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Abstract

In this paper, we study the impact of Canada's adoption of protectionist trade policy in 1879 on Canadian welfare. Under the National Policy the Canadian average weighted tariff increased from 14% to 21%. The conventional view is that this was a distortionary policy that negatively affected Canadian welfare. We argue that this view is incomplete because it ignores general equilibrium effects. Using a multi-industry general equilibrium model with differentiated goods, we show that the welfare effects of tariffs can potentially be positive, even for small open economies, due to their impact on the terms of trade. We apply these theoretical insights in a reassessment of the welfare consequences of the National Policy for Canada using newly compiled granular trade and production data from 1870 to 1913, and newly estimated historically contemporaneous import demand elasticities. Our results suggest that the National Policy's tariff changes actually improved Canadian welfare by between 0.13% to 0.20% of gross domestic product, although a multilateral move to free trade would have resulted in an even better welfare outcome for Canadians.

Bank topics: Trade integration; Economic models; International topics
JEL codes: F, F1, F13, F14, F42, F60, N, N71

Résumé

Dans ce document de travail, nous étudions l'incidence de la politique commerciale protectionniste que le Canada a adoptée en 1879 sur la prospérité du pays. À la suite de la mise en œuvre de la Politique nationale, le tarif douanier pondéré moyen a augmenté au Canada pour passer de 14 à 21 %. Il est généralement admis qu'il s'agissait d'une politique à effet distorsionnaire qui a influé négativement sur la prospérité du pays. Nous soutenons que ce point de vue est incomplet parce qu'il ne tient pas compte des effets d'équilibre général. À l'aide d'un modèle d'équilibre général multisectoriel intégrant des biens différenciés, nous montrons que l'incidence des tarifs douaniers sur la prospérité peut être positive – même dans de petites économies ouvertes – parce que ceux-ci influencent les termes de l'échange. Nous appliquons ces considérations théoriques à la réévaluation de l'incidence de la Politique nationale sur la prospérité du Canada en utilisant des données détaillées nouvellement compilées sur le commerce et la production pour la période de 1870 à 1913, et de nouvelles estimations contemporaines de l'élasticité de la demande d'importations, calculées à l'aide de données historiques. Nos résultats donnent à penser que les changements tarifaires associés à la Politique nationale ont, en réalité, fait augmenter la prospérité du Canada, soit un accroissement du PIB se situant entre 0,13 et

0,20 %, bien qu'un accord de libre-échange multilatéral aurait augmenté davantage la prospérité du pays.

Sujets : Intégration des échanges; Modèles économiques; Questions internationales
Codes JEL : F, F1, F13, F14, F42, F60, N, N71

Non-Technical Summary

The recent rise in anti-globalization sentiment among numerous Western countries has sparked a renewal of interest in understanding the economic implications of trade protectionism. This paper investigates the impact of Canada's adoption of the protectionist National Policy of 1879 on Canadian economic welfare at the time.

The National Policy, initiated by the Canadian federal government in 1879, instituted a significant hike in the Canadian average weighted import tariff from 14% to 21%. This policy was established at a time when Canada's fastest-growing trading partner, the United States, had also imposed significant import tariffs in an effort to protect domestic manufacturing industries.

The conventional view among economic historians is that the National Policy tariff changes had a negative impact on Canadian welfare due to their distortionary effect on Canadian prices. This view is built on the assumption that Canada, as a small open economy, had no impact on international prices, and hence no positive benefits of the policy could come through this channel.

We argue that this conventional view is incomplete and offer an alternative view based on a general equilibrium trade model with internationally differentiated goods. In this model, all countries have some degree of international market power, and hence even smaller countries can theoretically benefit from unilateral trade protectionism through general equilibrium price effects.

We assess the impact of the National Policy tariff changes using historical Canadian industry-level trade and production data as model inputs. Our results suggest that the increase in Canadian tariffs under the National Policy actually improved Canadian welfare by 0.13% to 0.20% of gross domestic product.

We also show that Canadian welfare was higher under this policy than it would have been had Canada unilaterally lowered its tariffs to zero, although a multilateral move to free trade would have resulted in a better welfare outcome for Canadians. We conclude that from a general equilibrium perspective, Canada's adoption of protectionist trade policy objectives was a welfare-enhancing policy change given the international context that the country was operating in at the time.

1 Introduction

Canada's National Policy was introduced by John A. Macdonald's Conservative government as part of the federal budget on March 14, 1879. It comprised three broad policy objectives: the promotion of immigration, the building of a trans-continental rail line, and the protection of domestic manufacturers from foreign competition. Virtually every line of the Canadian tariff schedule was rewritten in 1879, and average tariff rates rose from 14.2% in 1877 to 20.8% in 1880.[1] This change marked a significant shift in trade policy, away from revenue objectives towards protectionism, that established a tariff-setting agenda that guided domestic policy decisions for the next 110 years.[2]

The conventional view among economic historians is that this policy may have fostered dynamic effects by, for example, sheltering domestic infant industries and encouraging technological change, but it was costly for Canadians in terms of static reductions in welfare.[3] For example, Pomfret (1993) suggests that the policy's tariff-induced welfare costs were greater than 4–8% of gross domestic product (GDP). Using a standard Anderson and Neary (2005) partial equilibrium approach to measure the static deadweight loss (DWL) of the National Policy, Beaulieu and Cherniwchan (2014) find that the welfare effects were lower than Pomfret claimed, but still negative and in the neighborhood of 0.7% to 1.5% of GDP.

In this paper, we argue that the conventional view is incomplete because it is based on only a partial equilibrium analysis of the distortionary impact of tariffs. The reasons for the adoption of this incomplete approach are twofold. First, any positive impact of tariffs due to terms-of-trade effects may be difficult to quantify due to data limitations (see Feenstra 1995). Second, terms-of-trade effects may be small, particularly for a small open economy like Canada in 1879.[4] Rather than relying on the standard partial equilibrium approach, we use a static multi-industry trade model with differentiated goods to show that, even for small open economies, the general equilibrium welfare effects of tariffs are potentially positive due to their impact on a country's terms of trade.[5] The mea-

[1]During this period Canadian trade and production data correspond to fiscal years that end June 30. As a result, the introduction of the National Policy spans the fiscal years 1878 and 1879.

[2]For a detailed assessment of this shift in policy, see Alexander and Keay (2016), or Beaulieu and Cherniwchan (2014). The free trade agreement (FTA) between Canada and the United States came into effect on January 1, 1989.

[3]Inwood and Keay (2013) show that the National Policy induced investment and technological innovation in the Canadian iron and steel industries. Harris, Keay and Lewis (2015) argue that the most protected industries under the National Policy experienced disproportionately large output increases, productivity improvements, and price declines.

[4]As we discuss in Section 2, newer developments in trade theory provide a basis for accounting for the degree of market power, which, both according to these models and empirical evidence, is positive even for small open economies.

[5]Both our general equilibrium and the traditional partial equilibrium approaches are static. See Costinot and Rodriguez-Clare (2014) for an excellent survey of general equilibrium trade models of the

surement of these general equilibrium welfare effects in our model requires only national total income and industry-level evidence on average weighted tariffs (AWT); import penetration ratios; expenditure shares; and industry-specific, historically contemporaneous import demand elasticities (referred to as "international trade elasticities" in the trade literature).[6]

We construct or, where appropriate, estimate these variables and parameters using newly compiled, highly granular annual trade and production data for the years 1870 to 1913. Our results suggest that the increase in Canadian tariffs under the National Policy actually *improved* Canadian welfare by between 0.13% to 0.20% of domestic GDP. Our finding of a positive welfare effect is not dependent on our assumptions about relative industry size or our choice among elasticity estimates. We also show that although Canadian welfare was higher under this policy than it would have been had Canada unilaterally lowered its tariffs to zero, a multilateral move to free trade would have resulted in an even better welfare outcome for Canadians. We conclude that from a general equilibrium perspective, Macdonald's adoption of protectionist trade policy objectives was a welfare-enhancing policy change.

The rest of the paper proceeds as follows: in Section 2, we describe the theoretical foundation for establishing general equilibrium welfare effects of tariff changes; in Section 3, we discuss data sources and the methods used to construct and estimate the key variables and parameters needed to measure these effects; in Section 4, we report on our estimates of the welfare effects of the National Policy; and in Section 5 we conclude.

2 Theory: The Armington model

Our measure of the general equilibrium welfare effects of the adoption of protectionist trade policy in Canada in 1879 is derived from a version of the Armington model, which is similar to the single-industry, static models described in Arkolakis et al. (2012) and the multi-industry models described in Costinot and Rodriguez-Clare (2014) and Ossa (2015). We employ this particular approach because it is relatively parsimonious and it yields closed-form equations for the impact of tariff changes on welfare. As we show, the measurement of welfare changes in our theoretical setting only requires data on national income, industry-specific trade and production shares, tariff rates, and import demand elasticities, all of which are available, or can be estimated for Canada during the 1870–1913 period.

type used here.

[6] By "historically contemporaneous," we mean estimated with historical data and hence contemporaneous with our period of study.

2.1 Environment

Consider a world with $n = 1, ..., N$ countries and $s = 1, ..., S$ industries. Each country is endowed with L_n inelastically supplied workers and is home to a representative agent who derives welfare from an aggregate final consumption good C_n^F. This aggregate good is a Cobb-Douglas combination of industry-specific consumption goods C_n^s.

$$C_n^F = \prod_{s=1}^{S} C_n^{s\,\alpha_n^s}, \tag{1}$$

where $\sum_{s=1}^{S} \alpha_n^s = 1$.

Industry-specific final goods are produced in each country as a constant elasticity of substitution (CES) aggregate of tradable country-industry-specific differentiated intermediate products indexed by $i, j = 1, ..., N$.

$$Q_n^s = \left(\sum_{i=1}^{N} q_{ni}^{s\;\frac{\sigma^s-1}{\sigma^s}} \right)^{\frac{\sigma^s}{\sigma^s-1}}, \tag{2}$$

where Q_n^s denotes the output of a non-tradable final good in industry s of country n, q_{ni}^s denotes demand for the intermediate product from i by goods producers in industry s of country n, and $1 < \sigma^s < \infty$ denotes the elasticity of substitution across intermediate products used in industry s. Note that as σ^s increases, products become more substitutable, and when $\sigma^s = \infty$, products are perfect substitutes.

Products exported from i to n are subject to two trade costs: (i) an iceberg trade cost of the form $\kappa_{ni}^s \geq \kappa_{ii}^s = 1$, where κ_{ni}^s units of a given product in industry s need to be exported from i for each unit that arrives in n; and (ii) an ad valorem tariff $t_n^s \geq 0$ imposed by country n on imports produced by industry s, where $t_n^s = 0$ for home-produced products. All tariff revenue in n is assumed to be redistributed to the representative agent in that country.

Under a no arbitrage condition, the price of intermediate product i exported from country i to n in industry s can be denoted as $p_{ni}^s = \tau_{ni}^s p_i^s$, where $\tau_{ni}^s = \kappa_{ni}^s(1+t_n^s)$ denotes total trade costs on exports from i to n in industry s, and p_i^s denotes the domestic price of product i in industry s of country i.

The production of the tradable country-industry-specific intermediate products can be described by a constant returns to scale technology.

$$q_i^s = \varphi_i^s l_i^s, \tag{3}$$

where l_i^s denotes the labor input for producers in industry s of country i, and φ_i^s denotes a country-industry-specific productivity parameter. Under perfect competition, the domestic price of product i in industry s is equal to marginal cost.

$$p_i^s = \frac{w_i}{\varphi_i^s}, \tag{4}$$

where w_i denotes the wage earned by labor in country i.

We denote X_{ni}^s as total exports from i to n in industry s, and X_{nn}^s as domestic production consumed at home in industry s of country n. Since industry production functions are CES, exports can be expressed as

$$X_{ni}^s = \left(\frac{\tau_{ni}^s p_i^s}{P_n^s}\right)^{1-\sigma^s} X_n^s, \tag{5}$$

where $X_n^s = \alpha_n^s X_n = \sum_{i=1}^N X_{ni}^s$ denotes total expenditures in country n on all foreign and domestically produced products in industry s, and $X_n = \sum_{s=1}^S X_n^s$ denotes total expenditures in country n across all industries.

The corresponding price index for the final good in industry s of country n can be expressed as

$$P_n^s = \left(\sum_{i=1}^N \tau_{ni}^s p_j^{s\sigma^s - 1}\right)^{\frac{1}{1-\sigma^s}}. \tag{6}$$

2.2 Equilibrium

In the competitive equilibrium, trade is balanced and all goods markets clear. We denote consumer income from labor and tariff revenue in industry s of country n as Y_n^s and T_n^s respectively, where $T_n^s = \sum_{i=1}^N t_n^s X_{ni}^s/(1+t_n^s)$. The balanced trade condition implies that $\sum_{s=1}^S (Y_n^s + T_n^s) = \sum_{s=1}^S X_n^s$ for all n. The goods market clearing condition implies that $Y_n^s = \sum_{i=1}^N X_{in}^s/(1+t_i^s)$ for all n and s. One can derive a gravity equation by substituting equation (6) into (5).

$$X_{ni}^s = \frac{\left(\tau_{ni}^s p_i^s\right)^{1-\sigma^s}}{\sum_{i=1}^N \left(\tau_{ni}^s p_i^s\right)^{1-\sigma^s}} \alpha_n^s X_n \tag{7}$$

Substituting the competitive equilibrium conditions into (7) yields the following system of N equations and N unknowns:

$$Y_i = \sum_{n=1}^N \sum_{s=1}^S \frac{1}{1+t_n^s} \frac{\alpha_n^s \left(\tau_{ni}^s p_i^s\right)^{-\theta^s}}{\sum_{i=1}^N \left(\tau_{ni}^s p_i^s\right)^{-\theta^s}} \frac{Y_n}{1-\lambda_n}, \tag{8}$$

where $\lambda_i \in (0,1)$ denotes the share of tariff revenue in country i's total expenditures, and $-\theta^s = 1 - \sigma^s$ denotes a general expression for import demand elasticity in industry s.[7] By Walras' Law, only $N-1$ of these equations are independent, so income is determined only up to a constant. The unique equilibrium is characterized by the set of wages that satisfy equation (8). Once wages are solved for, values from (8) can be substituted into (7) to characterize exports.

2.3 Welfare

In this general equilibrium model, welfare in country n is equivalent to real aggregate consumption, where $C_n^F = X_n/P_n$. The aggregate price index in n, P_n, corresponds to the following:

$$P_n = \prod_{s=1}^{S} P_n^{s\alpha_n^s} \tag{9}$$

To solve for welfare, we first derive industry-level consumption equations, where $C_n^s = X_n^s/P_n^s$. Noting that $X_n^s = \alpha_n^s w_n L_n / (1-\lambda_n)$, we substitute (4) into (5), rearrange this equation in terms of P_n^s, and substitute the result into our industry-level consumption equations.

$$C_n^s = \left(\frac{1}{1-\lambda_n}\right) \varphi_n^s \alpha_n^s L_n \left(\pi_{nn}^s\right)^{\frac{-1}{\theta^s}}, \tag{10}$$

where $\pi_{nn}^s = X_{nn}^s/X_n$ denotes of the share of home consumption in industry s of country n.

For ease of exposition, we use what is commonly referred to as the "exact hat algebra" to represent counterfactual scenarios, where $\hat{z} = z'/z$ denotes the ratio of counterfactual value to the initial value of any given variable z (see Dekle, Eaton and Kortum 2007). With this notation, the following three expressions can be derived from equations (7), (8), and the expression for λ_i:

$$\hat{Y}_n Y_n = \sum_{i=1}^{N} \sum_{s=1}^{S} \frac{1}{1+t_n^{s\prime}} \frac{\alpha_i^s \pi_{in}^s \left(\hat{\tau_{in}^s} \hat{Y}_n\right)^{-\theta^s}}{\sum_{j=1}^{N} \pi_{ij}^s \left(\hat{\tau_{ij}^s} \hat{Y}_j\right)^{-\theta^s}} \frac{\hat{Y}_i Y_i}{1-\lambda_i^{\prime}} \tag{11}$$

$$\hat{\pi}_{ni}^s = \frac{\left(\hat{\tau_{ni}^s} \hat{Y}_j\right)^{-\theta^s}}{\sum_{j=1}^{N} \pi_{nj}^s \left(\hat{\tau_{nj}^s} \hat{Y}_j\right)^{-\theta^s}} \tag{12}$$

[7] The full expression for λ_i is $\sum_{n=1}^{N} \sum_{s=1}^{S} \frac{t_i^s}{1+t_i^s} \alpha_i^s \pi_{in}^s$, where $\pi_{in}^s = X_{in}^s/X_i^s$ denotes of the share of country i spending on goods imported from n in industry s.

$$\lambda_i' = \sum_{i=1}^{N}\sum_{s=1}^{S} \frac{t_i^{s\prime}}{1+t_i^{s\prime}} \frac{\alpha_i^s \pi_{in}^s \left(\hat{\tau_{in}^s}\hat{Y}_j\right)^{-\theta^s}}{\sum_{j=1}^{N}\pi_{ij}^s \left(\hat{\tau_{ij}^s}\hat{Y}_j\right)^{-\theta^s}} \tag{13}$$

Finally, the change in real consumption in industry s according to (10) becomes

$$\hat{C}_n^s = \left(\frac{1-\lambda_n}{1-\lambda_n'}\right)\left(\hat{\pi}_{nn}^s\right)^{\frac{-1}{\theta^s}}, \tag{14}$$

where $\hat{\varphi_n^s}\hat{\alpha}_n^s\hat{L}_n = 1$ since φ_n^s, α_n^s and L_n are constant across different states. Substituting this result into the total consumption expression from (1) yields the following equation for the equilibrium change in welfare following a change in ad valorem tariffs:

$$\hat{W}_n = \prod_{s=1}^{S} \hat{C}_n^{s\,\alpha^s} = \prod_{s=1}^{S}\left(\left(\frac{1-\lambda_n}{1-\lambda_n'}\right)\left(\hat{\pi}_{nn}^s\right)^{\frac{-1}{\theta^s}}\right)^{\alpha^s} \tag{15}$$

The impact of a change in tariffs on welfare in this model depends on how the change affects equation (15). Intuitively, an increase in tariffs in industry s of country n will raise welfare to the extent that the change positively affects the country's terms of trade, increases its tariff revenues and, as a result, raises total real income. These are exactly the effects that are missed in traditional partial-equilibrium deadweight loss calculations, which depend only on industries' home consumption shares, import demand elasticities, and average weighted tariffs.[8] Like partial equilibrium deadweight loss measures, (15) also captures the reduction in welfare that results from the distortionary effects of higher tariffs on home consumption shares (π_{nn}^s). The balance of the competing forces on welfare crucially depends on the import demand elasticity, $-\theta$. All else equal, when the magnitude of $-\theta$ is larger, imports and home production are more substitutable and tariffs are more distortionary. The optimal welfare maximizing tariff is therefore decreasing in θ. The optimal tariff also depends on country size, L_n. All else equal, larger countries have a greater scope for influencing domestic and foreign demand and therefore their terms of trade. As a result, the optimal tariff is increasing in country size. A close approximation for the optimal tariff in this model is

$$t_n^{s\,*} = \frac{1}{\theta^s \pi_{ii}^{s\,row}}, \tag{16}$$

where $0 < \pi_{ii}^{s\,row} \leq 1$ denotes the share of rest-of-world (RoW) spending on RoW goods in industry s.[9] For larger countries, $\pi_{ii}^{s\,row}$ is smaller and, as a result, the optimal tariff

[8] See Beaulieu and Cherniwchan 2014: 152, or Irwin 2010: 121.

[9] A similar expression to (16) appears in Costinot and Rodriguez-Clare (2014). See also Felbermayr et al. (2013, 2015), Demidova and Rodriguez-Clare (2009), Alvarez and Lucas (2007), or Gros (1987)

will be higher. For Canada, which was certainly a small open economy in the late 19th century, $\pi_{ii}^{s\,row}$ must have been close to 1. Since our estimates of θ^s tend to lie above 1 (see Table 2), the optimal tariff for Canada in our historical context will be strictly greater than zero, but less than 100%.

This result stems from the general equilibrium structure of our model, and it is not consistent with more traditional predictions from partial equilibrium models, which suggest that the optimal tariff for all small open economies should be zero (the minimization of DWL requires that $t_n^{s\,*} = 0$ in these models). The more traditional partial equilibrium results are based on the assumption that small economies exercise no market power and hence have no influence on their terms of trade. Our welfare measure is based on a theoretical structure that assumes that countries lie on a spectrum from smaller to larger economies, which exercise relatively little to relatively more market power.[10] We also note that our model, like the traditional partial equilibrium approach, is static.[11] The general equilibrium effects we measure do not depend on dynamic changes in technology, learning-by-doing, or the exploitation of scale economies.

To measure the general equilibrium changes in welfare that were the result of the adoption of protectionist trade policy in Canada under the National Policy in 1879, we must solve the system of equations described by (11)–(15). We require information on the initial values of national total income (Y_n^s), industry-specific expenditure shares (α_n^s), home consumption and import penetration shares (π_{nn}^s and π_{ni}^s), and average weighted tariff rates for before and after the policy (t_n^s and $t_n^{s\prime}$). We also need industry-specific import demand elasticities ($-\theta^s$).[12]

for more on small open economies' optimal tariffs.

[10]Broda et al. (2008) find evidence that large economies and, to a lesser extent, small economies exercise international market power due to specialization in differentiated industries.

[11]The predictions from this model are generalizable across other environments, including monopolistic competition (Gros 1987), producer heterogeneity (Felbermayr et al. 2013, Demidova and Rodriguez-Clare 2009, and Alvarez and Lucas 2007), and variable markups (Demidova 2015). In all of these environments, as long as goods are not perfect substitutes, in which case θ^s approaches ∞ and $t_n^{s\,*} = 0$, the optimal tariff will be greater than zero for all countries.

[12]A naive observer might assume that equation (15) requires data from before and after the policy change. However, realizations of the required variables over time reflect other shocks in addition to the National Policy. Therefore, looking at evidence from after the policy does not generate an accurate welfare measure. Instead, our preferred approach, which is standard in the empirical general equilibrium trade literature (Caliendo and Parro 2015), is to use data reflecting initial conditions and the tariff change that is the focus of our study, in the model's equations.

3 Data

3.1 Measuring average weighted tariffs

To measure industry-specific average weighted tariffs (t_n^s), we use newly compiled granular, product-level data from the Trade and Navigation tables published in the Canadian federal government's annual sessional papers for the years 1870 to 1913. The trade tables report the total value of imports for home consumption and the total value of all duties collected at the product level for all manufactured and non-manufactured import goods.[13] From these figures, average weighted tariffs for individual products can be calculated, which can then be easily aggregated up to commonly identified six-digit Harmonized Commodity Description and Coding System (HS6) import goods. We assign each good to one of 16 two-digit Standard Industrial Classification (SIC2) manufacturing industries, or an aggregate non-manufacturing industry.[14] Non-manufactured products include unprocessed raw materials and foodstuffs, such as sand and gravel, logs in the rough, live animals, or raw sugar.

Columns (1a) and (1b) in Table 1 report Canadian average weighted tariffs by industry and for the aggregate manufacturing and non-manufacturing sectors in 1877 – the last fiscal year before the National Policy was introduced, and 1880 – the first fiscal year after the policy was implemented. On average, the manufacturing sector's AWT rose by more than 7 percentage points, from 14.2% to 21.5%, with the introduction of the National Policy. Tariff rates for all 16 of the manufacturing industries increased, but the margin by which these rates rose was not uniform across the industries. Transport Equipment, Coal and Petroleum, and Food and Beverages, for example, enjoyed tariff increases in excess of 13 percentage points, while Printing and Publishing, and Non-Ferrous Metals' AWT more than doubled. In contrast, Iron and Steel, Leather, and Tobacco saw their tariffs increase by less than 3 percentage points. We note that subsequent changes during the 1880s and early 1900s reinforced these highly selective tariff revisions, both across industries and across time. Food and Beverages, Tobacco, and Textiles, for example, experienced repeated, substantial revisions (Alexander and Keay, 2016: Table 2).

For the non-manufacturing sector, average weighted tariffs were similar in level, and closely correlated with manufacturing tariffs throughout the pre-National Policy period. However, after 1879 manufactured goods' tariffs grew much faster than non-manufactured products' AWT, and the sectors' tariff levels diverged well into the twentieth century. Because non-manufacturing import goods were typically used as inputs into domestic

[13] In total, our dataset includes over 20,000 product-year observations.

[14] We use the 1948 SIC classification to match our trade data with Urquart's (1993) manufacturing industry output data. For a more detailed discussion of the derivation of our AWT, see Alexander and Keay (2016).

manufacturing production, the divergence in manufactured and non-manufactured goods' tariff rates is an indication of the selective, narrowly targeted adoption of protectionist objectives in Canada after 1879.

To provide some comparative context for the Canadian tariffs reported in Table 1, estimates of US industry-specific tariffs from 1880 are included in column (5). The US figures confirm that Canada's fastest-growing trade partner during our period of study was firmly protectionist, with US manufacturing tariffs averaging more than 37% in 1880. Irwin (2010: Table A1) reports that on average across all import products, US aggregate tariffs fell slightly at the time the National Policy was introduced in Canada, from 29.2% in 1877 to 29.1% in 1880. Trade figures in Mitchell and Deane (1962: 282 and 394) reveal that over all import products, British tariff rates were much lower than American rates, but they also fell slightly in 1879, from 5.1% to 4.7%. The dramatic increase in Canadian tariffs under the National Policy appears to have moved Canadian rates closer to American levels of protection, but the Canadian policy change was clearly not part of a broad, uniform global increase in rates in 1879.

Together, the patterns evident from the tariff rates reported in Table 1, columns (1a) and (1b), suggest that the National Policy marked a significant but highly selective policy shift. This shift occurred at a time when Canadian industrial production was rising rapidly, global markets were integrating, and, despite the high tariff walls being maintained by the United States, an increasing share of trade was flowing across the Canada-US border. These features of the National Policy's tariff changes, and the environment in which these changes were occurring, underline the need to use a multi-sector, general equilibrium model for the assessment of the welfare effects of Canada's adoption of protectionist trade policy objectives.

3.2 Measuring industry-specific expenditure, home consumption, and tariff revenue shares

Industry-specific expenditure shares (α_n^s) are measured as domestic expenditures on each industry's output goods as a share of aggregate domestic expenditures, where "expenditures" is defined as the gross value of domestic production for each industry in each year, less the value of industry exports, plus the value of import goods produced (or potentially produced) by each industry. Home consumption shares (π_{ni}^s) are measured as one minus each industry's import penetration ratio, which is equal to domestic expenditures on each industry's domestically produced output goods as a share of total expenditures. Tariff revenue shares (λ_n^s) are measured as the total value of all duties collected on import goods produced (or potentially produced) by each industry as a share of domestic expenditures on each industry's output. All domestic production data are taken from Urquart (1993) and Harris, Keay and Lewis (2015). All trade and tariff data are taken from the Canadian federal government's trade tables spanning the fiscal years 1868–1914.

Table 1, columns (2a) and (2b), report Canadian industry expenditure shares for 1877 and 1880. As we might expect, some manufacturing industries were considerably more important as a share of total expenditures than others. For example, Food and Beverages, Wood, Iron and Steel, and Clothing each make up over 4.5% of total domestic expenditures in 1879, which implies that tariff changes that affect these industries will be relatively influential with respect to aggregate Canadian welfare. In contrast, Tobacco, Rubber and Plastics, and Pulp and Paper, *combined* make up just over 1% of total domestic expenditures. Tariff changes that affect these industries will be inconsequential relative to the largest four or five industries. We also note that manufactured goods as a whole account for between 40% and 50% of aggregate domestic expenditures. The large industry share for the non-manufacturing sector, combined with this group's low import penetration ratios and relatively stable tariff rates, play an important role in our measures of the change in Canadian welfare following the country's adoption of trade protection in 1879.

Because high home consumption shares reflect low import penetration into the Canadian market, one might reasonably predict that there should be a positive relationship between an industry's AWT and its home consumption share. In general, this prediction holds for Canada during our period of study. In Table 1, columns (3a) and (3b), we can see that the home consumption share averaged over all manufacturing industries rose from 78% in 1877 to 82% in 1880, and we note that this share continued to rise into the early 1890s. In other words, despite the widespread international market integration and dramatic reductions in intercontinental transport costs that Canadian producers faced during the late 19th and early 20th century era of globalization, protectionism appears to have largely kept import penetration at bay in Canada.[15] However, the figures in Table 1 also reveal that the ability of Canadian trade policy to limit foreign competition was not uniform or unambiguous. The Non-Ferrous Metals, Rubber and Plastics, and Clothing industries, for example, faced relatively low home consumption shares despite quite sharply rising AWT under the National Policy. These industries' experiences stand out even more if we compare them to industries such as Food and Beverages, or Textiles, which saw their home consumption shares rise despite more moderate increases in AWT. For the non-manufacturing sector, we find that import penetration was significantly lower than for the manufacturing sector, at least on average. Again, this heterogeneity across

[15]For more on the first era of globalization (1870-1913), see Estevadeordal et al. (2003).

industries' expenditures and home consumption shares provides more justification for the adoption of a multi-sector general equilibrium model in our historic setting.

Turning to tariff revenues as a share of total expenditures, we see that although Canadian manufacturing industries' import penetration ratios fell after the introduction of the National Policy's tariff revisions, tariff revenues actually rose, at least on average over the 16 manufacturing industries. Table 1, columns (4a) and (4b), reveals that tariff revenue as a share of domestic expenditures rose from 3.1% in 1877 to 3.9% in 1880 for Canadian manufacturing as a whole, and we note that this share remained well above its 1877 level until at least 1913. The only industries that did not experience an increase in their tariff revenue shares in 1879 were Textiles, and Coal and Petroleum. Even the non-manufacturing sector, which had relatively low and falling tariff revenue shares throughout the entire 1870–1913 period, saw a slight rise in their share in 1879. These patterns, combined with the evidence of rising home consumption shares, suggest that Canadian import demand was sufficiently inelastic during this period to ensure that average tariff revenues rose, even as tariff rates were increased to limit foreign import competition.

3.3 Measuring import demand elasticities

The identification of import demand elasticities ($-\theta^s$) poses a significant empirical challenge for the measurement of welfare changes in the wake of Canada's adoption of protectionist trade policy in 1879. Others who have studied the welfare implications of late 19th century trade policy have resorted to relatively disaggregated, modern elasticity estimates that are reported in the more recent empirical trade literature.[16] Using modern estimates in our historical context requires that we assume that the degree of substitutability between domestic and foreign products has been constant over the very long run. While this assumption is unlikely to hold, the estimation of elasticities that are appropriate for the period requires information from the late 19th and early 20th centuries on domestic and foreign prices, tariffs, trade volumes, and domestic expenditures. Typically this information either does not exist, or it is only available at the national or sectoral level of aggregation. The use of highly aggregated data will result in estimates that ignore variation in substitutability that exists among products within a country or sector.[17]

We derive our welfare measures using both modern, but highly disaggregated, elas-

[16] For example, Beaulieu and Cherniwchan (2014) use Kee et al. (2008) estimates, and Irwin (2010) uses four sets of estimates, all from the post-1970 period.

[17] Elasticity estimates with disaggregated data are also less prone to aggregation bias (see Imbs and Mejean 2015). For more on the impact of elasticity choice, see Federico and Vasta (2015).

ticity estimates taken from recent empirical trade literature, and historic, but relatively aggregate, elasticities that we estimate with newly compiled Canadian price, production, and trade data that span the 1870–1913 period. Kee et al. (2008) estimate import demand elasticities at the six-digit product level using international panel data from 1988–2001. Beaulieu and Cherniwchan (2014) use these estimates in their partial equilibrium measures of the welfare impact of late 19th century changes in Canadian trade policy. The advantages of using these modern values for θ^s are that they were estimated using cross-country international data, which reduces the likelihood that they are affected by idiosyncratic, country-specific bias, and they are product-specific, which allows for a very finely detailed, granular investigation of the welfare effects of tariff changes.[18] The disadvantage of using modern estimates is that differentiation and substitutability among products was different in the 19th century than in the late 20th century, and Canadian-specific elasticities may well deviate substantially from those estimated with international panel data.

We report the Kee et al. elasticities, aggregated up to the SIC2 manufacturing industry level using product-specific import shares as weights, in Table 2, column (1). Fourteen of the sixteen modern estimates lie within the [2.8, 0.2] interval identified by Marquez (1999: 102) as the range of Canadian elasticities reported in 19 published sources between 1946 and 1994. The weighted average Kee et al. elasticity across all manufacturing industries is 1.87.

As an alternative to the Kee et al. modern θ^s figures, we estimate historically contemporaneous elasticities derived from import demand systems described by Shiells et al. (1989). Irwin (2000), and Inwood and Keay (2013) use variants of our specification to estimate historical elasticities of substitution for late 19th century US and Canadian iron and steel producers. Because we do not have product-specific production or price data for Canada during our period, we estimate our import demand functions using aggregate annual information from 1870–1913 for each manufacturing industry, and for the non-manufacturing sector as a whole. For each industry (s), we estimate an import demand function that takes the following form:

$$ln\left(X_{ni}^s\right) = \beta_0 + \beta_1 ln\left(\frac{P_n^s}{P_n}\right) + \beta_2 ln\left(\frac{P_{ni}^s\left(1+t_i^s\right)}{P_n}\right) + \beta_3 ln\left(X_n^s\right) + \beta_4 ln\ \left(L.X_{ni}^s\right) + \epsilon^s, \quad (17)$$

where time subscripts are suppressed, country n is Canada, i denotes RoW, X_{ni}^s denotes the nominal value of imports, P_n^s denotes the domestic industry price index, P_n is a domestic aggregate wholesale price index for all products, P_{ni}^s denotes the import unit

[18]Variations in welfare measurement due to aggregation are not reported in detail in this paper. In Alexander and Keay (2016) we find that aggregation from the HS6 product level to the SIC2 industry level reduces measured DWL by approximately 4% in 1880.

value (pre-tariff value of imports divided by quantity of imports), t_n^s denotes the Canadian AWT, X_n^s denotes aggregate domestic expenditures, $L.X_{ni}^s$ denotes lagged imports, and ϵ^s is a regression residual. The nominal value of imports for home consumption for each of Canada's SIC2 manufacturing industries is reported in Barnett (1966) at decennial census dates. Interpolation between these dates, and evidence for the non-manufacturing sector, is based on values reported in Taylor (1931), Urquhart and Buckley (1965), and the Trade and Navigation tables. The sources for domestic industry prices, and the aggregate manufacturing wholesale price index are described in Harris et al. (2015). When available, import unit values are from the Trade and Navigation tables or Taylor (1931). Interpolation across missing years for import unit values is based on US prices reported in *United States Statistical Abstracts* (various years) and the *Historical Statistics of the United States* (2006).[19] Lagged imports are included in equation (17) to allow for the possibility that import demand responses adjust to price changes over more than one period. Estimates of β_2, therefore, capture the short-run response of Canadian import demand to changes in each industries' post-tariff import price, and long-run import demand elasticity ($-\theta^s$) is equal to $-\beta_2/(1-\beta_4)$.

We estimate equation (17) by ordinary least squares (OLS) with robust standard errors for each manufacturing industry, and for manufacturing and non-manufacturing sectors (including industry fixed effects). The long-run import demand elasticities derived from these estimates are reported in Table 2, column (2). All 16 of our OLS elasticity parameter estimates are statistically distinguishable from zero, and all lie within Marquez's [2.8, 0.2] interval. The import demand elasticity parameter for the manufacturing sector as a whole is 1.59, and the weighted average over all 16 industries is 1.48. For the non-manufacturing sector, our long-run OLS estimate of θ^s is slightly lower, at 1.33.

When we compare our OLS estimates to the Kee et al. modern estimates (columns (1) and (2) in Table 2), we see that 11 of the 16 industries have lower historical estimates, and our OLS estimate for the manufacturing sector as a whole is statistically significantly lower than Kee et al.'s modern weighted average (1.59 versus 1.87). This is perhaps not surprising if we believe that there were fewer domestic substitutes for manufactured goods being imported into Canada in the late 19th and early 20th centuries, than there were in the late 20th century. However, it is also possible that the lower historical OLS estimates could reflect systematic identification problems due to the presence of endogeneity and selection. More specifically, our OLS estimates could be biased downwards (closer to zero) due to the supply-side relationship between import volumes and domestic prices,

[19] Sensitivity tests using alternate aggregate price indexes (CPI and GDP deflator, for example), dropping interpolated exports from domestic expenditures, or dropping lagged imports, do not have any qualitative impact on our elasticity estimates.

or because of the possible selection of inherently inelastic goods into the export market.[20]

To address these identification issues, we instrument for domestic prices in our import demand functions using Canadian raw material prices, an unskilled manufacturing wage index, coal prices, and user cost of capital as excluded instruments in a two-stage least squares instrumental variable (IV) approach. Relative to the OLS estimates, our long-run IV elasticities, reported in column (3) of Table 2, are larger for the manufacturing sector as a whole (1.76 versus 1.59), and for 11 of the 16 industries. All 16 IV elasticities are statistically distinguishable from zero, and again, all lie within the [2.8, 0.2] interval. However, even our IV estimates are generally smaller than the Kee et al. modern estimates. This is true on average and for 10 of the 16 SIC2 manufacturing industries.[21]

Both as a test of the sensitivity of our welfare results, and because the modern, OLS, and IV elasticity estimates capture import demand responses from slightly different perspectives (reflecting differences in perceived product differentiation and substitutability), we measure the welfare effects of Canada's move to protectionist trade policy in 1879 using all three sets of estimates. As a final check on the impact of our θ^s choice, we also derive our welfare estimates under the assumption that all industries' import demand elasticities were fixed at 4.0, which is a common calibration used in recent empirical trade literature corresponding to the (approximate) median among modern cross-country estimates (see Simonovska and Waugh 2014, for example).

The figures presented in Tables 1 and 2 paint a fairly complex picture of the composition of Canadian tariffs, industry expenditures, home consumption, and import demand during the first era of globalization. One interesting feature that stands out is that, in the midst of rising tariff rates and falling import penetration, overall tariff revenues in Canada increased after 1879. This suggests that the tariff changes in 1879 were not sufficiently protectionist to substantively impede the generation of tariff revenue, and as a result, the welfare implications of any trade-off between higher revenues and more distortion are not necessarily unambiguous or obvious.

[20]Imbs and Mejean (2015) develop a correction specific to this selection bias. For more on instrument selection for our IV estimates, see Irwin (2000), or Alexander and Keay (2016).

[21]There could remain some additional bias that IV does not address. For example, our lower historical estimates could reflect inelastic import responses to cyclical price dynamics imbedded in our 1870–1913 data. Because the Kee et al. estimates use panel data, they likely capture longer-run elasticities associated with gravity-type indicators and long-run trade costs. Since the National Policy tariff revisions might be characterized as longer-run changes to trade costs, our historical elasticities might be biased downwards relative to the modern estimates. For a detailed discussion of this potential source of bias, and its implications, see Ruhl (2008).

4 Results

We calculate the change in Canadian welfare that resulted from the change in domestic tariffs during the 1878 and 1879 fiscal years, by solving the system of equations (11)–(15), derived from our general equilibrium model. We first substitute values for Y_n^s, α_n^s, π_{nn}^s, π_{ni}^s, t_n^s and $t_n^{s\prime}$ into (11) to solve for values of $\hat{Y}_n$. These measures are then substituted into (12)–(15) to find values for $\hat{W}_n$. We compare the change in welfare due to the introduction of the National Policy with the counterfactual option of maintaining tariff rates at their 1877 level. To provide some comparative context, we also calculate the change in Canadian welfare that would have resulted from a unilateral reduction in Canadian tariffs to zero in 1879, and a multilateral reduction in all global tariffs to zero in 1879.

In addition to industry-specific Canadian tariff rates, expenditure shares, home consumption shares, and import demand elasticities, solving our system of equations also requires information about RoW. We assume that average weighted tariffs for RoW can be represented by estimates of US rates for each of the 16 SIC2 manufacturing industries, derived from the tariff sources provided in Irwin (2010: Table 1) and the text of the 1883 US Tariff Act (reported in column (5) of Table 1).[22] We also employ three measures of relative economic size (Y_n) in our welfare calculations: (i) we assume that the size of each Canadian industry relative to its RoW counterpart can be represented by the ratio of Canadian relative to American gross output,[23] (ii) we let each RoW industry be 10 times the size of the corresponding Canadian industry, (iii) we let each RoW industry be 100 times the size of the corresponding Canadian industry.[24]

In Table 3, Panel A, we report our general equilibrium measure of the change in Canadian welfare resulting from the introduction of protectionist tariffs under the National Policy in 1879, the change in Canadian welfare that would have resulted from a unilateral reduction in Canadian tariffs to zero in 1879, and the change in welfare that would have resulted from a multilateral reduction in all global tariffs to zero in 1879. These welfare changes are calculated using our IV and OLS θ^s estimates (columns (1) and (2)), Kee et al.'s (2008) modern estimates (column (3)), and fixed $\theta^s = 4.0 \ \forall \ s$ (column (4)). All welfare measures in Panel A assume that the size of the Canadian manufacturing industries (and the non-manufacturing sector) relative to their global counterparts can

[22] As a sensitivity test, we also assume that RoW AWT for all industries can be represented by aggregate US tariffs, which fell slightly from 29.2% in 1877 to 29.1% in 1880, or aggregate UK tariffs, which fell from 5.1% in 1877 to 4.7% in 1880.

[23] SIC2 industries are matched as closely as possible. Years vary according to availability of US data from *Historical Statistics of the United States* (2006).

[24] Assumptions (ii) and (iii) implicitly require that the RoW industrial structure was identical to that of the Canadian economy in 1879, and (i) requires that only US industry size matters for the determination of Canadian welfare effects.

be represented by US relative to Canadian gross output ratios. In Panel B and C, the same counterfactual welfare changes are reported, with the same elasticity estimates, but the Canadian industries are assumed to be 1/100th and 1/10th the size of the RoW, respectively. To emphasize the importance of adopting a general equilibrium approach to welfare measurement in our historical context, in Table 3, Panel D, we also report the change in deadweight loss resulting from the introduction of the National Policy derived using a standard Anderson-Neary partial equilibrium approach (Beaulieu and Cherniwchan 2014: 152). Because our general equilibrium approach captures partial equilibrium distortionary DWL, and because we use the same set of elasticity estimates and the same import penetration, AWT, and GDP figures in our general equilibrium and partial equilibrium calculations, the differences between the results reported in Panels A, B, and C, on one hand, and Panel D, on the other, reflect the positive welfare effects of the tariffs' impact on Canadian terms of trade and tariff revenue.

Our preferred measure of the static general equilibrium welfare impact of the National Policy is reported in the first row of column (1) in Panel A, which uses our industry-specific historic IV elasticity estimates, and assumes that industry-specific US-Canada gross output ratios reflect Canadian industry size relative to the RoW. We find that the National Policy tariff revisions *raised* welfare in Canada by 0.20% of GDP. The first row of columns (2) and (3) report the impact of the National Policy using our OLS elasticities and Kee et al.'s estimates. In both cases, we again find that the National Policy improved Canadian welfare, by 0.19% and 0.13% of GDP, respectively. Column (4) reports our findings based on calculations that fix $\theta^s = 4.0$ for all industries. Because this last elasticity estimate assumes import demand elasticities that are larger than any of our other estimates, the partial equilibrium distortions are larger, the optimal tariff is lower, and the National Policy improves welfare by only 0.03% of GDP, which is less than the other measures but, notably, still positive.

To illustrate the importance of country size in our general equilibrium approach, we report the welfare impact of the National Policy in the first rows of Panels B and C under the assumption that all 16 Canadian manufacturing industries (and the non-manufacturing sector) were 1/100th the size of RoW, and 1/10th the size of RoW, respectively. As equation (16) suggests, a nation's optimal tariff will be larger when its industries account for a larger proportion of global output. Therefore, increases in Canadian tariffs in 1879 are associated with larger increases in welfare when Canadian industries are larger relative to the RoW. Using our IV elasticity estimates, Canadian welfare increases by 0.199% of GDP when Canadian industries account for 1/10th of global output, but only by 0.197% when they account for 1/100th of global output. This relative difference in our measured welfare effects is consistent across elasticity estimates, but here we only want to emphasize that in Panels A, B, and C our qualitative result remains unchanged. Regardless of how we measure Canada's relative size in the global economy during the late 19th century, the imposition of the National Policy tariff positively affected Canadian welfare. This reveals the important insight that smaller countries, while relatively less able to influence their terms of trade, benefit relatively more from terms-of-trade improvements, and hence country size is not as influential in determining the gains from tariff changes in this model as one might expect based on conventional wisdom.

In the second rows of Panels A, B, and C of Table 3, we report the impact of a unilateral reduction in Canadian tariffs to zero in 1879, under our three industry-size assumptions and our four elasticity estimates. Again, the results are consistent with our intuition in a general equilibrium setting. Because the optimal tariff for Canada is generally above the observed AWT for most industries prior to the move to protectionism in 1879, welfare would have fallen if, rather than raising tariffs, Macdonald's Conservative government had adopted a unilateral free trade policy. The welfare loss in this counterfactual case ranges from -0.57% to -0.80%, depending our industry-size assumption and elasticity estimate.

In the third rows of Panels A, B, and C, we report the welfare impact of a multilateral move to free trade in 1879. Under all three industry-size assumptions, and all four elasticity estimates, reducing Canadian and RoW tariffs to zero improves Canadian welfare substantially more than the change following the introduction of the National Policy, or unilateral Canadian liberalization. Although our model suggests that the optimal tariffs for Canadian industries were well above zero in 1879, this is conditional on the maintenance of observed RoW tariff rates. For all countries in a general equilibrium setting, the negative impact of foreign tariffs will be significant. Global free trade removes all tariff distortions, such that, in our Canadian-historical context, the move from observed 1877 tariff rates to zero tariffs improves domestic welfare by between 0.70% and 0.98% of GDP, depending on how big Canadian industries were and how substitutable Canadian and foreign products were. These relatively large welfare effects reflect both high international (and Canadian) AWT, and high import penetration during our period.

As a whole, our general equilibrium welfare results contrast sharply with the more traditional partial equilibrium effects that can be measured with standard deadweight loss calculations. Beaulieu and Cherniwchan (2014: 146), for example, report that, "…the static welfare losses arising from protectionism [in Canada during the last half of the 1870s] amounted to 0.7%–1.5% of GDP." In Table 3, Panel D, we report partial equilibrium welfare loses due to the National Policy, derived using Beaulieu and Cherniwchan's DWL measure and our trade, production, and elasticity estimates that range from -0.30% to -0.85% of GDP. The implied positive terms-of-trade and tariff revenue effects of Canada's adoption of trade protection (using our preferred elasticity and industry-size measures) amount to just over 0.50% of GDP (= 0.20% - (-0.30%)). The presence of these sizable positive welfare effects should not be surprising, given the theoretical predictions described in Section 2. According to equation (16), the optimal tariff for a small open economy with import demand elasticities set equal to 4.0, which is the upper limit of the estimates used here, is roughly 25%. For elasticities below 4.0, the optimal tariff is higher still. Since the National Policy generally moved industry tariff rates closer to their optimal levels, despite the policy's distortionary effects, welfare improved for Canadians.

5 Conclusion

The 1870–1913 period involved rapid international market integration and globalization. Canada, as a small open economy, faced falling international transport costs, rising industrial import competition, and rising import penetration during the 1870s. In this environment, John A. Macdonald's Conservative government sought to protect domestic producers and improve Canadian welfare in the face of a highly protectionist, and rapidly integrating global economy, by abandoning revenue objectives in favor of protectionist goals. Under the National Policy, introduced in March 1879, the Canadian average weighted tariff on all import products rose from 14% to 21%, and it remained well above its 1877 level until at least World War I.

In this paper, we present evidence, based on a multi-industry, differentiated product general equilibrium trade model, and newly compiled, highly granular trade and production data, that suggests that the static welfare impact of the National Policy was in fact positive for Canadians. Specifically, our findings suggest that the tariff increases under the National Policy improved Canadian welfare by as much as 0.20% of GDP.

These findings are clearly not consistent with the more conventional partial equilibrium estimates that suggest that the welfare impact of the policy was strongly negative. We argue that our results bring to light important limitations in the more traditional partial equilibrium deadweight loss calculations. To be clear, our findings also support the view that global free trade would have led to the largest improvements in Canadian welfare – well above the gains from introducing the National Policy. However, given that most of the rest of the world was highly protectionist throughout this era, and that Canadian policy likely had little influence on the policy decisions of other countries, our theoretical approach and our evidence suggest that the National Policy was a welfare-enhancing policy for Canada.

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6 Tables

Table 1: Canadian tariff and expenditure shares, by industry (%)

	Canada								RoW (US)
	t_n^s		α_n^s		π_{nn}^s		λ_n^s		t_n^s
	(1a)	(1b)	(2a)	(2b)	(3a)	(3b)	(4a)	(4b)	(5)
	1877	1880	1877	1880	1877	1880	1877	1880	1880
Food and Beverages	15.7	31.2	12.9	9.9	81.8	88.9	2.9	3.5	39.7
Tobacco	50.3	59.2	0.6	0.5	91.2	92.6	4.4	4.5	75.5
Rubber and Plastics	17.5	25.1	0.1	0.2	71.5	62.2	5.0	9.6	35.0
Leather	14.9	18.9	4.0	5.2	94.2	95.7	0.9	0.8	28.9
Textile	16.7	22.3	3.0	3.2	53.8	67.7	7.6	7.3	52.0
Clothing	17.2	24.4	5.4	5.9	58.7	63.6	7.1	9.0	29.5
Wood	8.1	13.0	4.6	5.0	92.9	95.9	0.6	0.6	21.6
Pulp and Paper	16.9	23.9	0.6	0.6	71.0	74.9	4.9	6.1	33.1
Printing and Publishing	6.5	15.3	1.3	1.0	87.7	89.2	0.8	1.7	21.8
Iron and Steel	10.8	13.2	6.3	6.2	77.9	76.0	2.4	3.2	42.2
Transport Equipment	3.1	24.7	3.1	2.0	88.2	97.0	0.4	0.8	35.0
Non-Ferrous Metals	7.7	16.8	0.8	0.9	63.6	61.6	2.8	6.5	18.0
Non-Metallic Minerals	16.8	23.1	1.1	1.0	77.0	80.3	3.9	4.6	48.3
Coal and Petroleum	22.3	31.7	0.6	0.6	89.3	92.8	2.4	2.3	42.3
Chemicals	9.2	13.7	1.7	1.4	60.9	66.4	3.6	4.7	10.1
Miscellaneous	14.1	22.0	0.8	0.8	60.2	60.4	5.6	8.8	24.3
Manufacturing	14.2	21.5	47.0	44.3	78.0	82.0	3.1	3.9	37.3
Non-Manufacturing	12.3	19.1	52.9	53.3	92.5	95.0	0.9	1.0	25.0

Note: t_n^s = industry-specific average weighted tariffs, α_n^s = expenditure shares, π_{nn}^s = home consumption shares, and λ_n^s = tariff revenue shares. Derivation of all model parameters are described in text.

Source: Canadian AWT, imports, exports, and duty paid are compiled from Canadian federal government sessional papers' *Trade and Navigation Tables*. Gross value of production from Urquart (1993: Tables 1.1, 1.11, 4.1, 6.1, 6.2) and Harris et al (2015: Data Appendix). US AWT are constructed from sources in Irwin (2010) and *1883 Tariff Act*. RoW expenditures, home consumption, and tariff shares are described in the text. Industries are defined by 1948 2-digit SIC classification. Annual series (1870–1913) are available from the authors.

Table 2: Canadian historical import demand elasticity estimates (θ^s), by industry

	Kee et al. (1)	OLS (2)	IV (3)
Food and Beverages	3.45	1.07	0.93
Tobacco	3.54	1.41	2.09
Rubber and Plastics	0.81	1.57	1.72
Leather	1.30	1.65	1.70
Textile	1.82	1.80	2.03
Clothing	1.19	1.38	1.31
Wood	1.38	1.11	0.74
Pulp and Paper	1.87	2.34	2.27
Printing and Publishing	2.07	1.77	1.04
Iron and Steel	2.19	1.97	2.11
Transport Equipment	2.71	1.74	1.73
Non-Ferrous Metals	2.19	1.65	1.71
Non-Metallic Minerals	1.76	0.63	0.85
Coal and Petroleum	0.90	0.93	1.74
Chemicals	1.60	1.23	1.28
Miscellaneous	1.71	1.33	1.59
Manufacturing	1.87	1.59	1.76
Non-Manufacturing	1.67	1.33	1.68

Note: Elasticities in column 1 are constructed using import-weighted industry averages of HS6 estimates from Kee et al. (2008). Values in column 2 are estimates based on equation (17) using OLS. Values in column 3 are estimates based on equation (17) using IV. See text for details.

Table 3: Welfare Effects of the Canadian National Policy (%Δ Welfare/GDP)

Panel A: RoW = PQ^s_{US}/PQ^s_{Cda}				
	IV (1)	OLS (2)	Kee et al. (3)	Fixed (4)
National Policy	0.20	0.19	0.13	0.03
Unilateral Free Trade	-0.78	-0.75	-0.57	-0.30
Global Free Trade	0.71	0.77	0.97	0.91
Panel B: RoW = 100 times				
	IV (1)	OLS (2)	Kee et al. (3)	Fixed (4)
National Policy	0.20	0.19	0.13	0.03
Unilateral Free Trade	-0.78	-0.75	-0.57	-0.30
Global Free Trade	0.71	0.78	0.98	0.91
Panel C: RoW = 10 times				
	IV (1)	OLS (2)	Kee et al. (3)	Fixed (4)
National Policy	0.20	0.19	0.13	0.03
Unilateral Free Trade	-0.79	-0.75	-0.58	-0.30
Global Free Trade	0.70	0.76	0.97	0.90
Panel D: Partial Equilibrium DWL				
	IV (1)	OLS (2)	Kee et al. (3)	Fixed (4)
National Policy	-0.31	-0.30	-0.41	-0.85

Note: Values in column 1 are constructed using IV estimates of import demand elasticities from equation (17). Values in column 2 are constructed using OLS estimates of import demand elasticities from equation (17). Values in column 3 are constructed using import-weighted industry average import demand elasticities from Kee et al. (2008). Values in column 4 are constructed using import demand elasticities set equal to 4.0 for all industries. Rows 1, 2, and 3 correspond to tariff changes associated with the 1879 National Policy, unilateral free trade, and global free trade, respectively. Panel A reports general equilibrium welfare effects when RoW industry size is assumed to be captured by the ratio of US relative to Canadian gross output. Panels B and C report general equilibrium welfare effects when Canada is assumed to be 1/100th and 1/10th the size of RoW, respectively. Panel D reports partial equilibrium welfare effects derived from Beaulieu and Cherniwchan's (2014) and Irwin's (2010) DWL measure, using the same home consumption shares, AWT, and import demand elasticities used in our general equilibrium calculations.