Tariff Structure, Trade Expansion and Canadian Protectionism from 1870-1910*

Eugene Beaulieu
University of Calgary

Jevan Cherniwchan
University of Calgary

May 26, 2011

Abstract

We employ the Anderson-Neary Trade Restrictiveness Index (TRI) to examine Canadian trade policy during the first wave of globalization (1870-1913). Our analysis is the first to examine two important features of this period using the TRI: 1) the shift to protectionist trade policies, and 2) the large expansion in the volume and variety of goods traded. Using customs data on imports at the article level, we show that Canadian trade policy during this period was at least 11% more restrictive than previously understood. We compute the first estimates of the static welfare losses associated with tariff policy at this time to be $0.7-1.5\%$ of GDP. Moreover, we show how trade expansion along the extensive margin affects the restrictiveness and welfare cost associated with a given trade policy.

Keywords: Protection, Trade Restrictiveness, Trade Policy History

JEL Classification: F1, N7, N71

*We would like to thank Herb Emery, Irving Rosales, Scott Taylor and seminar participants at the "Globalization and the Making of Canada" Conference in Waterloo, Ontario, and the University of Calgary for helpful comments and suggestions. We would also like to thank Matt Krzepkowski and Fatih Yilmaz for excellent research assistance.

1 Introduction

Two fundamental shifts occurred in the world economy during the first wave of globalization (1870-1913): there was a transition to protectionism; and there was a tremendous expansion in both the volume and variety of goods traded internationally.[1] These changes led to significant revisions in the tariff schedules of many countries as governments changed policy to protect domestic producers and account for new varieties. Despite their importance, little is known about the consequences of these changes. Most historical studies of trade policy during this time are based on summary measures of trade policy, such as the Average Weighted Tariff (AWT).[2] These are poor measures of protection and do not capture how changes in the tariff schedule affect the restrictiveness of trade policy. This raises the natural question that we examine in this paper: how do changes in the tariff schedule to increase protection and to account for expansion in the number varieties traded affect the level and cost of protection?

To answer this question, we compute the Anderson-Neary Trade Restrictiveness Index (TRI) using Canadian trade data spanning four decades, from 1870-1910.[3] We focus on Canada for two main reasons. First and foremost, Canada provides an extremely rich context in which to analyze changes in the tariff structure; it is well known that protectionism was the underlying motivation for changes in Canadian trade policy during this period. Canada started actively protecting domestic industry in 1879 with the enactment of the National Policy.[4] Despite this, little is known about the level of protection in Canada during this

[1] For a discussion of the transition to protectionism, see O'Rourke (2000).

[2] Other measures include the effective rate of protection, the coefficient of variation of tariffs and the non-tariff-barrier coverage ration. Of these, the AWT is the most commonly employed because it is easily calculated from aggregate data by dividing total duties collected by total imports. For a discussion of the problems associated with using these measures of protection, see Anderson and Neary (2005).

[3] The TRI is an index measure equal to the uniform tariff, that if applied to all goods, would yield the same welfare level as the existing tariff structure. Unlike the AWT, the TRI is a theoretically consistent measure of protection that can be used to make valid cross-country or inter-temporal comparisons, making it ideal for our purposes. For an an overview of the theory underlying the TRI, see Anderson and Neary (2005).

[4] In 1879, the Canadian Finance Minister declared that policy was set 'to select for higher rates of duty those [goods] that are manufactured or can be manufactured in the country' (McDiarmid, 1946, p. 161).

period because existing studies have relied on the AWT to measure protection.[5] Our results demonstrate the importance of examining the tariff structure for understanding how policy changes affected the economy. As we show below, the AWT is a relatively accurate measure of trade policy when changes in the tariff structure are relatively uniform, such as when tariffs are increased on all goods to increase the level of protection for the entire economy. In contrast, we find that the AWT understates the level of protection when changes to the tariff structure are designed to increase protection for some goods.

We find that Canadian trade policy was at least 11% more restrictive than previously understood. Moreover, we show that Canadian tariff revisions after the National policy had similar effects on the level of protection. We also provide the first estimates of the welfare costs associated with protection in Canada during this time. While, the static welfare costs of Canadian trade policy during our period of study never been measured, they are typically viewed as having created substantial welfare losses.[6] We show that the welfare losses associated with Canadian protection between 1870 and 1910 amounted to 0.7-1.5% of GDP.

We also study Canada because it is an ideal case for examining protection during a period of rapid trade expansion. Over the 40 years from 1870 to 1910, the number of varieties of goods imported into Canada quadrupled. We present the first evidence of how this expansion of trade along the extensive margin affects the the level and cost of protection. When there is an increase in the number of varieties traded, policy makers revise the tariff schedule to account for these new goods. The evidence we present below reveals that these revisions play a large role in determining how protection is perceived. We find that most protection was afforded to "old" goods - that is, goods that were imported in 1870 (prior to the National Policy Tariff) - and that trade policy was less restrictive on "new" goods (goods first imported after 1870). Importantly, this aspect of trade policy is not captured by the AWT. However,

[5] One exception to this is Barnett (1976), who use a different summary measure of trade poicy, the effective rate of protection, to examine the Galt Tariff, which predates our period of study.

[6] See, for example, Dales (1966) or Pomfret (1993).

the TRI and AWT are similar for new goods, but diverge for old goods. Moreover, most of the welfare loss associated with the tariff structure was caused by protection of old goods. This is consistent with the persistent nature of trade policy; old goods tended to receive more protection over time.

In sum, the evidence we present here suggests a reevaluation of the typical history of Canadian protectionism at the end of the 19th century. Most studies focus on the National Policy tariff as the key driver of protectionism in Canada at this time because it corresponds to the largest increase in the AWT prior to the Great Depression; later revisions to the tariff schedule are ignored because they do not lead to similar changes in the AWT. We show that these revisions also played an important role in determining the level of protection. In particular, the Tariff Amendment Act of 1887 and Fielding's Tariff of 1897 altered the level of protection a similar amount. Hence, while the National Policy was the beginning of Canadian protectionism, subsequent revisions to the tariff schedule also had a large impact on the level of protection offered by trade policy.

It is important to understand how revisions to a tariff schedule affect protection, particularly during our period of study. There is a well-established literature debating the impact of protectionism on economic growth during this time[7], but most studies measure protection using country-wide average tariff measures.[8] Our results indicate that by doing so, researchers are ignoring important aspects of the tariff structure.

Our paper adds to an emerging literature documenting the protectiveness and costs of trade policy across time and countries using the TRI. This method for measuring the restrictiveness of trade policy was pioneered by Anderson and Neary (1994). Here, we follow the approach of Kee et al. (2009) and Irwin (2010) employ Feenstra's (1995) simplification of the TRI to measure protection. Doing so allows us to construct the index using observable data; constructing the index requires data on imports, ad-valorem tariff rates and elasticities

[7]Seminal works in this area include those of O'Rourke (2000) and Irwin (2002).

[8]One exception to this is the work of Lehmann and O'Rourke (2008), who distinguish between agricultural tariffs, industrial tariffs and revenue tariffs.

of import demand. This approach also provides a simple means for identifying the channels through which changes in tariff structure and the expansion of trade led to changes in the level of protection and a simple method for measuring the static welfare costs associated with protection.

By constructing the TRI using historical data, our paper is closely related to the work of Irwin (2010). Irwin constructs an annual TRI for the United States over the period 1859-1961 using data for up to 21 import categories. Given that historical elasticity estimates are not available during his period of study, Irwin relies on modern estimates. Throughout our analysis, we follow Irwin's approach and calculate the TRI using modern import demand elasticity estimates in the place of historical estimates. Our elasticities come from Kee et al. (2009). We employ the delta method and simulations to examine the robustness of our results to our choice of elasticities.

Our analysis differs from Irwin (2010) in two important respects. First, we examine how changes in tariff schedule to alter protection and to account for expansion in the number varieties traded affect the level and cost of protection. Although the United States underwent a shift to protectionism and a large expansion in trade during our period of study, these features are not examined by Irwin. Second, we employ customs data that is reported at the article level. This allows us to account for detailed changes in the tariff structure. As we show below, employing aggregated data will understate the effect of changes in tariff structure.

The rest of this paper proceeds as follows. Section two provides a brief overview of Canadian Tariff Policy between Confederation and World War I. Section three outlines the TRI, the data used in this study and the results. Section four presents the results of two robustness checks examining how our results are affected by our choice of elasticities and aggregation. Section five concludes.

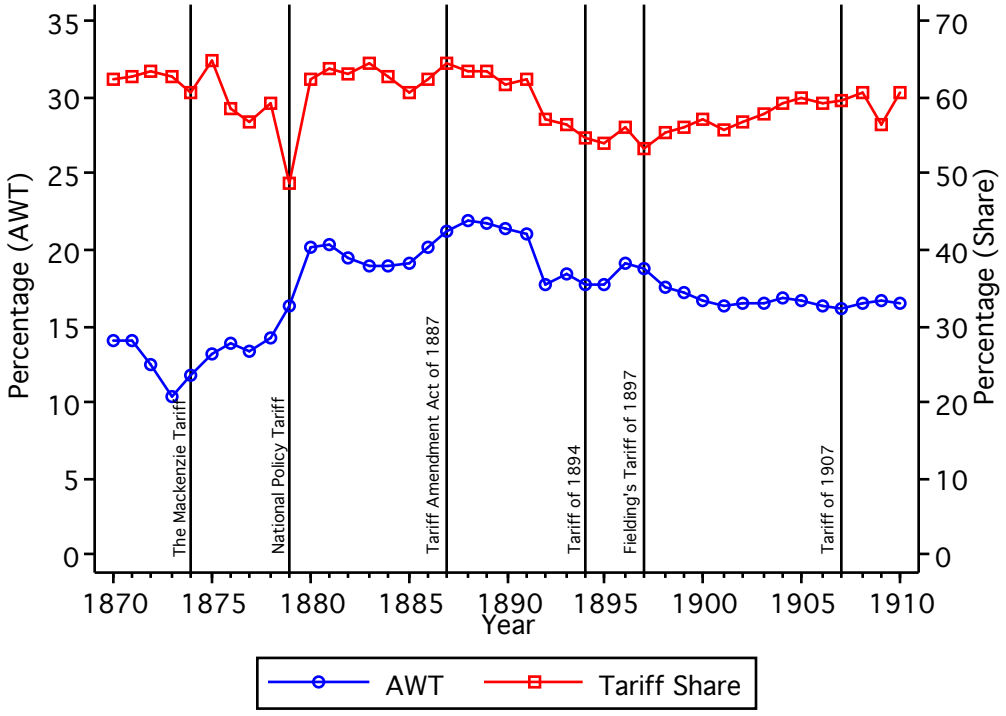
2 A Brief History of the Tariff in Canada: 1867-1910

Canadian tariffs were used primarily for revenue purposes prior to 1879 with the establishment of the National Policy tariff. Commercial policy in the first years following confederation consisted of a customs tariff that fulfilled a revenue role first, with protection largely neglected. In the mid-1870s, a prolonged stagnation of the economy reinforced the argument that the Dominion needed a commercial policy that offered genuine protection for Canadian industry. Manufacturers took up the call and some Parliamentarians responded. Arguably Canada's first significant protectionist commercial policy legislation was the 'National Policy' tariff, introduced by the Macdonald Conservatives in 1879. Prior to this the Canadian tariff (based on average tariff measures) was a relatively low, revenue-motivated tariff. Figure 1 presents the average tariff in Canada from 1870 to 1910. As seen in this figure, the average tariff increased from approximately 14 percent in 1875 to over 20 percent in 1879. However, the average tariff was still relatively low even after 1880. It was 20 percent in 1880 and increased slightly to 22 percent by 1886 before trending downward to 16 percent.

Even though protectionism played a role in the tariff policy post-1879, protectionist arguments were secondary to the need for government revenue in the early post-confederation period. As Figure 1 shows, customs duties provided on average 70 percent of the total Canadian government revenues during this period. With the large transportation development debts assumed by the Dominion, the tariff revenue that came from growing capital imports was essential to the government's nation-building objective. This called for a modest tariff that produced the necessary revenue stream but that didn't completely staunch the flow of imports.

Yet, for reasons outlined in the introduction, the average tariff does a poor job of measuring the level of protection. Moreover, given the observed increases in tariffs reflected in the tariff codes of Canada, we suspect that the National Policy changed the tariff structure to a greater extent than is reflected by examining the AWT in Figure 1. In their first session of parliament in 1879, Macdonald's Conservative Party increased tariff rates on manufactured

Figure 1: Average Tariff and the Tariff Share of Government Revenue in Canada: 1870-1910



Note: Average tariff constructed using data from Leacy, ed (1983). Data on tariff share in government revenue obtained from Gillespie (1991). Average tariff constructed using data from Leacy, ed (1983).

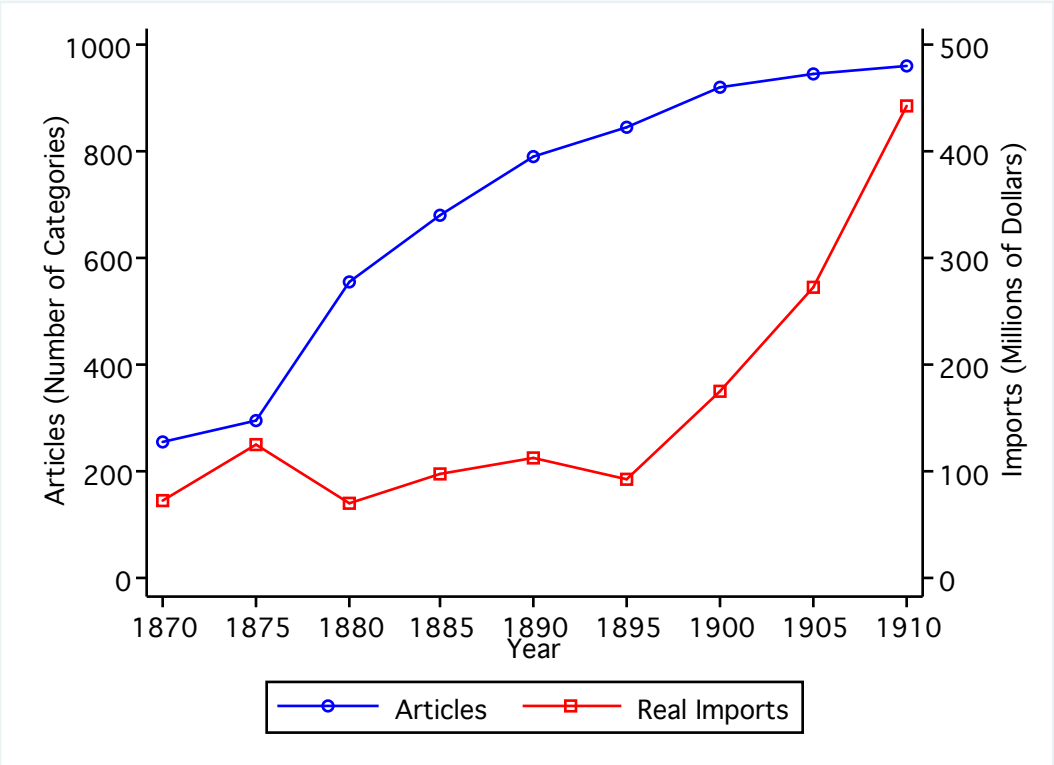
goods to 30, 35 and in some cases 45 percent, with textiles and iron and steel especially favoured with high tariff protection. The general rate was raised from 17.5 percent to 20 percent. The average ad valorem duty is reported as 22.25 percent. Two sectors were singled out for special attention. In an attempt to stimulate domestic production, rates of protection for the textile sector and the iron and steel industry were roughly doubled. In the textile industry, cotton duties increased from 17.5 percent to an effective specific and ad valorem rate of about 30 percent, while woollen rates also approximately doubled. Previously-free pig iron was charged a specific duty of 2.00 per ton, primary iron and steel went from a range of free to 5 percent to a range of 12.5 percent to 17.5 percent, and castings, forgings, boilers and engines increased from 17.5 percent to 25 percent. Even agricultural implements, whose manufacturers did not support increased protection, received a similar boost from 17.5 to 25

percent.

In the literature, one fact that is well-established is that the system of protection enacted by Macdonald in 1879 remained securely in place until well after the Second World War. According to the literature, the 1879 tariff reform was particularly important because it laid the foundation for the tariff schedule of the next 50 years. The general level of protection was essentially unchanged until 1930, with only minor changes to the tariff schedule (Taylor, 1939, p. 5). The tariff schedule was slightly revised in 1884 and 1894, but the only departure from the National Policy was the introduction of a preferential tariff for Great Britain in 1897. There was further revision to the tariff in 1904 and in 1907, by which time the government had established three levels of duties, the lowest being the British preferential, then scaling up to the intermediate and general tariffs. The intermediate tariff served as the basis for the negotiation of treaties with non-British countries. As mentioned above, it is impossible to fully understand the restrictiveness and welfare costs of the tariff structure by only considering the AWT. Below, we construct the TRI and examine if the level of protection was as low as implied by the AWT in Figure 1. We also examine whether the tariff structure remain unchanged following the National Policy Tariff as suggested by the AWT.

There is an additional feature of Canadian trade flows that stands out in the data. There was a dramatic increase in the value of imports into Canada from 1895 to 1910 and commencing in 1875, an equally dramatic increase in the number of goods imported. The rapid growth of imports and the number of goods imported are shown in Figure 2. Notice that expansion of the number of goods imported increased exponentially starting in 1875 but the value of imports did not increase dramatically for another twenty years. The AWT is not able to measure how the expansion in the number of imported goods affect the level and costs of protection. In the what follows, we examine the impact of trade expansion on the restrictiveness and welfare costs of tariffs using recently developed TRI measures.

Figure 2: Value of Imports and Number of Goods Imported into Canada: 1870-1910



Note: Real imports were computed from nominal imports using a GDP price deflator to compute real imports. The number of goods is computed from the number of goods traded defined by the HS-6 category.

3 Measuring Protection and Welfare Loss

To measure protection, we follow the approach of Kee et al. (2009) and Irwin (2010) and employ Feenstra's (1995) simplification of the Anderson-Neary Trade Restrictiveness Index.[9] With his simplification, the TRI can be written:

$$TRI = \left(\frac{1/2 \sum_{i=1}^{n} (\partial I_i / \partial p_i)(p_i t_i)^2}{1/2 \sum_{i=1}^{n} (\partial I_i / \partial p_i)(p_i)^2} \right)^{1/2} \tag{1}$$

[9]It is important to note that by employing the simplified version of the TRI, we are focusing on the first-order effects of trade policy and ruling out cross-price effects and other general equilibrium interactions. In principle, this means our estimates may understate the true level of protection (Lloyd and MacLaren, 2010). General equilibrium interactions could be captured using a computable general equilibrium (CGE) model, but Canadian data from the period of our study does not provide sufficient detail to allow for CGE modelling. More importantly, when calculated using CGE methods, the TRI is highly sensitive to the specification of the model (O'Rourke, 1997), meaning any second-order effects will depend explicitly on our modelling choices. By using the simplified TRI and focusing on the first-order effects of trade policy, we are able to abstract from this issue.

where $(\partial I_i/\partial p_i)$ is the change in import expenditures on good i resulting from a small change in the price of i, p_i is the price of good i and t_i is the ad-valorem tariff rate on good i.

Direct calculation of the TRI based on equation (1) is not possible, as $(\partial I_i/\partial p_i)$ is unobserved. This problem was addressed by Kee et al. (2009); they show that equation (1) can be manipulated so that it is expressed solely in terms of observables. With these manipulations, the TRI can be rewritten as:

$$TRI = \left(\frac{\sum_i^n m_i \varepsilon_i t_i^2}{\sum_{i=1}^n m_i \varepsilon_i} \right)^{1/2} \tag{2}$$

where m_i denotes total imports of good i and ε_i is the own-price elasticity of import demand for good i. By re-expressing equation (1) in this manner, it is possible to calculate the TRI directly using data on imports, ad-valorem tariff rates and elasticities of import demand.

This approach also provides a simple means for identifying the channels through which changes in tariff policy led to changes in the level of protection. As Kee et al. (2008) show, the TRI given by (2) can be rewritten as:

$$TRI = \left(\bar{t}^2 + \sigma^2 + \rho \right)^{1/2} \tag{3}$$

where $\bar{t}$ is the AWT, $\sigma^2 = \sum_{i=1}^n s_i (t_i - \bar{t})^2$ is the import-weighted variance in the tariff rate, and $\rho = \sum_{i=1}^n s_i (\tilde{\varepsilon}_i - 1)(t_i^2 - \bar{t}^2)$ is the import-weighted covariance between tariffs and elasticities, where $s_i = m_i / \sum_{i=1}^n m_i$ is the share of good i in total imports and $\tilde{\varepsilon}_i = \varepsilon_i / \bar{\varepsilon}$ is the import-weighted average elasticity. This decomposition makes it easy to identify whether changes in protection are being brought about primarily through changes in the average level of tariffs $(\bar{t})$, through changes in the set of goods high tariffs are applied to (σ^2), or by placing tariffs on goods with relatively inelastic demand (ρ).

In addition, employing the simplified TRI provides a method for calculating the static welfare loss associated with trade policy. As Kee et al. (2008) indicate, the numerator in equation (2) is equal to twice the static deadweight loss (DWL) arising from protection. Hence, an approximate value of the welfare loss associated with protection can be calculated

using:

$$\frac{DWL}{GDP} = \frac{1}{2}\sum_{i=1}^{n} \tilde{m}_i \varepsilon_i t_i^2 \tag{4}$$

where $\tilde{m}_i = m_i/GDP$ is the ratio of imports of good i to GDP. Like the TRI given in (2), this equation can be calculated directly using observable data.

Equation (4) can also be manipulated so that the channels driving welfare losses can be identified. Again following Kee et al. (2008), DWL/GDP can be rewritten as:

$$DWL/GDP = \frac{1}{2} \times \bar{\varepsilon} \times (\bar{t}^2 + \sigma^2 + \rho) \tag{5}$$

Like the decomposition presented in equation (3), this equation makes it possible to determine how changes in the level, dispersion and placement of tariffs affect welfare.

3.1 Data

To calculate the TRI and welfare loss measures given by (2) and (4), we require data on GDP, imports, ad-valorem tariff rates and elasticities of import demand. Estimates of Canadian GDP used to calculate static welfare loss were obtained from Urquhart (1993), Table 1.1. The trade data are detailed customs data from the *Tables of the Trade and Navigation of the Dominion of Canada*. These tables report Canadian imports and duties at the article level throughout our period of study. Using the article-level customs data is important as it allows us to observe changes to the tariff schedule that might be missed at higher levels of aggregation. Our trade data was taken from these tables at five-year intervals for the years 1870-1910. The values of imports and duty collected in each year are reported in Table 1.

We computed the observed (or applied) ad-valorem tariffs that were reported for each article in the customs schedule in each year.[10] We employ the ad-valorem tariff rates from customs data for two reasons. First, it is computationally necessary to calculate ad valorem

[10]We calculated the ad-valorem tariff rates using article-level data on imports and duties collected. Dividing duties collected by the value of imports yields the ad-valorem rate for each article that was imported according to the customs schedule.

rates from the customs data because the Canadian government employed a combination of specific and ad-valorem tariffs throughout our period of study and we do not have sufficient data to separately incorporate specific tariffs into our measurement of protection.[11] Second, employing the computed ad-valorem tariff rate allows us to capture trade policy as it was actually applied on imported goods at the article level.

To calculate the TRI, we also require an estimate of the elasticity of demand for each article. Unfortunately, no such estimates exist for this period and cannot be calculated with available data. Hence, throughout most of the analysis we follow the approach of Irwin (2010) and calculate the TRI using modern import demand elasticity estimates in the place of historical estimates.

We obtain our estimates of import price elasticities from Kee et al. (2008), who estimate elasticities for a wide range of goods and countries (including Canada) for the period 1988-2001. This data set is highly disaggregated, allowing us to match elasticities within narrowly defined categories. The data from Kee et al. (2008) is classified according to the HS6 classification scheme, whereas our import data is not classified according to any standard categorization. Therefore we matched each article in our data to an HS6 category on the basis of descriptor and then assigned each category the appropriate Canadian elasticity estimate.[12] If a Canadian estimate is not available for a particular HS6 category or the existing estimate is an outlier[13], the average estimate for that category from the rest of the world was used. Articles that could not be assigned to an HS6 category (due to poor or non-existent correspondence between the data and the HS6 classification scheme) were instead assigned the average elasticity value from the Kee et al. (2008) data. Following the assignment of elasticities, the data were aggregated to the HS6 level. The number of HS6

[11] Although this approach is common practice, it means that changes in tariff levels for some goods will reflect changes in import prices in addition to changes in trade policy. Price changes have been shown to have large effects when specific tariffs are widely used (Irwin, 1998), however, in our case their effects should be small. Throughout our period of study, Canada employed specific duties sparingly.

[12] In section 4 we discuss the robustness of our results to aggregating our data to the HS6 category.

[13] We consider elasticity estimates to be outliers if they are greater than two standard deviations away from the average value in the Kee et al. (2008) data.

Table 1: Data Overview

Year	Imports ($1000)	Duty ($1000)	GDP ($1000)	Price Index 1900=100	Average Weighted Tariff (%)	Average Import Elasticity	Number of Varieties
1870	69,670	9,289	363,194	104	13.33	-2.20	255
1875	117,166	15,344	429,876	108	13.10	-2.13	299
1880	68,808	14,018	452,082	104	20.37	-2.23	559
1885	97,689	19,106	528,170	100	19.58	-2.13	680
1890	109,697	23,897	665,293	104	21.78	-2.20	790
1895	101,680	17,877	609,921	91	17.58	-2.15	847
1900	176,550	28,807	867,201	100	16.41	-2.20	922
1905	250,554	41,766	1,306,322	109	16.67	-2.21	947
1910	364,409	60,828	1,947,358	122	16.69	-2.17	964

Note: Imports, duty and GDP are in nominal values. The Price Index was obtained from Urquhart (1993), Table 1.6.

categories or "Varieties" reported in each year are listed in Table 1.

Using the data from Kee et al. also provides us with a simple means to examine the robustness of our results to changes in elasticity. In addition to reporting elasticities, Kee et al. also report estimated standard errors. These estimates allow us to construct a confidence interval for the TRI using the delta method. This confidence interval allows us to identify how changes in the elasticities influence our results.[14]

Table 1 provides an overview of the data used in our analysis. As can be seen from the table, the average weighted tariff rate in Canada remained relatively constant until the implementation of the National Policy; the AWT increased from just over 13% in 1875 to just over 20% by 1880. Tariffs remained high throughout the 1880s, peaking again at just under 22% in 1890, before falling to 17.5% in 1895. The AWT fell to just over 16% by 1900 and remained relatively constant throughout the rest of the period studied. Despite this variation in the AWT, Canadian trade expanded throughout our sample; with the exception of 1880, the volume of imports and number of varieties traded increased in all years.

[14]In section 4 we discuss an alternative method for examining the robustness of our results to employing modern elasticity estimates.

Table 2: Average Tariffs, Trade Restrictiveness and Welfare Losses

Year	Average Tariff on Total Imports	Average Tariff on Dutiable Imports	Share of Imports Duty Free	Imports /GDP	TRI		DWL/GDP	
1870	13.33	20.58	35.23	19.18	14.72	(3.08)	0.37	(0.14)
1875	13.09	19.64	33.31	27.26	15.51	(2.98)	0.54	(0.18)
1880	20.37	25.94	21.47	15.22	22.97	(2.27)	0.76	(0.17)
1885	19.56	26.08	25.01	18.50	22.56	(2.50)	1.07	(0.24)
1890	21.78	31.02	29.77	16.49	30.47	(2.58)	1.36	(0.21)
1895	17.58	30.58	42.51	16.67	30.82	(3.27)	1.24	(0.17)
1900	16.41	27.68	40.73	20.24	25.23	(3.99)	1.24	(0.25)
1905	16.67	27.68	39.78	19.18	29.86	(4.31)	1.50	(0.39)
1910	16.69	26.72	37.54	18.71	25.13	(3.50)	1.00	(0.27)

Note: All values in percentages. Standard errors for both the TRI and DWL/GDP are reported in parentheses. These standard errors were calculated by applying the delta method to equation (2).

3.2 Results

Our main results are presented in Table 2. For comparison, Table 2 also includes the AWT and other commonly employed measures of protection for each period. Our results indicate that Canada's trade policy at the end of the 19th century was more protectionist than previously believed; the AWT understates the level of protection offered by trade policy in all years. Moreover, the correlation between the TRI and AWT is only 0.65 in our sample, meaning that changes in the TRI do not correspond perfectly to changes in the average tariff. Importantly, other commonly employed measures of protection also do not capture these changes.

The difference in protection as measured by the AWT and the TRI can be seen clearly in Figure 3. This figure displays the AWT, the TRI, and a two standard deviation band for the TRI (given by the dashed lines) in each year. Clearly, the AWT is less than the TRI in all years, meaning that previous inference has understated protection. However, two other important details also emerge. First, the figure shows that the average tariff is a relatively accurate measure of the restrictiveness of trade policy when the revenue aspects of tariffs are an important consideration. The AWT tracks the TRI quite closely until the Tariff

Amendment Act of 1887, when there was a large increase in protection but, as Figure 1 shows, the relative importance of tariffs as a source of revenue began to decline. Second, the AWT lies within the two standard deviation band in every year up to (and including 1885), but lies outside the band in the years that follow. Given that this band is meant to reflect how variation in elasticities may affect our results, we can see that our choice of elasticities is not driving our results in all years.

Figure 3 also demonstrates that tariff revisions following the National Policy had a much larger effect on the level of protection than previously thought. This is important because most previous studies of Canada have focused on the National Policy as the long term determinant of the level of protection available in the Canadian economy. When the AWT is used to measure protection, the National Policy appears to have the largest effect on protection. Our results show that the Tariff Amendment Act of 1887 and Fielding's Tariff of 1897 altered the level of protection by a similar magnitude.

Unlike the National Policy, which largely increased protection through changes in the level of tariffs, later revisions primarily increased protection through changes to the dispersion of tariffs across goods. This can be seen by employing the decomposition of the TRI given in equation (3). Figure 4 presents the results of such a decomposition. From this figure it is readily apparent that the increase in protection resulting from the National Policy was driven primarily by changes in the level of tariffs. The changes in protection resulting from the Tariff Amendment Act of 1887 and Fielding's Tariff of 1897, on the other hand, were driven primarily by changes in tariff rates for a subset of goods. This can be seen from the increase in the variance in the tariff rate; such changes only occur as the set of goods subject to high tariffs changes. Such changes fit the historical record: as Pinchin (1970) indicates, the Tariff Amendment Act of 1887 and Fielding's Tariff of 1897 largely consisted of revisions to the tariff rates applied to some goods as opposed to schedule-wide changes in tariff rates. Moreover, the covariance between tariffs and elasticities are nearly constant for the entire period, which provides further evidence that our results are not being driven by our choice

of elasticities.

Table 2 also includes the first estimates of the welfare loss associated with Canadian tariff policy during this period. Our results indicate that Canadian protectionism led to substantial welfare losses. Losses were less than 0.6% prior to the National Policy, and ranged between $0.76 - 1.50\%$ of GDP thereafter. Like the TRI, the change in welfare loss was highest following the implementation of the National Policy, but later revisions to the tariff schedule, particularly the Tariff Amendment Act of 1887 also had big effects on welfare. The ratio of static deadweight loss to GDP (the solid line) and a two standard deviation band (the dashed lines) are plotted in Figure 5.

Like the TRI, the sources of welfare loss vary by year. Figure 6 presents the results of a decomposition based on equation (5). This figure shows that changes in welfare are primarily driven by changes in the set of goods tariffs are applied to, rather than changes in the level of protection. This can be seen from the large changes in the variance of the tariffs and the covariance between import elasticities and tariffs after 1880; such changes only occur as the set of goods subject to tariffs changes.

Recall that the number of goods imported into Canada quadrupled during our period of study as a result of technological progress and falling trade costs. As Figure 7 shows, the expansion of trade along the extensive margin was an important component of the overall value of imported goods. In fact, by 1880, goods that were not imported at all in 1870 (new goods), comprised half of the value of imports. New goods and old goods were approximately equal shares of imports until 1900, when new goods became a larger share of the value of imports than goods that were already imported in 1870. Although it is not shown in this figure, it is important to point out that there was very little attrition along the extensive margin; that is, most of the goods that were imported in 1870 continued to be imported in 1910.

It is important to consider how this tremendous growth in the number of goods and the magnitude of their imports, affected the level of protection. If we look at the AWT

Figure 3: Measures of Trade Restrictiveness

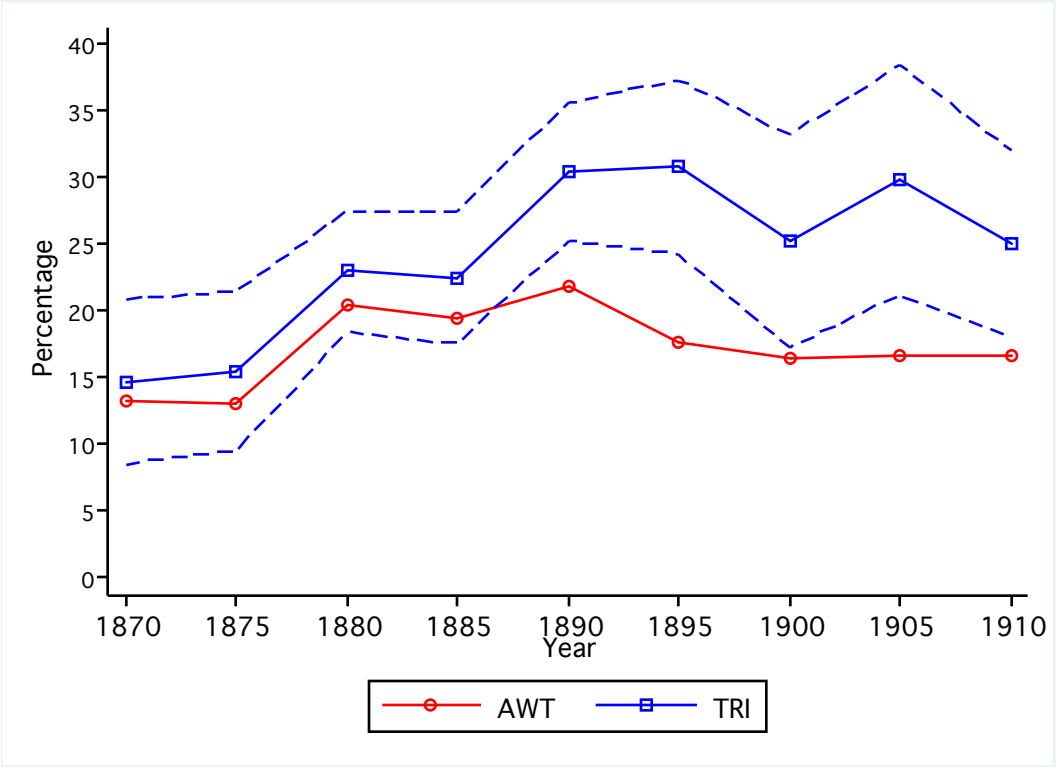


Figure 4: Sources of Protection

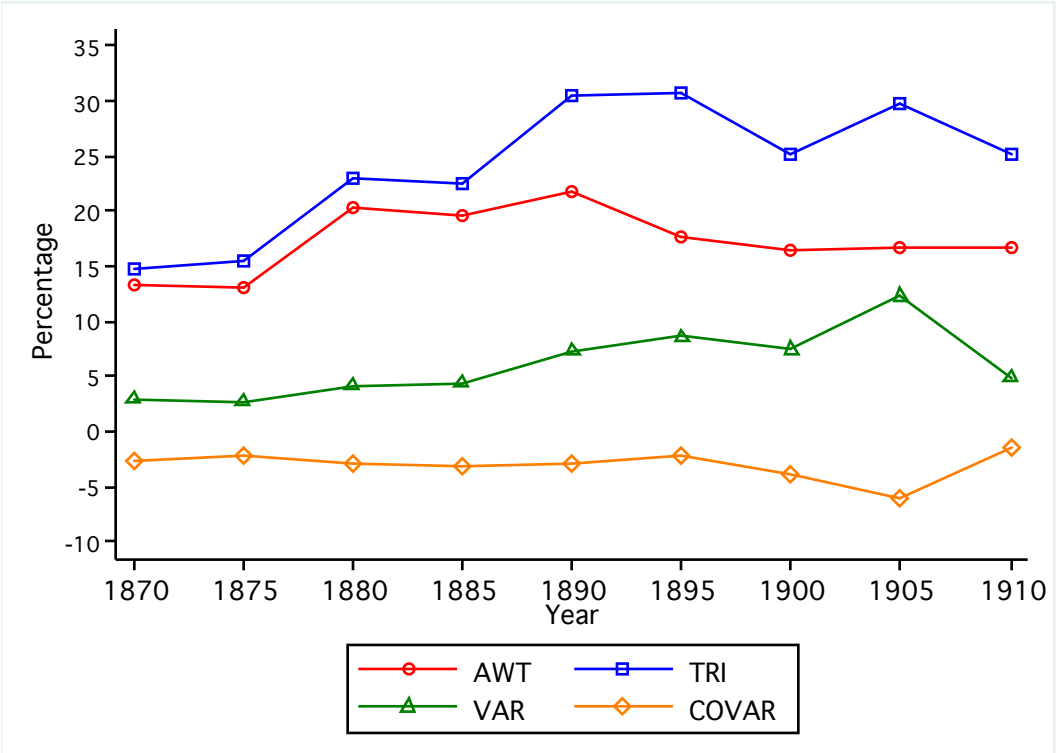


Figure 5: Welfare Loss

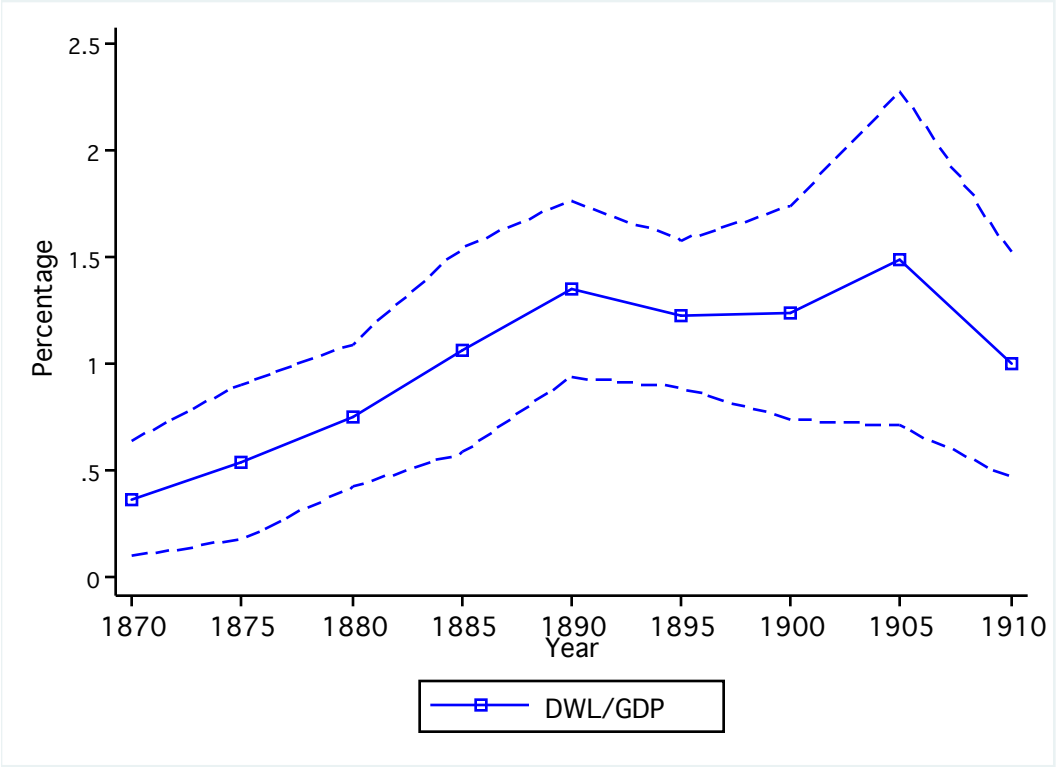


Figure 6: Sources of Welfare Loss

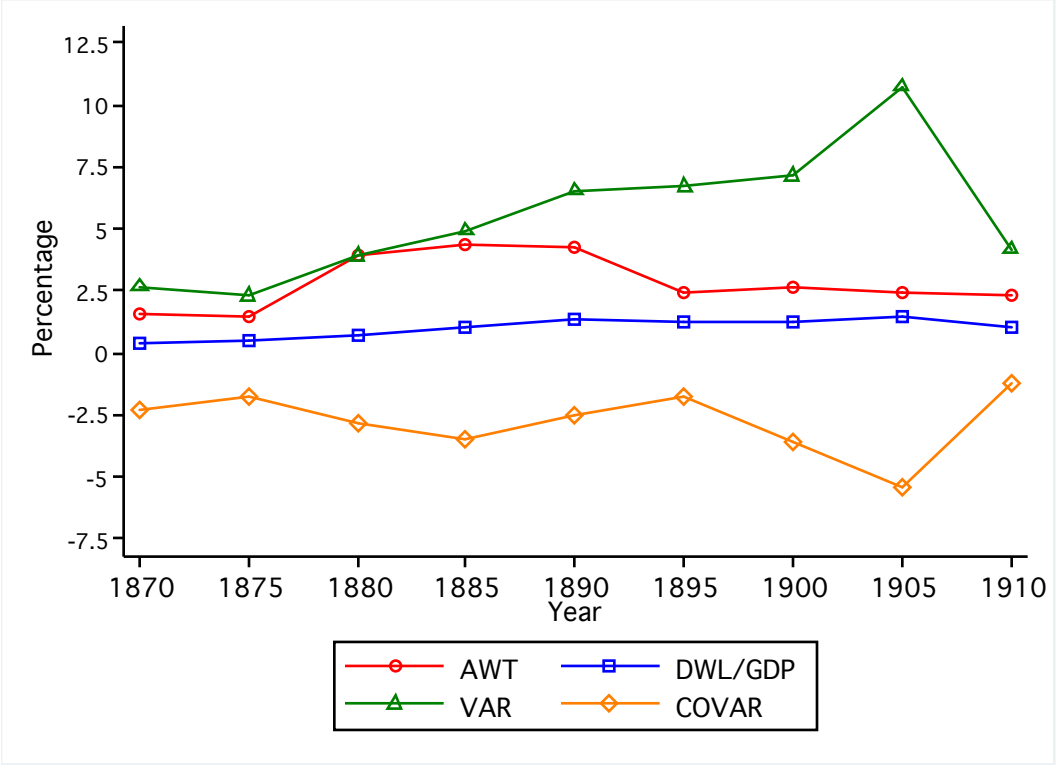
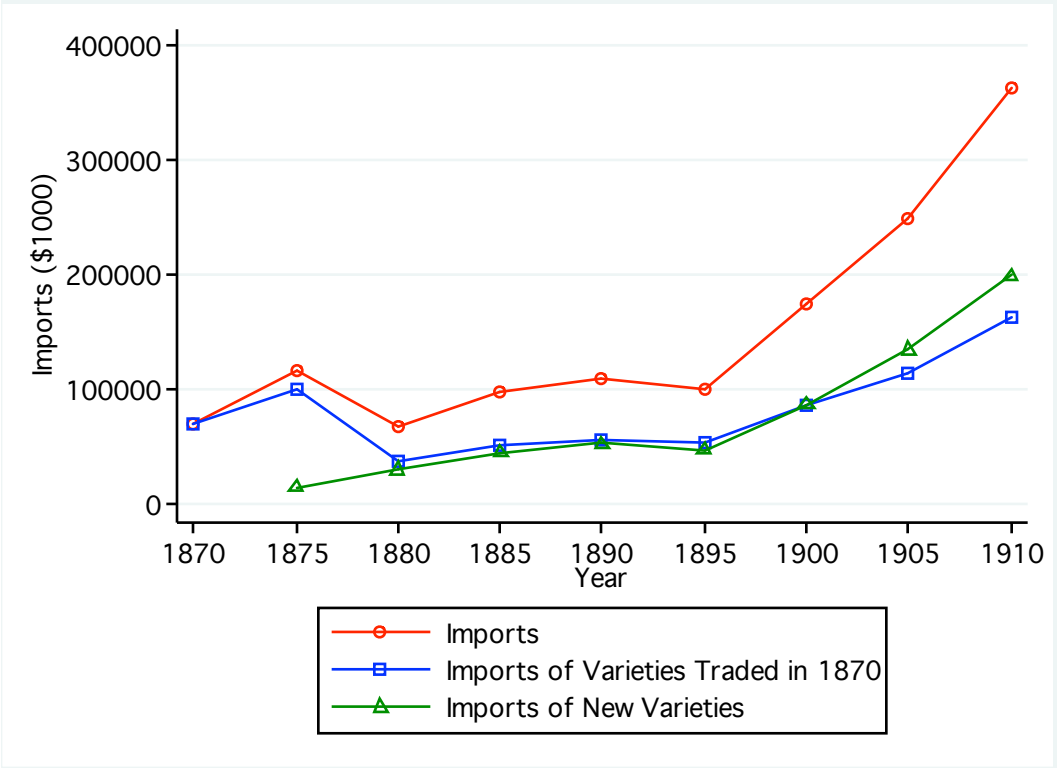


Figure 7: The Value of Trade: Old Goods and New Goods



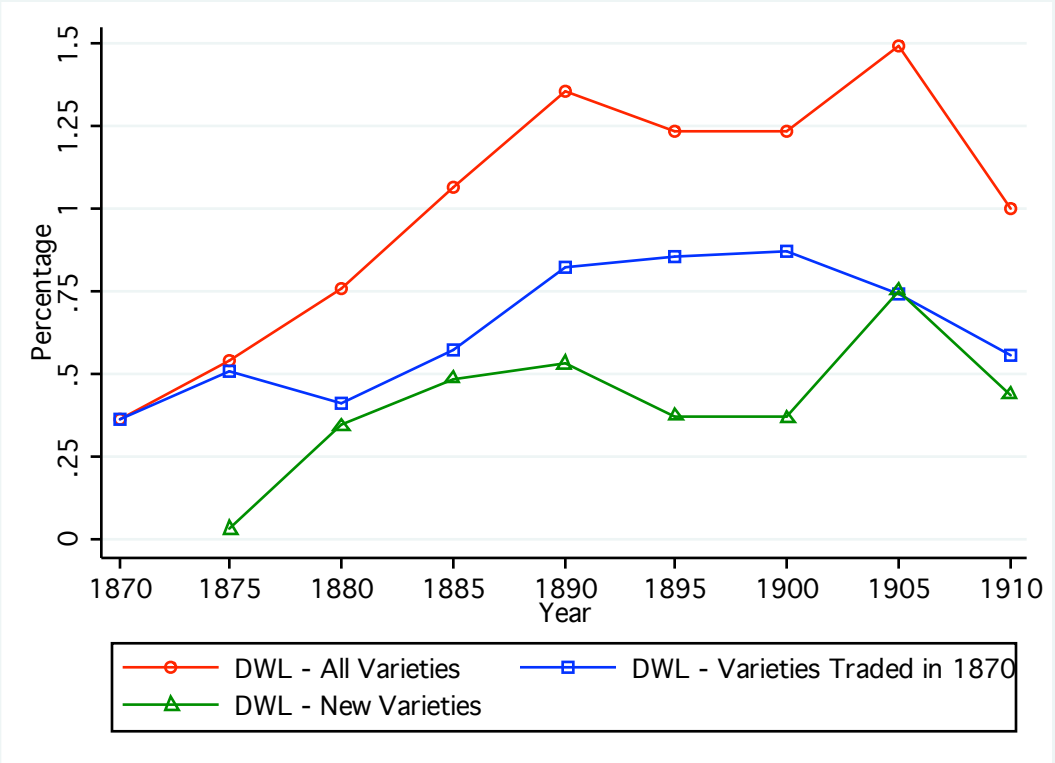
and compare this between new goods and old goods we see that the AWT was very similar across these different types of goods. As seen in Figure 8, the AWT on old goods was slightly higher than on new goods until 1890, and was virtually identical thereafter. Hence, if one only considers the AWT, one would conclude that new goods and old goods received a similar level of protection. This would be a mistake. Figure 9 shows that trade policy was much more protective for old goods than it was to new goods. Although on average the tariff structure was similar for new goods and old goods, it is clear that old goods were afforded a much higher level of protection than new goods.

This provides further validation for our results presented in Figure 4. As we discussed above, Figure 4 shows how revisions to the tariff structure following the implementation of the National Policy had a much larger effect on protection than previously believed because of increases in the variance of the tariff rate. Figure 9 shows that this increase is largely due to protection given to existing Canadian manufactures; increases in the level of protection

Figure 8: The AWT and Trade Expansion along the Extensive Margin

Figure 9: The TRI and Trade Expansion along the Extensive Margin

Figure 10: Welfare and the Extensive Margin



were primarily given to old goods.

Finally consider the welfare consequences of the tariff structure. As expected, most of the deadweight loss generated by the protectionist tariff of the time was due to tariffs on the old imported goods. See Figure 10.

While the results presented above outline the patterns of protection and welfare loss in Canada from 1870-1910, it is natural to ask whether the level of protection and welfare losses obtained from Canadian trade policy are high. To get a sense of the magnitudes of these estimates, we compare our results to estimates from other studies. Table 3 compares our estimates to those for Canada for later periods. These results show that Canada's recent trade policy was much less restrictive and much less costly that that at the turn of the 20th century. Table 4 presents protection and welfare loss estimates for both Canada and the United States between 1870-1910. From the table it can be seen that Canada's TRI is much lower than that of the United States during this period, meaning that although Canada

Table 3: Canada's Protection over Time

Year	Import-weighted Average Tariff	Anderson-Neary TRI	DWL/GDP
1870-1910	17.28	24.14	1.01
1990	6.95	9.55	*NA*
1988-2001	2.92	7.54	0.08

Note: All values in percentages. Estimate for 1990 taken from Anderson and Neary (2005). Estimates for 1988-2001 taken from Kee et al. (2008).

Table 4: Canada versus the United States

Year	Import-weighted Average Tariff		Anderson-Neary TRI		DWL/GDP	
	CAN	US	CAN	US	CAN	US
1870	13.3	44.9	14.7	49.9	0.37	1.33
1875	13.1	29.4	15.5	39.6	0.54	1.02
1880	20.4	29.1	23.0	40.4	0.76	0.93
1885	19.6	30.8	22.6	43.8	1.07	0.96
1890	21.8	29.6	30.5	40.9	1.36	0.81
1895	17.6	20.4	30.8	34.0	1.24	0.51
1900	16.4	27.6	25.2	52.2	1.24	0.56
1905	16.7	23.8	29.9	37.0	1.50	0.46
1910	15.7	21.1	25.1	33.8	1.00	0.46

Note: All values in percentages. US figures taken from Irwin (2010).

was more protectionist than previously understood, it was still less protectionist than other countries at this time. More importantly, Canada had higher welfare losses than the United States during much of this period; even though Canada was less protectionist than the US, the costs of protection were higher.

Overall, our results show that Canada's trade policy at the turn of the 20th century was more restrictive than previously thought. While the extent to which the average tariff understates protectionism varies with time used, the TRI is higher than the average tariff in all cases. This suggests that previous studies that have relied on the average tariff for inference are understating the case for protection, particularly in years when tariff revisions primarily consisted of revisions for some goods, instead of changing the tariff level faced by all goods. Moreover, the results show that the average tariff does not move in perfect

correspondence with the TRI; inference based on changes on the AWT alone will be invalid when revenue considerations do not matter.

4 Robustness Checks

4.1 Elasticities

Throughout the analysis presented above, we employed modern elasticity estimates because period elasticities are unavailable and cannot be calculated using existing data. Hence, it is possible that the particular distribution of elasticities used in constructing TRI may be driving our results. Since there is no method available to directly account for this, we employ simulations to examine the robustness of our calculations to the distribution of elasticities used.

The simulation procedure we employ is based on two observations made by Irwin (2010). He suggests that most estimated elasticities tend to fall on the interval $(-3, -1)$ and that most trade elasticities are relatively stable over time. Hence, a reasonable estimate of the TRI should be similar to a TRI calculated with a random draw of elasticities from this interval. Accordingly, for our simulations we assume that all historical elasticities are uniformly distributed over the interval $(-3, -1)$. Given this assumption, each article was assigned a random elasticity drawn from the interval and the corresponding TRI was calculated. This procedure was repeated 10,000 times to create 10,000 distinct measures of TRI and welfare loss for each year. The results of this procedure are displayed in Figures 11 and 12.

Figure 11 displays the AWT, the TRI calculated with the elasticities from Kee et al. (2008), and the simulated TRI results. Note that the mean simulated TRI is given by the solid line, while the maximum and minimum values are given by the dashed lines. Like the original estimates, the simulated TRI is higher than the AWT in all years, and is imperfectly correlated with the AWT. Moreover, the Tariff Revision of 1897 still leads to a large increase in protection, while Fielding's Tariff of 1897 leads to a decrease in protection, meaning our

Figure 11: TRI Simulations

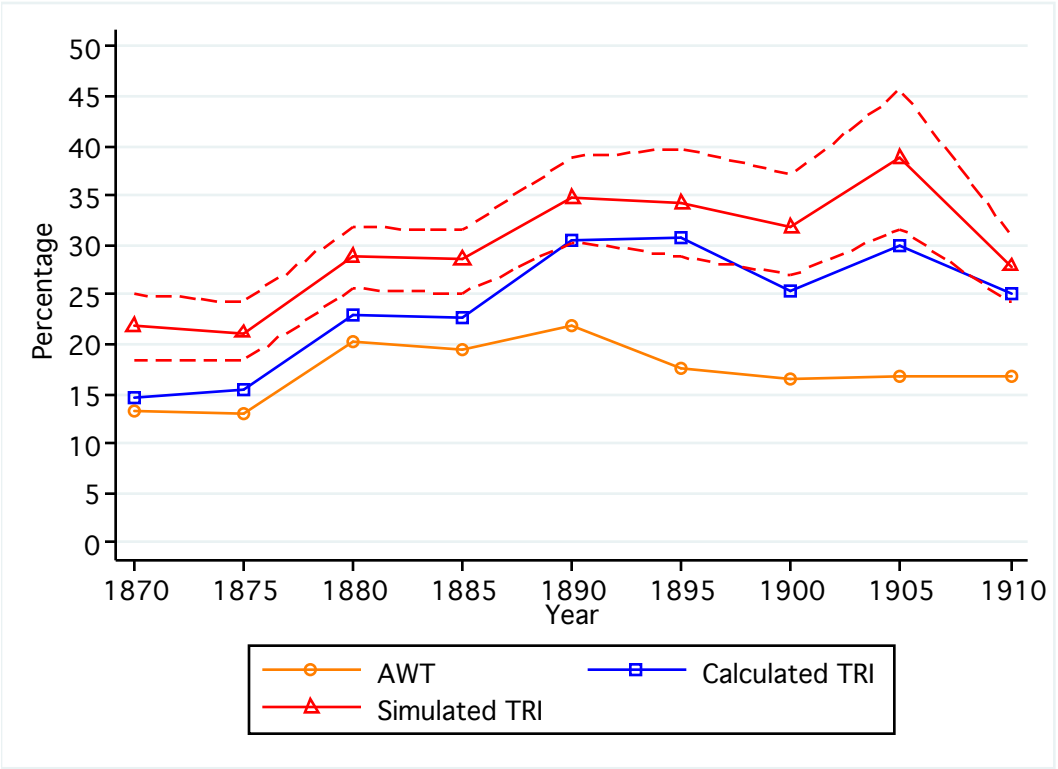
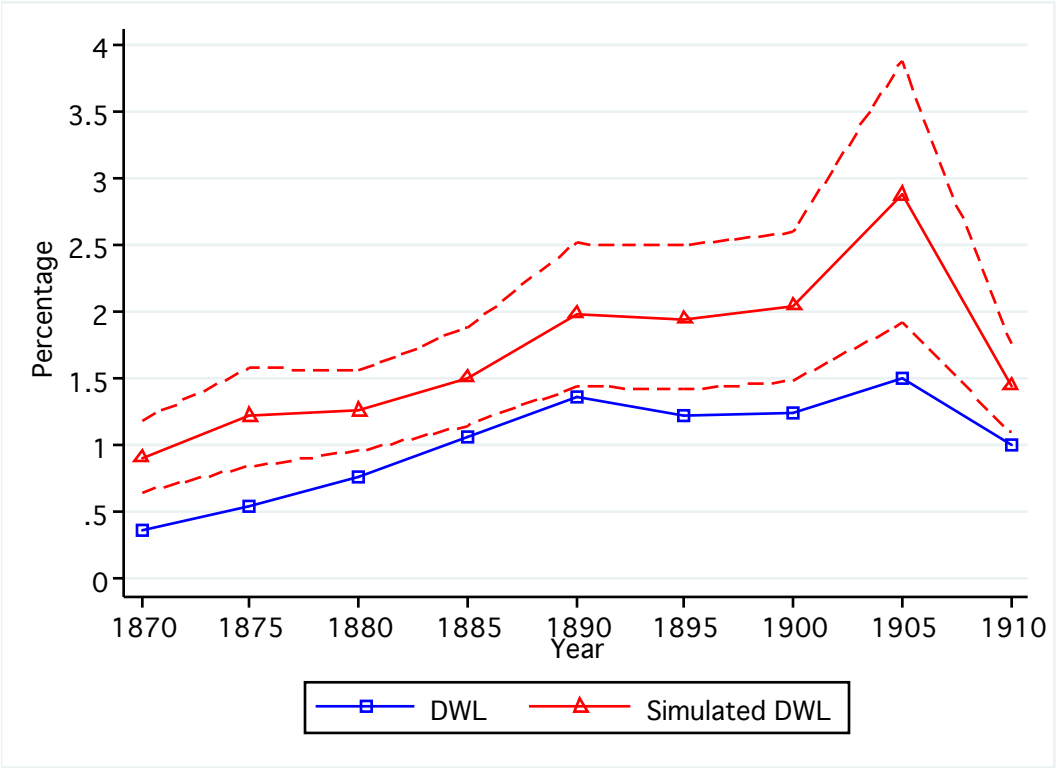


Figure 12: Welfare Loss Simulations



finding that later tariff revisions were important determinants of protection is robust to our choice of elasticities. However, the simulated TRI is much higher than the calculated TRI in all years. Hence, while our choice of elasticities does not affect the pattern of protection over time, it does influence our estimate of the level of protection. As such, our calculated TRI may be considered a lower bound on the true level of protection.

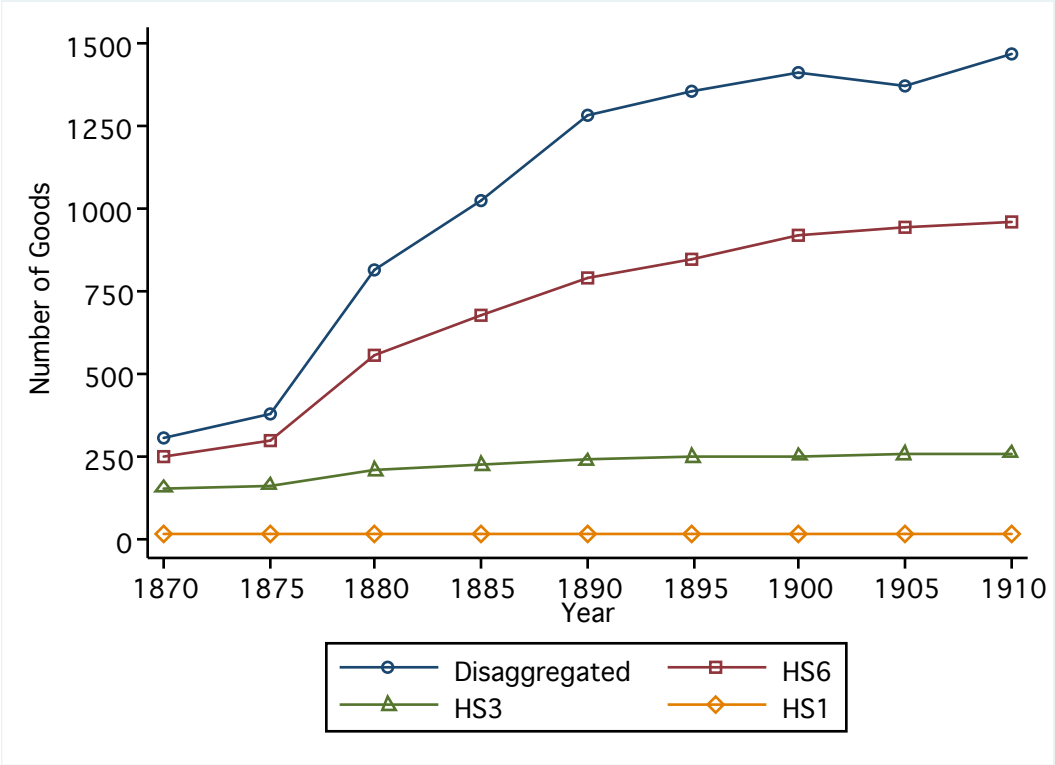
The results of our welfare loss simulations paint a similar picture. Figure 12 displays the welfare loss estimates calculated using the elasticities from Kee et al. (2008), and the simulated results. As before, the mean simulated welfare loss is given by the solid line with triangle markers, while the maximum and minimum values are given by the dashed lines. Our simulated results display a similar general trend to our calculated results, but are higher in every year. Our choice of elasticities appear to cause welfare loss to be understated; as such, the calculated DWL/GDP should be considered a lower bound on the true welfare losses.

4.2 Aggregation

In order to use the estimated elasticities from Kee et al. (2008) in our analysis, we were forced to aggregate the raw trade data from the *Tables of the Trade and Navigation of the Dominion of Canada* to the HS6 level. As we discussed previously, this involved matching our data to each HS6 category on the basis of descriptor. As can be seen in Figure 13, this leads to a substantial reduction in the number of goods reported in all years. This leads to a natural concern: the reduction may drive our results by artificially manipulating the variance in the tariff rate in all years. To investigate whether aggregation is driving our results, we recalculated TRI and DWL/GDP using both disaggregated and aggregated data for all years. Throughout, we assume a constant elasticity of import demand for all goods; doing so allows us to focus on differences in protection created solely from differences in how the trade data is aggregated.

Figures 14 and 15 show how aggregation changes our measurement of protection and

Figure 13: Aggregation and Varieties Traded



welfare loss. In Figures 14 and 15, the measures for disaggregated data and data aggregated to HS6 are nearly identical. This means our main analysis is not a product of aggregation.

One other aspect of Figures 14 and 15 is worth noting. While the TRI and DWL/GDP are nearly identical when calculated using disaggregated or HS6 data, higher levels of aggregation (HS3 and HS1) clearly understate the true level of protection and welfare loss. While this point has been made previously by Irwin (2010), our results show that the degree to which calculations using highly aggregated data understate protection or welfare loss is not constant. This means that studies using highly aggregated data in their analysis may fail to capture the full effect of the tariff structure on protection and welfare loss.

Figure 14: Aggregation and The Measurement of Protection

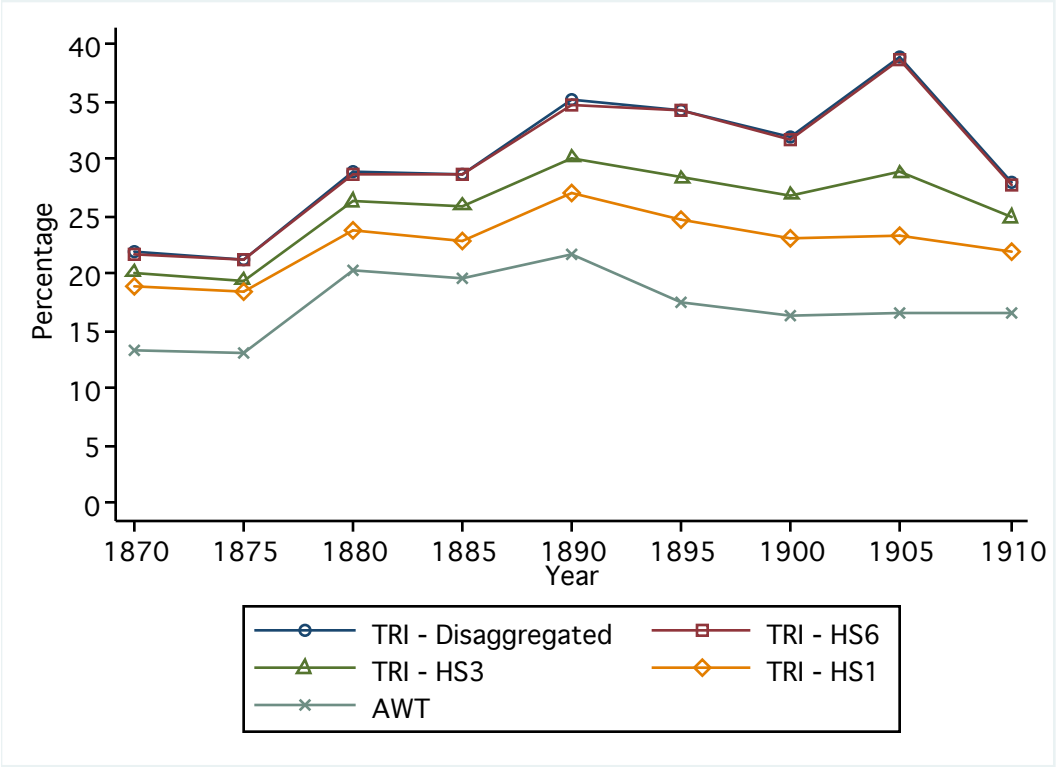
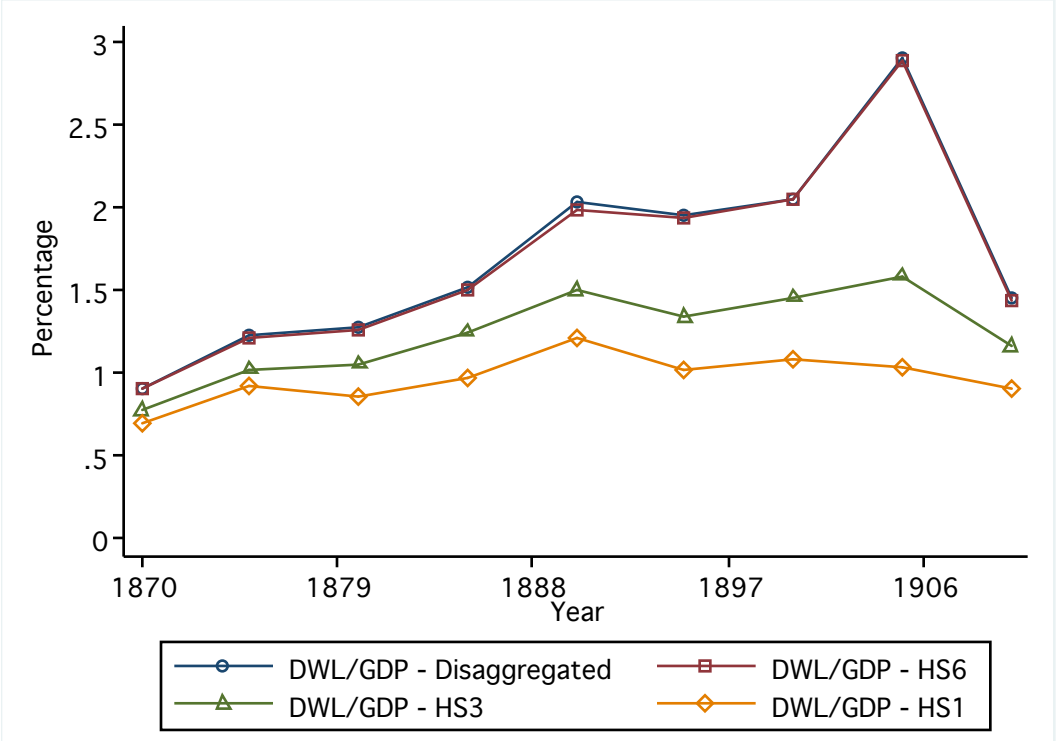


Figure 15: Aggregation and The Measurement of Welfare Loss



5 Conclusion

We examine the trade restrictiveness and welfare consequences of trade policy in a small open economy during the first wave of globalization (1870-1913) - a time of an historic transformation of trade policy from revenue- to protectionist-based policy and a time of unprecedented growth in trade. To examine the effects of trade policy on protection and welfare we construct a simplified version of the Anderson-Neary Trade Restrictiveness Index for Canada at the end of the 19th and beginning of the 20th century. We find that the historiography of Canada's trade policy is very different when the structure of the tariff is included in the analysis with the TRI - than when only the AWT is considered. The evidence based on the TRI reveals that Canada's trade policy at this time was much more protectionist than previously thought. The AWT understates the level of protection by at least 13 percentage points when compared to the TRI. However, we show that the AWT does a reasonable job of measuring the restrictiveness of trade policy when the tariff is designed to raise revenue, rather than for protectionist purposes. Moreover, we compute the first estimates of the static welfare losses associated with tariff policy at this time and find the deadweight losses from protectionism amounted to be $0.7 - 1.5\%$ of GDP.

These results provide a reevaluation of the typical history found in the literature on Canadian protectionism at the end of the 19th century. Most studies focus on the National Policy tariff as the key driver of protectionism because it corresponds to the largest increase in the AWT prior to the Great Depression; later revisions to the tariff schedule are ignored because they do not lead to similar changes in the AWT. The evidence presented here leads one to conclude that these revisions also played an important role in determining the level of protection. In particular, the Tariff Amendment Act of 1887 and Fielding's Tariff of 1897 altered the level of protection a similar amount. Hence, while the National Policy was the beginning of Canadian protectionism, subsequent revisions to the tariff schedule also had a large impact on the level of protection offered by trade policy.

In addition, we find that most of the protection is afforded to "old" goods - that is, goods

that were imported in 1870 (prior to the National Policy tariff) - and that trade policy was less restrictive on new goods (goods that were first imported after 1870). The TRI and AWT are similar for new goods but diverge for old goods. Moreover, most of the welfare loss associated with the tariff structure was caused by the trade restrictiveness of the old goods. This is consistent with the persistent nature of trade policy - as new goods are imported the tariff structure reflects more of a revenue-tariff than a protectionist tariff. Old goods tended to receive more protection over time.

Our results are robust to the elasticities used in our analysis. While the elasticities we employed were estimated for a much later period, our simulated results show that the trends in protection and welfare loss are not sensitive to changes in the distribution of elasticities. However, the level of both the TRI and DWL/GDP depend on the distribution; our calculated results are less than our simulated results in all years. This suggests that our calculated results represent plausible lower bounds for the magnitudes of protection and welfare loss.

References

Anderson, James E. and J. Peter Neary, "Measuring the Restrictiveness of Trade Policy," *The World Bank Economic Review*, 1994, *8* (2), 151–169.

_ **and** _ , *Measuring the Restrictiveness of International Trade Policy*, The MIT Press, 2005.

Barnett, D.F., "The Galt Tariff: Incedental or Effective Protection," *The Canadian Journal of Economics*, August 1976, *9* (3), 389–407.

Dales, J.H., *The Protective Tariff in Canada's Development: Eight Essays on Trade and Tariffs When Factors Move, With Special Reference to Canadian Protectionism, 1870-1955*, University of Toronto, 1966.

Feenstra, Robert C., "Estimating the Effects of Trade Policy," Working Paper 5051, National Bureau of Economic Research March 1995.

Gillespie, W. Irwin, *Tax, Borrow and Spend: Financing Federal Spending in Canada, 1867-1990*, Ottawa, Canada: Carleton University Press, 1991.

Irwin, Douglas A., "Changes in U.S. Tariffs: The Role of Import Prices and Commercial Policies," *The American Economic Review*, 1998, *88* (4), 1015–1026.

_ , "Interpreting the Tariff-Growth Correlation of the Late 19th Century," *The American Economic Review*, 2002, *92* (2), pp. 165–169.

_ , "Trade Restrictiveness and Deadweight Losses from U.S. Tariffs," *American Economic Journal: Economic Policy*, 2010, *2*, 111–133.

Kee, Hiau L., Alessandro Nicita, and Marcelo Olarreaga, "Import Demand Elasticities and Trade Distortions," *The Review of Economics and Statistics*, November 2008, *90* (4), 666–682.

_ **,** _ **, and** _ , "Estimating Trade Restrictiveness Indices," *The Economic Journal*, 2009, *119*, 172–199.

Leacy, F.H., ed., *Historical Statistics of Canada*, 2 ed., Statistics Canada, 1983.

Lehmann, Sibylle H. and Kevin H. O'Rourke, "The Structure of Protection and Growth in the Late 19th Century," *NBER Working Paper*, 2008, (14493).

Lloyd, Peter and Donald MacLaren, "Partial- and General-Equilibrium Measures of Trade Restrictiveness," *Review of International Economics*, 2010, *18* (5), 1044–1057.

McDiarmid, Orville John, *Commercial Policy in the Canadian Economy*, Cambridge MA: Harvard University Press, 1946.

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

_ , "Tariffs and Growth in the Late 19th Century," *The Economic Journal*, 2000, *110* (463), 456–483.

Pinchin, Hugh McAlester, "Canadian Tariff Levels 1870-1959." PhD dissertation, Yale University 1970.

Pomfret, Richard, *The Economic Development of Canada*, Nelson Canada, 1993.

Taylor, K.W., "The Commercial Policy of Canada," in H.R. Kemp, ed., *Canadian Marketing Problems*, Toronto: University of Toronto Press, 1939.

Urquhart, M.C., *Gross National Product, Canada, 1870-1926: The Derivation of the Estimates*, McGill-Queen's University Press, 1993.