Online Appendix to: Merger Policy in a Quantitative Model of International Trade

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February 9, 2019

I Impact of Demand and Supply Conditions

We prove the following proposition:

Proposition I. *The potential for conflict between national authorities varies with demand conditions and production costs as follows:*

1. *Suppose that* $\partial_2 P^j(Q^j, a^j) > 0$ *and* $\partial^2_{12} P^j(Q^j, a^j) \leq 0$ *for all* Q^j *such that* $P^j(Q^j, a^j) > 0$*, where* a^j *is a demand shifter in country* $j \in \{1, 2\}$*. Then, an increase in the country-*j *demand level* a^j *induces an increase in* ρ^{j*} *and a decrease in* ρ^{i*}*,* $i \neq j$*.*

2. *Suppose demand is linear and the number of active firms in both countries is the same. Then, an increase in the marginal production cost of a country-*j *firm that is active in both countries decreases* ρ^{j*} *and increases* ρ^{i*}*,* $i \neq j$*, if* $\rho^{j*} > 1$*, and has the reverse effects if* $\rho^{j*} < 1$*.*

Proof. We use the same notation as in the proof of Proposition 2.

Part 1. Adapting our notation for the demand shift parameter a^j, the equilibrium output level in country $j \in \{1, 2\}$ is given by the unique solution to

$$\Gamma(Q^{j*}; (c_k^j); a^j) \equiv \sum_{k \in \mathcal{N}^1 \cup \mathcal{N}^2} \max\left(0, -\frac{P^j(Q^{j*}; a^j) - c_k^j}{\partial_1 P^j(Q^{j*}; a^j)}\right) - Q^{j*} = 0.$$

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Applying the implicit function theorem to this equation, yields:

$$\begin{aligned}\frac{dQ^{j*}}{da^j} &= -\frac{\left(|\overline{\mathcal{N}}^{1j}| + |\overline{\mathcal{N}}^{2j}|\right)\partial_2 P^j(Q^{j*};a^j) + Q^{j*}\partial^2_{12}P^j(Q^{j*};a^j)}{\left(|\overline{\mathcal{N}}^{1j}| + |\overline{\mathcal{N}}^{2j}| + 1\right)\partial_1 P^j(Q^{j*};a^j) + Q^{j*}\partial^2_{11}P(Q^{j*};a^j)},\\ &< -\frac{\partial_2 P^j(Q^{j*};a^j)}{\partial_1 P^j(Q^{j*};a^j)},\end{aligned}$$

where the first line follows as $-\left[P^j(Q^{j*};a^j) - c^j_k\right]/\partial_1 P^j(Q^{j*};a^j) = q^{j*}_k$ if $k \in \overline{\mathcal{N}}^{1j} \cup \overline{\mathcal{N}}^{2j}$, and the second line from Assumption 1, $\partial_2 P^j(Q^{j*};a^j) > 0$ and $\partial^2_{12}P^j(Q^{j*};a^j) \leq 0$. We thus obtain:

$$\begin{aligned}\frac{dP^j(Q^{j*};a^j)}{da^j} &= \partial_1 P^j(Q^{j*};a^j)\frac{dQ^{j*}}{da^j} + \partial_2 P^j(Q^{j*};a^j)\\ &> 0.\end{aligned}$$

The assertion on the effect of a^j on ρ^{j*} and ρ^{i*} then follows by observing that $\frac{dP^i(Q^{i*};a^i)}{da^j} = 0$ for $i \neq j$.

Part 2. Consider firm $k \in \mathcal{N}^i$. By assumption, firm k is active in both countries, i.e., $k \in \overline{\mathcal{N}}^{i1} \cap \overline{\mathcal{N}}^{i2}$. Applying the implicit function theorem to the equilibrium condition $\Gamma(Q^{j*};(c^j_k)_{k\in\mathcal{N}^1\cup\mathcal{N}^2}) = 0$, where j may or may not be equal to i, we obtain:

$$\begin{aligned}\frac{dQ^{j*}}{dc_k} &= \frac{\tau^{ij}}{\left(|\overline{\mathcal{N}}^{1j}| + |\overline{\mathcal{N}}^{2j}| + 1\right)P^{j\prime}(Q^{j*}) + Q^{j*}P^{j\prime\prime}(Q^{j*})}\\ &= -\frac{\tau^{ij}}{\left(|\overline{\mathcal{N}}^{1j}| + |\overline{\mathcal{N}}^{2j}| + 1\right)b^j},\end{aligned}$$

where, by the assumption of linear demand, $P''(\cdot) \equiv 0$, and $P^{j\prime}(\cdot) \equiv -b^j$. For $j \neq i$, we have $d\rho^{j*}/dc_k > 0$ if and only if

$$-b^j\frac{dQ^{j*}}{dc_k}P^{i*} > -b^i\frac{dQ^{i*}}{dc_k}P^{j*},$$

or, equivalently,

$$\frac{\tau^{ij}}{\left(|\overline{\mathcal{N}}^{1j}| + |\overline{\mathcal{N}}^{2j}| + 1\right)}\frac{\left(|\overline{\mathcal{N}}^{1j}| + |\overline{\mathcal{N}}^{2j}| + 1\right)}{\tau^{ii}}\frac{P^{i*}}{P^{j*}} > 1.$$

As $\tau^{ii} = 1$, and the number of active firms is the same in both countries, i.e., $|\overline{\mathcal{N}}^{11}| + |\overline{\mathcal{N}}^{21}| =$

$|\overline{\mathcal{N}}^{12}| + |\overline{\mathcal{N}}^{22}|$, this inequality can be rewritten as

$$\rho^{i*} \equiv \frac{\tau^{ij} P^{i*}}{P^{j*}} > 1.$$

Similarly, we obtain $d\rho^{i*}/dc_k > 0$ if and only if $\rho^{i*} < 1$. □

II Solution of the Cournot Game with Linear Demand

In this section, we describe how the theoretical moments coming from the Cournot game are computed. Fix a sector s and a vector of productivity draws in each country. As each firm can sell its good at home and abroad, the number of potentially active firms in sector s is $N_s = N_s^1 + N_s^2$ in both countries. However, because a firm can profitably sell in a market only if its unit cost is less than the market price it faces (net of iceberg transportation costs), the number of *active* firms can vary across countries. We drop sector subscripts from now on to ease notation. Consider the manufacturing market in country i. We relabel firms such that $c_1^i \leq c_2^i \leq \ldots \leq c_N^i$, i.e., adjusting for trade costs, firms are ranked from the most productive to the least productive.

Consider an equilibrium candidate in which the first K firms are active. For $1 \leq k \leq K$, the profit of firm k in country i is given by $\pi_k^i = \left(a^i - b^i(q_k^i + Q_{-k}^i) - c_k^i\right) q_k^i$, where $Q_{-k}^i = \sum_{l \neq k} q_l^i$ is the total output of firm k's rivals. This yields the usual first-order condition: $a^i - b^i Q_{-k}^i - c_k^i - 2b^i q_k^i = 0$. Denoting by $C_K^i = \sum_{k=1}^K c_k^i$ the sum of the marginal costs of the first K firms, and summing over the active firms' first-order conditions, we obtain the market price in country i in this equilibrium candidate: $P^i = \frac{a + C_K^i}{K+1}$.

By Lemma 1, there exists a unique $\overline{K} \in \{0, 1, \ldots, N\}$ such that $\frac{a^i + C_K^i}{K+1} > c_K^i$ for all $K \leq \overline{K}$ and $\frac{a^i + C_K^i}{K+1} \leq c_K^i$ for all $\overline{K} + 1 \leq K \leq N$. Therefore, at the unique Nash equilibrium, only the $\overline{K}$ most productive firms are active, and the market price, which is one of the empirical moments we are targeting in the calibration, is given by $P^i = \frac{a^i + C_{\overline{K}}^i}{\overline{K}+1}$. Equilibrium quantities and profits in market i are given by: $q_k^i = \frac{\max(P^i - c_k^i, 0)}{b^i}$ and $\pi_k^i = \frac{\max(P^i - c_k^i, 0)^2}{b^i}$, respectively ($1 \leq k \leq N$). The other moments used in the calibration can be computed as follows: $\text{Sales}^i = P^i \sum_{k \in \mathcal{N}^i} q_k^i$, $\text{Export}^{ij} = P^j \sum_{k \in \mathcal{N}^i} q_k^j$, $\text{TC}^i = \sum_{k \in \mathcal{N}^i} c_k \left(q_k^i + q_k^j\right)$, and $\text{HHI}^i = 10000 \frac{\sum_{k \in \mathcal{N}^i} \left(P^i q_k^i + P^j q_k^j\right)^2}{\left(\sum_{k \in \mathcal{N}^i} P^i q_k^i + P^j q_k^j\right)^2}$, where $j \neq i$, and TC^i and HHI^i denote total costs and the production-based HHI in country i, respectively.

III Competitive Fringe

The competitive fringe extension is similar to the baseline linear-demand Cournot model in most aspects and we focus on an exposition of the key differences here.

As in the baseline calibration, we start by drawing N_s^i productivity levels (z) from a Pareto distribution with scale parameter x_s^i and shape parameter ζ_s^i. The $N_{o,s}^i$ most productive firms are assumed to behave oligopolistically whereas the remaining $N_s^i - N_{o,s}^i$ firms belong to the competitive fringe. $N_{o,s}^i$ is a parameter which is directly determined from the data (see below). The cost function of each oligopoly player k located in country i is as before $C_k^i(q_k) = \frac{1}{z_k}(w^i)^{\eta_s^i}(P_0^i)^{(1-\eta_s^i)}q_k$. We assume that fringe firm l's costs are $C_l^f(q_l) = \frac{1}{z_l}(w^i)^{\eta_s^i}(P_0^i)^{(1-\eta_s^i)}(q_l)^2$ which implies increasing marginal costs and ensures fringe firms are always active. We assume that fringe firms can not export. From now on, we drop sector subscript s and country superscript i to ease notation.

Cournot players move first and set quantities q_k. Fringe firms observe the aggregate output of Cournot players and decide how much to produce. Fringe firms are price takers and choose quantities such that marginal cost equals the equilibrium price (P). This yields fringe firm l's supply function as $S_l(P) = \frac{1}{2}\frac{z_l}{w^\eta P_0^{1-\eta}}P$. Total fringe supply will be $Q^F = \gamma P$ where $\gamma = \frac{1}{2}\sum \frac{z_l}{w^\eta P_0^{1-\eta}}$, where the sum is taken over all fringe firms operating in the country under consideration.

The equilibrium price P now depends on the total quantity supplied by Cournot players (Q) as well as on the output produced by the fringe (Q^F):

$$P = a - \frac{1}{b}(Q + \gamma P),$$

i.e.,

$$P = \frac{ab}{b+\gamma} - \frac{1}{b+\gamma}Q.$$

This describes the new inverse demand function that Cournot players are facing. We can now simply define $\hat{a} \equiv \frac{ab}{b+\gamma}$ and $\frac{1}{\hat{b}} \equiv \frac{1}{b+\gamma}$ and compute the equilibrium quantities and prices for Cournot players as a function of $\hat{a}$ and $\hat{b}$. When computing our theoretical moments, we now take into account the presence of competitive fringe firms. That is, domestic sales now include the competitive fringe's sales, total costs include costs incurred by the competitive fringe firms, and the theoretical HHI is computed using the market shares of both Cournot players and competitive fringe firms. Since fringe firms cannot export, the value of exports is calculated as before.

The calibration of the competitive fringe model requires one additional parameter, $N_{o,s}^i$,

which we calibrate directly from our data on concentration ratios as follows. For each sector and each country, we first fit a fractional polynomial function to match the concentration ratios for which we have data.[1] This yields an imputed relationship between the number of the N largest firms and the total share of sales in a sector these firms account for.[2] In a second step, we use this relationship to compute the number of firms which jointly account for 80% of total sales and set $N^i_{o,s}$ equal to that number.

We use the same 160 sectors for the calibration of the competitive fringe model as for the baseline model, so the descriptive statistics for the empirical moments are identical to the ones presented in Table 1 in the paper. Calibrated parameter values are also very similar to before (Table IX.3.1). The only more substantial difference is that we now obtain higher values for the dispersion parameter ζ (indicating lower productivity dispersion), especially for Canada. The model fit also remains close to perfect, with the exception of some small deviations for relative prices and Canadian HHIs (Figure IX.3.1). Finally, the evolution of conflict statistics with trade costs is almost identical to our baseline results (Figures IX.3.3 and IX.3.4). As before, the dominant type of conflict at present levels of trade costs is that merger authorities are too tough on domestic mergers, with the exception of a minority of sectors in the U.S.

IV Third-Country Imports

For our extension to allow for third-country imports, we assume that, in every sector, there are n^i identical third-country firms selling in country $i \in \{US, CAN\}$ with a constant unit cost of γ^i.

We take n^i directly from the data by setting it equal to the number of firms exporting to i, as reported in the World Bank's Exporter Dynamics Database. Because many countries either do not report the number of exporters to the US and Canada at a suitable level of disaggregation, or are not in the database at all, we use two imputation procedures to get the best possible proxy for n^i. First, we assume that the distribution of exporters across sectors is the same in countries for which we observe sector-level detail and those for which we do not and distribute the total number of exporters for the latter type of country accordingly.

[1] We have data on CR4, CR8, CR20 and CR50 for the U.S. For Canada, we also have data for CR12 and CR16. For sectors with more than 20 firms, we use polynomials with three fractional powers and for sectors with between 10 and 20 firms, we use two fractional powers. (10 is the minimum number of firms we observe in our data.)

[2] Note that our concentration ratio data are production-based and do not include the sales of foreign firms in the domestic market. That is, sales shares are calculated as a fraction of sales for all domestic firms.

Second, we regress the log of the number of exporters on the log of sector-level exports to the US and Canada, where export values are taken from the United Nations' Comtrade database and are observed for all important trading partners. We then impute missing values for the exporter variable using predicted values from this regression. Note that this simple log-log regression has a tight fit, with an R^2 of around 70%. Finally, we use the concordance provided by Pierce and Schott (2012) to map the resulting proxy into the NAICS classification underlying our main data.

Second, we calibrate γ^i to match aggregate imports by country i from third countries. Specifically, we use the United Nations' Comtrade database to obtain imports by the US and Canada from third countries for the year 2002 at the 6-digit level of the Harmonised System and map them into the NAICS classification, again using the concordance by Pierce and Schott (2012).

V Price Competition with Constant Elasticity of Substitution (CES) Demands

V.1 Theory

This section draws heavily on Nocke and Schutz (2018b), who use an aggregative games approach to derive general existence and uniqueness results for oligopoly pricing games with multi-product firms.

Preferences. The representative consumer in country i has the following utility function:

$$U^i\left(Q_0^i, \left(\left(q_k^i\right)_{k\in\mathcal{P}_s}\right)_{1\leq s\leq S}\right) = Q_0^i + \sum_{s=1}^{S} b_s^i \frac{\sigma_s^i}{\sigma_s^i - 1} \log\left(\sum_{k\in\mathcal{P}_s}\left(q_k^i\right)^{\frac{\sigma_s^i-1}{\sigma_s^i}}\right),$$

where $\mathcal{P}_s$ is the set of products in sector s, q_k^i is the consumption of variety $k \in \mathcal{P}_s$ in country i and $\sigma_s^i > 1$ is the elasticity of substitution between varieties in sector s and country i. As in the baseline model, b_s^i plays the role of a market size parameter. Maximizing this utility function subject to the budget constraint gives rise to standard CES demands:

$$q_k^i = b_s^i \frac{\left(p_k^i\right)^{-\sigma_s^i}}{\sum_{l\in\mathcal{P}_s}\left(p_l^i\right)^{1-\sigma_s^i}}, \tag{1}$$

where p_k^i is the price of variety $k \in \mathcal{P}_s$ in country i. The consumer's indirect utility function is given by $I^i + \sum_{s=1}^{S} \frac{b_s^i}{\sigma_s^i - 1} \log\left(H_s^i\right)$, where $H_s^i = \sum_{k \in \mathcal{P}_s} \left(p_k^i\right)^{1-\sigma_s^i}$. We call H_s^i the aggregator in sector s and country i. Notice that H_s^i gives us a measure of consumer surplus in sector s and country i.

Firms and Markets. The set of firms in sector s, $\mathcal{N}_s$, is a partition of the set of products $\mathcal{P}_s$. We assume that $|\mathcal{N}_s| \geq 2$, i.e., there are at least two firms. As in the baseline Cournot model, we assume that there are no multinational firms, so that firm $f \in \mathcal{N}_s$ has all its productive assets based either in country 1 or in country 2. Let $\mathcal{N}_s^i$ be the set of firms based in country i. Firm $f \in \mathcal{N}_s^i$ produces variety $k \in f$ at constant marginal cost $c_k > 0$. As in the baseline model, it faces iceberg-type trade costs $\tau_s^{ij} > 0$ to sell in country j, and we assume that $\tau_s^{ii} = 1$. In the following, we let $c_k^j = \tau_s^{ij} c_k$ for every $i, j \in \{1, 2\}$, $f \in \mathcal{N}_s^i$ and $k \in f$. Firms compete in prices, and markets are segmented.

Equilibrium. We drop subscript s from now on to ease notation. Nocke and Schutz (2018b) show that the price competition game in market i is aggregative and has a unique Nash equilibrium. In equilibrium, firm $f \in \mathcal{N}$ sets the same markup over all its products in country i: for every $k, l \in f$, $\frac{p_k^i - c_k^i}{p_k^i} = \frac{p_l^i - c_l^i}{p_l^i} \equiv \mu_f^i$. Let $s_f^i = \frac{\sum_{k \in f} \left(p_k^i\right)^{1-\sigma^i}}{\sum_{k \in \mathcal{P}} \left(p_k^i\right)^{1-\sigma^i}}$ be the market share (in value) of firm f in country i. Nocke and Schutz (2018b) also show that the pricing game has a type aggregation property, in that the behavior of firm $f \in \mathcal{N}^j$ in country i can be fully summarized by its type $\theta_f^i = \left(\tau^{ji}\right)^{1-\sigma^i} \sum_{k \in f} c_k^{1-\sigma_i}$. If H^{i*} is the equilibrium aggregator level in country i, then firm f's markup and market share jointly solve the following system of equations:

$$\begin{cases} \mu_f^i &= \frac{1}{\sigma^i - (\sigma^i - 1) s_f^i}, \\ s_f^i &= \frac{\theta_f^i}{H^{i*}} \left(1 - \mu_f^i\right)^{\sigma^i - 1}. \end{cases}$$

This system of equations has a unique solution: $\left(\mu_f^i, s_f^i\right) \equiv \left(m^i\left(\frac{\theta_f^i}{H^{i*}}\right), S^i\left(\frac{\theta_f^i}{H^{i*}}\right)\right)$. The condition that H^{i*} is indeed the equilibrium aggregator level can then be written as follows:

$$\sum_{f \in \mathcal{N}} S^i\left(\frac{\theta_f^i}{H^{i*}}\right) = 1, \tag{2}$$

i.e., market shares have to add up to 1. Firm f's equilibrium profit in country i is then given by: $b^i m^i\left(\frac{\theta_f^i}{H^{i*}}\right) S^i\left(\frac{\theta_f^i}{H^{i*}}\right)$.

Merger Analysis. In the following, we assume that $\sigma^1 = \sigma^2 \equiv \sigma$, which is the standard assumption in multiple-location trade models (e.g., Chaney, 2008). Under this condition, $S^1(\cdot) = S^2(\cdot) \equiv S(\cdot)$, and $m^1(\cdot) = m^2(\cdot) \equiv m(\cdot)$.

Assume that $|\mathcal{N}^i| \geq 2$, and let $f' \neq f''$ in $\mathcal{N}^i$. Suppose that firms f' and f'' merge, and let $M = f' \cup f''$ be the merged entity. Following the merger, the production costs of varieties in M may change in a complicated way, but type aggregation allows us to capture all these changes quite simply: let θ^i_M be the type of the merged entity in its domestic market (given the common σ assumption, this also pins down firm M's type in country $j \neq i$: $\theta^j_M = (\tau^{ij})^{1-\sigma}\,\theta^i_M$).

As expected, mergers are more likely to be profitable under price competition. We say that merger M involves synergies if $\theta^i_M > \theta^i_{f'} + \theta^i_{f''}$. Notice that this is equivalent to $\theta^j_M > \theta^j_{f'} + \theta^j_{f''}$. A merger that involves synergies is profitable. The reason is that even a merger that involves no synergies ($\theta^i_M = \theta^i_{f'} + \theta^i_{f''}$) is profitable, as it allows the merging parties to coordinate pricing, and it raises the prices of the non-merging parties by strategic complementarity (see Proposition 12 in Nocke and Schutz, 2018a). The conclusion then follows from the fact that a firm's equilibrium profit is a strictly increasing function of its type.

Merger M is CS-increasing (resp. CS-decreasing) in country $j \in \{1, 2\}$ if and only if it raises (resp. lowers) the equilibrium H^j. Nocke and Schutz (2018a) show that there exists a cutoff type $\hat{\theta}^j_M$ such that the merger is CS-increasing if $\theta^j_M > \hat{\theta}^j_M$, CS-neutral if $\theta^j_M = \hat{\theta}^j_M$, and CS-decreasing if $\theta^j_M < \hat{\theta}^j_M$. Denoting the pre-merger equilibrium aggregator level by H^{j*}, this cutoff type is pinned down by the following condition:

$$S\left(\frac{\theta^j_M}{H^{j*}}\right) = S\left(\frac{\theta^j_{f'}}{H^{j*}}\right) + S\left(\frac{\theta^j_{f''}}{H^{j*}}\right).$$

This condition has the same interpretation as under homogeneous-product Cournot competition: for the merger to be CS-neutral, the aggregate behavior of the merging parties has to be the same after the merger as before the merger. As Nocke and Schutz (2018a) show, a CS-nondecreasing merger must involve synergies: $\hat{\theta}^j_M > \theta^j_{f'} + \theta^j_{f''}$ for $j = 1, 2$. This implies that, if $\theta^j_M \geq \hat{\theta}^j_M$ for at least one $j \in \{1, 2\}$, then the merger is profitable.

Thresholds $\hat{\theta}^1_M$ and $\hat{\theta}^2_M$ play the same role as thresholds $\hat{c}^1_M$ and $\hat{c}^2_M$ in the baseline, in that they allow us to define the nature of conflict. We say that merger control in country i is a too-tough-for-thy-neighbor policy if $\hat{\theta}^i_M > (\tau^{ij})^{\sigma-1}\,\hat{\theta}^j_M$ ($j \neq i$), and a too-lenient-for-thy-neighbor policy if $\hat{\theta}^i_M < (\tau^{ij})^{\sigma-1}\,\hat{\theta}^j_M$ (recall that $\theta^j_M = (\tau^{ij})^{1-\sigma}\,\theta^i_M$). While the cutoff types $\hat{\theta}^j_M$ are specific to the characteristics of the merger under consideration, the following

proposition says that, just like in the baseline, the nature of potential conflict is the same for any merger between firms located in the same country:

Proposition II. *Consider a merger $M = f' \cup f''$ between firms located in country i. Merger control in country i is a too-tough-for-thy-neighbor policy if $\rho^{i*} > 1$ and a too-lenient-for-thy-neighbor policy if $\rho^{i*} < 1$, where*

$$\rho^{i*} = \frac{\tau^{ij} P^{i*}}{P^{j*}},$$

and $P^{j*} \equiv (H^{j*})^{\frac{1}{1-\sigma}}$ is the CES price index in country $j \in \{1,2\}$.

Proof. Let $i \neq j$ in $\{1,2\}$ and $f' \neq f''$ in $\mathcal{N}^i$. By definition of $\hat{\theta}^i_M$,

$$S\left(\frac{\hat{\theta}^i_M}{H^{i*}}\right) = S\left(\frac{\theta^i_{f'}}{H^{i*}}\right) + S\left(\frac{\theta^i_{f''}}{H^{i*}}\right).$$

Define $\tilde{\theta}^j_M = (\tau^{ij})^{1-\sigma} \hat{\theta}^i_M$, and recall that $\theta^j_f = (\tau^{ij})^{1-\sigma} \theta^i_f$ for $f \in \{f', f''\}$. Then,

$$S\left(\left(\tau^{ij}\right)^{\sigma-1} \frac{\tilde{\theta}^j_M}{H^{i*}}\right) - S\left(\left(\tau^{ij}\right)^{\sigma-1} \frac{\theta^j_{f'}}{H^{i*}}\right) - S\left(\left(\tau^{ij}\right)^{\sigma-1} \frac{\theta^j_{f''}}{H^{i*}}\right) = 0.$$

Moreover, $\left(\rho^{i*}\right)^{\sigma-1} = (\tau^{ij})^{\sigma-1} \frac{H^{j*}}{H^{i*}}$. Therefore,

$$S\left(\left(\rho^{i*}\right)^{\sigma-1} \frac{\tilde{\theta}^j_M}{H^{j*}}\right) - S\left(\left(\rho^{i*}\right)^{\sigma-1} \frac{\theta^j_{f'}}{H^{j*}}\right) - S\left(\left(\rho^{i*}\right)^{\sigma-1} \frac{\theta^j_{f''}}{H^{j*}}\right) = 0.$$

For every $x > 0$, define

$$\phi(x) = S\left(x\frac{\tilde{\theta}^j_M}{H^{j*}}\right) - S\left(x\frac{\theta^j_{f'}}{H^{j*}}\right) - S\left(x\frac{\theta^j_{f''}}{H^{j*}}\right),$$

and notice that $\phi\left(\left(\rho^{i*}\right)^{\sigma-1}\right) = 0$. We claim that $\phi'(x) < 0$ whenever $\phi(x) = 0$. To see this, let $\varepsilon(x) \equiv x\frac{S'(x)}{S(x)}$ be the elasticity of S for every $x > 0$. Nocke and Schutz (2018b) show that ε is strictly decreasing (see Lemma XXV in their Online Appendix). Let x such that $\phi(x) = 0$. Then,

$$\begin{aligned} x\phi'(x) &= x\left(\frac{\tilde{\theta}^j_M}{H^{j*}} S'\left(x\frac{\tilde{\theta}^j_M}{H^{j*}}\right) - \frac{\theta^j_{f'}}{H^{j*}} S'\left(x\frac{\theta^j_{f'}}{H^{j*}}\right) - \frac{\theta^j_{f''}}{H^{j*}} S'\left(x\frac{\theta^j_{f''}}{H^{j*}}\right)\right), \\ &= \varepsilon\left(x\frac{\tilde{\theta}^j_M}{H^{j*}}\right) S\left(x\frac{\tilde{\theta}^j_M}{H^{j*}}\right) - \varepsilon\left(x\frac{\theta^j_{f'}}{H^{j*}}\right) S\left(x\frac{\theta^j_{f'}}{H^{j*}}\right) - \varepsilon\left(x\frac{\theta^j_{f''}}{H^{j*}}\right) S\left(x\frac{\theta^j_{f''}}{H^{j*}}\right), \end{aligned}$$

$$
\begin{aligned}
&= \varepsilon\left(x\frac{\tilde{\theta}^j_M}{H^{j*}}\right)\left(S\left(x\frac{\theta^j_{f'}}{H^{j*}}\right)+S\left(x\frac{\theta^j_{f''}}{H^{j*}}\right)\right)\\
&\quad -\varepsilon\left(x\frac{\theta^j_{f'}}{H^{j*}}\right)S\left(x\frac{\theta^j_{f'}}{H^{j*}}\right)-\varepsilon\left(x\frac{\theta^j_{f''}}{H^{j*}}\right)S\left(x\frac{\theta^j_{f''}}{H^{j*}}\right),\\
&< 0,
\end{aligned}
$$

where the third line follows from the fact that $\phi(x) = 0$ and the fourth line follows from the fact that ε is decreasing. Since $\phi\left((\rho^{i*})^{\sigma-1}\right) = 0$, this implies that $\phi(x) > 0$ for all $x < (\rho^{i*})^{\sigma-1}$ and $\phi(x) < 0$ for all $x > (\rho^{i*})^{\sigma-1}$.

Assume that $\rho^{i*} > 1$. Then, $(\rho^{i*})^{\sigma-1} > 1$ and $\phi(1) > 0$. Therefore,

$$
S\left(\frac{\tilde{\theta}^j_M}{H^{j*}}\right)-S\left(\frac{\theta^j_{f'}}{H^{j*}}\right)-S\left(\frac{\theta^j_{f''}}{H^{j*}}\right)>0,
$$

and, since $S' > 0$, $\hat{\theta}^j_M < \tilde{\theta}^j_M = (\tau^{ij})^{1-\sigma}\hat{\theta}^i_M$. It follows that merger control in country i is a too-tough-for-thy-neighbor policy. If instead $\rho^{i*} < 1$, then the above inequalities are reversed, and merger control in country i is a too-lenient-for-thy-neighbor policy. □

Proposition 1 therefore extends to the case of price competition with CES demands if we replace homogeneous Cournot prices by CES price indices in the definition of the sufficient statistic ρ.

V.2 Calibration

Operationalization. As in the baseline, we assume that production technologies are Cobb-Douglas and that productivity levels in country i and sector s are drawn from a Pareto distribution with scale parameter x^i_s and shape parameter ζ^i_s. We assume that each firm owns a single product, i.e., $|\mathcal{P}_s| = |\mathcal{N}_s|$. Given the type aggregation property discussed above, it would be equivalent to assume that firms own multiple products, and that firms' domestic types are drawn from a Pareto distribution. In the following, we drop the sector subscript to ease notation.

Parameters to be Calibrated. We need parameter values for α^1, α^2, σ, b^1, b^2, τ^{12}, τ^{21}, x^1, x^2, ζ^1, ζ^2, $|\mathcal{N}^1|$, $|\mathcal{N}^2|$, η^1 and η^2. As in the baseline, parameters α^1, α^2, $|\mathcal{N}^1|$, $|\mathcal{N}^2|$, η^1 and η^2 are taken directly from the data. We normalize x^1 to 0.1, which amounts to a choice of units. Under our assumption of quasi-linear CES preferences, the total expenditures of

country i's representative consumer in sector s are constant and equal to b^i. We therefore set b^i equal to the sum of country i's domestic sales and country j's exports, $j \neq i$. This leaves us with the following six-dimensional vector of parameters to calibrate:

$$\Gamma = \left(\sigma, \tau^{12}, \tau^{21}, x^2, \zeta^1, \zeta^2\right).$$

The value of Γ is chosen so as to match the following seven empirical moments: $\bar{P}^2/\bar{P}^1$ (where $\bar{P}^i$ is the market-share-weighted average price in country i), Exp^{12} and Exp^{21} (where Exp^{ij} is the value of exports from i to j), HHI^1 and HHI^2 (where HHI^i is the production-based Herfindahl-Hirschman index in country i), and TC^1 and TC^2 (where TC^i denotes total costs in country i). Note that the number of moments strictly exceeds the dimensionality of parameter vector Γ, so that the model is overidentified, and we cannot expect to obtain a perfect model fit. We will therefore adjust Γ so as to minimize the sum of the squared residuals between theoretical and empirical moments, where residuals are defined as in Davis, Haltiwanger, and Schuh (1996) (see Footnote 15 in the paper for details).[3]

Computation of the Theoretical Moments. We start with an initial guess of $\Gamma \in (0, \infty)^7$. We continue to use Monte Carlo integration with 1000 iterations to compute our theoretical moments. Fix a vector of marginal costs and suppose that the equilibrium values of H^1 and H^2 are known.

The value of firm f's exports ($f \in \mathcal{N}^j$) is given by:

$$\begin{aligned} b^i \sum_{k \in f} \frac{\left(p_k^i\right)^{1-\sigma}}{H^{i*}} &= b^i \sum_{k \in f} \frac{1}{H^{i*}} \left(\frac{c_k^i}{1-\mu_f^i}\right)^{1-\sigma^i}, \\ &= b^i (1-\mu_f^i)^{\sigma^i - 1} \frac{\theta_f^i}{H^{i*}}, \\ &= b^i s_f^i = b^i S\left(\frac{\theta_f^i}{H^{i*}}\right). \end{aligned}$$

[3]We have also implemented an alternative specification, where σ^1 and σ^2 are allowed to differ, so that the parameters are exactly identified. The downside of this approach is that we have not been able to prove Proposition II when $\sigma^1 \neq \sigma^2$. To investigate whether domestic competition policies are too lenient or too tough for foreign consumers, we have simulated a large number of mergers, and computed the proportion of mergers that raise (resp. lower) domestic consumer surplus and lower (resp. raise) foreign consumer surplus. The results are consistent with those presented below. They are available upon request.

Therefore, the value of country j's exports is given by:

$$Exp^{ji} = b^i \sum_{f \in \mathcal{N}^j} S\left(\frac{\theta_f^i}{H^{i*}}\right).$$

Firm f's total costs ($f \in \mathcal{N}^i$) are given by:

$$\sum_{k \in f}\left[c_k^i b^i \frac{1}{H^{i*}}\left(p_k^i\right)^{-\sigma^i} + \frac{1}{\tau^{ij}} c_k^j b^j \frac{1}{H^{j*}}\left(p_k^j\right)^{-\sigma^j}\right] = b^i s_f^i\left(1-\mu_f^i\right) + \frac{1}{\tau^{ij}} b^j s_f^j\left(1-\mu_f^j\right).$$

Therefore,

$$\mathrm{TC}^i = \sum_{f \in \mathcal{N}^i}\left[b^i S\left(\frac{\theta_f^i}{H^{i*}}\right)\left(1 - m\left(\frac{\theta_f^i}{H^{i*}}\right)\right) + \frac{1}{\tau^{ij}} b^j S\left(\frac{\theta_f^j}{H^{j*}}\right)\left(1 - m\left(\frac{\theta_f^j}{H^{j*}}\right)\right)\right].$$

The value of firm f's output ($f \in \mathcal{N}^i$) is given by: $b^i s_f^i + b^j s_f^j$. Therefore, the production-based HHI in country i is:

$$HHI^i = 10000 \times \frac{\sum_{f \in \mathcal{N}^i}\left(b^i S\left(\frac{\theta_f^i}{H^{i*}}\right) + b^j S\left(\frac{\theta_f^j}{H^{j*}}\right)\right)^2}{\left(\sum_{f \in \mathcal{N}^i} b^i S\left(\frac{\theta_f^i}{H^{i*}}\right) + b^j S\left(\frac{\theta_f^j}{H^{j*}}\right)\right)^2}.$$

We now define the ratio of weighted price indices: $\bar{P}^2/\bar{P}^1$. We define $\bar{P}^i$ as the ratio of the value of sales in country i (including domestic sales and imports) to the volume of sales in country i. $\bar{P}^i$ is given by:

$$\begin{aligned}
P^i &= \frac{b^i \sum_{f \in \mathcal{N}} \sum_{k \in f} p_k^i q_k^i}{b^i \sum_{f \in \mathcal{N}} \sum_{k \in f} q_k^i}, \\
&= \left(\sum_{f \in \mathcal{N}} \sum_{k \in f} \frac{\left(p_k^i\right)^{-\sigma}}{H^{i*}}\right)^{-1}, \\
&= \left(\sum_{f \in \mathcal{N}} \sum_{k \in f} \frac{1}{H^{i*}}\left(\frac{c_k^i}{1-\mu_f^i}\right)^{-\sigma}\right)^{-1}, \\
&= \left(\sum_{f \in \mathcal{N}} \left(1-\mu_f^i\right)^{\sigma} \frac{1}{H^{i*}} \sum_{k \in f}\left(c_k^i\right)^{-\sigma}\right)^{-1}, \\
&= \left(\sum_{f \in \mathcal{N}} s_f^i (1-\mu_f^i) \frac{\xi_f^i}{\theta_f^i}\right)^{-1},
\end{aligned}$$

where $\xi_f^i \equiv \sum_{k \in f} \left(c_k^i\right)^{-\sigma}$. Therefore,

$$\bar{P}^2/\bar{P}^1 = \frac{\sum_{f \in \mathcal{N}} S\left(\frac{\theta_f^1}{H^{1*}}\right)\left(1 - m\left(\frac{\theta_f^1}{H^{1*}}\right)\right)\frac{\xi_f^1}{\theta_f^1}}{\sum_{f \in \mathcal{N}} S\left(\frac{\theta_f^2}{H^{2*}}\right)\left(1 - m\left(\frac{\theta_f^2}{H^{2*}}\right)\right)\frac{\xi_f^2}{\theta_f^2}}.$$

H^{1*} and H^{2*} are computed using the nested fixed point algorithm developed by Nocke and Schutz (2018b). For every f and i, $m\left(\frac{\theta_f^i}{H^{i*}}\right)$ and $S\left(\frac{\theta_f^i}{H^{i*}}\right)$ are solved for using standard derivative-based methods. Once all these moments have been computed for every Monte Carlo iteration, we take averages across iterations to obtain an approximation of the corresponding expectations.

Calibration Algorithm and Identification. The identification argument is similar to the baseline. We minimize the sum of squared deviations using standard derivative-based methods in a first step, and the simplex algorithm in a second step.

Goodness-of-Fit and Parameter Values. Figure IX.7.1 plots the model fit for our 8 targeted moments in all 160 sectors. Despite the fact that our parameters are now overidentified, we match our empirical moments almost perfectly in all sectors. As in the baseline, we also plot other concentration ratios, that were not directly targeted in the calibration. The model does a relatively good job at predicting these moments as well. Table IX.7.1 reports summary statistics on the calibrated parameters. We obtain an elasticity of substitution of 5.5 (resp. 5.2) in the average (resp. median) sector, which is broadly consistent with Broda and Weinstein (2006)'s estimates at a similar level of aggregation.

Conflict Statistics. Using the calibrated parameters, we compute the value of ρ^{US} and ρ^{CAN}, both at current trade costs and at higher and lower levels of trade costs. The results are shown in Figures IX.7.3 and IX.7.4. At current trade costs, ρ^{US} and ρ^{CAN} are larger than one in all sectors, meaning that domestic competition policy is always too tough from the point of view of foreign consumers. As trade costs decrease, some of the ρ's decrease below one. These results are close to those we obtained in the baseline: at current trade costs levels, domestic merger policy tends to be too tough for foreign consumers; however, as trade costs fall, too-lenient-for-thy-neighbor policies become more prevalent, similar to our baseline calibration.

VI Different strength of synergies

We vary the strength of merger-induced synergies, considering both stronger ($\beta = 30$) and weaker synergies ($\beta = 70$) relative to our baseline calibration. The resulting tables and graphs can be found in Sections IX.9 and IX.10.

In both cases, the fit of the calibration continues to be very good. Allowing for stronger synergies generates more mergers that are profitable and permitted by the antitrust authorities, resulting in lower values for the merger opportunity parameters T^{US} and T^{CAN}. Conversely, weakening the strength of synergies increases the calibrated values for T^{US} and T^{CAN} as more opportunities are needed to match the number of mergers observed in the data. This adjustment of T to the strength of synergies explains why our counterfactual policy changes lead to *stronger* quantitative consumer surplus effects as we increase β (weaker synergies). While each individual merger now has smaller consumer surplus effects, the change in the number of merger opportunities is now larger as we start from a higher base value for T. The latter effect overcompensates the former, leading to slightly stronger consumer surplus effects in the case of weaker synergies, and less pronounced consumer surplus effects in the case of stronger synergies. Qualitatively, however, all results are similar to before and our previous conclusions are not affected by varying the strength of synergies.

VII Cross-Border Mergers

We now allow for cross-border mergers in addition to domestic mergers. Cross-border mergers are not directly relevant for this paper's central question as, by choice, our interest is in the conflicts resulting from domestic mergers only. Moreover, recall that the international ownership structure of firms does not matter for our analysis, given the focus on consumer surplus and the absence of income effects. Nevertheless, given that cross-border mergers are an important feature of overall North American merger activity, incorporating them into our calibration might change parameter values and thus indirectly affect our results.[4]

This extension is identical to the baseline model with the exception that we now allow for mergers between U.S. and Canadian firms, in addition to purely domestic mergers. This is done by introducing a third merger opportunity parameter (T^{Cross}) so that there are now $T_s^1 + T_s^2 + T_s^{Cross} + 1$ periods in our merger game.

[4]Between 1993 and 2002, we observe an annual average of approximately 0.15 U.S.-Canada cross-border mergers per sector in our data, which is similar to the number of domestic Canadian mergers (see Table IX.11.1).

Initially, there are only domestic firms. A share $T^{Cross}/\left(T^{Cross}+T^{US}+T^{CAN}\right)$ of merger opportunities is now of the cross-border type, i.e., one of the merger partners is a U.S. firm while the other is a Canadian firm. We assume that cross-border mergers will only be permitted if they do not decrease consumer surplus in *both* markets (i.e., merger authorities in both countries have veto rights). If a cross-border merger takes place, it creates a multinational enterprise (MNE) with production facilities in both countries. We assume that the new MNE chooses the location of production for serving each market such that the costs of doing so are minimized. That is, for each location, the MNE decides whether to serve the market through local production or through exports from the other country. Recall that post-merger the two merging parties will have the same productivity level, $\overline{z}_M$. Thus, the marginal cost of MNE M serving location i through local production and exports from j are $\bar{c}_{M,ii}=\frac{1}{\bar{z}_M}(\alpha^i)^{\eta_s^i}$ and $\bar{c}_{M,ji}=\frac{\tau_s^{ji}}{\bar{z}_M}(\alpha^j)^{\eta_s^j}$, respectively. So location i will be served locally if $(\alpha^i)^{\eta_s^i}/(\alpha^j)^{\eta_s^j}<\tau_s^{ji}$, i.e., if the wage advantage of location j is insufficient to overcompensate the trade costs between the two locations.

In order to calibrate T^{Cross}, we use the annual average of the number of cross-border mergers between U.S. and Canadian firms between 1993 and 2002 as an additional empirical moment in each sector. Similar to T^{US} and T^{CAN}, T^{Cross} mainly shifts the theoretically predicted number of cross-border mergers in the model, making parameter identification straightforward. Still, the overall fit of the model deteriorates slightly (see Figure IX.11.1) because of the additional moment that needs to be matched. In total, there are now seven sectors (rather than four in the baseline) for which we are unable to match our empirical moments and which we drop in the following.

Tables IX.11.1 and IX.11.2 present summary statistics and parameter estimates for the remaining 153 sectors. As seen, the presence of cross-border mergers does not lead to major changes in the other parameter estimates. Interestingly, the estimated T^{Cross} is an order of magnitude smaller than T^{CAN}, despite the fact that we observe similar numbers of cross-border and domestic Canadian mergers in the data. This difference stems from the tendency of cross-border mergers to have smaller anti-competitive effects and thus to be more readily authorized by the two merger authorities. Intuitively, if none of the merging parties is exporting to the other country pre-merger, there will be no anti-competitive effect at all but the synergy effect will be the same as for domestic mergers. Even if the foreign firm was serving the domestic market, the presence of trade costs implies that its pre-merger market share tends to be low and the corresponding anti-competitive merger effects weak.

A comparison of conflict statistics (Figures IX.11.3–IX.11.6) and counterfactual exper-

iments (Figures IX.11.7–IX.11.8 and Tables IX.11.5–IX.11.6) for the cross-border merger extension with the baseline calibration with mergers also reveals no qualitative differences and the magnitude of consumer surplus changes is broadly similar to before.[5]

VIII Veto-Rights Baseline

We start from an initial situation in which countries have veto rights over foreign mergers. That is, we match the same moments using the same set of parameters as before, but now we assume from the beginning that antitrust authorities have the power to block foreign mergers if they decrease consumer surplus in the authority's domestic market. As can be seen in Table IX.12.2, the parameter values resulting from this modified calibration are similar to the no-veto-rights baseline. The only exception is the number of U.S. merger opportunities (T^{US}) which are around 50% higher than before in the median sector. Intuitively, because mergers now need to clear two hurdles instead of one, we need more merger opportunities to match the same number of mergers observed in the data. This is mainly relevant for T^{US}, because the U.S. merger authority does not want to block Canadian mergers for the calibrated level of trade costs (see below).

As shown in Figures IX.12.3–IX.12.6, the relative importance of our two main types of conflict is also very similar to the earlier no-veto rights calibration. The types of counterfactuals we can look at in this veto-rights baseline are of course different than before. We start by removing bilateral veto rights. The results are a mirror image of our earlier counterfactuals where we introduced veto rights. At the calibrated level of trade costs, removing veto rights has a negative impact on Canadian consumer surplus and a positive impact on U.S. consumers. Changes in trade costs also create effects mirroring the ones from our baseline with no veto rights.

As before, the introduction of a North American merger authority leads to a drop in Canadian consumer surplus, and an increase in U.S. consumer surplus. The main difference to our baseline calibration is that the effects are larger. Intuitively, with a veto rights baseline, moving to a North American merger authority creates two effects which are beneficial for U.S. consumers. First, Canadian merger activity increases because Canadian merger policy was initially too tough on domestic mergers from the point of view of the U.S. This is similar to our baseline counterfactuals. Second, the new authority also permits a number of U.S. mergers which used to be blocked by Canada because the overall consumer surplus impact

[5]Throughout our counterfactuals, we assume that both merger authorities continue to have veto rights over cross-border mergers.

is positive, even though the impact on Canada is negative. This effect was absent from our no-veto-rights baseline. Indeed, the number of U.S. mergers now increases by around 15% with the introduction of a North American merger authority, whereas before the change was close to zero.[6]

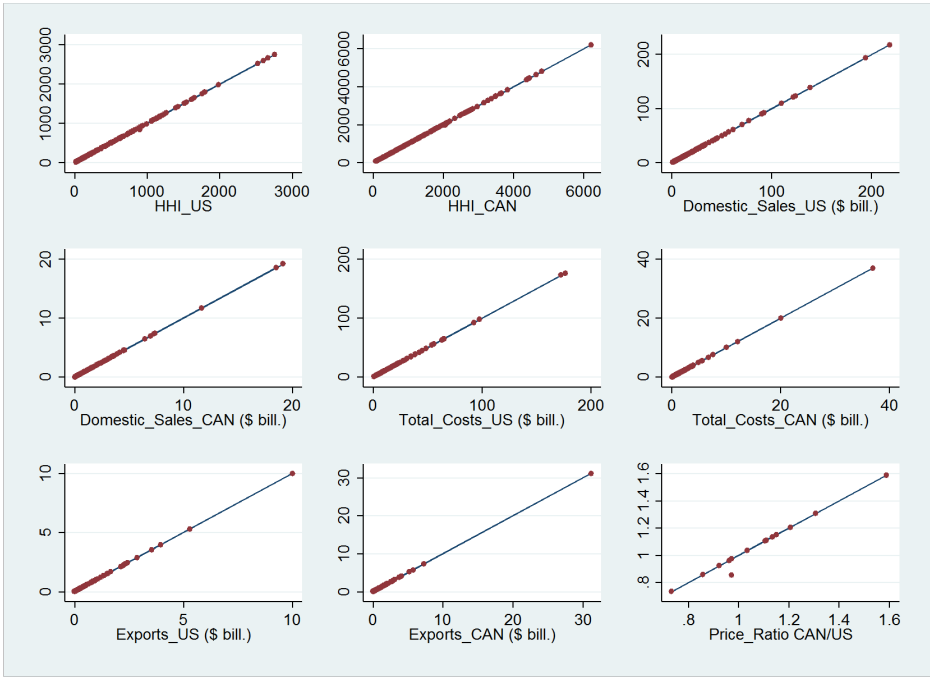
As trade costs fall, mergers have a more detrimental effect on foreign consumer surplus, and the new supranational merger authority increasingly blocks them. In our baseline calibration, this was particularly beneficial for Canadian consumers who benefited from a North American merger authority at lower levels of trade cost. In the present situation, where we already start out with veto rights, this effect is absent. This explains why the overall impact of having a North American merger authority on Canada is negative throughout the range of trade cost we analyze, whereas it is positive for the U.S.

[6]See Figures IX.12.7–IX.12.8 and Tables IX.12.5–IX.12.6.

IX Tables and Figures

IX.1 Model Fit for the Calibration Without Mergers

Figure IX.1.1: Theoretical vs. Empirical Moments (targeted moments)



Figures plot theoretical moments (vertical axis) against empirical moments (horizontal axis). Each dot represents a sector. The straight line is the 45-degree line.

IX.2 Unit-Value-Based Relative Price Data

Table IX.2.1: Unit Values: Empirical Moments - Summary Statistics

Empirical Moment	Mean	Median	Standard Deviation	P10	P90
# Mergers US	2.18	1.09	4	0.1	4.22
# Mergers CAN	0.16	0.06	0.26	0	0.47
P^{CAN}/P^{US}	1.31	1.11	0.68	0.48	2.7
Shipments US	22205621	12473479	31082770	3408354	43858147
Shipments CAN	1593020	877455	2541084	177964	3482581
Exports US	527450	201771	1065915	25483	1203514
Exports CAN	758595	190372	2631997	31796	1665297
HHI US	601	417	561	106	1332
HHI CAN	1281	859	1184	194	2899
Total Cost US	16132940	9140820	23804465	2350389	33070284
Total Cost CAN	1784190	854798	3628505	175275	3703720
Observations	160	160	160	160	160

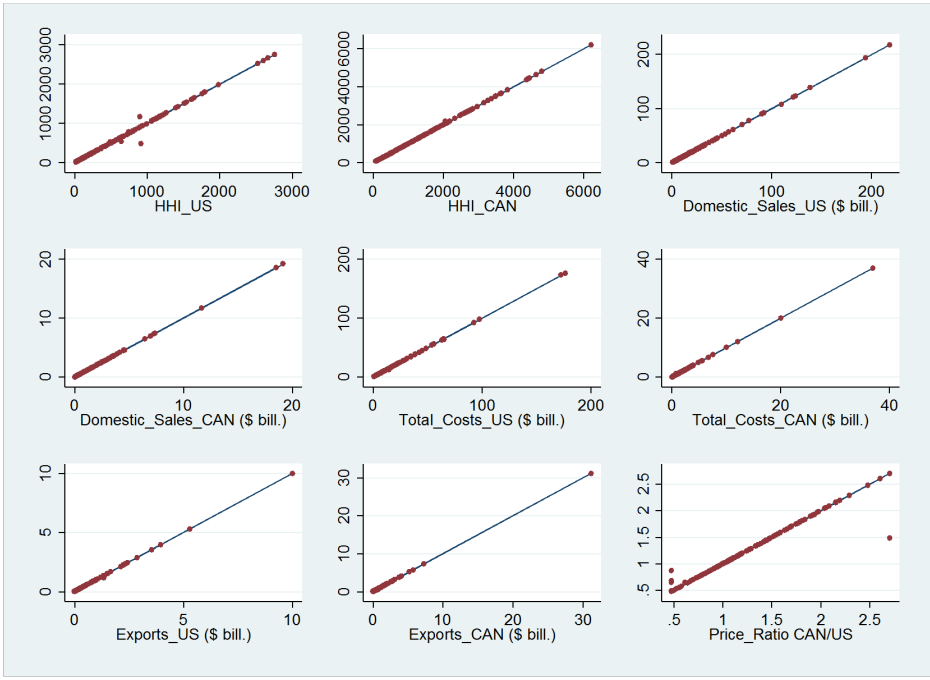
All data are at the 5-digit NAICS level for the year 2002. All value entries (shipments, exports, costs) are in 000s of current USD.

Table IX.2.2: Unit Values: Parameter Values - Summary Statistics

A) Parameters from Data	Mean	Median	Standard Deviation	P10	P90
α^{US}	1	1	0	1	1
α^{CAN}	0.750	0.750	0	0.750	0.750
N^{US}	1605.825	705	3147.181	134	3783.5
N^{CAN}	269.788	131.5	423.494	27.5	637.5
η^{US}	0.288	0.277	0.099	0.165	0.417
η^{CAN}	0.26	0.259	0.096	0.118	0.378
B) Calibrated Parameters	Mean	Median	Standard Deviation	P10	P90
a^{US}	25	25	0	25	25
a^{CAN}	165.68	25.214	515.457	5.972	343.258
$1/b^{US}$	18296.83	6227.962	45925.45	1098.09	38424.43
$1/b^{CAN}$	8335.895	416.318	37478.63	13.14	9079.492
$\tau^{CAN,US}$	1.881	1.348	1.502	0.858	3.257
$\tau^{US,CAN}$	2.091	1.652	1.548	0.86	4.107
ζ^{US}	5.548	5.102	2.799	2.624	8.426
ζ^{CAN}	17.02	7.702	33.597	4.437	30.526
x^{US}	0.374	0.183	0.628	0.052	0.68
x^{CAN}	0.449	0.267	0.637	0.075	0.901
Observations	160	160	160	160	160

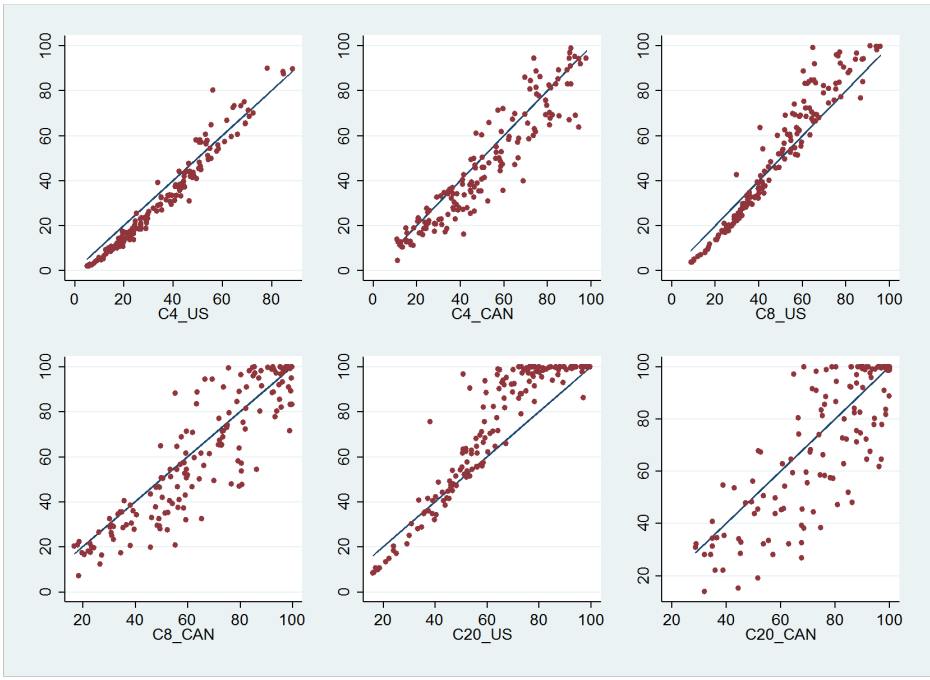
We compute all parameters reported in the Table separately for each 5-digit NAICS industry. The Table reports summary statistics calculated across all industries.

Figure IX.2.1: Unit Values: Theoretical vs. Empirical Moments (targeted moments)



Figures plot theoretical moments (vertical axis) against empirical moments (horizontal axis). Each dot represents a sector. The straight line is the 45-degree line.

Figure IX.2.2: Unit Values: Theoretical vs. Empirical Moments (moments not targeted)



Figures plot theoretical moments (vertical axis) against empirical moments (horizontal axis). Each dot represents a sector. The straight line is the 45-degree line.

Figure IX.2.3: Unit Values: Potential Conflicts Arising from U.S. Mergers

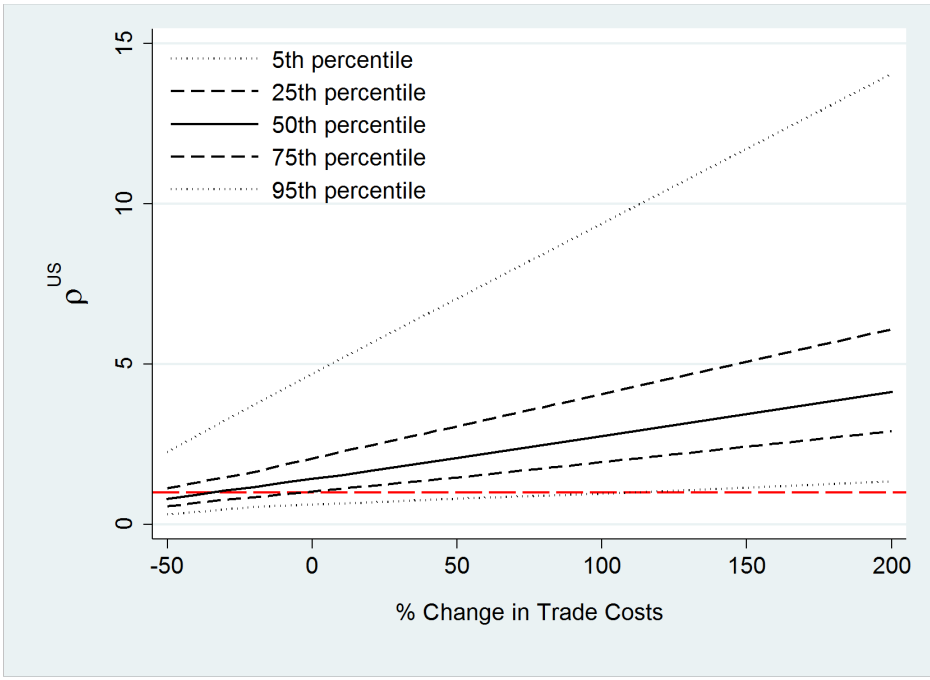


Figure shows percentiles of the distribution of ρ^{US} across sectors for different trade cost changes.

Figure IX.2.4: Unit Values: Potential Conflicts Arising from Canadian Mergers

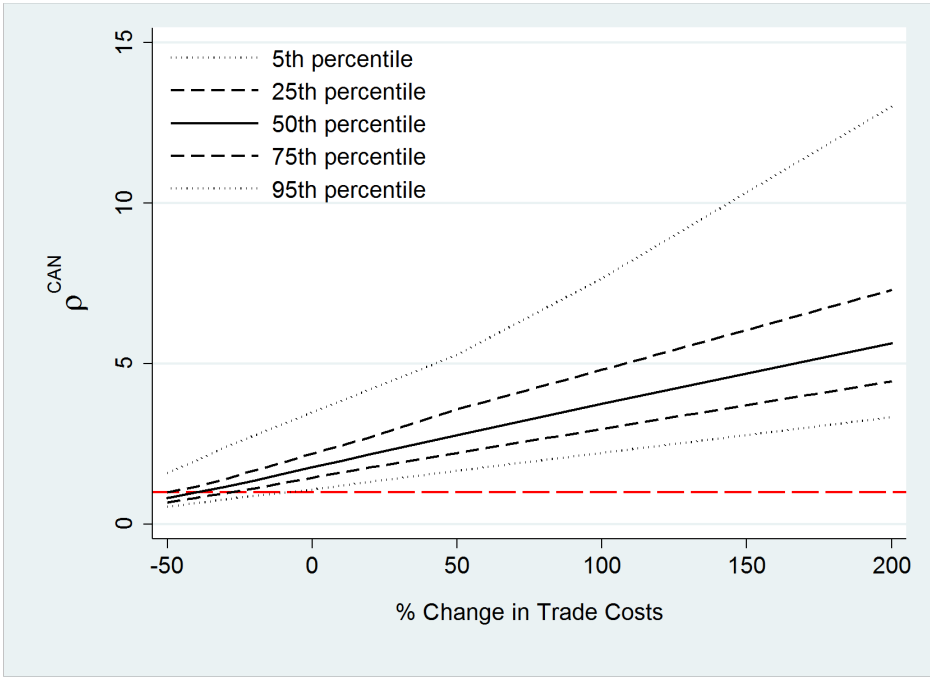


Figure shows percentiles of the distribution of ρ^{CAN} across sectors for different trade cost changes.

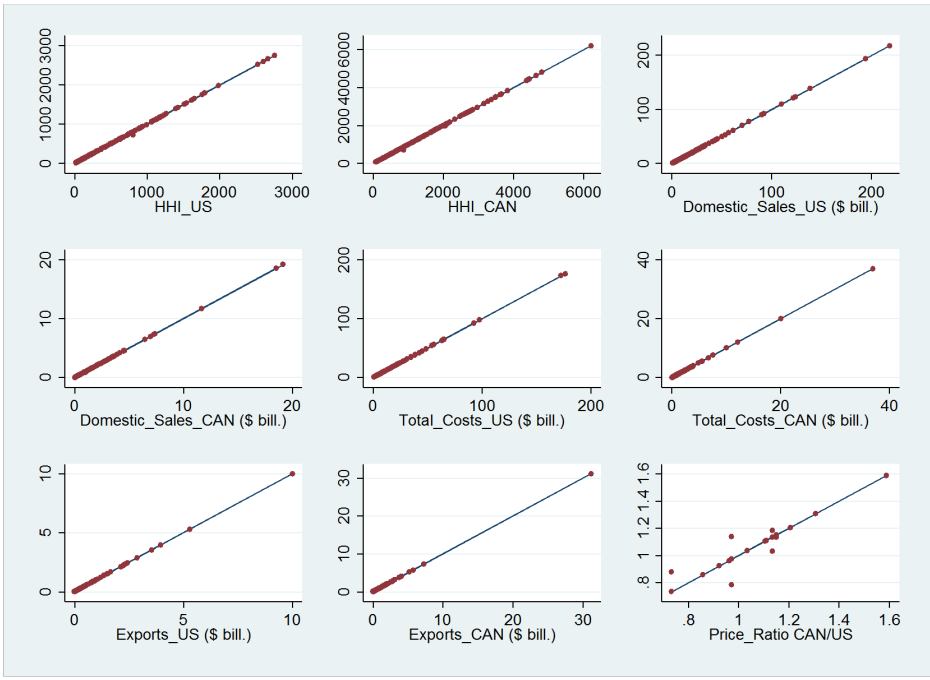
IX.3 Competitive Fringe

Table IX.3.1: Competitive Fringe: Parameter Values - Summary Statistics

A) Parameters from Data	Mean	Median	Standard Deviation	P10	P90
α^{US}	1	1	0	1	1
α^{CAN}	0.750	0.750	0	0.750	0.750
N^{US}	1608.575	708.5	3148.925	135	3785
N^{CAN}	270.512	132	423.61	27.5	637.5
η^{US}	0.288	0.277	0.099	0.165	0.417
η^{CAN}	0.26	0.259	0.096	0.118	0.378
B) Calibrated Parameters	Mean	Median	Standard Deviation	P10	P90
a^{US}	25	25	0	25	25
a^{CAN}	3014480.37	20.45	2.85E+07	6.844	77.09
$1/b^{US}$	19158.887	6353.124	48187.28	1149.088	39813.52
$1/b^{CAN}$	5717.765	680.767	31056.64	49.632	7535.123
$\tau^{CAN,US}$	1.565	1.32	1.046	1.128	2.132
$\tau^{US,CAN}$	1.865	1.58	1.051	1.001	3.038
ζ^{US}	5.72E+18	5.281	7.23E+19	2.902	8.999
ζ^{CAN}	6.17E+303	17.56	.	5.704	123.482
x^{US}	0.421	0.202	0.752	0.056	0.747
x^{CAN}	0.568	0.304	0.83	0.103	1.157
Observations	160	160	160	160	160

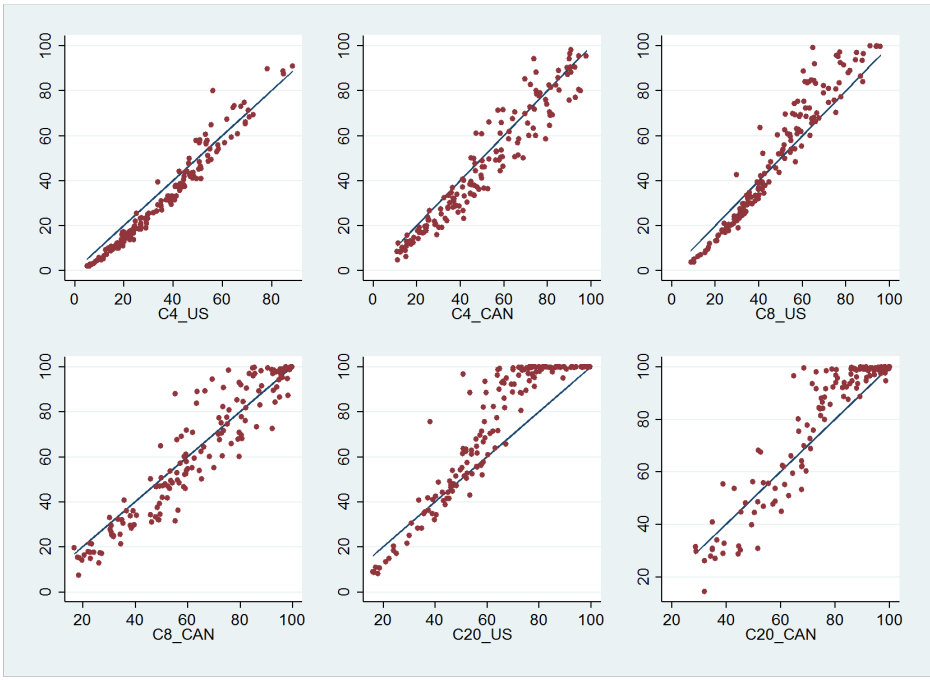
We compute all parameters reported in the Table separately for each 5-digit NAICS industry. The Table reports summary statistics calculated across all industries.

Figure IX.3.1: Competitive Fringe: Theoretical vs. Empirical Moments (targeted moments)



Figures plot theoretical moments (vertical axis) against empirical moments (horizontal axis). Each dot represents a sector. The straight line is the 45-degree line.

Figure IX.3.2: Competitive Fringe: Theoretical vs. Empirical Moments (moments not targeted)



Figures plot theoretical moments (vertical axis) against empirical moments (horizontal axis). Each dot represents a sector. The straight line is the 45-degree line.

Figure IX.3.3: Competitive Fringe: Potential Conflicts Arising from U.S. Mergers

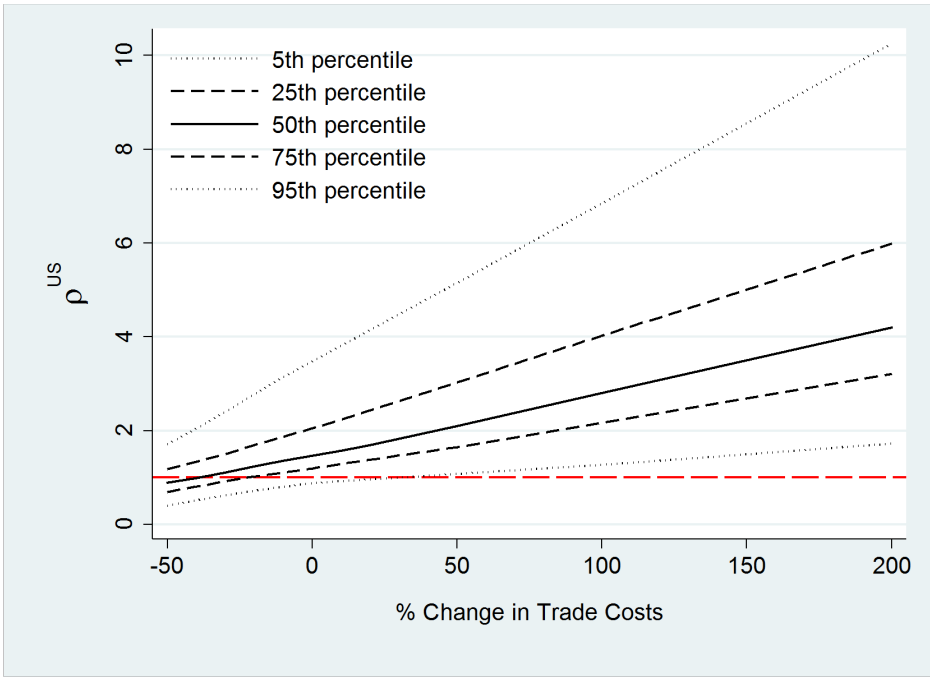


Figure shows percentiles of the distribution of ρ^{US} across sectors for different trade cost changes.

Figure IX.3.4: Competitive Fringe: Potential Conflicts Arising from Canadian Mergers

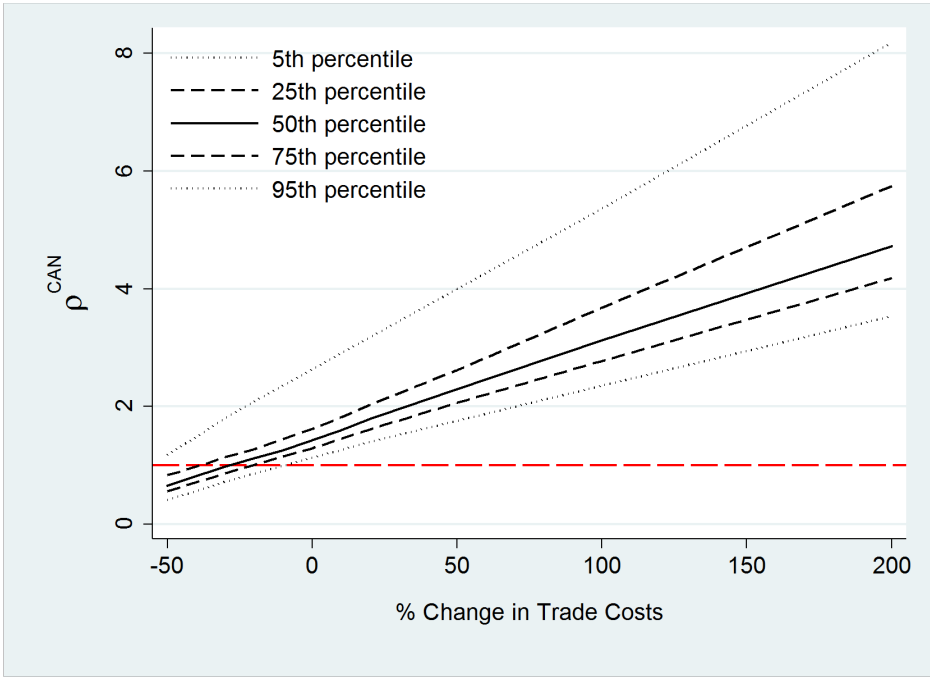


Figure shows percentiles of the distribution of ρ^{CAN} across sectors for different trade cost changes.

IX.4 Third-Country Imports

Table IX.4.1: Third-Country Imports: Empirical Moments - Summary Statistics

Empirical Moment	Mean	Median	Standard Deviation	P10	P90
# Mergers US	2.18	1.09	4	0.1	4.22
# Mergers CAN	0.16	0.06	0.26	0	0.47
P^{CAN}/P^{US}	1.07	1.11	0.15	0.86	1.21
Shipments US	20505775	11828262	28694501	2877768	40032316
Shipments CAN	1490934	778059	2465785	152022	3286376
Exports US	527450	201771	1065915	25483	1203514
Exports ROW-CAN	511791	278147	748771	44699	1072403
Exports CAN	758595	190372	2631997	31796	1665297
Exports ROW-US	5924830	2776289	9782982	377294	14356791
HHI US	601	417	561	106	1332
HHI CAN	1281	859	1184	194	2899
Total Cost US	14957591	8564500	22305998	2183426	31124176
Total Cost	1706772	818182	3562964	170948	3487938
Observations	160	160	160	160	160

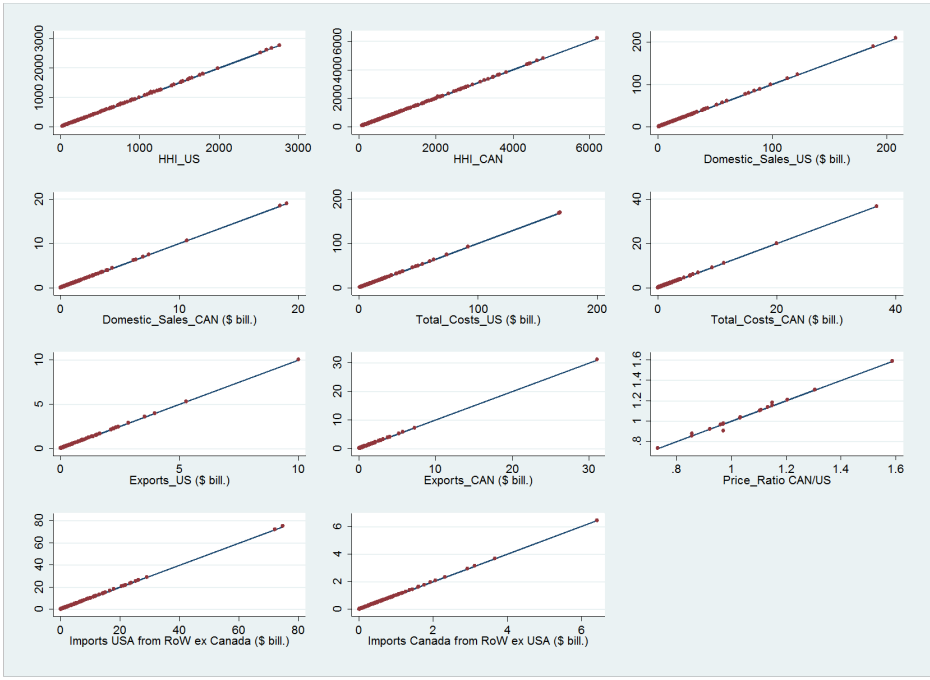
All data are at the 5-digit NAICS level for the year 2002. All value entries (shipments, exports, costs) are in 000s of current USD.

Table IX.4.2: Third-Country Imports: Parameter Values - Summary Statistics

A) Parameters from Data	Mean	Median	Standard Deviation	P10	P90
α^{US}	1	1	0	1	1
α^{CAN}	0.750	0.750	0	0.750	0.750
N^{US}	1605.825	705	3147.181	134	3783.5
N^{CAN}	269.788	131.5	423.494	27.5	637.5
n^{US}	1098.513	639.5	1292.754	133.5	2420.5
n^{CAN}	316.331	192	322.71	51	767
η^{US}	0.288	0.277	0.099	0.165	0.417
η^{CAN}	0.26	0.259	0.096	0.118	0.378
B) Calibrated Parameters	Mean	Median	Standard Deviation	P10	P90
a^{US}	25	25	0	25	25
a^{CAN}	110.894	25.628	367.273	6.174	218.865
$1/b^{US}$	34215.71	10536.48	79874.01	1589.324	74835.24
$1/b^{CAN}$	9949.841	815.889	44725.12	51.179	13431.01
$\tau^{CAN,US}$	1.706	1.418	1.096	1.136	2.402
$\tau^{US,CAN}$	1.806	1.485	1.315	0.753	3.016
ζ^{US}	5.477	5.039	2.953	2.586	8.41
ζ^{CAN}	16.99	8.419	45.493	4.69	27.027
x^{US}	0.614	0.213	1.226	0.06	1.064
x^{CAN}	0.784	0.364	1.341	0.101	1.77
γ^{US}	3.229	2.163	3.179	0.457	7.668
γ^{CAN}	3.361	2.141	3.513	0.415	7.904
Observations	160	160	160	160	160

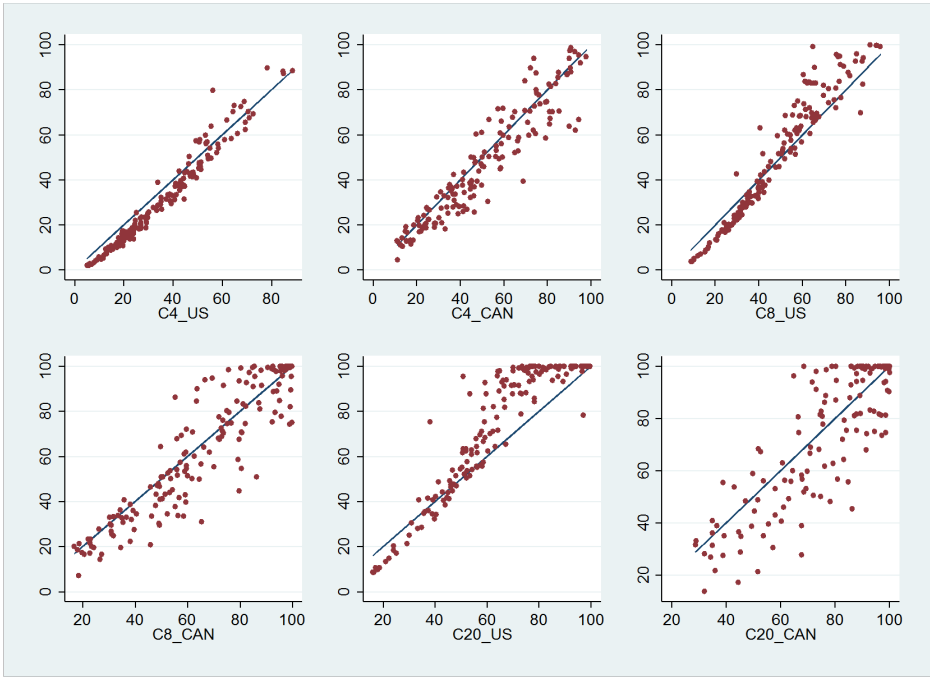
We compute all parameters reported in the Table separately for each 5-digit NAICS industry. The Table reports summary statistics calculated across all industries.

Figure IX.4.1: Third-Country Imports: Theoretical vs. Empirical Moments (targeted moments)



Figures plot theoretical moments (vertical axis) against empirical moments (horizontal axis). Each dot represents a sector. The straight line is the 45-degree line.

Figure IX.4.2: Third-Country Imports: Theoretical vs. Empirical Moments (moments not targeted)



Figures plot theoretical moments (vertical axis) against empirical moments (horizontal axis). Each dot represents a sector. The straight line is the 45-degree line.

Figure IX.4.3: Third-Country Imports: Potential Conflicts Arising from U.S. Mergers

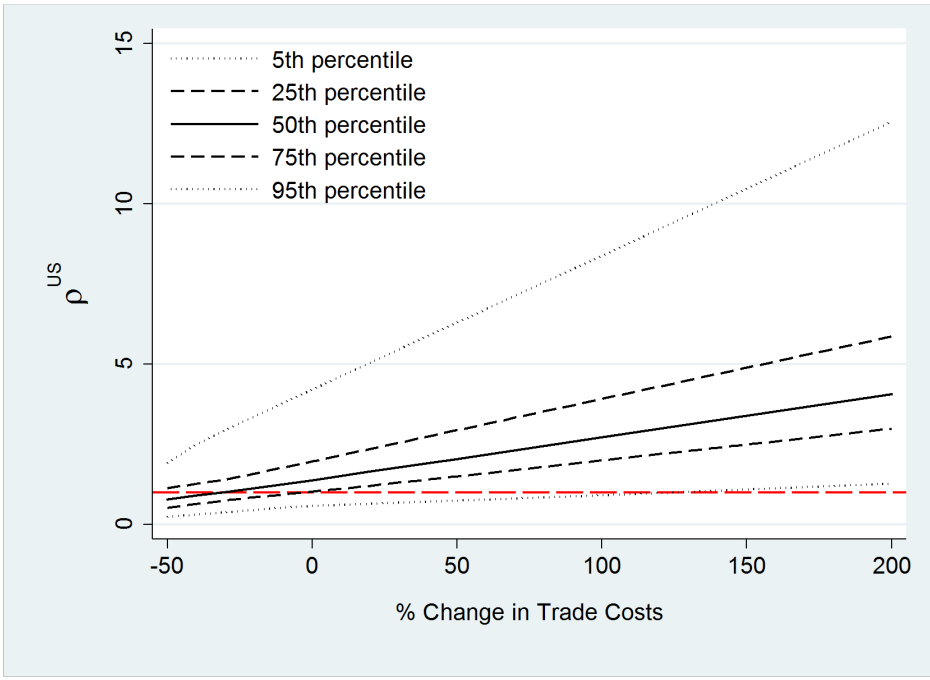


Figure shows percentiles of the distribution of ρ^{US} across sectors for different trade cost changes.

Figure IX.4.4: Third-Country Imports: Potential Conflicts Arising from Canadian Mergers

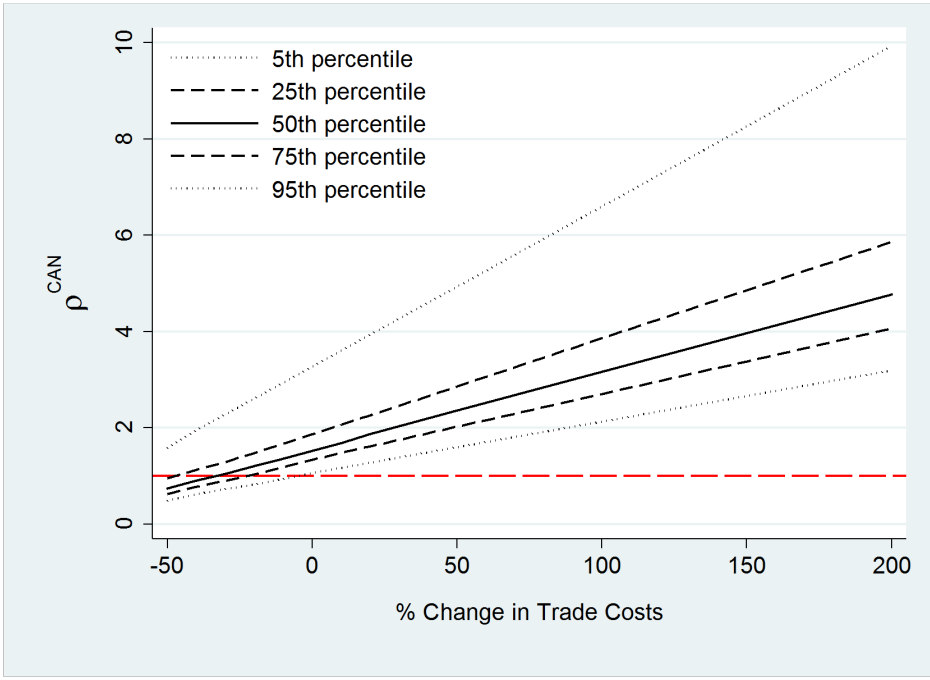


Figure shows percentiles of the distribution of ρ^{CAN} across sectors for different trade cost changes.

IX.5 Additive Trade Costs

Table IX.5.1: Additive Trade Costs: Parameter Values - Summary Statistics

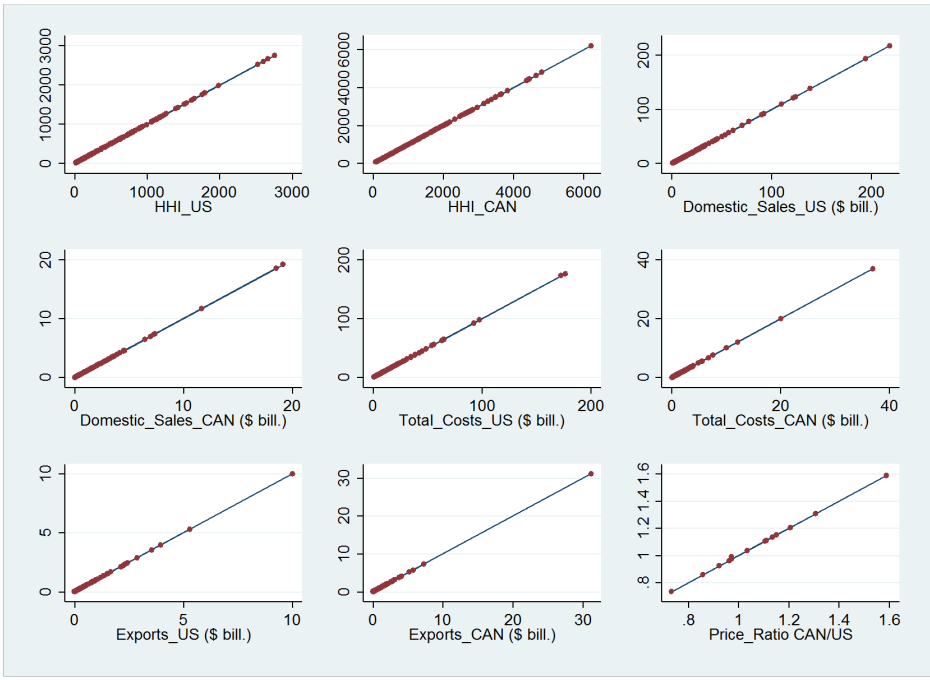
A) Parameters from Data	Mean	Median	Standard Deviation	P10	P90
α^{US}	1	1	0	1	1
α^{CAN}	0.750	0.750	0	0.750	0.750
N^{US}	1605.825	705	3147.181	134	3783.5
N^{CAN}	269.788	131.5	423.494	27.5	637.5
η^{US}	0.288	0.277	0.099	0.165	0.417
η^{CAN}	0.26	0.259	0.096	0.118	0.378
B) Calibrated Parameters	Mean	Median	Standard Deviation	P10	P90
a^{US}	25	25	0	25	25
a^{CAN}	72.18	22.221	189.78	6.851	164.242
$1/b^{US}$	18436.24	6208.874	46031.9	1157.136	40069.08
$1/b^{CAN}$	5296.576	545.203	30162.84	31.607	7297.475
$\tau^{CAN,US}$	1.167	0.739	1.156	0.139	2.575
$\tau^{US,CAN}$	0.966	0.561	1.792	-0.507	3.327
ζ^{US}	5.471	5.012	2.897	2.624	8.23
ζ^{CAN}	10.683	7.876	9.15	4.444	21.704
x^{US}	0.376	0.183	0.633	0.052	0.688
x^{CAN}	0.47	0.261	0.685	0.085	1.07
Observations	160	160	160	160	160

We compute all parameters reported in the Table separately for each 5-digit NAICS industry. The Table reports summary statistics calculated across all industries.

Table IX.5.2: Additive Trade Costs: Conflict Statistics

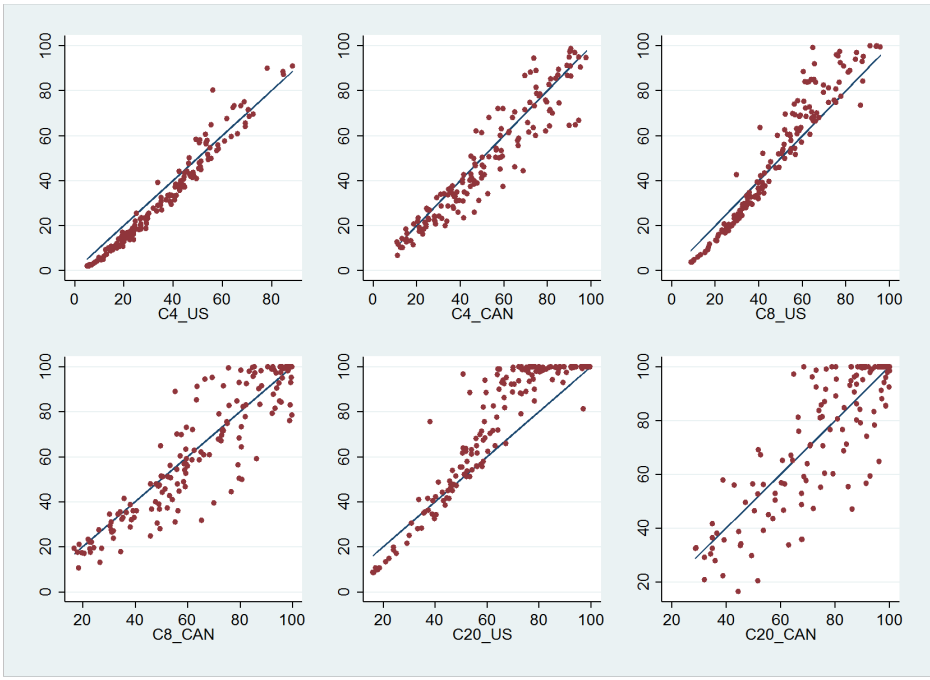
	# sectors with $\rho > 0$	# sectors with $\rho < 0$
US	130	30
CAN	160	0

Figure IX.5.1: Additive Trade Costs: Theoretical vs. Empirical Moments (targeted moments)



Figures plot theoretical moments (vertical axis) against empirical moments (horizontal axis). Each dot represents a sector. The straight line is the 45-degree line.

Figure IX.5.2: Additive Trade Costs: Theoretical vs. Empirical Moments (moments not targeted)



Figures plot theoretical moments (vertical axis) against empirical moments (horizontal axis). Each dot represents a sector. The straight line is the 45-degree line.

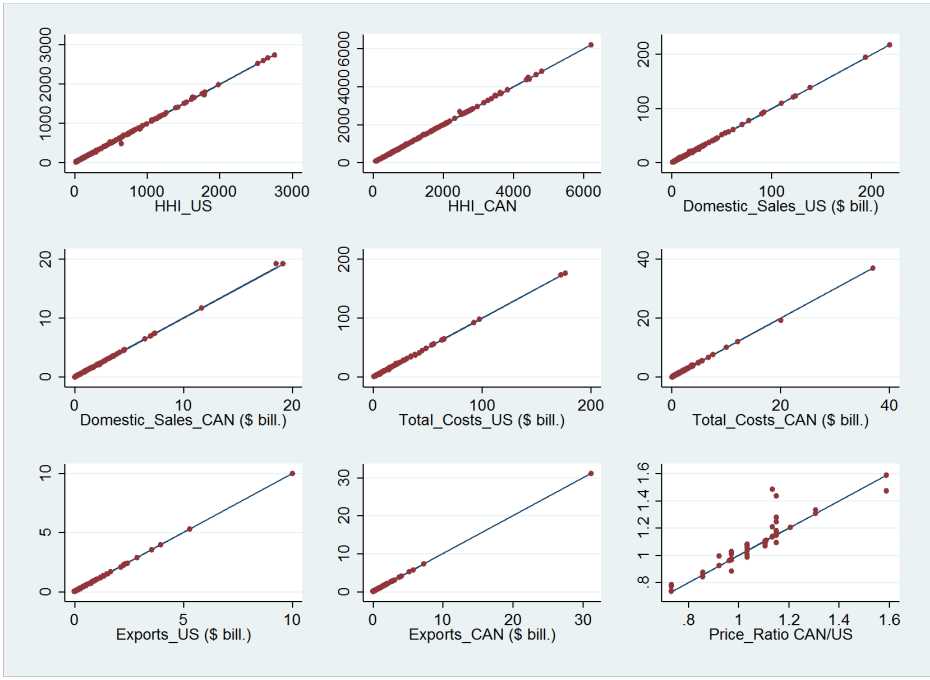
IX.6 Constraining τ's to be no Smaller than 1

Table IX.6.1: $\tau \geq 1$: Parameter Values - Summary Statistics

A) Parameters from Data	Mean	Median	Standard Deviation	P10	P90
α^{US}	1	1	0	1	1
α^{CAN}	0.750	0.750	0	0.750	0.750
N^{US}	1605.825	705	3147.181	134	3783.5
N^{CAN}	269.788	131.5	423.494	27.5	637.5
η^{US}	0.288	0.277	0.099	0.165	0.417
η^{CAN}	0.26	0.259	0.096	0.118	0.378
B) Calibrated Parameters	Mean	Median	Standard Deviation	P10	P90
a^{US}	25	25	0	25	25
a^{CAN}	72.936	23.014	264.824	7.077	104.093
$1/b^{US}$	18543.49	6446.46	46114.23	1235.636	39293.58
$1/b^{CAN}$	5095.145	558.073	28820.42	35.959	6773.389
$\tau^{CAN,US}$	1.725	1.41	1.158	1.113	2.456
$\tau^{US,CAN}$	1.902	1.506	1.3	1	3.103
ζ^{US}	5.512	4.786	3.102	2.568	8.797
ζ^{CAN}	13.724	8.279	18.091	4.611	28.345
x^{US}	0.377	0.183	0.633	0.051	0.629
x^{CAN}	0.48	0.265	0.697	0.085	1.016
Observations	160	160	160	160	160

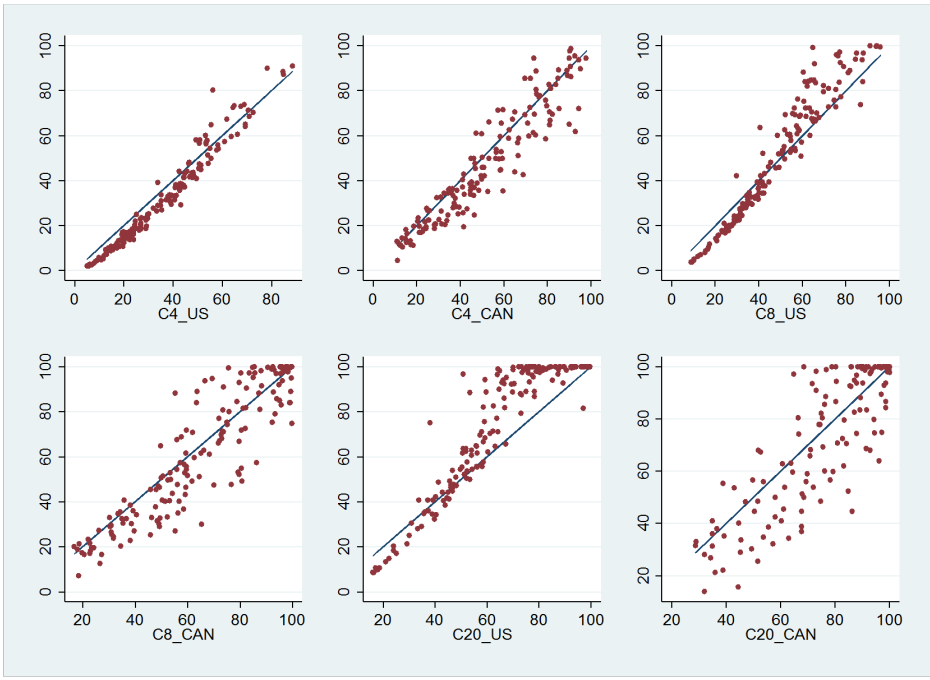
We compute all parameters reported in the Table separately for each 5-digit NAICS industry. The Table reports summary statistics calculated across all industries.

Figure IX.6.1: $\tau \geq 1$: Theoretical vs. Empirical Moments (targeted moments)



Figures plot theoretical moments (vertical axis) against empirical moments (horizontal axis). Each dot represents a sector. The straight line is the 45-degree line.

Figure IX.6.2: $\tau \geq 1$: Theoretical vs. Empirical Moments (moments not targeted)



Figures plot theoretical moments (vertical axis) against empirical moments (horizontal axis). Each dot represents a sector. The straight line is the 45-degree line.

Figure IX.6.3: $\tau \geq 1$: Potential Conflicts Arising from U.S. Mergers

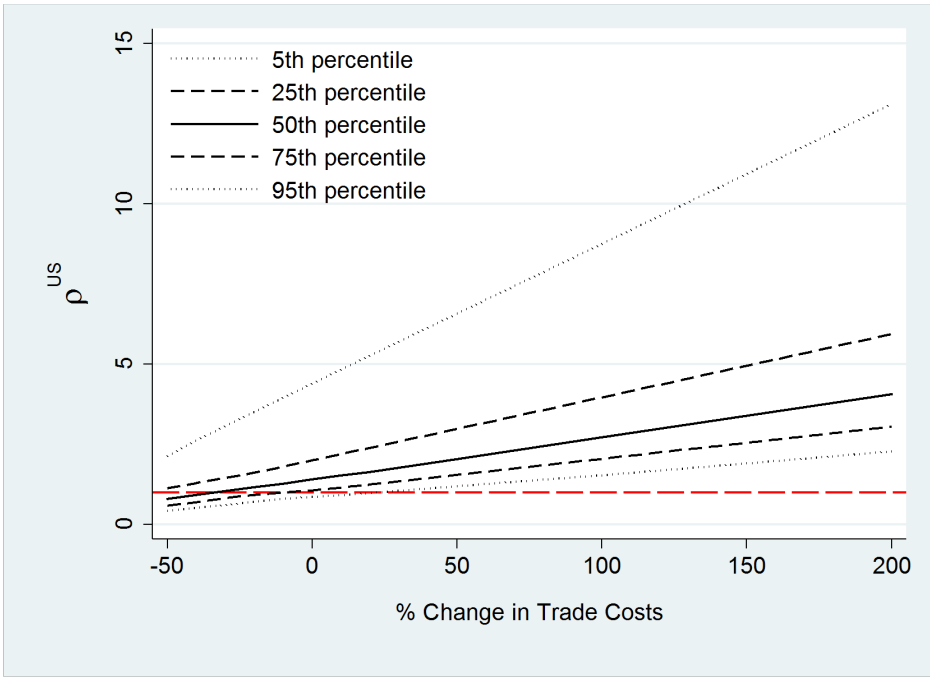


Figure shows percentiles of the distribution of ρ^{US} across sectors for different trade cost changes.

Figure IX.6.4: $\tau \geq 1$: Potential Conflicts Arising from Canadian Mergers

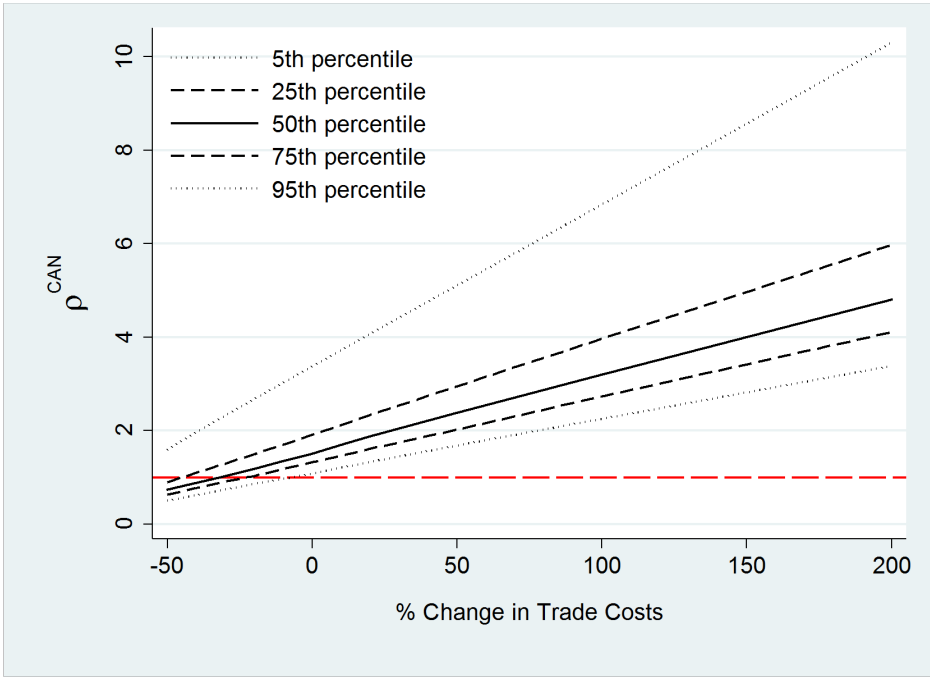


Figure shows percentiles of the distribution of ρ^{CAN} across sectors for different trade cost changes.

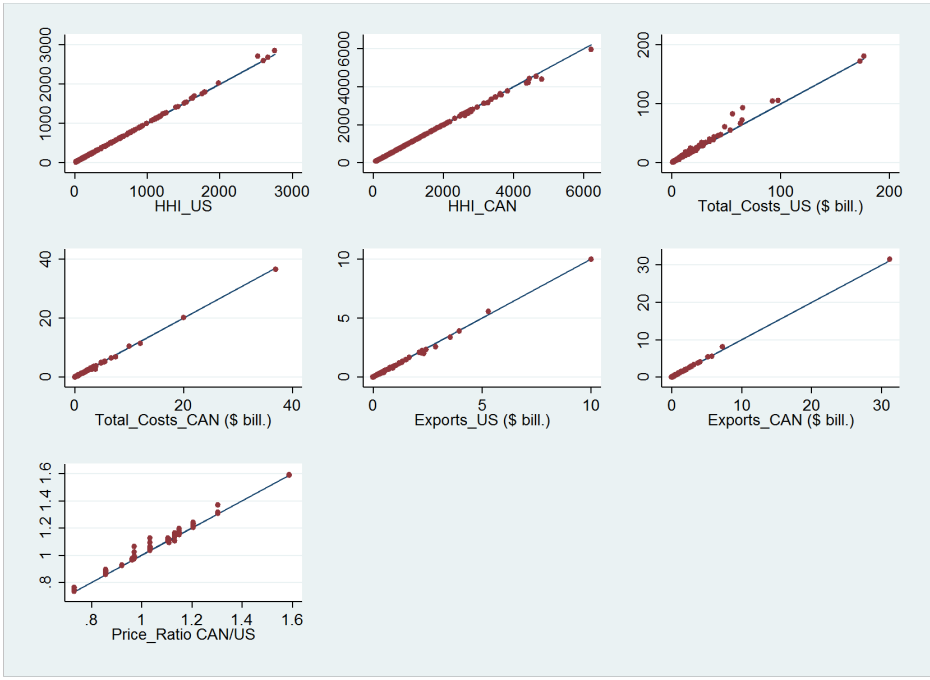
IX.7 Differentiated-Bertrand Competition with CES Demands

Table IX.7.1: CES-Bertrand: Parameter Values - Summary Statistics

A) Parameters from Data	Mean	Median	Standard Deviation	P10	P90
α^{US}	1	1	0	1	1
α^{CAN}	0.750	0.750	0	0.750	0.750
N^{US}	1608.575	708.5	3148.925	135	3785
N^{CAN}	270.512	132	423.61	27.5	637.5
η^{US}	0.288	0.277	0.099	0.165	0.417
η^{CAN}	0.26	0.259	0.096	0.118	0.378
b^{US}	628984.43	350076.23	898729	96548	1264400
b^{CAN}	58079.16	33184	87622.26	7558	130230
B) Calibrated Parameters	Mean	Median	Standard Deviation	P10	P90
σ	5.512	5.163	2.423	3.314	7.877
$\tau^{US,CAN}$	2.611	1.803	2.327	1.181	4.467
$\tau^{CAN,US}$	7.146	2.267	18.844	1.335	10.324
ζ^{US}	5.188	4.991	2.636	2.59	8.021
ζ^{CAN}	4.888	4.579	2.217	2.299	7.853
x^{US}	0.1	0.1	0	0.1	0.1
x^{CAN}	0.124	0.104	0.074	0.073	0.175
Observations	160	160	160	160	160

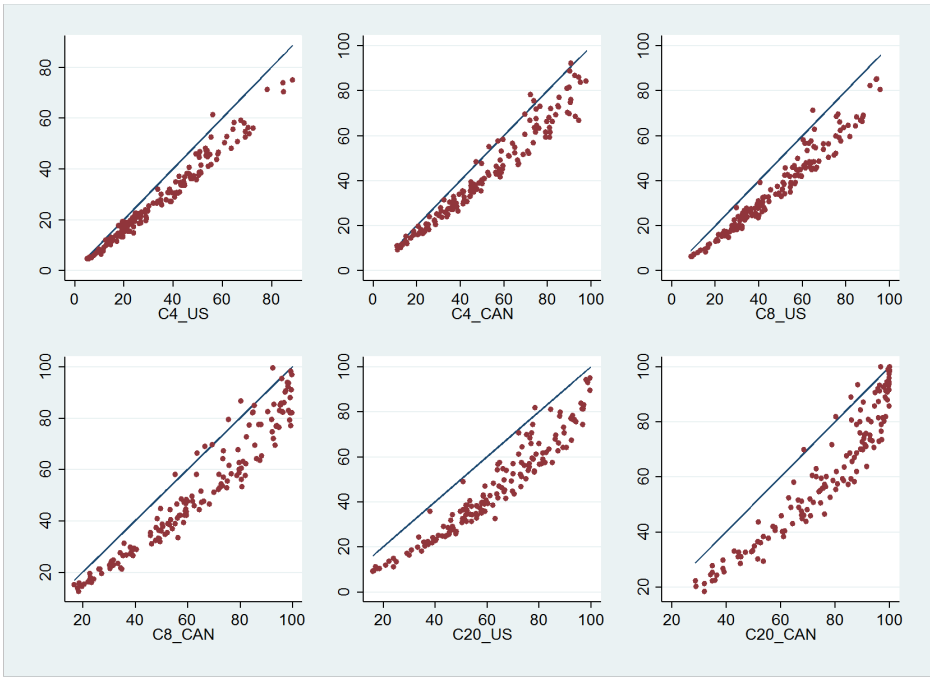
We compute all parameters reported in the Table separately for each 5-digit NAICS industry. The Table reports summary statistics calculated across all industries.

Figure IX.7.1: CES-Bertrand: Theoretical vs. Empirical Moments (targeted moments)



Figures plot theoretical moments (vertical axis) against empirical moments (horizontal axis). Each dot represents a sector. The straight line is the 45-degree line.

Figure IX.7.2: CES-Bertrand: Theoretical vs. Empirical Moments (moments not targeted)



Figures plot theoretical moments (vertical axis) against empirical moments (horizontal axis). Each dot represents a sector. The straight line is the 45-degree line.

Figure IX.7.3: CES-Bertrand: Potential Conflicts Arising from U.S. Mergers

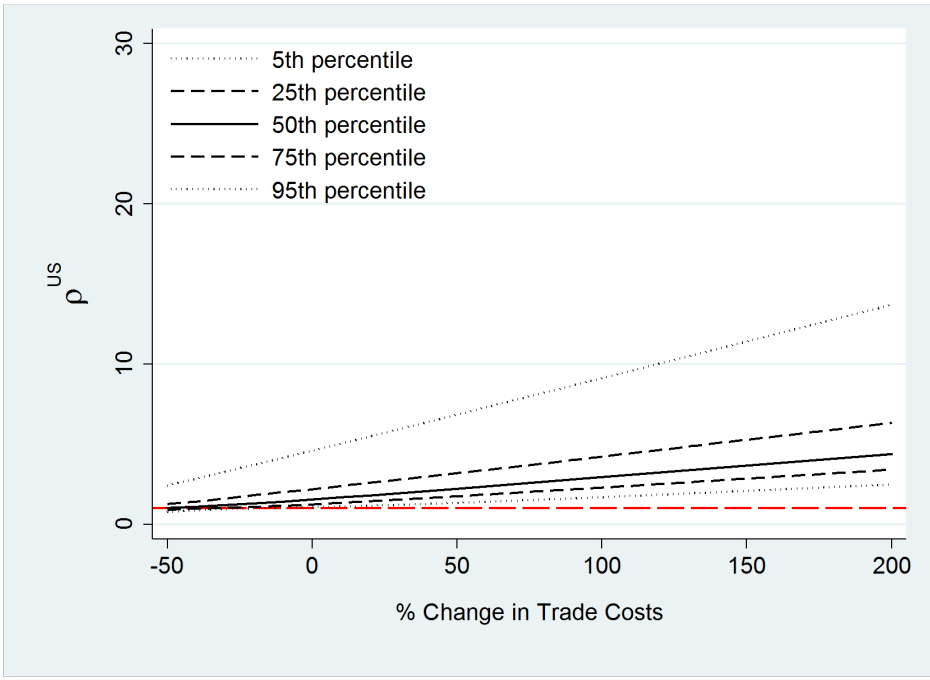


Figure shows percentiles of the distribution of ρ^{US} across sectors for different trade cost changes.

Figure IX.7.4: CES-Bertrand: Potential Conflicts Arising from Canadian Mergers

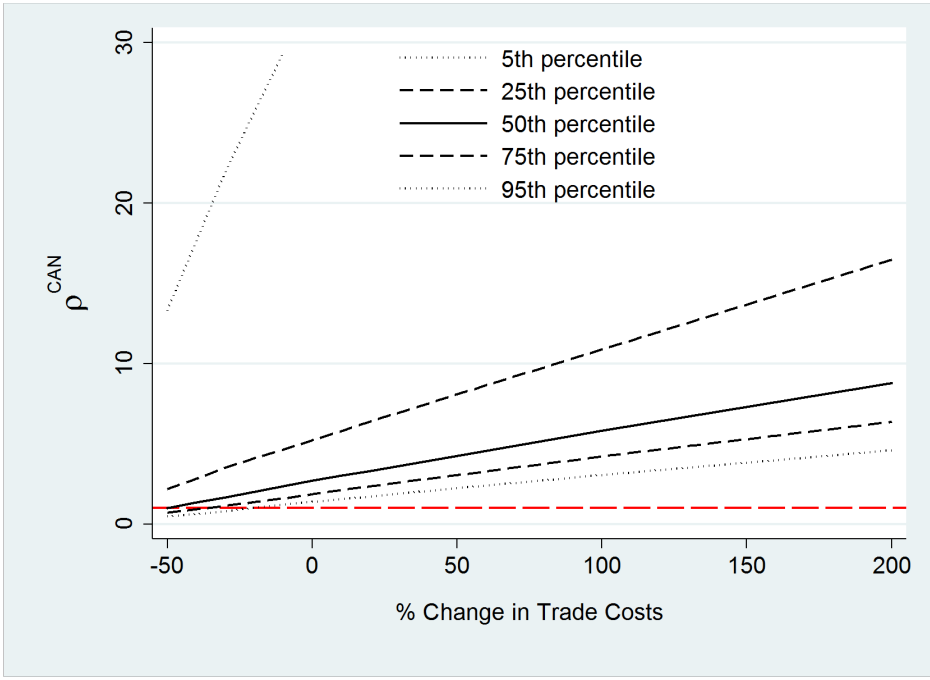


Figure shows percentiles of the distribution of ρ^{CAN} across sectors for different trade cost changes.

IX.8 Additional Results for the Calibration with Mergers

Table IX.8.1: Calibration with Mergers: Empirical Moments - Summary Statistics

Empirical Moment	Mean	Median	Standard Deviation	P10	P90
# Mergers US	1.89	1.03	3.2	0.1	4.04
# Mergers CAN	0.15	0.05	0.23	0	0.46
P^{CAN}/P^{US}	1.07	1.11	0.15	0.86	1.21
Shipments US	20921043	11860888	29498736	3400500	40930747
Shipments CAN	1580794	853768	2562833	174308	3458801
Exports US	503568	186527	1064930	24056	1081069
Exports CAN	756150	176937	2665055	29227	1724507
HHI US	609	431	565	109	1399
HHI CAN	1306	882	1188	205	2959
Total Cost US	15491387	8849658	23556546	2339720	28982876
Total Cost CAN	1775447	817627	3670628	174584	3676058
Observations	156	156	156	156	156

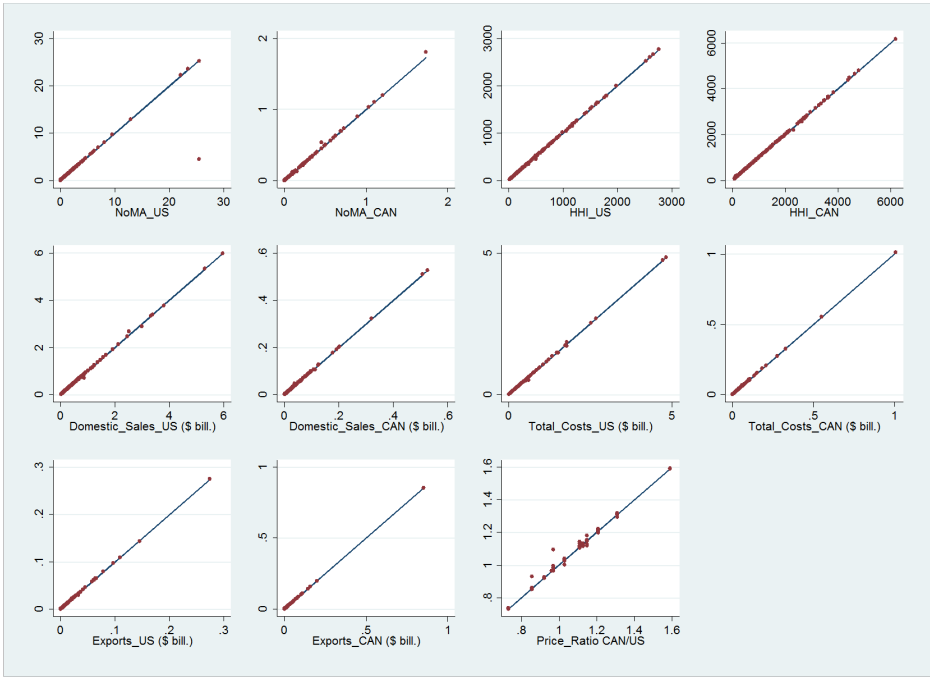
All data are at the 5-digit NAICS level for the year 2002. All value entries (shipments, exports, costs) are in 000s of current USD.

Table IX.8.2: Calibration with Mergers: Parameter Values - Summary Statistics

A) Parameters from Data	Mean	Median	Standard Deviation	P10	P90
α^{US}	1	1	0	1	1
α^{CAN}	0.750	0.750	0	0.750	0.750
N^{US}	1573.526	655	3173.016	131	3666
N^{CAN}	263.718	126.5	425.923	27	629
β^{US}	50	50	0	50	50
β^{CAN}	50	50	0	50	50
η^{US}	0.286	0.274	0.099	0.161	0.417
η^{CAN}	0.258	0.258	0.096	0.116	0.378
B) Calibrated Parameters	Mean	Median	Standard Deviation	P10	P90
T^{US}	70.998	9.614	279.812	0.895	92.331
T^{CAN}	4.879	0.607	25.266	0	6.805
a^{US}	25	25	0	25	25
a^{CAN}	65.393	23.237	119.869	6.939	145.666
$1/b^{US}$	17530.13	6204.119	46201.5	1148.512	31440.66
$1/b^{CAN}$	5080.8	496.343	29405.76	27.651	7140.99
$\tau^{CAN,US}$	1.758	1.448	1.156	1.144	2.608
$\tau^{US,CAN}$	1.861	1.515	1.3	0.843	3.07
ζ^{US}	5.593	5.107	3.134	2.589	8.424
ζ^{CAN}	22.948	8.254	138.54	4.543	24.727
x^{US}	0.381	0.178	0.644	0.052	0.651
x^{CAN}	0.481	0.269	0.707	0.087	1.078
Observations	156	156	156	156	156

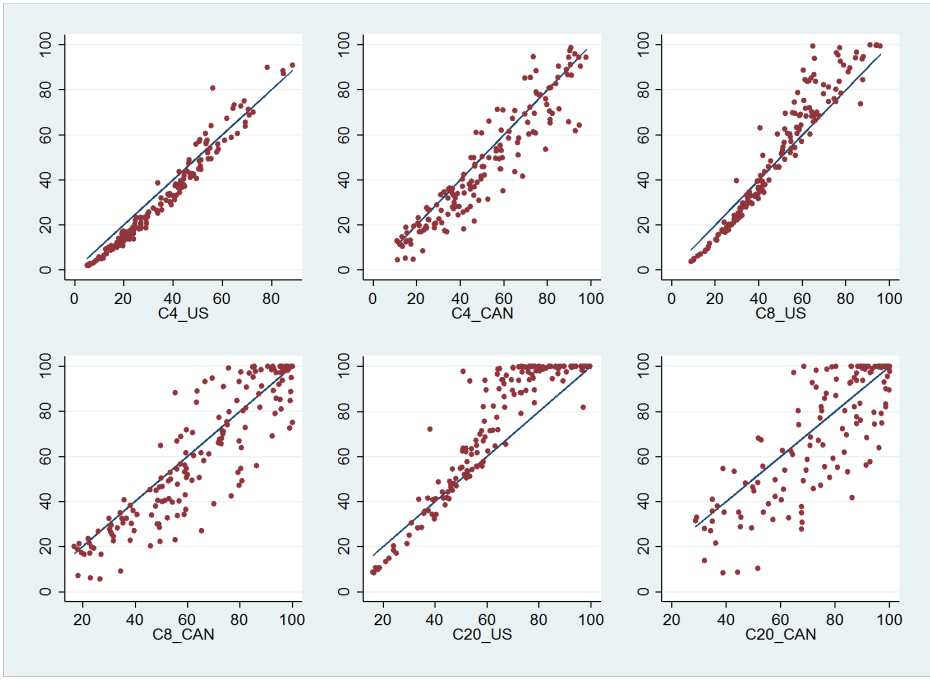
We compute all parameters reported in the Table separately for each 5-digit NAICS industry. The Table reports summary statistics calculated across all industries.

Figure IX.8.1: Calibration with Mergers: Theoretical vs. Empirical Moments (targeted moments)



Figures plot theoretical moments (vertical axis) against empirical moments (horizontal axis). Each dot represents a sector. The straight line is the 45-degree line.

Figure IX.8.2: Calibration with Mergers: Theoretical vs. Empirical Moments (moments not targeted)



Figures plot theoretical moments (vertical axis) against empirical moments (horizontal axis). Each dot represents a sector. The straight line is the 45-degree line.

Figure IX.8.3: Calibration with Mergers: Potential Conflicts Arising from U.S. Mergers

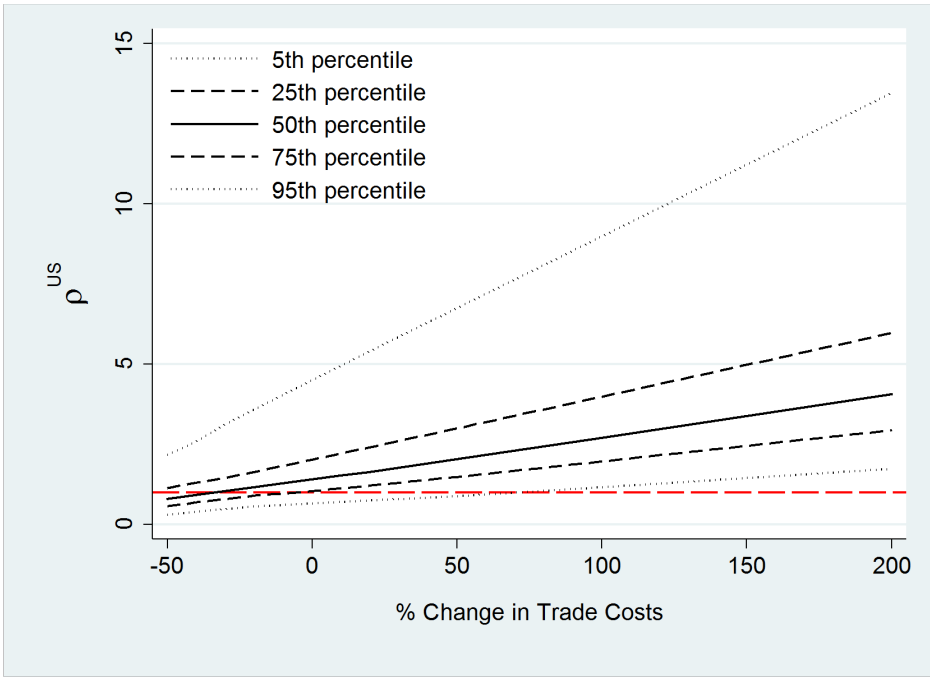


Figure shows percentiles of the distribution of ρ^{US} across sectors for different trade cost changes.

Figure IX.8.4: Calibration with Mergers: Potential Conflicts Arising from Canadian Mergers

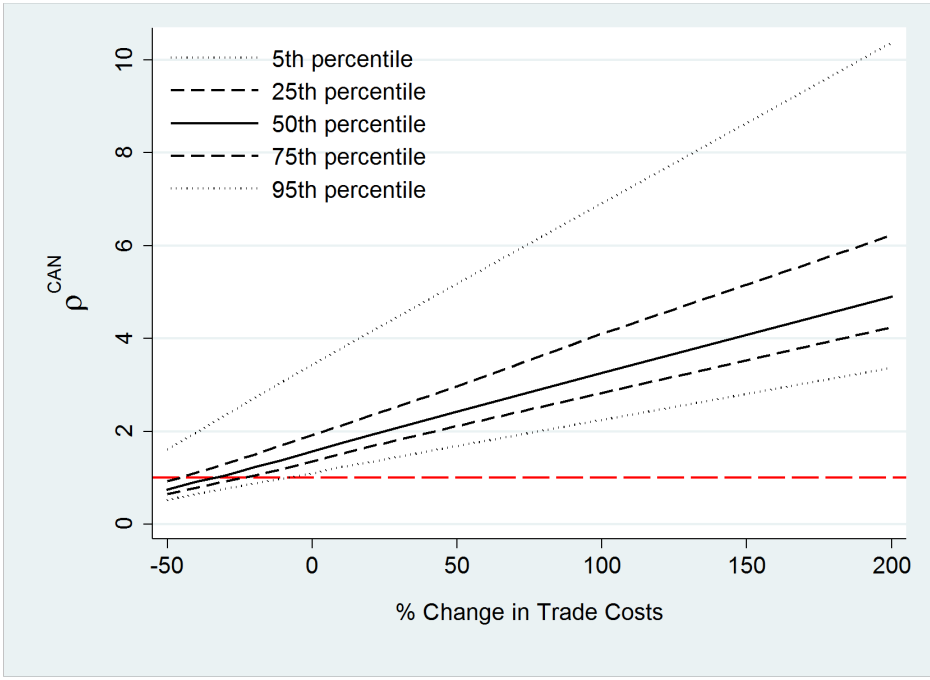


Figure shows percentiles of the distribution of ρ^{CAN} across sectors for different trade cost changes.

IX.9 Stronger Synergies ($\beta = 30$)

Table IX.9.1: Stronger Synergies: Empirical Moments - Summary Statistics

Empirical Moment	Mean	Median	Standard Deviation	P10	P90
# Mergers US	1.89	1.03	3.2	0.1	4.04
# Mergers CAN	0.15	0.05	0.23	0	0.46
P^{CAN}/P^{US}	1.07	1.11	0.15	0.86	1.21
Shipments US	20921043	11860888	29498736	3400500	40930747
Shipments CAN	1580794	853768	2562833	174308	3458801
Exports US	503568	186527	1064930	24056	1081069
Exports CAN	756150	176937	2665055	29227	1724507
HHI US	609	431	565	109	1399
HHI CAN	1306	882	1188	205	2959
Total Cost US	15491387	8849658	23556546	2339720	28982876
Total Cost CAN	1775447	817627	3670628	174584	3676058
Observations	156	156	156	156	156

All data are at the 5-digit NAICS level for the year 2002. All value entries (shipments, exports, costs) are in 000s of current USD.

Table IX.9.2: Stronger Synergies: Parameter Values - Summary Statistics

A) Parameters from Data	Mean	Median	Standard Deviation	P10	P90
α^{US}	1	1	0	1	1
α^{CAN}	0.750	0.750	0	0.750	0.750
N^{US}	1573.526	655	3173.016	131	3666
N^{CAN}	263.718	126.5	425.923	27	629
β^{US}	30	30	0	30	30
β^{CAN}	30	30	0	30	30
η^{US}	0.286	0.274	0.099	0.161	0.417
η^{CAN}	0.258	0.258	0.096	0.116	0.378
B) Calibrated Parameters	Mean	Median	Standard Deviation	P10	P90
T^{US}	34.89	5.951	174.097	0.595	42.045
T^{CAN}	1.696	0.304	5.465	0	3.022
a^{US}	25	25	0	25	25
a^{CAN}	63.863	23.869	117.871	6.94	148.68
$1/b^{US}$	17643.13	6205.846	46333.03	1148.559	31485.07
$1/b^{CAN}$	5056.029	484.248	28914.75	28.38	6814.364
$\tau^{CAN,US}$	1.759	1.455	1.151	1.145	2.609
$\tau^{US,CAN}$	1.863	1.526	1.307	0.839	3.1
ζ^{US}	5.653	5.092	3.194	2.58	8.926
ζ^{CAN}	5.19E+19	8.306	6.49E+20	4.538	26.995
x^{US}	0.381	0.178	0.644	0.052	0.654
x^{CAN}	0.481	0.267	0.707	0.087	1.078
Observations	156	156	156	156	156

We compute all parameters reported in the Table separately for each 5-digit NAICS industry. The Table reports summary statistics calculated across all industries.

Table IX.9.3: Stronger Synergies: Simulated Domestic and Cross-Border Price Effects of Mergers

Price Effect	Mean	Median	Standard Deviation	P10	P90
US merger, US price	-0.10%	-0.06%	0.11%	-0.24%	-0.01%
US merger, CAN price	-0.02%	-0.01%	0.06%	-0.08%	0.01%
CAN merger, CAN price	-0.14%	-0.06%	0.18%	-0.40%	-0.01%
CAN merger, US price	-0.07%	0.00%	0.18%	-0.20%	0.00%

We compute the domestic and cross-border price effects of mergers separately for each 5-digit industry. The Table reports summary statistics calculated across all industries. Industries without merger opportunities are dropped.

Table IX.9.4: Stronger Synergies: Synergy Effects

MC Reduction	Mean	Median	Standard Deviation	P10	P90
US mergers	-6.84%	-6.78%	2.42%	-9.06%	-3.60%
Canadian mergers	-10.92%	-7.09%	9.18%	-24.10%	-5.67%

We compute the synergy effects of mergers separately for each 5-digit industry. The Table reports summary statistics calculated across all industries. Industries without merger opportunities are dropped.

Table IX.9.5: Stronger Synergies: Introducing Veto Rights

Change in Outcome (000s USD)	Mean	Median	Standard Deviation	P10	P90
Total Consumer Surplus US+Canada	-794.8	0	4384.9	-683.4	0
Consumer Surplus US	-869.5	0	4756.2	-738.2	0
Consumer Surplus Canada	74.7	0	396.3	0	78.4

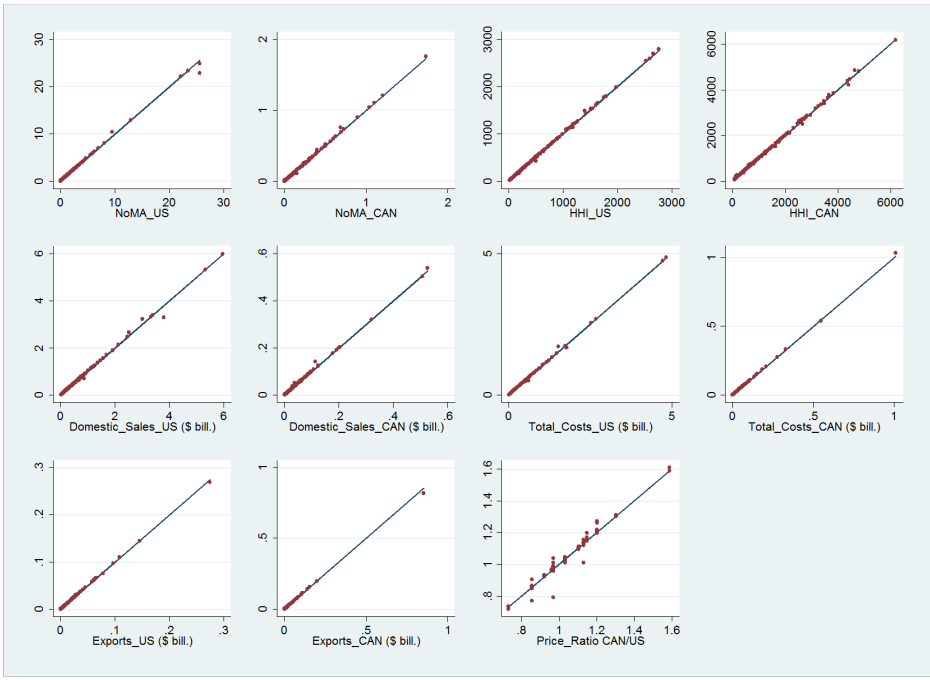
We compute the consumer surplus effects of introducing veto rights separately for each 5-digit industry. The Table reports summary statistics calculated across all industries.

Table IX.9.6: Stronger Synergies: North-American Competition Authority

Change in Outcome (000s USD)	Mean	Median	Standard Deviation	P10	P90
Total Consumer Surplus US+Canada	1983.8	7	11860.2	0	1055.8
Consumer Surplus US	2116.4	0	13244.7	-14.6	721.5
Consumer Surplus Canada	-132.6	0.9	1468.5	-21.5	106.3

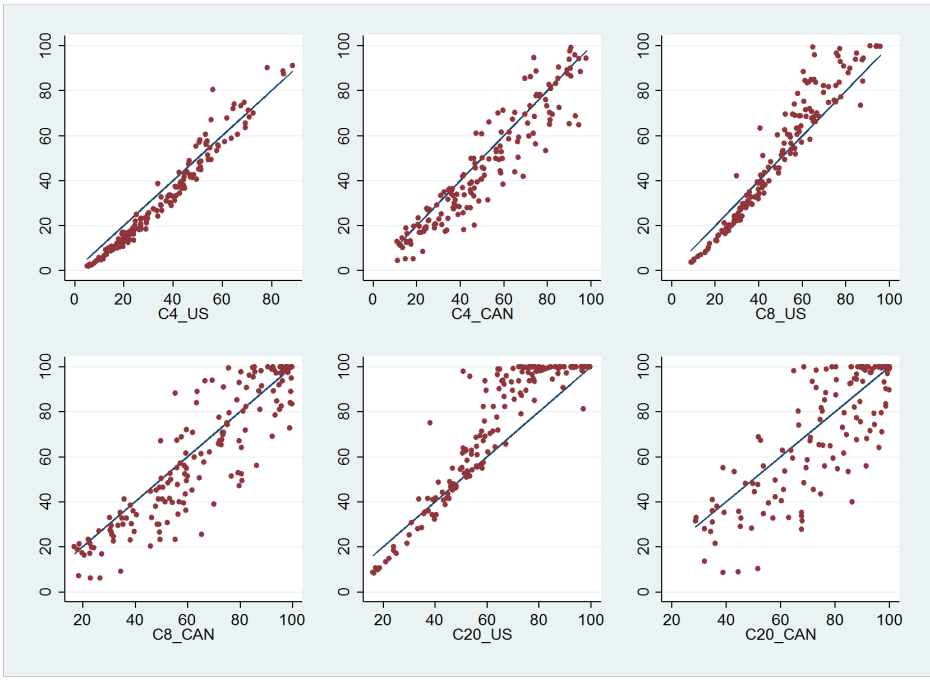
We compute the consumer surplus effects of creating a North-American competition authority separately for each 5-digit industry. The Table reports summary statistics calculated across all industries.

Figure IX.9.1: Stronger Synergies: Theoretical vs. Empirical Moments (targeted moments)



Figures plot theoretical moments (vertical axis) against empirical moments (horizontal axis). Each dot represents a sector. The straight line is the 45-degree line.

Figure IX.9.2: Stronger Synergies: Theoretical vs. Empirical Moments (moments not targeted)



Figures plot theoretical moments (vertical axis) against empirical moments (horizontal axis). Each dot represents a sector. The straight line is the 45-degree line.

Figure IX.9.3: Stronger Synergies: Potential Conflicts Arising from U.S. Mergers

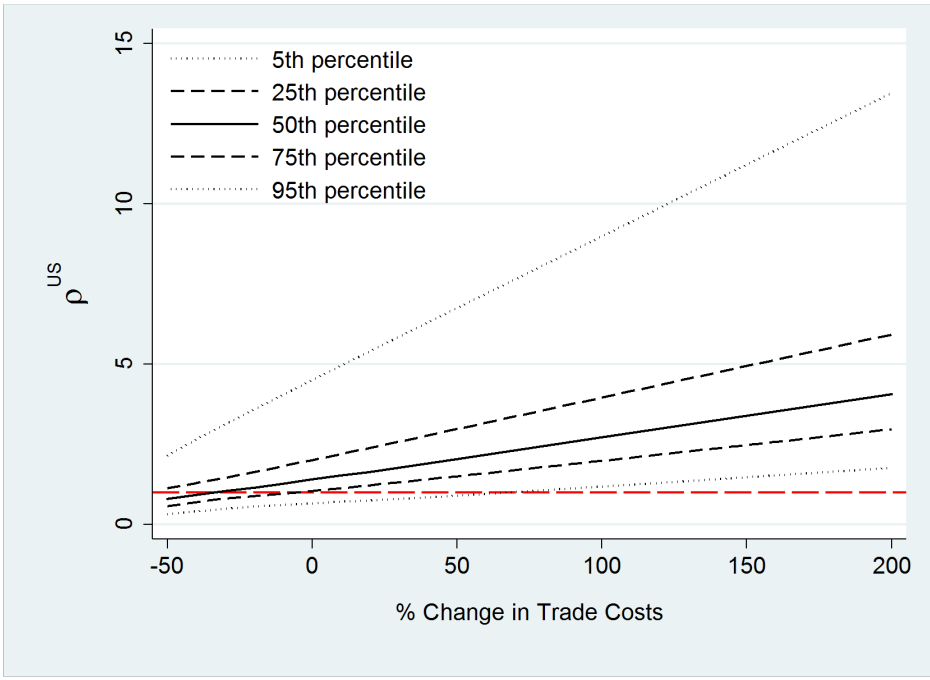


Figure shows percentiles of the distribution of ρ^{US} across sectors for different trade cost changes.

Figure IX.9.4: Stronger Synergies: Potential Conflicts Arising from Canadian Mergers

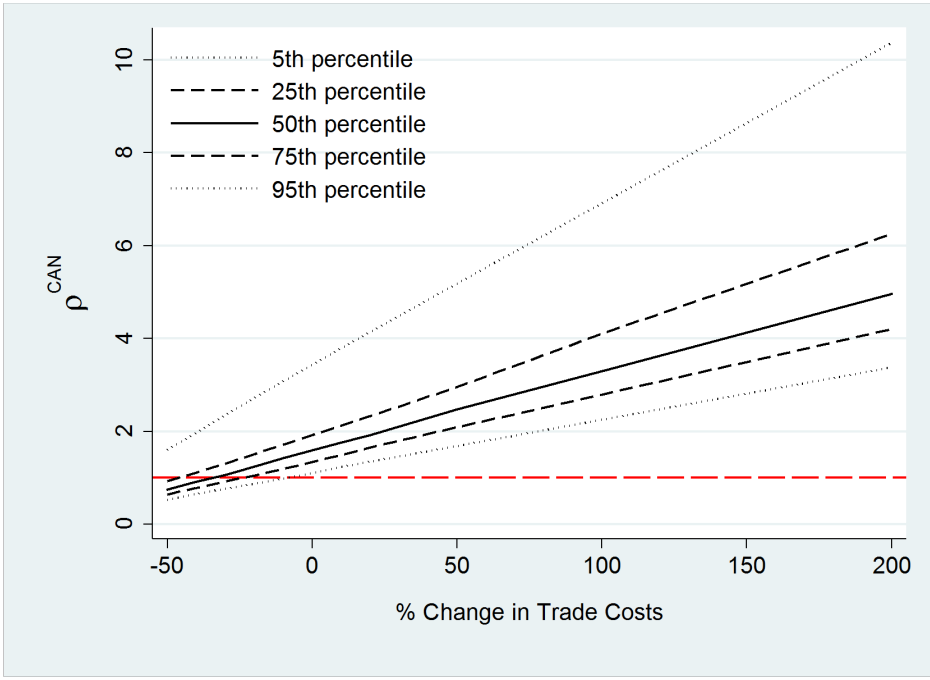


Figure shows percentiles of the distribution of ρ^{CAN} across sectors for different trade cost changes.

Figure IX.9.5: Stronger Synergies: Actual Conflicts, % of all profitable merger opportunities (U.S. mergers)

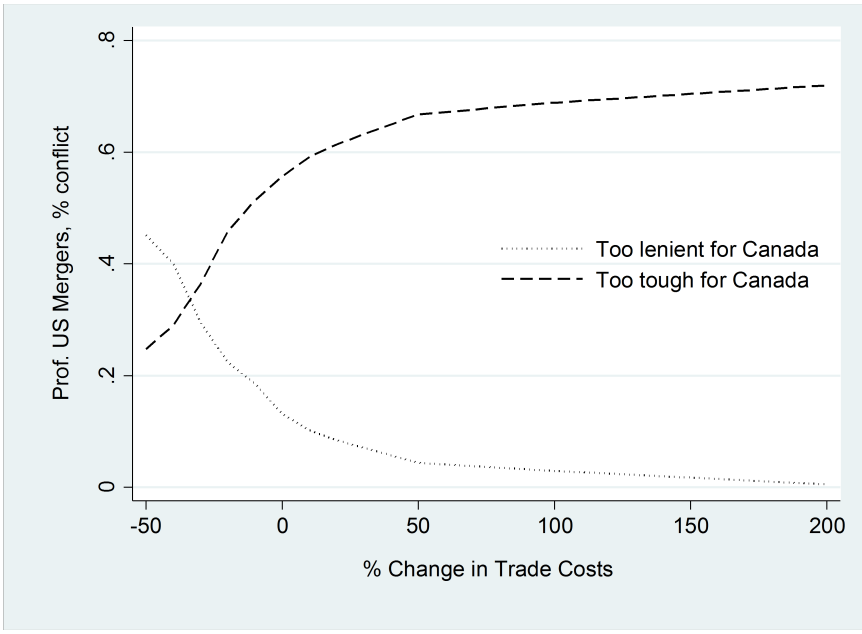


Figure shows means across sectors of the fraction of profitable mergers where a conflict arose. "Too lenient for Canada" means that the U.S. authorized a merger which lowered consumer surplus in Canada; "Too tough for Canada" means that the U.S. blocked a merger which would have increased Canadian consumer surplus. If there are no merger opportunities in a sector, the sector is dropped.

Figure IX.9.6: Stronger Synergies: Actual Conflicts, % of all profitable merger opportunities (Canadian mergers)

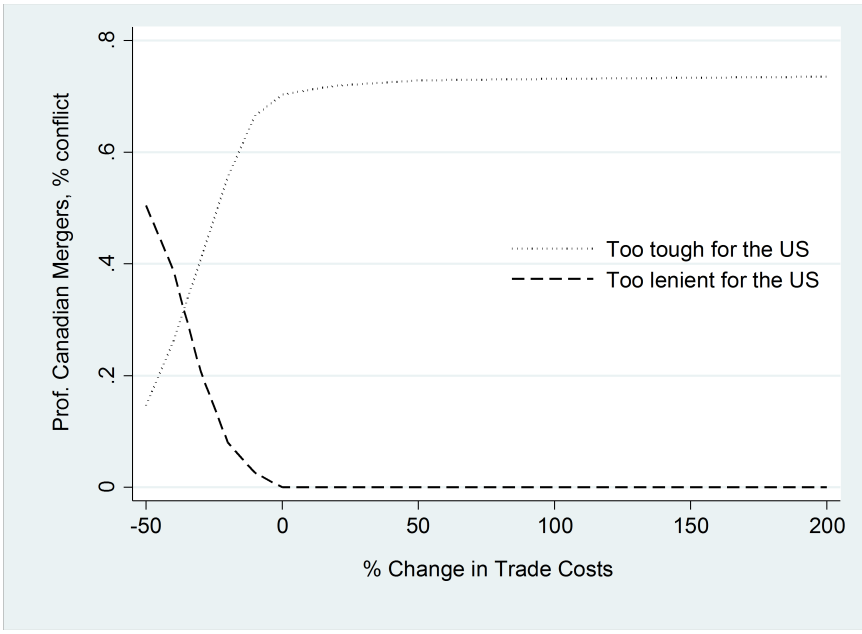


Figure shows means across sectors of the fraction of profitable mergers where a conflict arose. "Too lenient for the U.S." means that Canada authorized a merger which lowered consumer surplus in the U.S.; "Too tough for the U.S." means that Canada blocked a merger which would have increased U.S. consumer surplus. If there are no merger opportunities in a sector, the sector is dropped.

Figure IX.9.7: Stronger Synergies: Consumer surplus change, No-Veto to Veto Case

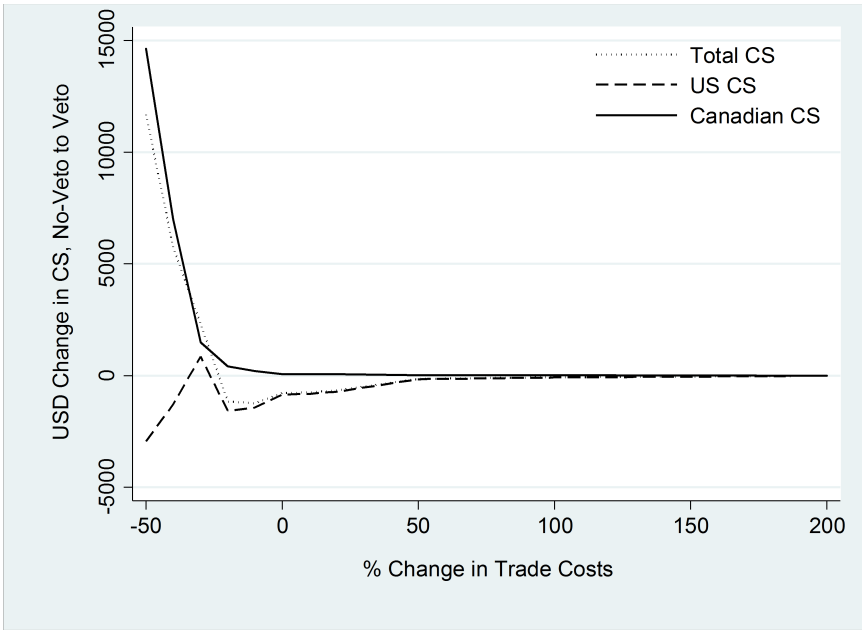


Figure shows the USD change in consumer surplus (in 000s of USD) induced by a move from no-veto rights to veto rights for different levels of trade cost changes.

Figure IX.9.8: Stronger Synergies: Consumer surplus change, No-Veto to North-American Competition Authority

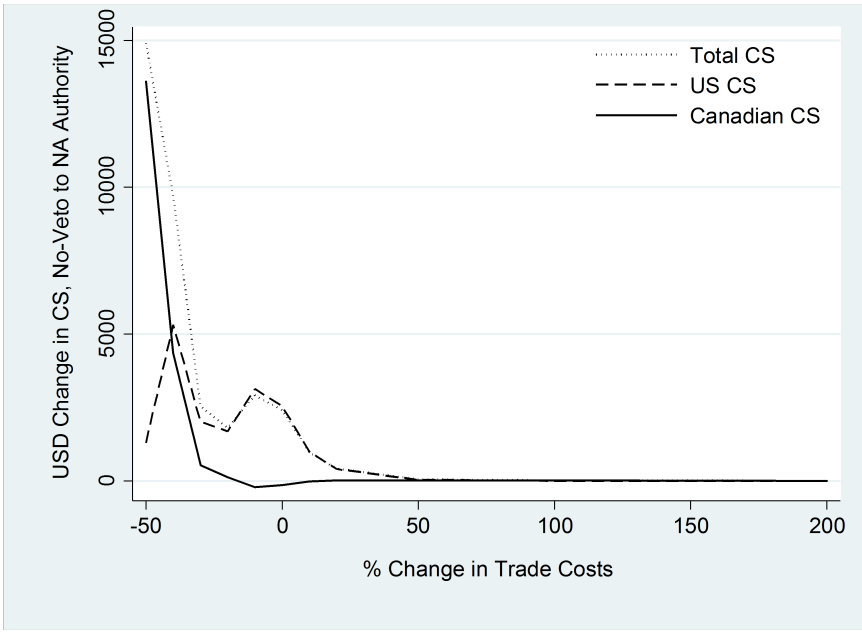


Figure shows the USD change in consumer surplus (in 000s of USD) induced by a move from the no-veto-rights case to a North-American merger authority for different trade cost changes.

IX.10 Weaker Synergies

Table IX.10.1: Weaker Synergies: Empirical Moments - Summary Statistics

Empirical Moment	Mean	Median	Standard Deviation	P10	P90
# Mergers US	1.89	1.03	3.2	0.1	4.04
# Mergers CAN	0.15	0.05	0.23	0	0.46
P^{CAN}/P^{US}	1.07	1.11	0.15	0.86	1.21
Shipments US	20921043	11860888	29498736	3400500	40930747
Shipments CAN	1580794	853768	2562833	174308	3458801
Exports US	503568	186527	1064930	24056	1081069
Exports CAN	756150	176937	2665055	29227	1724507
HHI US	609	431	565	109	1399
HHI CAN	1306	882	1188	205	2959
Total Cost US	15491387	8849658	23556546	2339720	28982876
Total Cost CAN	1775447	817627	3670628	174584	3676058
Observations	156	156	156	156	156

All data are at the 5-digit NAICS level for the year 2002. All value entries (shipments, exports, costs) are in 000s of current USD.

Table IX.10.2: Weaker Synergies: Parameter Values - Summary Statistics

A) Parameters from Data	Mean	Median	Standard Deviation	P10	P90
α^{US}	1	1	0	1	1
α^{CAN}	0.750	0.750	0	0.750	0.750
N^{US}	1573.526	655	3173.016	131	3666
N^{CAN}	263.718	126.5	425.923	27	629
β^{US}	70	70	0	70	70
β^{CAN}	70	70	0	70	70
η^{US}	0.286	0.274	0.099	0.161	0.417
η^{CAN}	0.258	0.258	0.096	0.116	0.378
B) Calibrated Parameters	Mean	Median	Standard Deviation	P10	P90
T^{US}	104.698	14.382	354.02	1.388	154.422
T^{CAN}	10.31	1	49.874	0	11.053
a^{US}	25	25	0	25	25
a^{CAN}	65.474	23.555	118.817	6.928	140.449
$1/b^{US}$	17464.93	6204.34	44769.21	1147.988	31424.63
$1/b^{CAN}$	4703.031	476.5	25137.25	29.545	7037.502
$\tau^{CAN,US}$	1.768	1.456	1.167	1.145	2.61
$\tau^{US,CAN}$	1.991	1.517	1.723	0.846	3.261
ζ^{US}	5.496	5.082	2.76	2.693	8.324
ζ^{CAN}	8.98E+28	8.307	1.12E+30	4.463	26.668
x^{US}	0.383	0.177	0.648	0.052	0.654
x^{CAN}	0.48	0.27	0.697	0.087	1.078
Observations	156	156	156	156	156

We compute all parameters reported in the Table separately for each 5-digit NAICS industry. The Table reports summary statistics calculated across all industries.

Table IX.10.3: Weaker Synergies: Simulated Domestic and Cross-Border Price Effects of Mergers

Price Effect	Mean	Median	Standard Deviation	P10	P90
US merger, US price	-0.12%	-0.06%	0.13%	-0.26%	-0.01%
US merger, CAN price	-0.03%	-0.01%	0.10%	-0.09%	0.01%
CAN merger, CAN price	-0.15%	-0.06%	0.23%	-0.41%	-0.01%
CAN merger, US price	-0.08%	-0.01%	0.21%	-0.27%	0.00%

We compute the domestic and cross-border price effects of mergers separately for each 5-digit industry. The Table reports summary statistics calculated across all industries. Industries without merger opportunities are dropped.

Table IX.10.4: Weaker Synergies: Synergy Effects

MC Reduction	Mean	Median	Standard Deviation	P10	P90
US mergers	-7.4%	-7.1%	3.0%	-10.6%	-3.3%
Canadian mergers	-11.1%	-7.2%	9.4%	-27.7%	-5.8%

We compute the synergy effects of mergers separately for each 5-digit industry. The Table reports summary statistics calculated across all industries. Industries without merger opportunities are dropped.

Table IX.10.5: Weaker Synergies: Introducing Veto Rights

Change in Outcome (000s USD)	Mean	Median	Standard Deviation	P10	P90
Total Consumer Surplus US+Canada	-2137.1	0	12090.4	-1574.7	0
Consumer Surplus US	-2338.7	0	13095.5	-1798.3	0
Consumer Surplus Canada	201.6	0	1058.2	0	223.5

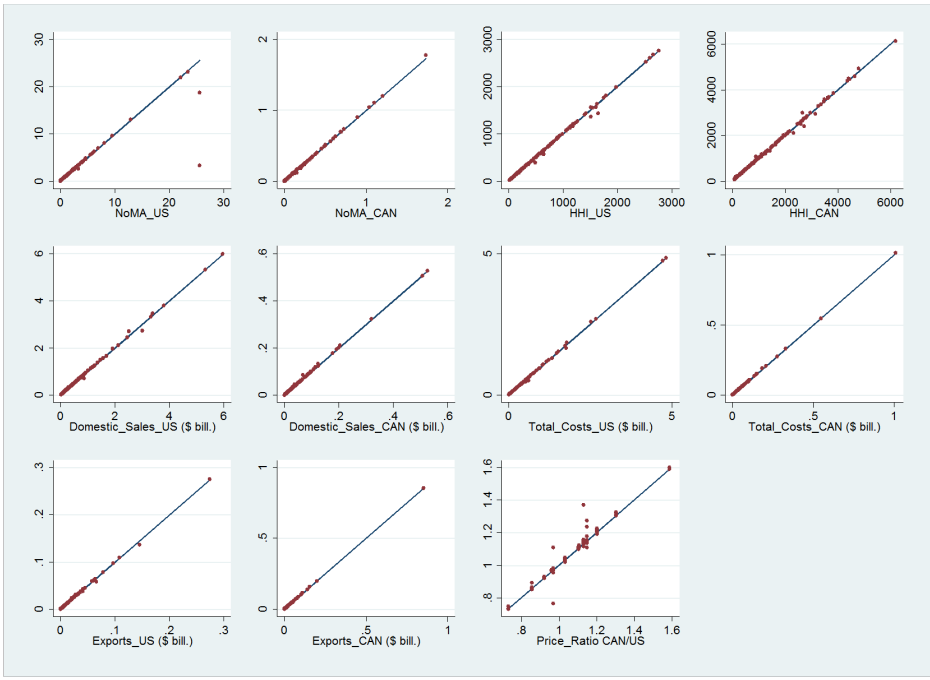
We compute the consumer surplus effects of introducing veto rights separately for each 5-digit industry. The Table reports summary statistics calculated across all industries.

Table IX.10.6: Weaker Synergies: North-American Competition Authority

Change in Outcome (000s USD)	Mean	Median	Standard Deviation	P10	P90
Total Consumer Surplus US+Canada	13855	29.1	76020.3	0	3342
Consumer Surplus US	14904.7	0	85251.6	-40.7	3991.4
Consumer Surplus Canada	-1049.8	3	10998.4	-177	213.6

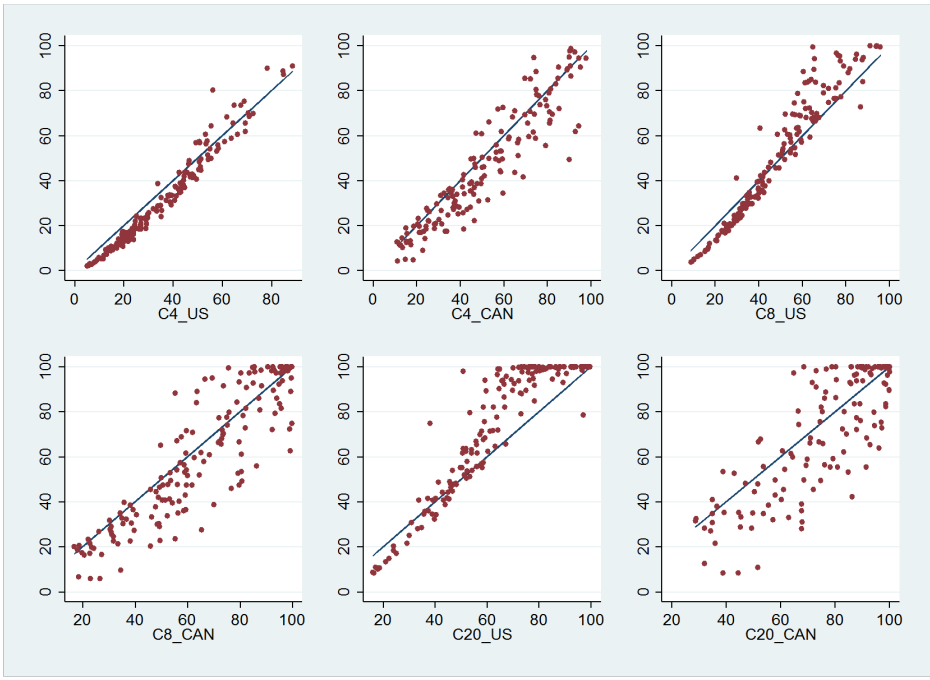
We compute the consumer surplus effects of creating a North-American competition authority separately for each 5-digit industry. The Table reports summary statistics calculated across all industries.

Figure IX.10.1: Weaker Synergies: Theoretical vs. Empirical Moments (targeted moments)



Figures plot theoretical moments (vertical axis) against empirical moments (horizontal axis). Each dot represents a sector. The straight line is the 45-degree line.

Figure IX.10.2: Weaker Synergies: Theoretical vs. Empirical Moments (moments not targeted)



Figures plot theoretical moments (vertical axis) against empirical moments (horizontal axis). Each dot represents a sector. The straight line is the 45-degree line.

Figure IX.10.3: Weaker Synergies: Potential Conflicts Arising from U.S. Mergers

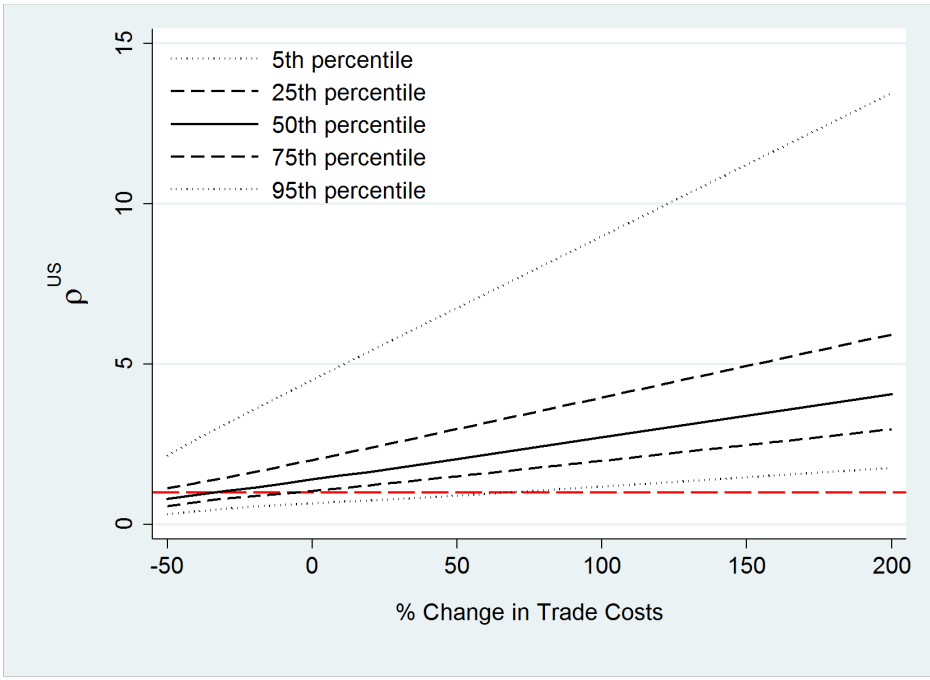


Figure shows percentiles of the distribution of ρ^{US} across sectors for different trade cost changes.

Figure IX.10.4: Weaker Synergies: Potential Conflicts Arising from Canadian Mergers

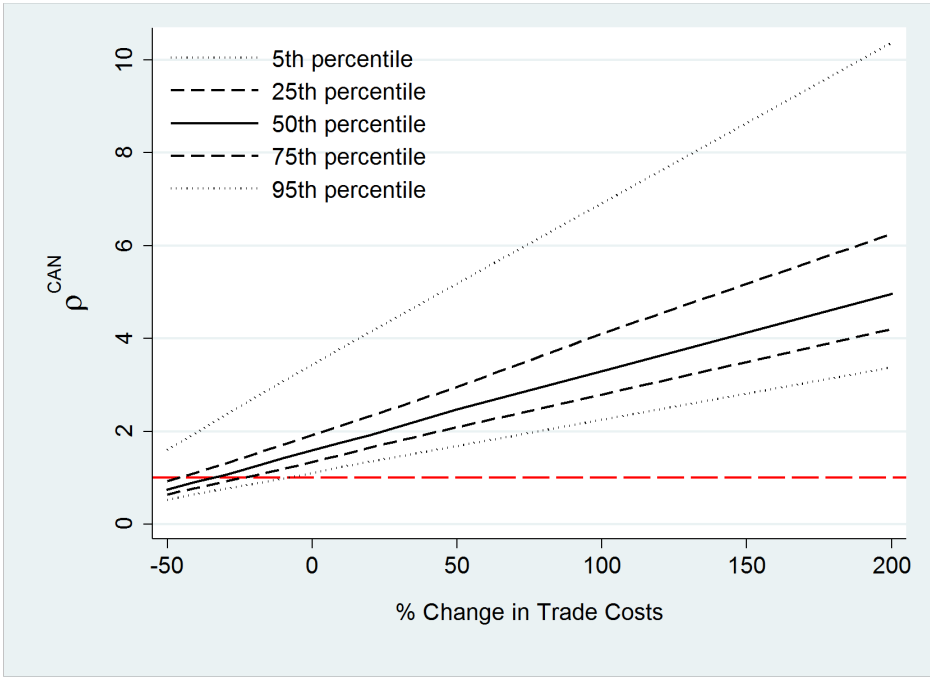


Figure shows percentiles of the distribution of ρ^{CAN} across sectors for different trade cost changes.

Figure IX.10.5: Weaker Synergies: Actual Conflicts, % of all profitable merger opportunities (U.S. mergers)

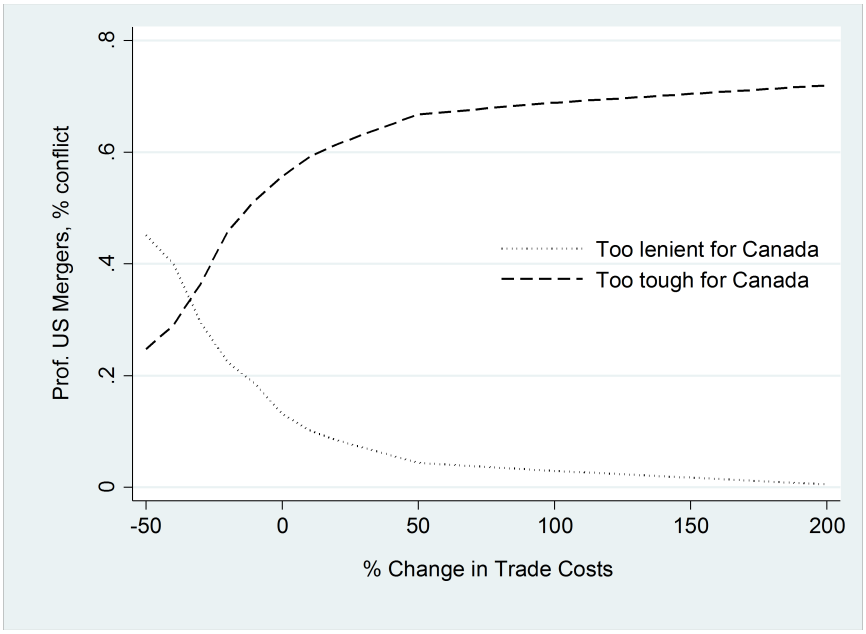


Figure shows means across sectors of the fraction of profitable mergers where a conflict arose. "Too lenient for Canada" means that the U.S. authorized a merger which lowered consumer surplus in Canada; "Too tough for Canada" means that the U.S. blocked a merger which would have increased Canadian consumer surplus. If there are no merger opportunities in a sector, the sector is dropped.

Figure IX.10.6: Weaker Synergies: Actual Conflicts, % of all profitable merger opportunities (Canadian mergers)

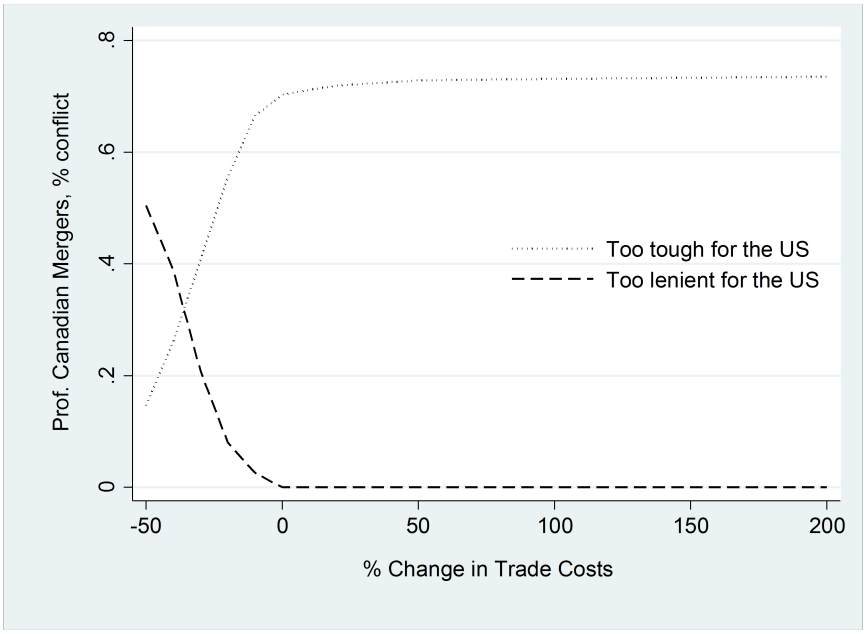


Figure shows means across sectors of the fraction of profitable mergers where a conflict arose. "Too lenient for the U.S." means that Canada authorized a merger which lowered consumer surplus in the U.S.; "Too tough for the U.S." means that Canada blocked a merger which would have increased U.S. consumer surplus. If there are no merger opportunities in a sector, the sector is dropped.

Figure IX.10.7: Weaker Synergies: Consumer surplus change, No-Veto to Veto Case

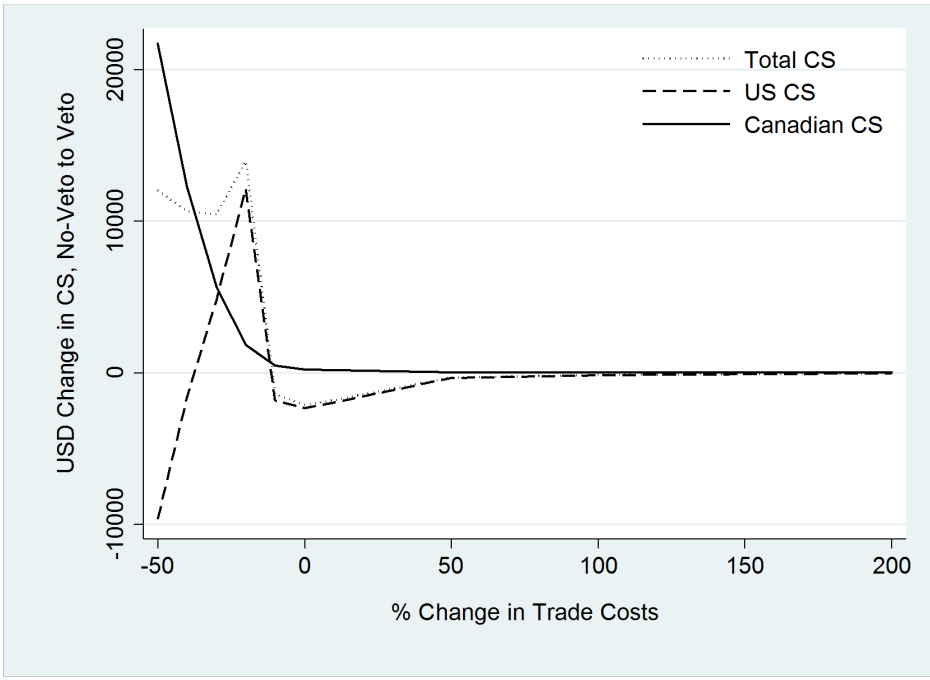


Figure shows the USD change in consumer surplus (in 000s of USD) induced by a move from no-veto rights to veto rights for different levels of trade cost changes.

Figure IX.10.8: Weaker Synergies: Consumer surplus change, No-Veto to North-American Competition Authority

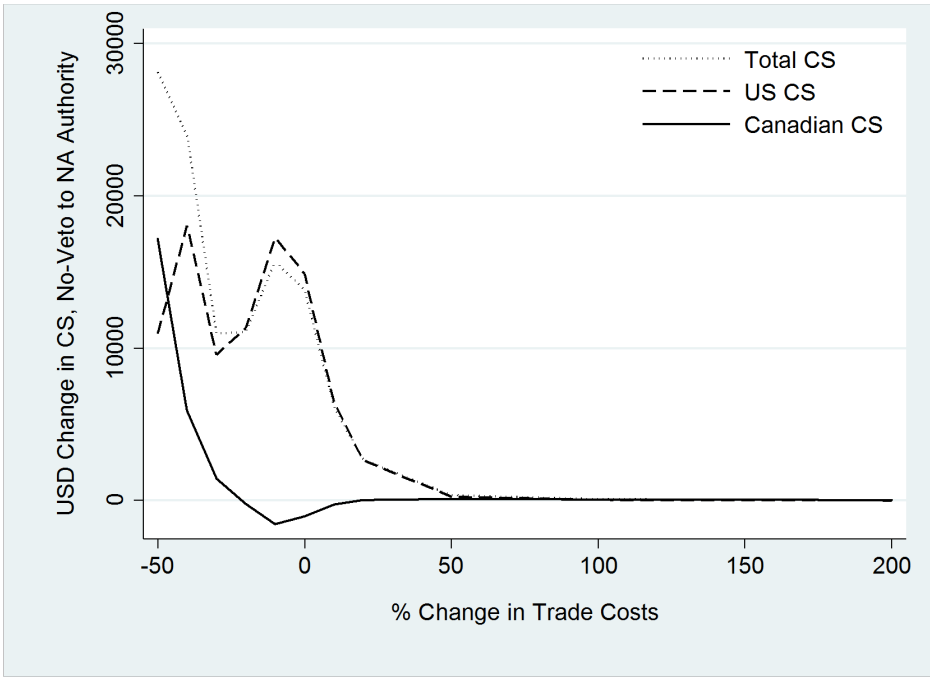


Figure shows the USD change in consumer surplus (in 000s of USD) induced by a move from the no-veto-rights case to a North-American merger authority for different trade cost changes.

IX.11 Cross-Border Mergers

Table IX.11.1: Cross-Border Mergers: Empirical Moments - Summary Statistics

Empirical Moment	Mean	Median	Standard Deviation	P10	P90
#Mergers US	1.75	1.03	2.59	0.1	4.02
#Mergers CAN	0.14	0.05	0.22	0	0.4
#Cross-Border M&As	0.14	0.06	0.22	0	0.31
P^{CAN}/P^{US}	1.07	1.11	0.15	0.86	1.21
Shipments US	20533282	11883048	28863509	3400500	37087500
Shipments CAN	1585925	833611	2584535	181621	3458801
Exports US	504761	179533	1068599	24056	1081069
Exports CAN	764477	183491	2688164	29227	1606087
HHI US	609	419	570	102	1399
HHI CAN	1304	866	1198	205	2959
Total Cost US	15306538	9077127	23418916	2339720	28181255
Total Cost	1783115	822414	3699110	175965	3625594
Observations	153	153	153	153	153

All data are at the 5-digit NAICS level for the year 2002. All value entries (shipments, exports, costs) are in 000s of current USD.

Table IX.11.2: Cross-Border Mergers: Parameter Values - Summary Statistics

A) Parameters from Data	Mean	Median	Standard Deviation	P10	P90
α^{US}	1	1	0	1	1
α^{CAN}	0.750	0.750	0	0.750	0.750
N^{US}	1553.601	654	3189.439	137	3666
N^{CAN}	263.124	126	429.324	27	629
β^{US}	50	50	0	50	50
β^{CAN}	50	50	0	50	50
η^{US}	0.286	0.274	0.1	0.161	0.417
η^{CAN}	0.257	0.258	0.097	0.116	0.374
B) Calibrated Parameters	Mean	Median	Standard Deviation	P10	P90
T^{US}	78.063	8.884	319.432	0.707	88.994
T^{CAN}	12.43	0.697	95.726	0	7.731
T^{Cross}	0.213	0.096	0.513	0	0.485
a^{US}	25	25	0	25	25
a^{CAN}	77.351	23.95	225.761	7.221	144.212
$1/b^{US}$	17861.04	5961.235	46992.39	1142.593	31397.49
$1/b^{CAN}$	5218.449	474.732	30399.07	32.686	6895.149
$\tau^{CAN,US}$	1.759	1.461	1.166	1.142	2.531
$\tau^{US,CAN}$	1.9	1.535	1.358	0.841	3.138
ζ^{US}	5.559	5.032	3.115	2.607	8.4
ζ^{CAN}	1.24E+09	8.299	1.53E+10	4.572	23.472
x^{US}	0.387	0.184	0.659	0.053	0.733
x^{CAN}	0.492	0.257	0.722	0.086	1.155
Observations	153	153	153	153	153

We compute all parameters reported in the Table separately for each 5-digit NAICS industry. The Table reports summary statistics calculated across all industries.

Table IX.11.3: Cross-Border Mergers: Simulated Domestic and Cross-Border Price Effects of Mergers

Price Effect	Mean	Median	Standard Deviation	P10	P90
US merger, US price	-0.11%	-0.06%	0.12%	-0.26%	-0.01%
US merger, CAN price	-0.03%	-0.01%	0.09%	-0.08%	0.01%
CAN merger, CAN price	-0.13%	-0.07%	0.18%	-0.26%	-0.01%
CAN merger, US price	-0.10%	0.00%	0.46%	-0.24%	0.00%

We compute the domestic and cross-border price effects of mergers separately for each 5-digit industry. The Table reports summary statistics calculated across all industries. Industries without merger opportunities are dropped.

Table IX.11.4: Cross-Border Mergers: Synergy Effects

MC Reduction	Mean	Median	Standard Deviation	P10	P90
US mergers	-7.3%	-7.1%	3.0%	-10.3%	-3.6%
Canadian mergers	-11.0%	-6.6%	11.5%	-24.5%	-4.6%

We compute the synergy effects of mergers separately for each 5-digit industry. The Table reports summary statistics calculated across all industries. Industries without merger opportunities are dropped.

Table IX.11.5: Cross-Border Mergers: Introducing Veto Rights

Change in Outcome (000s USD)	Mean	Median	Standard Deviation	P10	P90
Total Consumer Surplus US+Canada	-1465.2	0	8339.8	-1077.6	0
Consumer Surplus US	-1600.8	0	9066.7	-1257.1	0
Consumer Surplus Canada	135.6	0	761.7	0	90.1

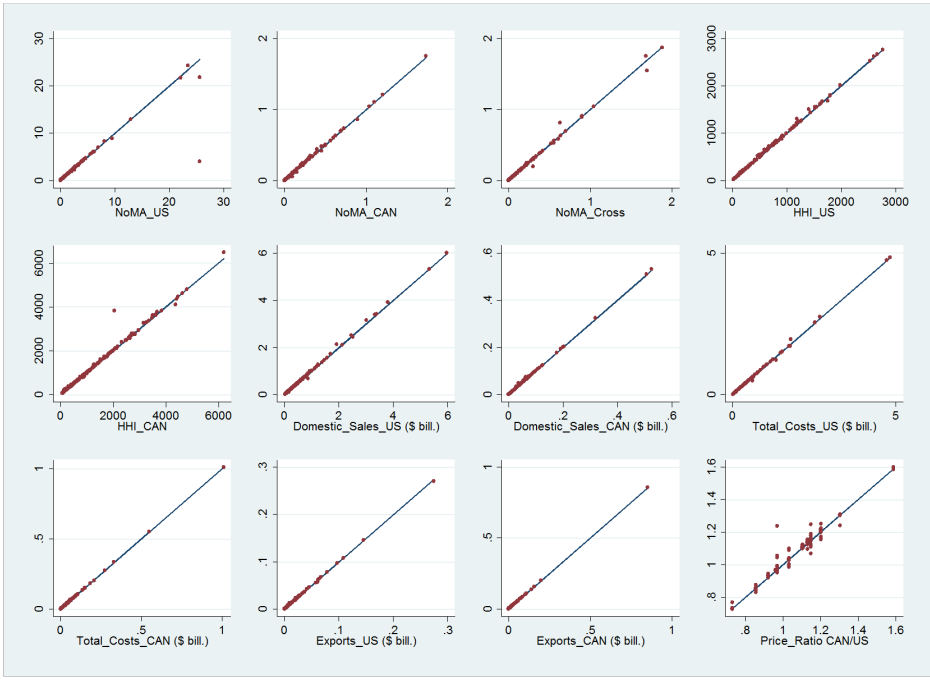
We compute the consumer surplus effects of introducing veto rights separately for each 5-digit industry. The Table reports summary statistics calculated across all industries.

Table IX.11.6: Cross-Border Mergers: North-American Competition Authority

Change in Outcome (000s USD)	Mean	Median	Standard Deviation	P10	P90
Total Consumer Surplus US+Canada	27400.5	22.2	233394.9	0	4660.1
Consumer Surplus US	28442.4	11.2	240510.3	-17.2	3425.9
Consumer Surplus Canada	-1041.9	0.7	8476.8	-104.9	110.6

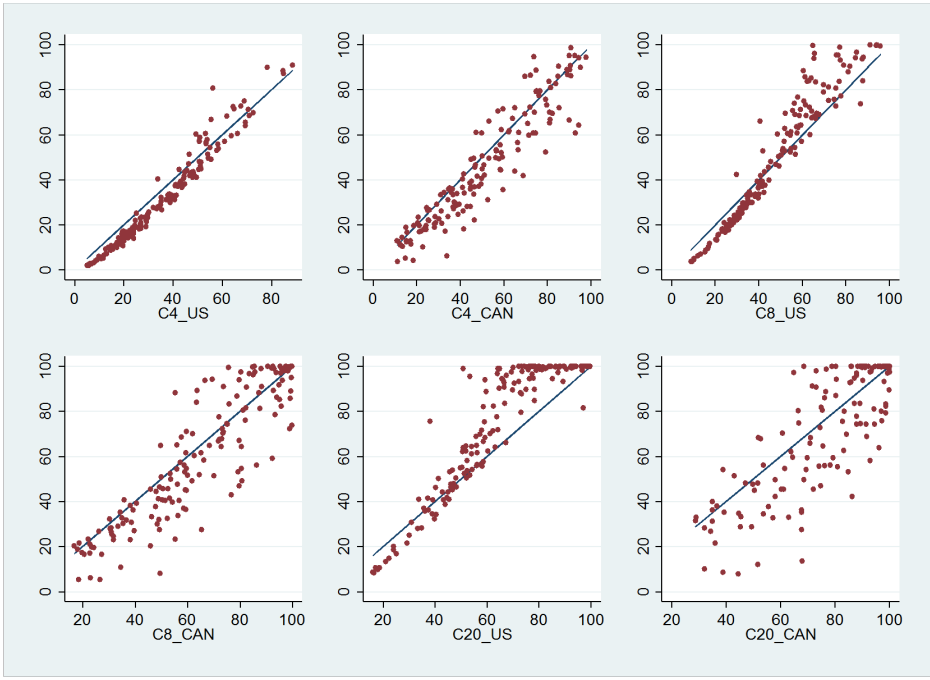
We compute the consumer surplus effects of creating a North-American competition authority separately for each 5-digit industry. The Table reports summary statistics calculated across all industries.

Figure IX.11.1: Cross-Border Mergers: Theoretical vs. Empirical Moments (targeted moments)



Figures plot theoretical moments (vertical axis) against empirical moments (horizontal axis). Each dot represents a sector. The straight line is the 45-degree line.

Figure IX.11.2: Cross-Border Mergers: Theoretical vs. Empirical Moments (moments not targeted)



Figures plot theoretical moments (vertical axis) against empirical moments (horizontal axis). Each dot represents a sector. The straight line is the 45-degree line.

Figure IX.11.3: Cross-Border Mergers: Potential Conflicts Arising from U.S. Mergers

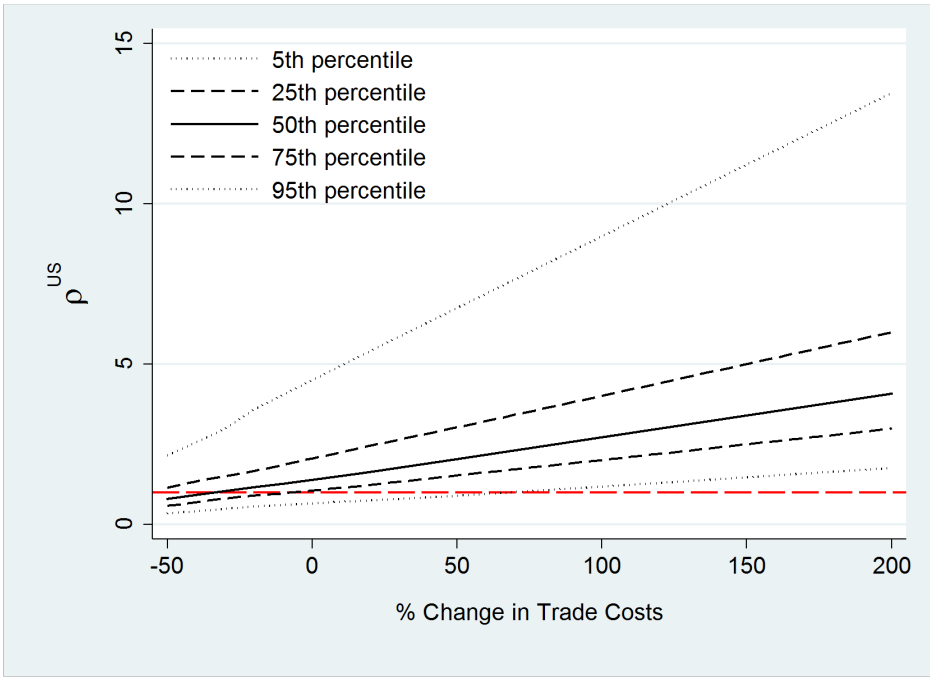


Figure shows percentiles of the distribution of ρ^{US} across sectors for different trade cost changes.

Figure IX.11.4: Cross-Border Mergers: Potential Conflicts Arising from Canadian Mergers

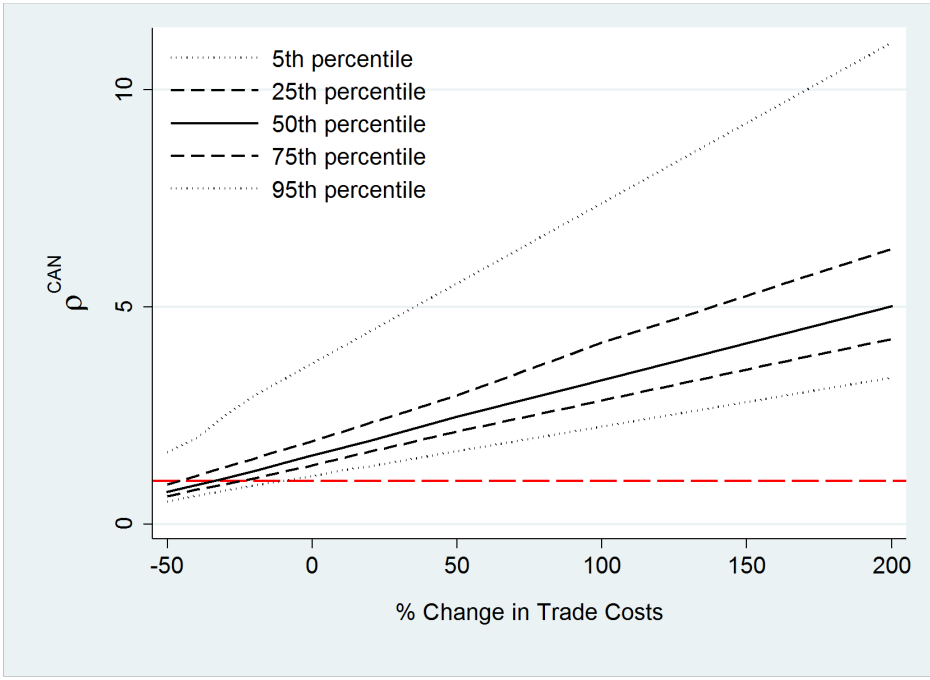


Figure shows percentiles of the distribution of ρ^{CAN} across sectors for different trade cost changes.

Figure IX.11.5: Cross-Border Mergers: Actual Conflicts, % of all profitable merger opportunities (U.S. mergers)

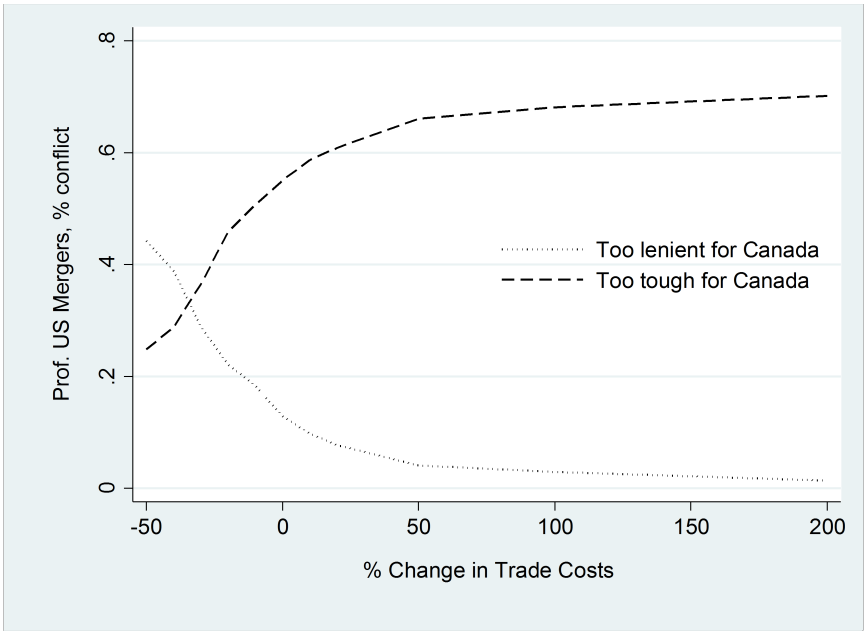


Figure shows means across sectors of the fraction of profitable mergers where a conflict arose. "Too lenient for Canada" means that the U.S. authorized a merger which lowered consumer surplus in Canada; "Too tough for Canada" means that the U.S. blocked a merger which would have increased Canadian consumer surplus. If there are no merger opportunities in a sector, the sector is dropped.

Figure IX.11.6: Cross-Border Mergers: Actual Conflicts, % of all profitable merger opportunities (Canadian mergers)

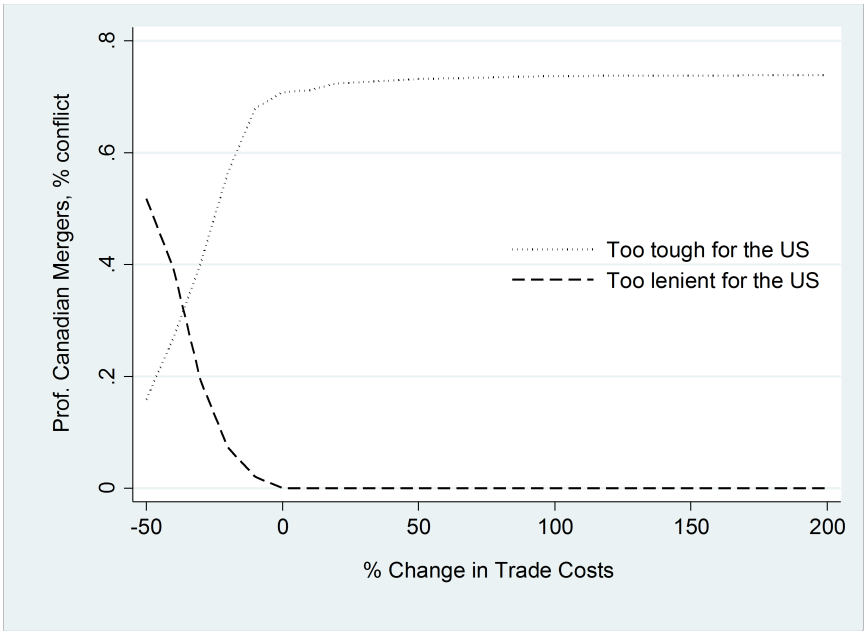


Figure shows means across sectors of the fraction of profitable mergers where a conflict arose. "Too lenient for the U.S." means that Canada authorized a merger which lowered consumer surplus in the U.S.; "Too tough for the U.S." means that Canada blocked a merger which would have increased U.S. consumer surplus. If there are no merger opportunities in a sector, the sector is dropped.

Figure IX.11.7: Cross-Border Mergers: Consumer surplus change, No-Veto to Veto Case

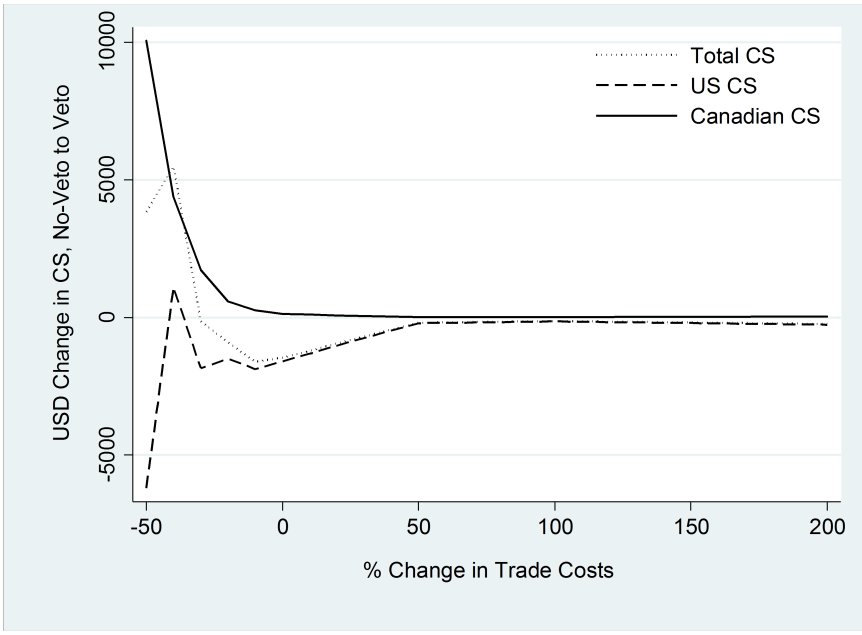


Figure shows the USD change in consumer surplus (in 000s of USD) induced by a move from no-veto rights to veto rights for different levels of trade cost changes.

Figure IX.11.8: Cross-Border Mergers: Consumer surplus change, No-Veto to North-American Competition Authority

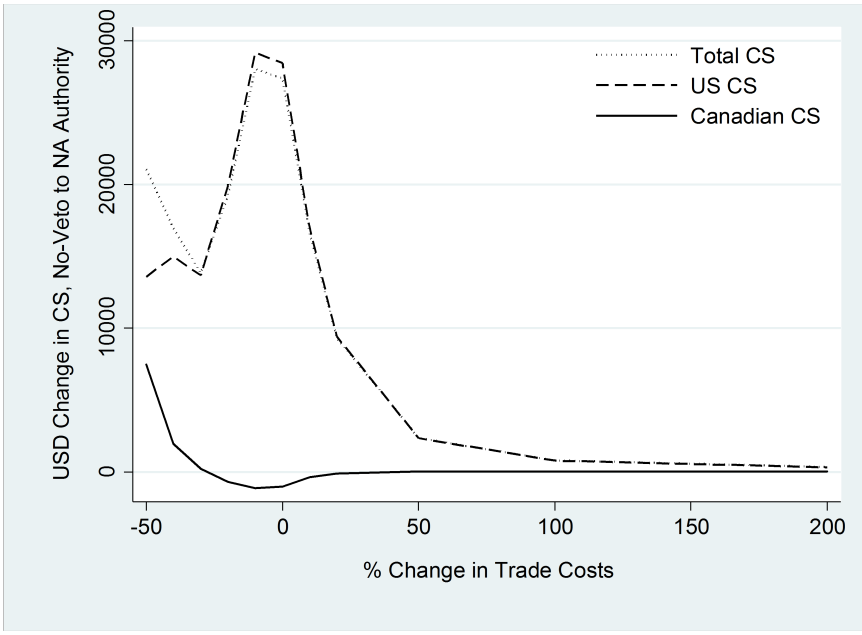


Figure shows the USD change in consumer surplus (in 000s of USD) induced by a move from the no-veto-rights case to a North-American merger authority for different trade cost changes.

IX.12 Veto-Rights Baseline

Table IX.12.1: Veto-Rights Baseline: Empirical Moments - Summary Statistics

Empirical Moment	Mean	Median	Standard Deviation	P10	P90
# Mergers US	1.89	1.03	3.2	0.1	4.04
# Mergers CAN	0.15	0.05	0.23	0	0.46
P^{CAN}/P^{US}	1.07	1.11	0.15	0.86	1.21
Shipments US	20921043	11860888	29498736	3400500	40930747
Shipments CAN	1580794	853768	2562833	174308	3458801
Exports US	503568	186527	1064930	24056	1081069
Exports CAN	756150	176937	2665055	29227	1724507
HHI US	609	431	565	109	1399
HHI CAN	1306	882	1188	205	2959
Total Cost US	15491387	8849658	23556546	2339720	28982876
Total Cost CAN	1775447	817627	3670628	174584	3676058
Observations	156	156	156	156	156

All data are at the 5-digit NAICS level for the year 2002. All value entries (shipments, exports, costs) are in 000s of current USD.

Table IX.12.2: Veto-Rights Baseline: Parameter Values - Summary Statistics

A) Parameters from Data	Mean	Median	Standard Deviation	P10	P90
α^{US}	1	1	0	1	1
α^{CAN}	0.750	0.750	0	0.750	0.750
N^{US}	1574.006	655	3173.156	131	3670
N^{CAN}	263.686	126.5	425.8	27	629
β^{US}	50	50	0	50	50
β^{CAN}	50	50	0	50	50
η^{US}	0.286	0.274	0.099	0.161	0.417
η^{CAN}	0.258	0.258	0.096	0.116	0.378
B) Calibrated Parameters	Mean	Median	Standard Deviation	P10	P90
T^{US}	78.424	13.05	284.262	1.35	96.4
T^{CAN}	4.763	0.59	25.122	0	6.8
a^{US}	25	25	0	25	25
a^{CAN}	65.018	23.25	118.738	6.94	145
$1/b^{US}$	17509.88	6205	46192.72	1150	31400
$1/b^{CAN}$	5080.737	496.5	29392.25	23.9	7140
$\tau^{CAN,US}$	1.758	1.445	1.158	1.14	2.6
$\tau^{US,CAN}$	1.86	1.515	1.299	0.843	3.07
ζ^{US}	5.603	5.115	3.06	2.59	8.47
ζ^{CAN}	11.806	8.265	10.784	4.54	24.2
x^{US}	0.381	0.178	0.644	0.052	0.651
x^{CAN}	0.48	0.267	0.707	0.087	1.08
Observations	156	156	156	156	156

We compute all parameters reported in the Table separately for each 5-digit NAICS industry. The Table reports summary statistics calculated across all industries.

Table IX.12.3: Veto-Rights Baseline: Domestic and Cross-Border Price Effects of Mergers

Price Effect	Mean	Median	Standard Deviation	P10	P90
US merger, US price	-0.13%	-0.07%	0.14%	-0.29%	-0.01%
US merger, CAN price	-0.04%	-0.02%	0.08%	-0.10%	0.00%
CAN merger, CAN price	-0.14%	-0.07%	0.18%	-0.32%	-0.01%
CAN merger, US price	-0.08%	-0.01%	0.21%	-0.28%	0.00%

We compute the domestic and cross-border price effects of mergers separately for each 5-digit industry. The Table reports summary statistics calculated across all industries. Industries without merger opportunities are dropped.

Table IX.12.4: Veto-Rights Baseline: Synergy Effects

MC Reduction	Mean	Median	Standard Deviation	P10	P90
US mergers	-7.9%	-7.3%	2.2%	-10.0%	-6.2%
Canadian mergers	-11.0%	-7.3%	9.3%	-24.0%	-5.7%

We compute the synergy effects of mergers separately for each 5-digit industry. The Table reports summary statistics calculated across all industries. Industries without merger opportunities are dropped.

Table IX.12.5: Veto-Rights Baseline: Removing Veto Rights

Change in Outcome (000s USD)	Mean	Median	Standard Deviation	P10	P90
Total Consumer Surplus US+Canada	5271.9	0	30001.9	0	3839.8
Consumer Surplus US	5937.8	0	34029.3	0	3979
Consumer Surplus Canada	-665.9	0	4049.6	-319.7	0

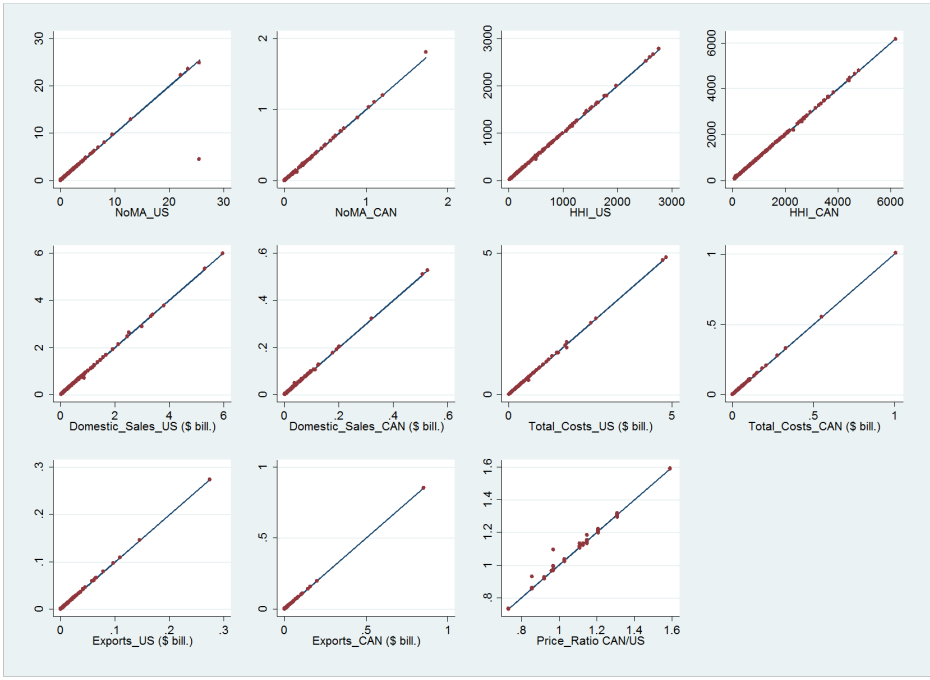
We compute the consumer surplus effects of removing veto rights separately for each 5-digit industry. The Table reports summary statistics calculated across all industries.

Table IX.12.6: Veto-Rights Baseline: North-American Competition Authority

Change in Outcome (000s USD)	Mean	Median	Standard Deviation	P10	P90
Total Consumer Surplus US+Canada	11905.7	24.5	51335.4	0	10463.4
Consumer Surplus US	12976.1	3.9	57348.6	-20.8	10787.8
Consumer Surplus Canada	-1070.5	0	6546.3	-533.7	114.4

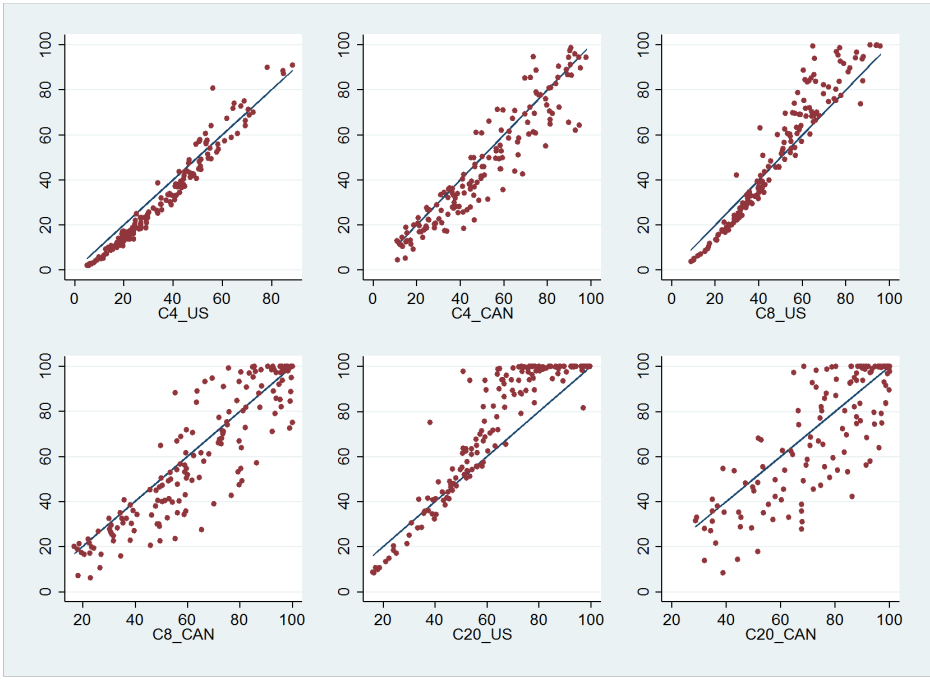
We compute the consumer surplus effects of creating a North-American competition authority separately for each 5-digit industry. The Table reports summary statistics calculated across all industries.

Figure IX.12.1: Veto-Rights Baseline: Theoretical vs. Empirical Moments (targeted moments)



Figures plot theoretical moments (vertical axis) against empirical moments (horizontal axis). Each dot represents a sector. The straight line is the 45-degree line.

Figure IX.12.2: Veto-Rights Baseline: Theoretical vs. Empirical Moments (moments not targeted)



Figures plot theoretical moments (vertical axis) against empirical moments (horizontal axis). Each dot represents a sector. The straight line is the 45-degree line.

Figure IX.12.3: Veto-Rights Baseline: Potential Conflicts Arising from U.S. Mergers

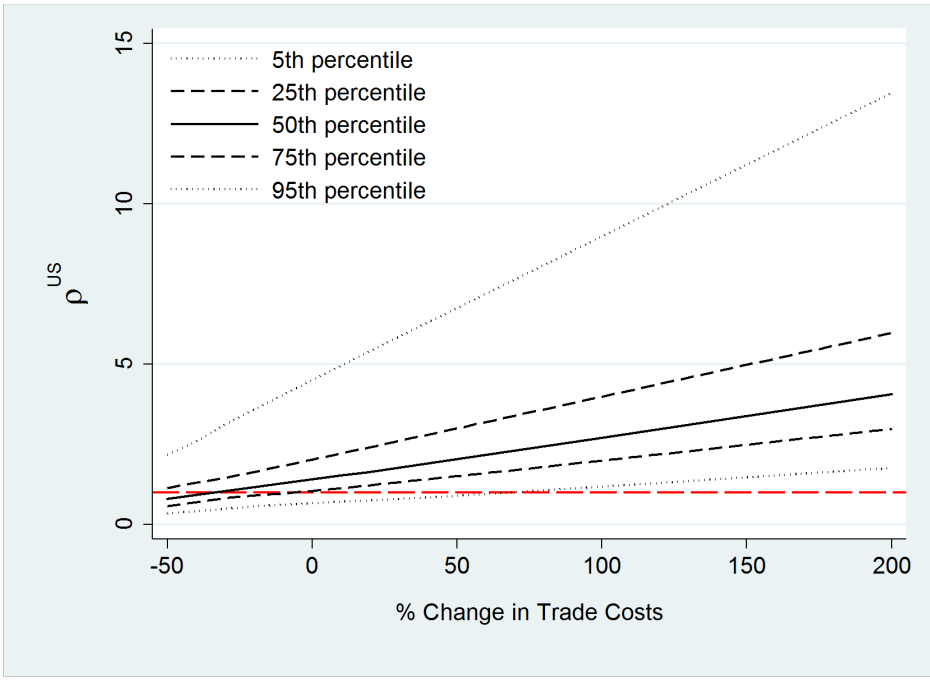


Figure shows percentiles of the distribution of ρ^{US} across sectors for different trade cost changes.

Figure IX.12.4: Veto-Rights Baseline: Potential Conflicts Arising from Canadian Mergers

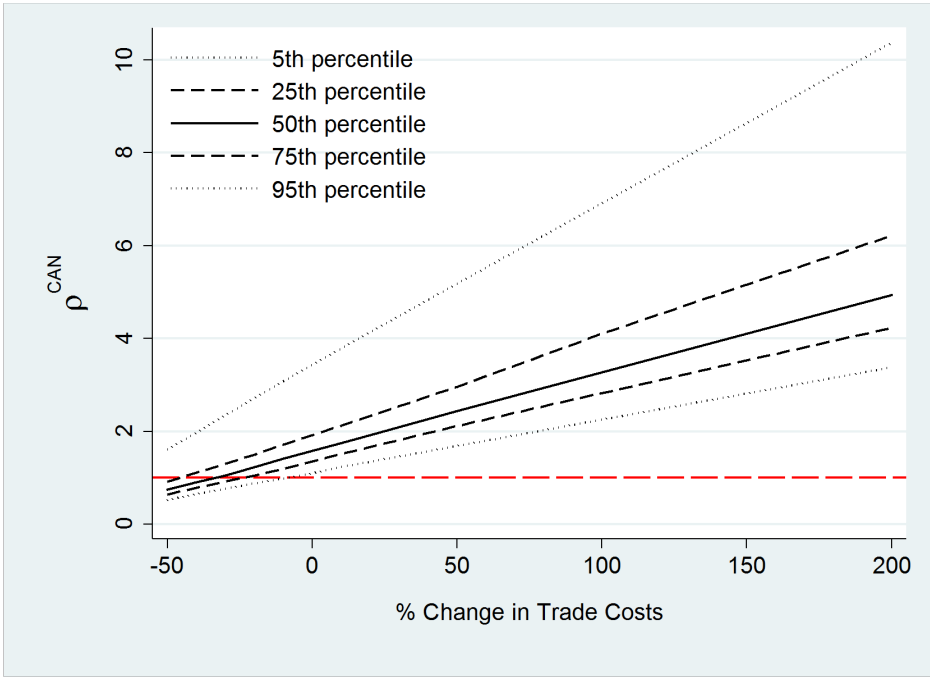


Figure shows percentiles of the distribution of ρ^{CAN} across sectors for different trade cost changes.

Figure IX.12.5: Veto-Rights Baseline: Actual Conflicts, % of all profitable merger opportunities (U.S. mergers)

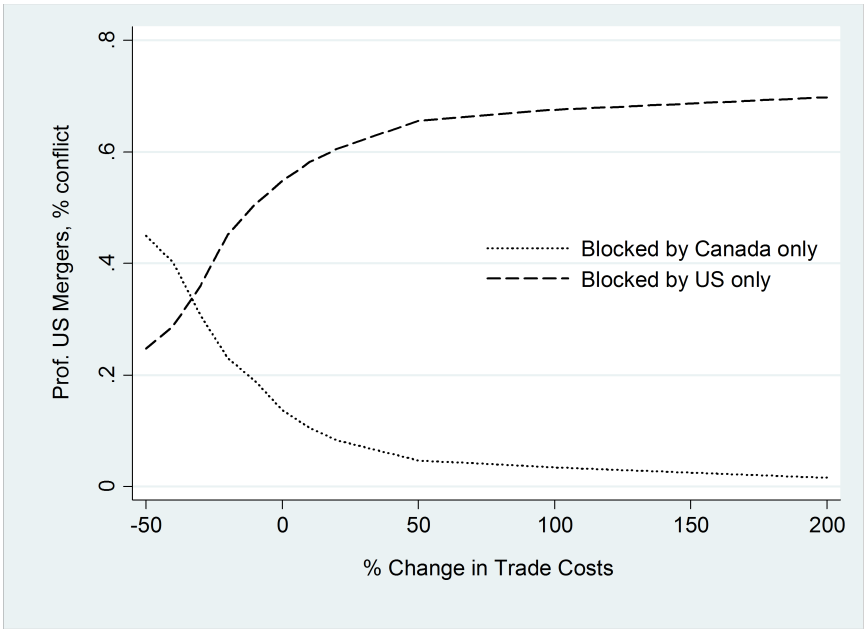


Figure shows means across sectors of the fraction of profitable mergers where a conflict arose. "Too lenient for Canada" means that the U.S. authorized a merger which lowered consumer surplus in Canada; "Too tough for Canada" means that the U.S. blocked a merger which would have increased Canadian consumer surplus. If there are no merger opportunities in a sector, the sector is dropped.

Figure IX.12.6: Veto-Rights Baseline: Actual Conflicts, % of all profitable merger opportunities (Canadian mergers)

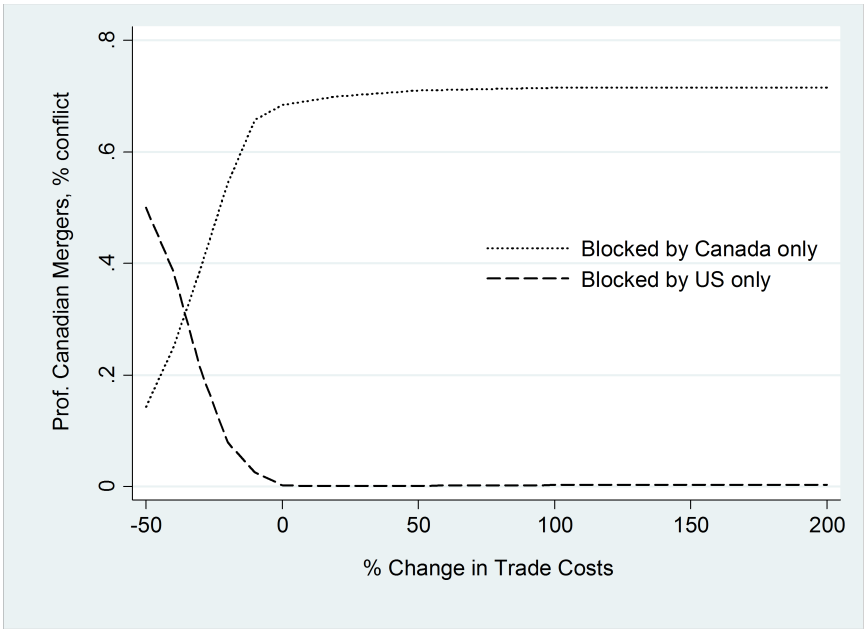


Figure shows means across sectors of the fraction of profitable mergers where a conflict arose. "Too lenient for the U.S." means that Canada authorized a merger which lowered consumer surplus in the U.S.; "Too tough for the U.S." means that Canada blocked a merger which would have increased U.S. consumer surplus. If there are no merger opportunities in a sector, the sector is dropped.

Figure IX.12.7: Veto-Rights Baseline: Consumer surplus change, Veto to No-Veto Case

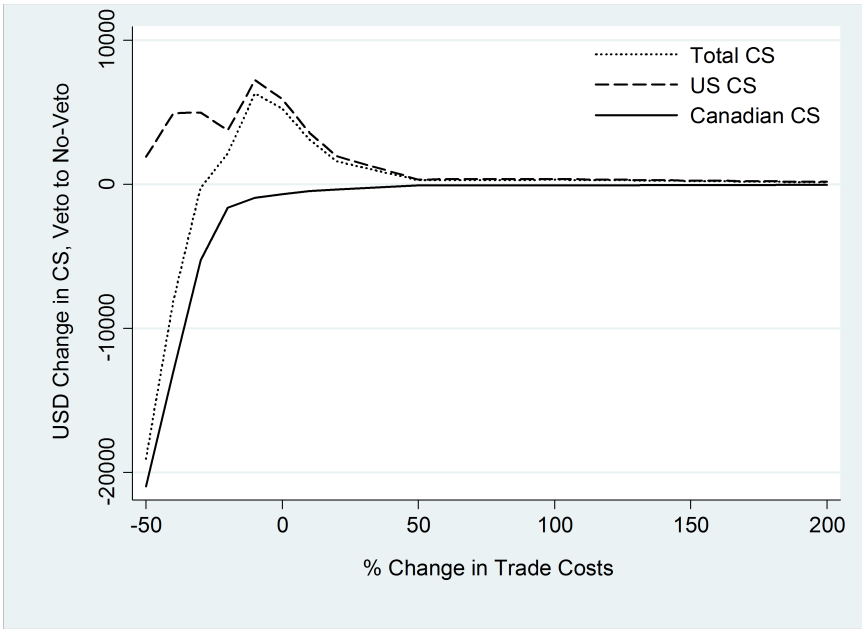


Figure shows the USD change in consumer surplus (in 000s of USD) induced by a move from veto rights to no-veto rights for different levels of trade cost changes.

Figure IX.12.8: Veto-Rights Baseline: Consumer surplus change, Veto to North-American Competition Authority

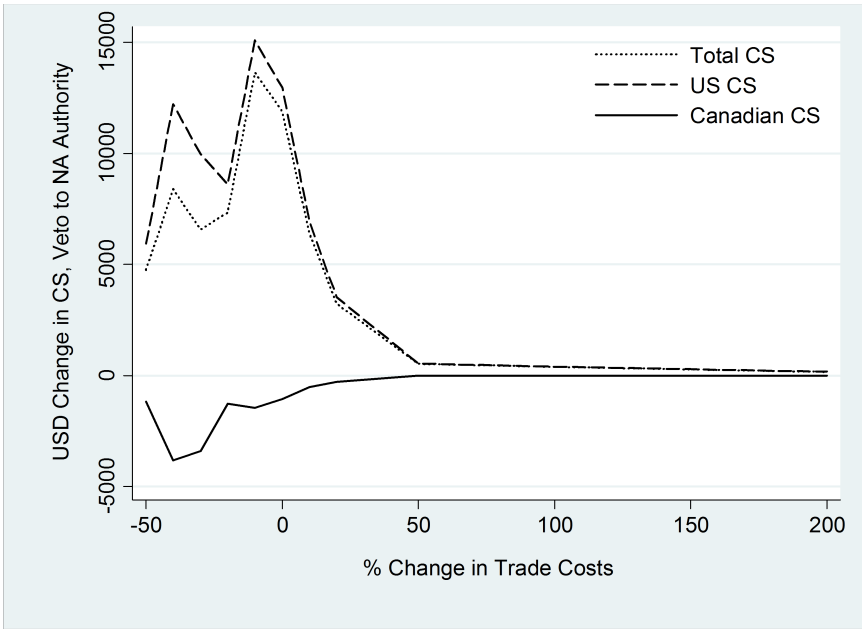


Figure shows the USD change in consumer surplus (in 000s of USD) induced by a move from the veto-rights case to a North-American merger authority for different trade cost changes.

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