	14.2	-0.09
1921	2,557	73.60	3.5	11.4	19.8	-0.11
1922	3,074	73.40	4.2	14.7	25.3	-0.23
1923	3,732	85.40	4.4	15.2	27.4	-0.28
1924	3,575	87.00	4.1	14.9	25.5	-0.22
1925	4,176	90.60	4.6	13.2	24.0	-0.23
1926	4,408	97.00	4.5	13.4	25.1	-0.24
1927	4,163	95.50	4.4	13.8	25.8	-0.25
1928	4,078	97.40	4.2	13.3	25.2	-0.23
1929	4,339	103.60	4.2	13.5	25.7	-0.24
1930	3,114	91.20	3.4	14.8	27.5	-0.22
1931	2,088	76.50	2.7	17.8	32.0	-0.24
1932	1,325	58.70	2.3	19.6	34.8	-0.23
1933	1,433	56.40	2.5	19.8	35.3	-0.26
1934	1,636	66.00	2.5	18.4	32.2	-0.21
1935	2,039	73.30	2.8	17.5	31.2	-0.22
1936	2,424	83.80	2.9	16.8	30.2	-0.22
1937	3,010	91.90	3.3	15.6	27.9	-0.21
1938	1,950	86.10	2.3	15.5	26.8	-0.13
1939	2,276	92.20	2.5	14.4	26.5	-0.14
1940	2,541	101.40	2.5	12.5	25.6	-0.14
1941	3,222	126.70	2.5	13.6	29.5	-0.19
1942	2,780	161.90	1.7	11.5	27.8	-0.11
1943	3,390	198.60	1.7	11.6	28.2	-0.12
1944	3,887	219.80	1.8	9.5	25.8	-0.10
1945	4,098	223.10	1.8	9.3	26.2	-0.11
1946	4,825	222.30	2.2	9.9	26.5	-0.13
1947	5,666	244.20	2.3	7.6	17.8	-0.06
1948	7,092	269.20	2.6	5.7	12.3	-0.03
1949	6,592	267.30	2.5	5.5	10.7	-0.02
1950	8,743	293.80	3.0	6.0	11.9	-0.04
1951	10,817	339.30	3.2	5.5	10.0	-0.03

1952	10,747	358.30	3.0	5.3	10.8	-0.03
1953	10,779	379.40	2.8	5.4	10.6	-0.03
1954	10,240	380.40	2.7	5.2	10.1	-0.02
1955	11,337	414.80	2.7	5.6	10.8	-0.03
1956	12,516	437.50	2.9	5.7	10.9	-0.03
1957	12,951	461.10	2.8	5.8	10.6	-0.03
1958	12,739	467.20	2.7	6.4	12.9	-0.04
1959	14,994	506.60	3.0	7.0	12.1	-0.04
1960	14,650	526.40	2.8	7.4	12.9	-0.04
1961	14,658	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-A are used in the calculation of the TRI and the DWL.

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

		1867	1890	1925	1950	Elasticities of Import Demand			
						A	B	C	D
Schedule A	Chemicals, oils, paints	34.6	32.0	29.3	15.5	-2.53	-7.18	-1.1	-0.97
Schedule B	Earthenware and glassware	45.8	57.2	43.5	26.5	-2.85	-2.12	-1.72	-1.37
Schedule C	Metals and manufactures	27.2	35.4	34.3	13.0	-1.68	-1.51	-1.5	-2.0
Schedule D	Wood and manufactures	21.8	16.1	22.4	3.6	-1.40	-5.44	-1.36	-0.96
Schedule E	Sugar, molasses, & manufactures	68.7	63.0	62.8	10.5	-0.66	-0.66	-1	-1.0
Schedule F	Tobacco & manufactures	130.6	80.1	50.7	24.8	-1.13	-7.57	-2.59	-1.13
Schedule G	Agricultural products	26.9	25.6	23.3	10.7	-1.13	-0.21	-0.62	-1.13
Schedule H	Spirits, wines, & beverages	119.5	68.5	42.4	25.1	-1.64	-0.70	-1	-1.0
Schedule I	Cotton manufactures	40.1	39.9	30.7	23.8	-3.94	-1.41	-1.35	-2.43
Schedule J	Flax, hemp, jute, & manufactures	35.1	25.3	17.9	6.4	-1.14	-1.41	-1.35	-2.43
Schedule K	Wool & manufactures	50.7	61.0	43.7	23.9	-3.92	-0.52	-1.35	-2.43
Schedule L	Silk & silk goods	58.6	49.5	53.1	30.6	-3.92	-0.52	-1.35	-2.43
Schedule M	Pulp, paper, & books	30.7	19.3	23.6	9.9	-0.69	-1.63	-1.2	-1.44
Schedule N	Sundries	32.4	24.7	38.3	18.2	-1.66	-1.66	-1.14	-4.44

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 (A) Stern, Francis, and Schumacher (1976), table 2.3, p. 22; (B) Shiells, Stern, and Deardorff (1986), Table 4, p. 515; (C) Ho and Jorgenson (1994), Table 1; (D) Kreinin (1973),

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 (A)	DWL/GDP (percent)
1859	15.4	19.6	0.38	21.1	7.2	15.4	0.26
1867	44.6	46.7	0.65	4.5	4.5	47.6	1.08
1875	29.4	40.7	0.53	27.8	6.5	39.6	1.02
1885	30.8	46.1	0.57	33.2	5.1	43.8	0.96
1890	29.6	44.6	0.55	33.7	5.0	40.9	0.83
1900	27.6	49.5	0.55	44.2	4.0	52.2	0.56
1910	21.1	41.6	0.55	49.2	4.6	33.8	0.46
1922	14.7	38.1	0.52	61.4	4.2	25.3	0.23
1929	13.5	40.1	0.54	66.4	4.2	25.7	0.24
1931	17.8	53.2	0.63	66.7	2.7	32.0	0.24
1938	15.5	37.8	0.48	60.7	2.3	26.8	0.13
1946	10.3	25.3	0.70	61.0	2.2	26.5	0.13
1950	6.1	13.1	0.58	54.5	3.0	11.9	0.04
1960	7.2	12.2	0.61	39.5	2.8	12.9	0.04

Other TRI Estimates for the United States

	Average Tariff on Total Imports	Average Tariff on Dutiable Imports	Share of Imports Duty Free	Imports/GDP	TRI	DWL (millions)	DWL/GDP (percent)
1990	4.0	5.0	32.8	8.5	6.1	NA	NA
2004	3.0	4.8	69.6	12.5	10.7	$11,060	0.09

1990: Anderson and Neary (2005, 286), general equilibrium, assumed elasticities of substitution, 1200 import categories, two composite final goods, no quotas.
2004: Kee, Nicita, and Olarreaga (2008), partial equilibrium, estimated import demand elasticities, 4625 tariff lines, does not include import quotas

Other Estimates for the United States

	Average Tariff on Total Imports	Average Tariff on Dutiable Imports	Share of Imports Duty Free	Imports/GDP	TRI	DWL (millions)	DWL/GDP (percent)
1951	5.5	12.5	55.4	3.2	NA	$183	0.05
1971	6.1	9.2	33.6	4.0	NA	$493	0.04
1985	3.8	5.5	30.9	8.1	23.7	NA	NA
1987	3.5	5.2	32.9	8.5	NA	$1,900-3,000	0.04-0.06
2005	1.4	4.6	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 U.S. Tariff on Imports and Trade Restrictiveness Index, 1867-1961

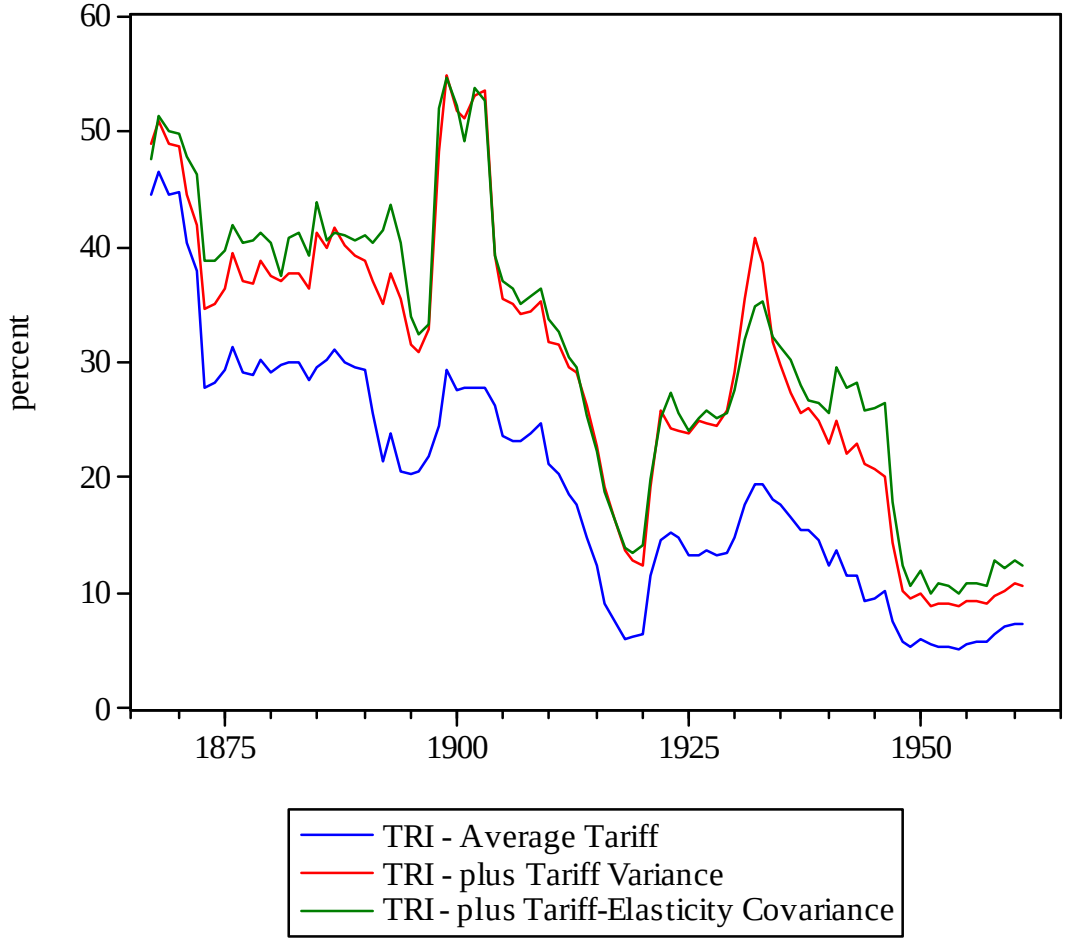


Figure 2: Ratio of TRI-A to the Average Tariff, 1867-1961

Source: Calculated from data in appendix.

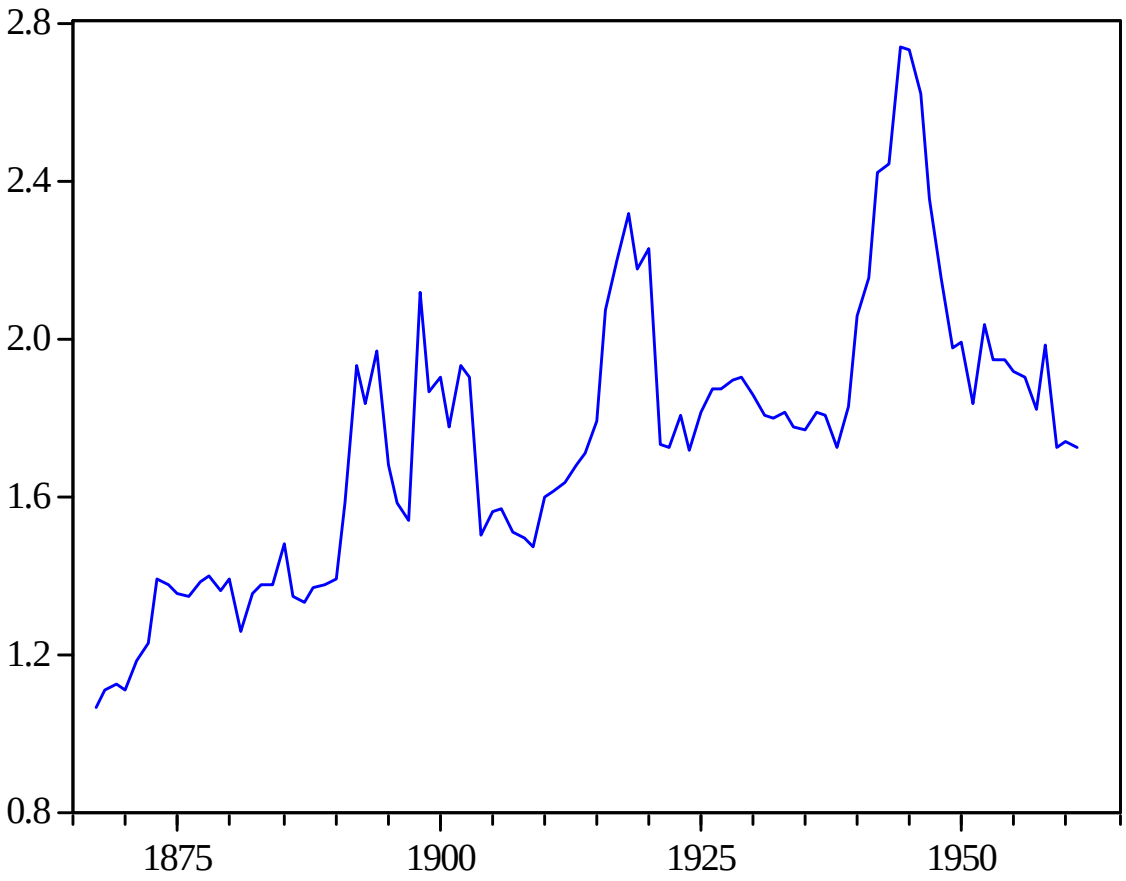


Figure 3: Alternative Calculations of the TRI

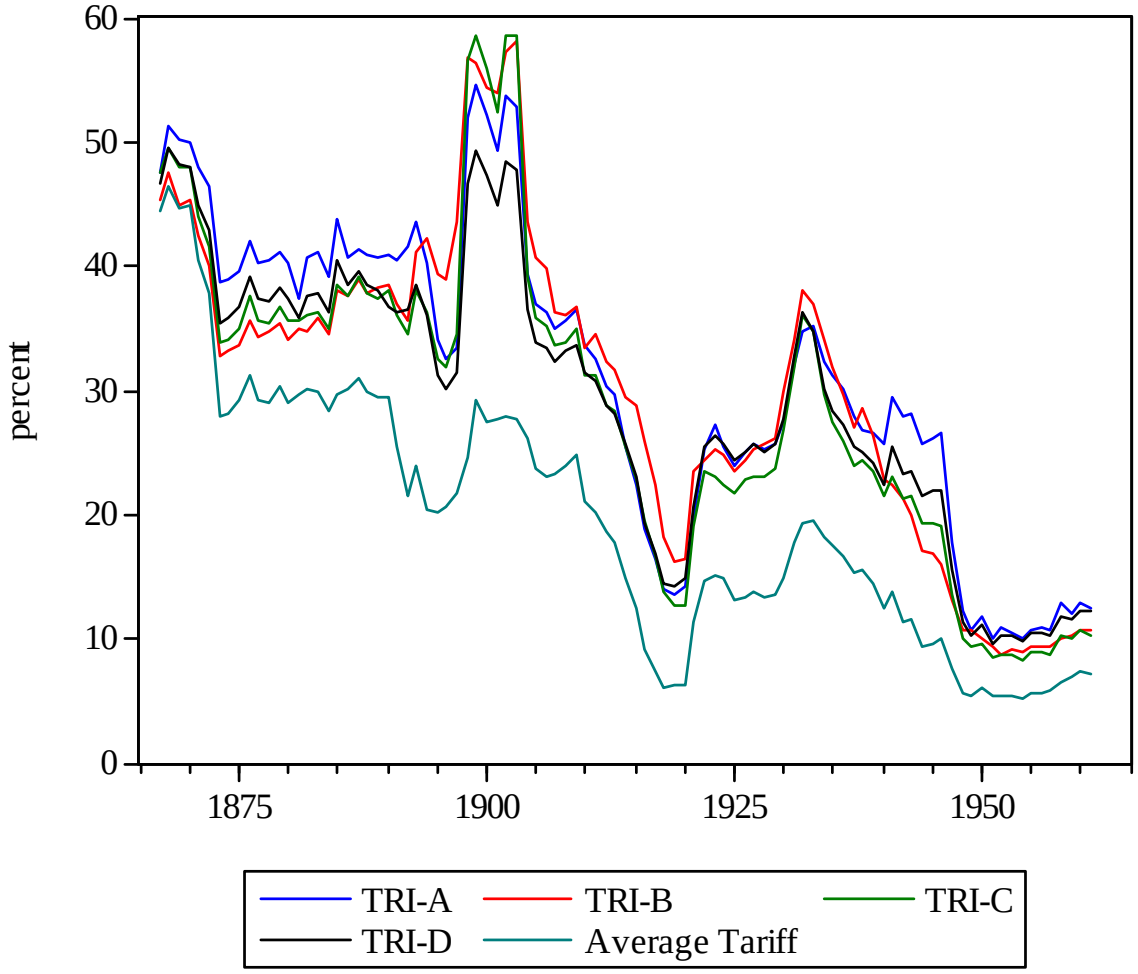


Figure 4: Deadweight Loss from U.S. Import Tariffs, 1867-1961

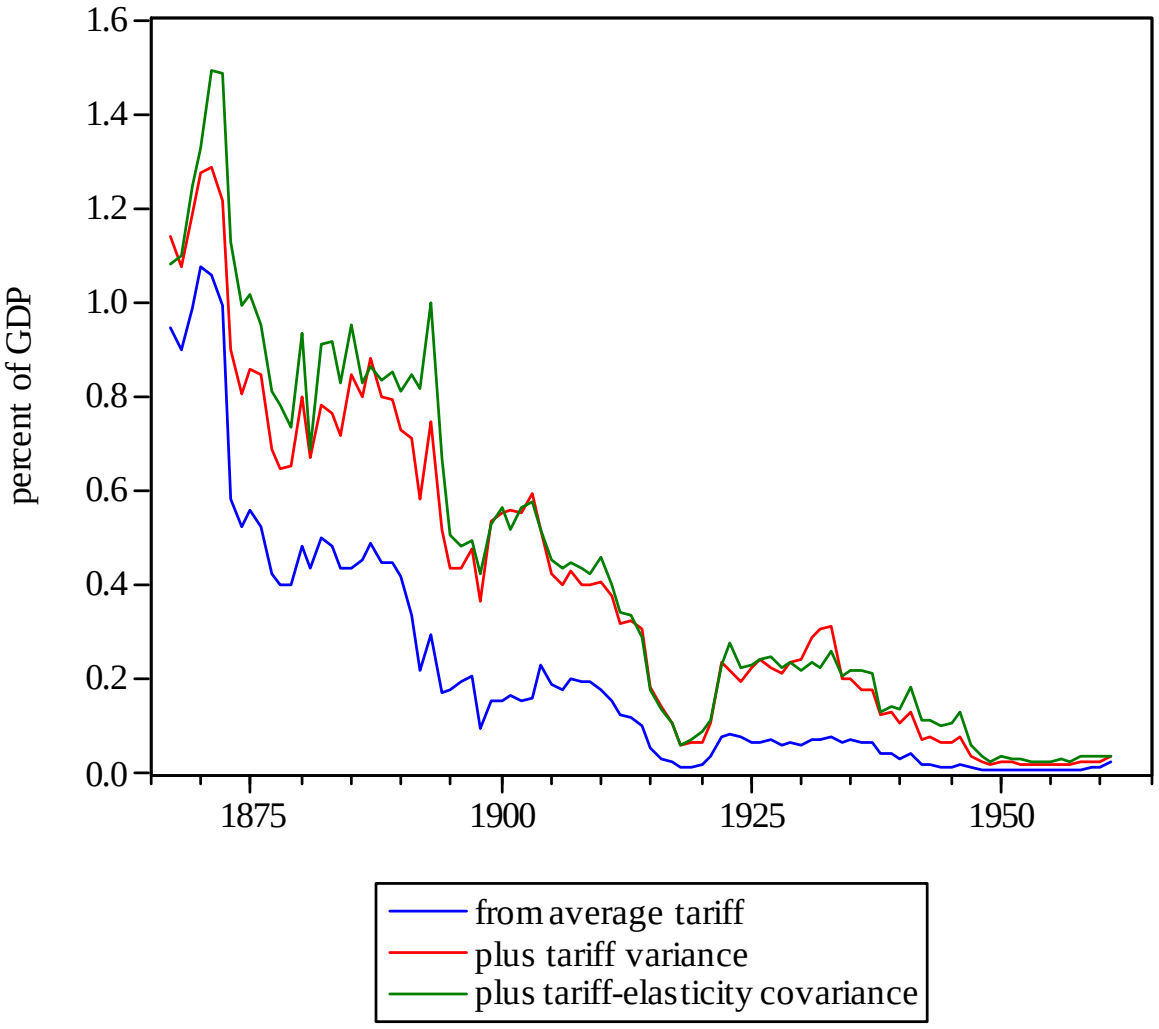


Figure 5: Alternative Calculations of the Deadweight Loss

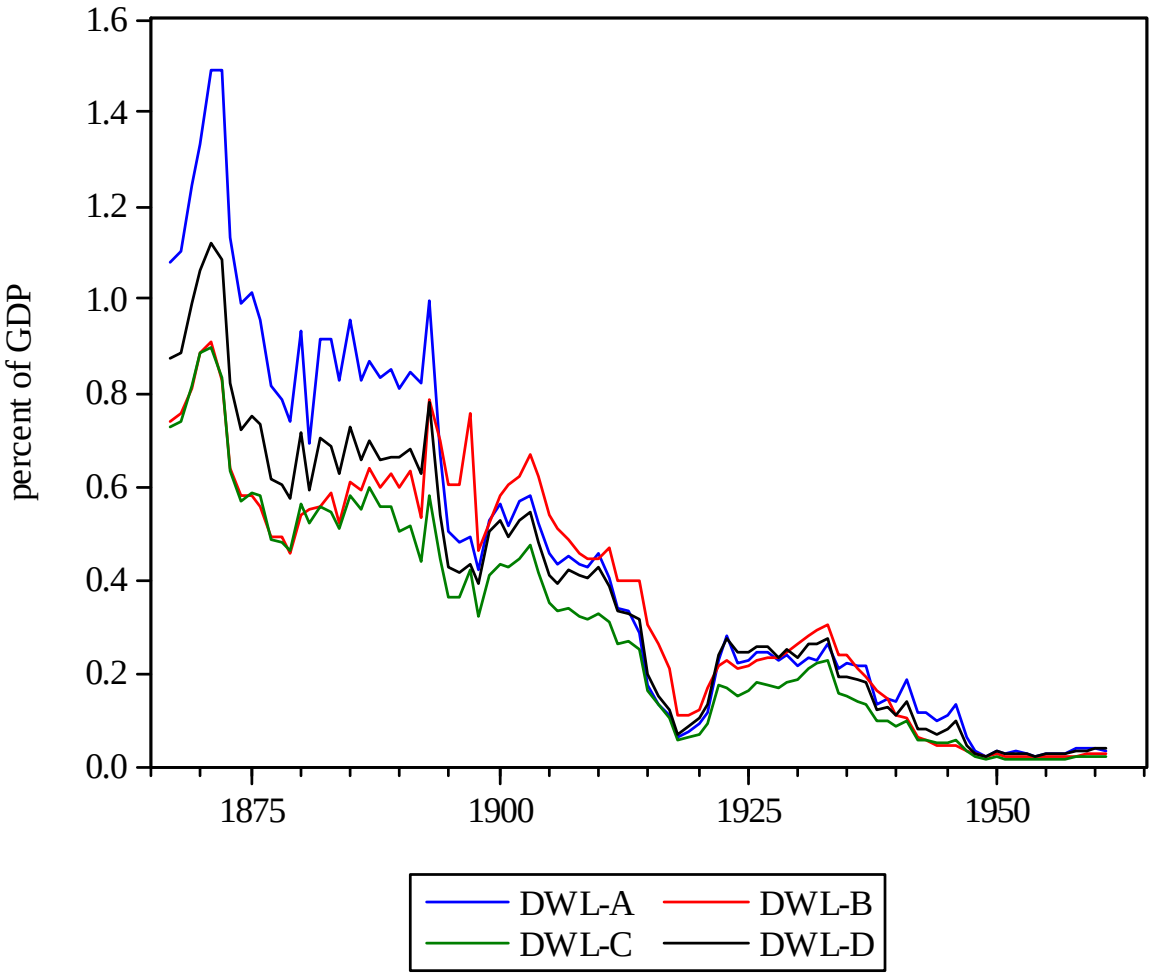


Figure 6: Share of Duty-Free Imports in Total Imports, 1867-1961

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

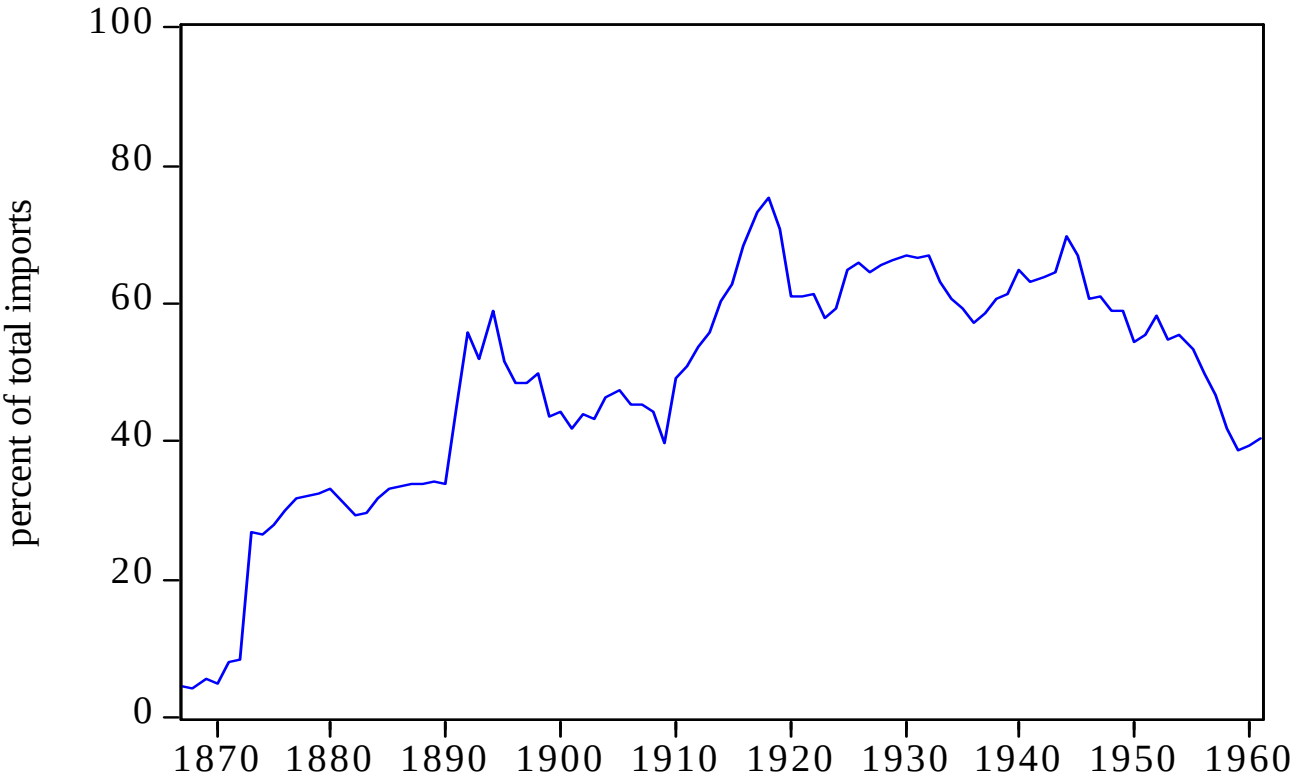
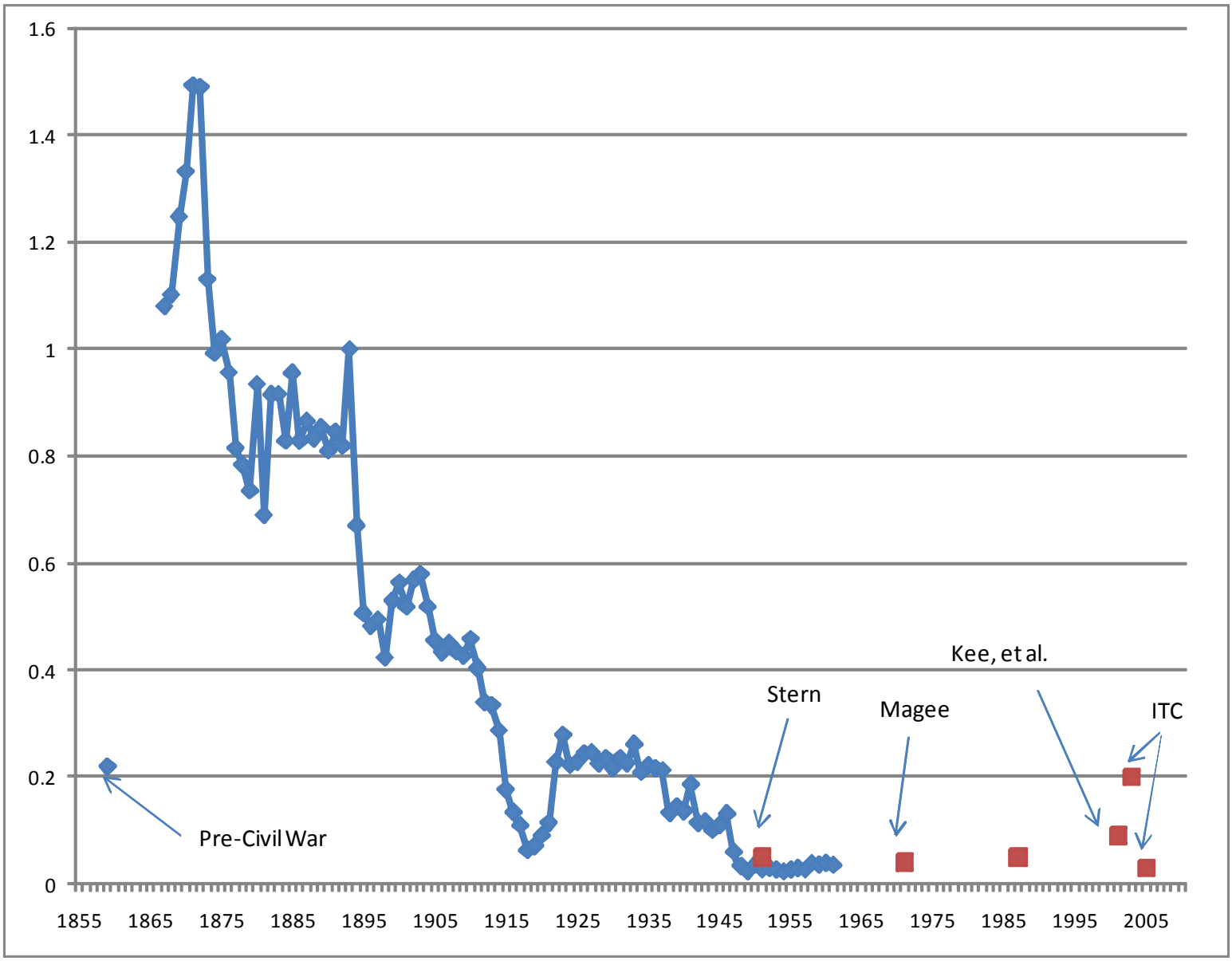


Figure 7: Comparison of Deadweight Loss Estimates from U.S. Import Tariffs



Note: From TRI (A) and other estimate on Table 2. The ITC estimate for 2002 includes import quotas (notably the Multifiber Arrangement); the ITC estimate for 2005 occurs after the MFA expires.

Figure 8: U.S. Tariffs – Average Welfare Cost per Dollar Revenue