

# Merger Policy in a Quantitative Model of International Trade

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- The economic activity of many firms (exporters, importers, multinationals) increasingly extends beyond national borders.
- This implies that merger approval decisions of national competition authorities have important effects on other jurisdictions.
- National antitrust authorities consider only the effects of a merger on domestic (consumer) welfare.
- When evaluating a merger, an authority trades off the *market power effect* and the *efficiency effect*. For the same merger, the sign of the net effect may be different in different countries.
- But in contrast to international trade and monetary policy, no global organization exists to coordinate merger policy.

## Research questions:

- What are the determinants of potential conflicts between national antitrust authorities? Are these conflicts likely to become larger as trade costs fall?
- How important are any potential conflicts/externalities quantitatively?
- What conclusions can we draw for the coordination of national merger and trade policies?

- This paper: provides a (quantitative) framework to answer these and related questions.
- Develop a two-country model with the following features:
  - Heterogeneous firms
  - Trade Frictions
  - Strategic interaction between firms (here: Cournot)
  - Endogenous merger formation
  - Explicit modeling of competition authorities' objective functions
- Calibrate this model to match key features of U.S. and Canadian data at the industry level (160 manufacturing sectors in 2002).
- Use the model for counterfactual analysis (veto rights, North-American merger authority, interaction with trade costs).

For general demand and cost structures we show:

- The nature of the potential conflict depends on whether the home or the foreign market is more competitive, adjusting for trade costs.
- In general, there will always be conflict.
- If countries do not have veto rights, a country's policy regarding its own mergers will be either too tough or too lenient for the other country.

- Domestic policy is too tough in the vast majority of sectors:
  - Particularly true for domestic Canadian mergers.
  - Slightly less so for U.S. mergers: significant minority of sectors in which U.S. policy is too lenient.
- Introducing veto rights has only minor effects:
  - No change in U.S. consumer surplus following introduction of U.S. veto.
  - Canadian veto slightly increases Canadian consumer surplus at the cost of lower U.S. consumer surplus (overall losses).
- A North-American antitrust authority would lead to large increases in North-American consumer surplus, but at the detriment of Canadian consumers.

- Changes in trade costs have subtle effects on the scope for conflict and the gains from coordination.
- Higher trade costs (moving towards autarky): less conflict as smaller price externalities.
- Lower trade costs:
  - Conflicts arising from too lenient policies become much more frequent.
  - Increase the value of veto rights, especially for the smaller country (Canada).
  - Focus of the North-American competition authority shifts towards preventing too lenient policies. This helps Canada and makes cooperation more feasible.

- Conflicts between merger authorities can be expected to be frequent.
- They will mostly be “hidden”: the dominant type of conflict at present levels of trade costs is that there are too few foreign mergers.
- Veto rights are thus inefficient tools for addressing present conflicts.
- Supranational merger authorities work better but are unlikely to be acceptable to smaller, less competitive countries.
- Falling trade costs make veto rights much more important but may also facilitate cooperation.



- Optimal design of (closed-economy) merger policy: Williamson (1968), Farrell and Shapiro (1990), Nocke and Whinston (2010, 2013).
- Merger incentives & endogenous merger formation: Salant, Switzer and Reynold (1983), Perry and Porter (1985), Deneckere and Davidson (1985); Kamien and Zang (1990), Pesendorfer (2005).
- Merger simulations (for closed economies): Nevo (2000).
- Competition policy in open economies: Head and Ries (1997), Horn and Levinsohn (2001).
- International trade literature on strategic trade policy: Brander and Spencer (1984); Brander (1995).
- International trade literature on causes and consequences of domestic and cross-border M&As: Neary (2007), Nocke and Yeaple (2007, 2008), di Giovanni (2005), Breinlich (2008).

# The Cournot Model

- There are two countries ( $i = 1, 2$ ),  $S$  manufacturing sectors and an outside sector.
- In country  $i$ , the representative consumer's utility function is given by:

$$U_i(Q_0^i, \mathbf{Q}^i) = Q_0^i + \sum_{s=1}^S u_s^i(Q_s^i),$$

- $Q_s^i \equiv Q_s^{i,i} + Q_s^{i,j}$  is consumption in sector  $s$  and country  $i$ ;  $Q_s^{i,k}$  is consumption in country  $i$  of goods produced in country  $k$ ;  $P_s^i$  is the price of sector  $s$  good in country  $i$ .
- The consumer's budget constraint is:

$$P_0^i Q_0^i + \sum_{s=1}^S P_s^i Q_s^i \leq w^i L^i + \text{Profits}^i.$$

# The Cournot Model

- These preferences generate the following inverse demand functions for sector  $s$ 's product in country  $i$ :

$$P_s^i(Q_s^i) = \max \{ u_s^{i'}(Q_s^i), 0 \}$$

- Outside good:
  - Perfect competition, freely traded internationally.
  - CRS technology using only labour (one unit of labour  $\rightarrow \alpha^i$  units of output).
  - Chosen as the numéraire.
  - Assume parameters are such that it is produced and consumed in both countries.
  - This pins down wages at  $w^i = \alpha^i$ .

## Manufacturing sectors:

- CRS technology combining the outside good (= intermediate input) and labor. We will be more specific about this technology later on.
- $N_s^i$  potentially active manufacturing firms in each country/sector.
- $c_{k,s}$ : marginal cost of firm  $k$  in sector  $s$ .
- $\tau_s^{ij}$ : iceberg-type trade cost from country  $i$  to country  $j$  in sector  $s$ , with  $\tau_s^{ij} = 1$  if  $i = j$ .
- Firms compete à la Cournot in each manufacturing market.

# Some Theoretical Results

- (Make the usual assumptions for the Cournot game)
- Consider merger  $M = \{k, l\}$  between firms  $k$  and  $l$ , producing in sector  $s$  and country 1. Assume these firms are active before the merger. Drop sector index  $s$  from now on.
- Let  $\bar{c}_M$  be the post-merger marginal cost of the merged firm.
- Let  $P^{1*}$  and  $P^{2*}$  be the pre-merger equilibrium Cournot prices in countries 1 and 2.
- Let  $\Delta CS^i(M)$  denote the change in consumer surplus induced by merger  $M$  in country  $i$ .
- We say that the merger is *CS-neutral* in country  $i$  if  $\Delta CS^i(M) = 0$ , *CS-decreasing* if  $\Delta CS^i(M) < 0$ , and *CS-increasing* if  $\Delta CS^i(M) > 0$ .

# Some Theoretical Results

- Define:

- $\hat{c}_M^1 = c_k + c_l - P^{1*}$
- $\hat{c}_M^2 = c_k + c_l - P^{2*} / \tau^{12}$

- Proposition: Merger  $M$  is ...

- CS-neutral in country  $i$  if  $\bar{c}_M = \hat{c}_M^i$ ,
- CS-increasing in country  $i$  if  $\bar{c}_M < \hat{c}_M^i$ ,
- CS-decreasing in country  $i$  if  $\bar{c}_M > \hat{c}_M^i$ ,

- Merger  $M$  is more likely to be CS-increasing in country  $i$  when  $P^{i*}$  is lower, adjusting for trade costs. Intuition:

- Efficiency effect vs market power effect.
- Market power effect lower when  $P^{i*}$  lower.
- If  $\tau^{12} > 1$ , exporters have less market power abroad.

# Some Theoretical Results

- Assume that the competition authority in country  $i$  aims at maximizing  $CS^i$ . Consumer Surplus Standard
- Two polar assumptions regarding the scope of national merger policies:
  - *Veto rights*: countries can block any merger that significantly affects the domestic market, independently of whether the merger involves domestic or foreign firms. (This is the current legal standard in most countries.) Effects doctrine
  - *No veto rights*: only the home country has jurisdiction over domestic mergers. (Relevant for countries which may have *de jure* but not *de facto* veto rights over foreign mergers.)
- Focus on no-veto rights case in the following. (See paper for veto-rights case.)

# Some Theoretical Results

- In the no-veto case, for mergers in country 1 two types of conflicts can arise:
  - ①  $\hat{c}_M^1 > \hat{c}_M^2$ : merger control in country 1 is too lenient for country 2.
  - ②  $\hat{c}_M^1 < \hat{c}_M^2$ : merger control in country 1 is too tough for country 2.
- In general,  $\hat{c}_M^1 \neq \hat{c}_M^2$ , so there is always one type of potential conflict.
- Let  $\rho^i = \tau^{ij} \frac{P^{i*}}{P^{j*}}$ .
- We show that  $\rho^i$  is a sufficient statistic for conflict: Merger control in country  $i$  is too lenient (resp. too tough) for country  $j$  iff  $\rho^i < 1$  (resp.  $\rho^i > 1$ ).



- We now put more structure on preferences and technologies and calibrate our model to ...
  - ... determine what kind of conflict is more likely to arise.
  - ... quantify the extent of the conflict.
- Preferences: assume sub-utilities are quadratic, so

$$P_s^i(Q_s^i) = a_s^i - b_s^i \times (Q_s^i)$$

- Technologies: the production function of firm  $k$  is

$$q_k = \frac{1}{(\eta_s^i)^{\eta_s^i} (1 - \eta_s^i)^{1 - \eta_s^i}} z_k l_k^{\eta_s^i} q_{0,k}^{1 - \eta_s^i},$$

where:

- $l_k$  is labour input
- $q_{0,k}$  is outside good input (= intermediate consumption)
- $\eta_s^i$  is the labour input share and  $z_k$  is the productivity of firm  $k$

# Operationalization: Preferences and Technologies

- We start out with  $N_s^i$  firms in country  $i$ .
- Firms' productivity levels ( $z$ ) are drawn from (sector-specific) Pareto distributions with shape parameters  $\zeta_{is}$  and cutoffs  $x_{is}$ .
- Marginal costs are thus

$$c = \frac{1}{z} (w^i)^{\eta_i^s} (P_0^i)^{(1-\eta_i^s)} = \frac{1}{z} (\alpha^i)^{\eta_i^s}.$$

- Synergies: if firm  $k$  merges with firm  $l$ , then the productivity of the merged firm  $M$  is

$$\bar{z}_M = \left( z_k^\delta + z_l^\delta \right)^{1/\delta}.$$

- We can think of  $\delta$  as a synergy parameter ( $\delta \rightarrow \infty$ : no synergies). Assume synergies are random and merger-specific:

$$\delta_{kl} \sim \ln N \left( \ln \left( \beta_s^i \right) - \frac{1}{2}, 1 \right).$$

- The merger game is modeled as a dynamic random matching game with  $1 + T_s^1 + T_s^2$  periods in each sector  $s$ .  $T_s^1$  and  $T_s^2$  are parameters to be estimated.
- Out of the last  $T_s^1 + T_s^2$  periods, we randomly and uniformly draw  $T^i$  periods in which firms from country  $i$  get merger opportunities.
- We think of  $T_s^1$  and  $T_s^2$  as parameters capturing frictions in the market for firms' ownership.

# Operationalization: Merger Process

- Consider period  $t \in \{1, \dots, T_s^1 + T_s^2\}$  in which country  $i$  receives a merger opportunity. The timing within the period is as follows:
  - 1 Nature randomly draws two firms from country  $i$ : the acquirer and the target. Nature also draws a synergy parameter  $\delta$  for this merger.
  - 2 The acquirer can make a take-it-or-leave-it offer to the target. The target can accept or reject this offer.
  - 3 If a merger is proposed, then the domestic merger authority decides whether to clear it.
  - 4 Firms decide whether to stay in the industry. Exiting firms receive a positive but arbitrarily small scrap value.
  - 5 Firms compete in quantities in both manufacturing markets.
- In Period 0, no country receives merger opportunities.

# Operationalization: Merger Process

- Assume that all players have discount factors equal to zero. This implies:
  - Firms that would be inactive in the current period on a stand-alone basis leave the market.
  - Merger partners evaluate the profitability of their merger given current market structure.
  - Competition authorities follow a simple rule: block the merger if and only if it decreases domestic consumer surplus, given current market structure. (Later, we look at alternative merger policies.)
- Then this game has a unique subgame-perfect equilibrium.
- We compute our theoretical moments at the end of the  $1 + T_s^1 + T_s^2$  periods.

- Choose model parameters to match industry-level data for U.S. and Canadian manufacturing (5-digit NAICS: 160 sectors, year 2002).
- We choose parameters to match the following empirical moments:
  - Industry-level sales, costs, and production-based HHIs. [Source: U.S. Census Bureau, Statistics Canada]
  - Industry-level import values for trade between the U.S. and Canada. [Source: NBER; Pierce and Schott, 2009]
  - Relative industry-level output prices computed from PPP data from the 2005 International Comparison Program. [Source: Inklaar and Timmer, 2012]
  - Industry-level annual average number of mergers over 1993-2002. [Source: Thomson SDC Platinum]

- Model parameters to be estimated separately for each sector:
  - Vertical intercepts and slopes of inverse demand:  $a^{CAN}$ ,  $b^{US}$ ,  $b^{CAN}$ . We normalise  $a^{US} = 25$ .
  - Parameters of the productivity distribution (assumed to be Pareto): shape parameters  $\zeta^{US}$  and  $\zeta^{CAN}$ , cutoffs  $x^{US}$  and  $x^{CAN}$ .
  - Trade costs:  $\tau^{US-CAN}$ ,  $\tau^{CAN-US}$
  - Number of periods of the merger process:  $T^{US}$ ,  $T^{CAN}$ . (We do not restrict the  $T^i$ 's to be integers.)



- Parameters which we take directly from the data:
  - Labor productivity in the outside sector:  $\alpha^{US} = 1$ ,  $\alpha^{CAN} = 0.75$  (ratio of Canadian to US wage rate).
  - $\eta_s^i$ : labor share in total costs.
  - Initial number of potentially active firms:  $N^{US}$ ,  $N^{CAN}$
- Parameters which we do not estimate:
  - Strength of synergies: set  $\beta_s^{US} = \beta_s^{CAN} = 50$  so that merger-specific synergies are distributed as  $\delta_{kl} \sim \ln N \left( \ln(50) - \frac{1}{2}, 1 \right)$ .
  - Check plausibility of implied marginal costs reductions later on.

Details about the calibration procedure (done separately for each sector):

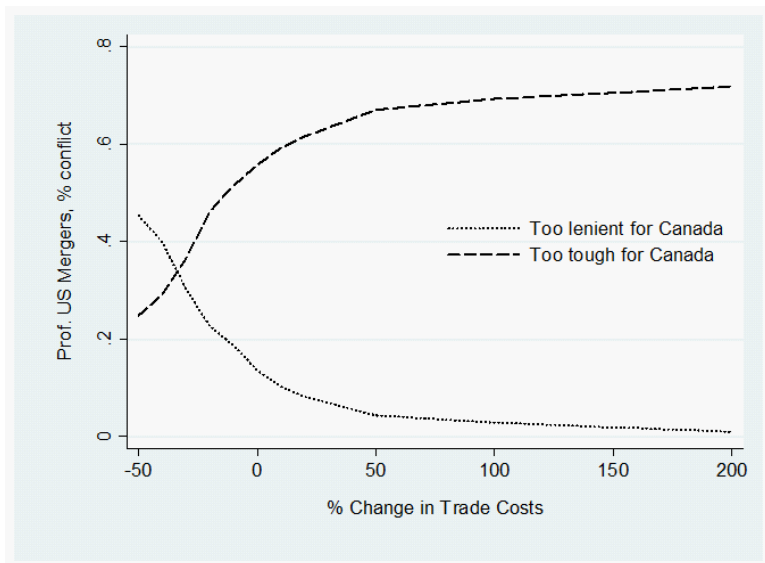
- Start with initial guess of parameter values  $\Gamma = \{a^{CAN}, b^{US}, b^{CAN}, \zeta^{US}, \zeta^{CAN}, x^{US}, x^{CAN}, \tau^{UC}, \tau^{CU}, T^{US}, T^{CAN}\}$ .
- Draw 1,000 realizations of productivity vectors, synergies and merger opportunities.
- For each realization, play the merger game and compute theoretical moments at the final equilibrium.
- Take arithmetic averages across realizations for each theoretical moment.
- Compute deviations between theoretical and empirical moments.
- Vary  $\Gamma$  until we achieve a perfect match.

Parameter Identification, Descriptive Statistics

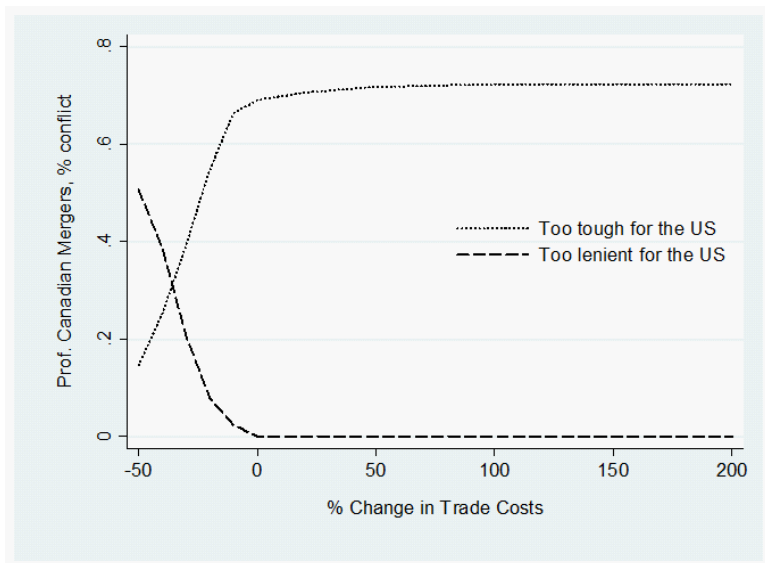
Using the calibrated parameters of the model, we will now look at:

- How does the type of conflict change as trade costs evolve?
- Two sets of counterfactual policy experiments
  - Introduce veto rights, unilaterally and for both countries at the same time.
  - Introduce a North-American competition authority which maximizes total consumer surplus.
  - Evaluate how consumer surplus effects change as trade costs change.

# Trade Costs and Actual Conflicts from U.S. Mergers



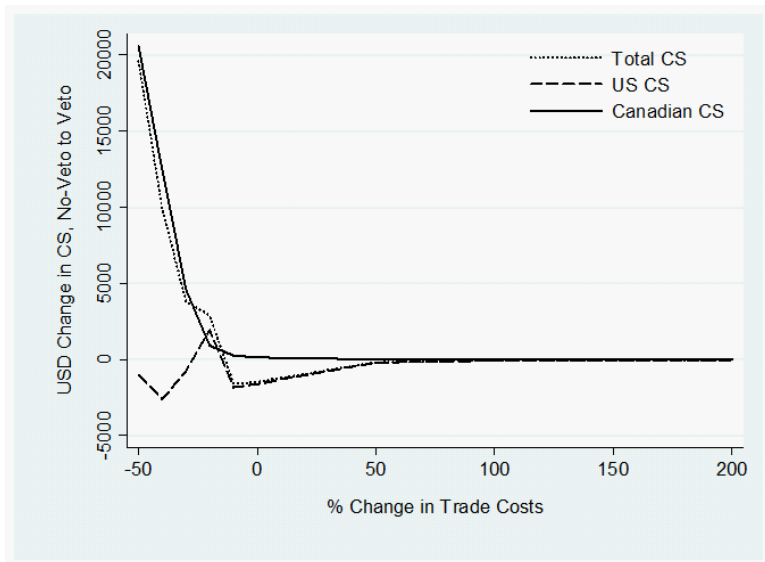
# Trade Costs and Actual Conflicts from Canadian Mergers



# Counterfactual I: Introducing Veto Rights

Change in Outcome (000s USD)	Mean	Median	Standard Deviation	Minimum	Maximum
Panel A: U.S. Veto over Canadian Mergers					
Total Consumer Surplus US+Canada	0	0	0	0	0
Consumer Surplus US	0	0	0	0	0
Consumer Surplus Canada	0	0	0	0	0
Panel B: Canadian Veto over U.S. Mergers					
Total Consumer Surplus US+Canada	-1486.5	0	8505.5	-75872.5	185
Consumer Surplus US	-1618.7	0	9221	-80714.2	163.4
Consumer Surplus Canada	132.3	0	746.2	0	5788.2
Panel C: Bilateral Veto Rights					
Total Consumer Surplus US+Canada	-1486.5	0	8505.5	-75872.5	185
Consumer Surplus US	-1618.7	0	9221	-80714.2	163.4
Consumer Surplus Canada	132.3	0	746.2	0	5788.2

# Counterfactual I: Introducing Veto Rights

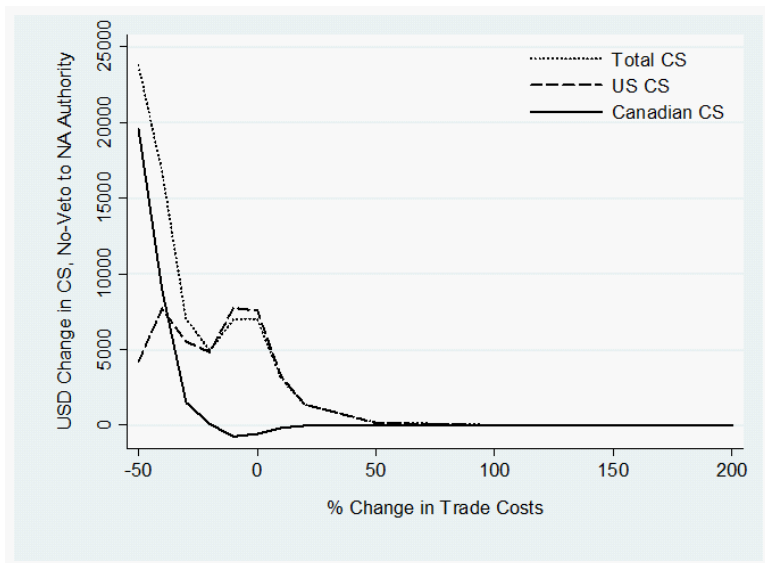


# Counterfactual II: North-American Competition Authority

Change in Outcome (000s USD)	Mean	Median	Standard Deviation	Minimum	Maximum
Total Consumer Surplus US+Canada	7043	11.6	39422.8	-14953.9	304897.9
Consumer Surplus US	7593.2	0	44433.4	-15664.1	363737.2
Consumer Surplus Canada	-550.3	2.4	5626.6	-58839.3	13790.6



# Counterfactual II: North-American Competition Authority



- Starting from a veto rights baseline.
  - Parameter estimates similar to baseline. Exception:  $T^{US}$  higher than before.
  - Counterfactual results are a mirror image of earlier results.
- Modeling a competitive fringe
  - Parameter estimates similar to baseline. Exception:  $T^{US}$  and  $T^{CAN}$  higher than before.
  - Empirical fit worsens slightly (have to drop 15 sectors).
  - Counterfactual results qualitatively identical to baseline.

- Sensitivity analysis regarding the strength of synergies
  - Use  $\beta_s^{US} = \beta_s^{CAN} = 30$  (more synergies) and  $\beta_s^{US} = \beta_s^{CAN} = 70$  (less synergies).
  - Does not change the results qualitatively.
  - Lower  $\beta$ s lead to lower calibrated  $T$ , offsetting the consumer surplus effects of stronger synergies.
- Cross-border mergers
  - Introduce  $T^{cross}$  to match cross-border M&A activity.
  - Creates multinationals which can produce locally or import.
  - Only leads to minor changes in other parameters and qualitative results unaffected.
- Differentiated Goods and Price Competition

- We have provided a quantitative framework for the analysis of cross-border externalities of merger policies.
- Theoretical results:
  - The nature of the potential conflict depends whether the home or the foreign market is more competitive, adjusting for trade costs.
  - In general, there will always be conflict.
- Calibration results:
  - Domestic policy is too tough in the vast majority of sectors. Thus, introducing veto rights has only minor effects.
  - A North-American merger authority leads to large increases in total consumer surplus but hurts Canadian consumers.
  - As trade costs fall:
    - Conflicts arising from too lenient policies become much more frequent and the value of veto rights increases.
    - North-American merger authority shifts towards preventing too-lenient policies. Helps Canada and makes cooperation more feasible.

Thank You!

# Relevant Welfare Standard in Merger Review

In most important jurisdictions, the relevant legal standard in merger evaluation (as in antitrust policy more generally) is consumer surplus.

*“Although many analyses of mergers in the economics literature focus on an aggregate surplus standard, enforcement practice in most countries (including the U.S. and the E.U.) is closest to a consumer surplus standard.” [Whinston, Handbook of IO, 2007]*

EC Horizontal Merger Guidelines:

*“The relevant benchmark in assessing efficiency claims is that consumers will not be worse off as a result of the merger.”*

U.S. Horizontal Merger Guidelines:

*“[...] the Agencies normally evaluate mergers based on their impact on customers [...] the Agencies consider whether cognizable efficiencies likely would be sufficient to reverse the mergers potential to harm customers in the relevant market, e.g., by preventing price increases in that market.”*

# Extraterritorial Jurisdiction in Antitrust

Many countries have adopted the “effects doctrine” in international competition law, according to which countries/courts may *assert jurisdiction over any foreign firm whose activity is intended to affect, and actually does affect, the domestic market.*

The effects doctrine has a long tradition in the United States:

*“[I]t is settled law...that any state may impose liabilities, even upon persons not within its allegiance, for conduct outside its borders that has consequences within its borders which the state reprehends; and these liabilities other states will ordinarily recognize.”* [Judge Learned Hand; U.S. vs. Alcoa 1945]

- The effects doctrine extends to mergers:

*“Two foreign firms, one in Europe and the other in Canada, account together for a substantial percentage of U.S. sales of a particular product through direct imports. Both firms have sales offices and are subject to personal jurisdiction in the United States, although neither has productive assets in the United States. They enter into an agreement to merge. [...] The Agencies would conclude that [Clayton Act] Section 7 jurisdiction technically exists.”*

[U.S. Antitrust Enforcement Guidelines for International Operations]

- The European Commission has been quite aggressive in extending its jurisdiction to extraterritorial mergers.
  - In 2001, it effectively blocked the merger of General Electric and Honeywell on the basis of negative effects on European markets, after the merger had already been cleared by U.S. authorities.



# Operationalization: Equilibrium without Mergers

- Denote the trade-cost-adjusted marginal cost of firm  $j$  for selling in country  $i$  by  $\tau_{i(j)}c_j$ .
- Consider an equilibrium in which the  $M_i$  (domestic or foreign) firms with the lowest  $\tau_{i(j)}c_j$  are active in country  $i$ .
- Summing the first order conditions for profit maximisation, we obtain the price in country  $i$  in this candidate equilibrium:

$$P_i(M_i) = a_i - \frac{M_i}{M_i + 1} (a_i - \gamma_{M_i})$$

where  $\gamma_{M_i} = \frac{1}{M_i} \sum_{m=1}^{M_i} (\tau_{i(m)}c_m)$ .

# Operationalization: Equilibrium without Mergers

- We obtain a unique  $1 \leq \bar{M}_i \leq N_1 + N_2$  such that

$$P_i(\bar{M}_i) > c_m \quad \text{for all } 1 \leq m \leq \bar{M}_i$$

$$P_i(\bar{M}_i) \leq c_m \quad \text{for all } \bar{M}_i + 1 \leq m \leq N_1 + N_2$$

- At this unique Nash equilibrium, we have

$$Q_i = \frac{\bar{M}_i}{\bar{M}_i + 1} \frac{a_i - \gamma \bar{M}_i}{b_i}$$

$$q_{ij} = \begin{cases} \frac{1}{b_i} \left( a_i - c_j - \frac{\bar{M}_i}{\bar{M}_i + 1} (a_i - \gamma \bar{M}_i) \right) & \text{if } 1 \leq j \leq \bar{M}_i \\ 0 & \text{otherwise} \end{cases}$$

# Operationalization: Equilibrium without Mergers

This allows us to compute the required theoretical moments. For example:

- Domestic sales of country  $i$  firms:

$$s_i = \sum_{n=1}^{\bar{N}_{ii}} P_i q_{in}$$

- Value of exports from country  $i$  to country  $i'$ :

$$x_{ii'} = \sum_{n=1}^{\bar{N}_{ii'}} P_{i'} q_{i'n}$$

- Production-based HHI in country  $i$ :

$$HHI_i = 10,000 \times \sum_{n=1}^{\max(\bar{N}_{ii}, \bar{N}_{ii'})} \left( \frac{P_i q_{in} + P_{i'} q_{i'n}}{\sum_{n=1}^{\max(\bar{N}_{ii}, \bar{N}_{ii'})} (P_i q_{in} + P_{i'} q_{i'n})} \right)^2$$

Parameter identification (intuition):

- The  $\tau$ 's pin down the import-to-domestic-sales ratio.
- Domestic sales and imports are inversely proportional to  $b$ .
- The ratio  $a^{US} / a^{CAN}$  pins down the relative price ratio.
- The number of mergers in country  $i$  is positively related to  $T^i$ .
- The shape parameters of the Pareto distribution ( $\zeta^{US}, \zeta^{CAN}$ ) move the HHIs.
- The cut-off parameters of the Pareto distribution ( $x^{US}, x^{CAN}$ ) move total costs.

# Empirical Moments

Empirical Moment	Mean	Median	Standard Deviation	Minimum	Maximum
# M&As US	1.89	1.03	3.2	0	25.5
# M&As CAN	0.15	0.05	0.23	0	1.2
Export Price Ratio CAN/US	1.07	1.11	0.15	0.73	1.59
Shipments US ('000 USD)	20914894	11847495	29481158	978468	2.18E+08
Shipments CAN ('000 USD)	1580744	852509	2563169	23257	19167750
Exports US ('000 USD)	503553	186566	1064862	2318	10003740
Exports CAN ('000 USD)	756379	177074	2666532	104	31143030
HHI US (%)	609	431	565	19	2760
HHI CAN (%)	1306	882	1189	77	6200
Total Cost US ('000 USD)	15491544	8853675	23554262	664482	1.76E+08
Total Cost CAN ('000 USD)	1775104	817824	3668129	40161	36875100
Observations	156	156	156	156	156

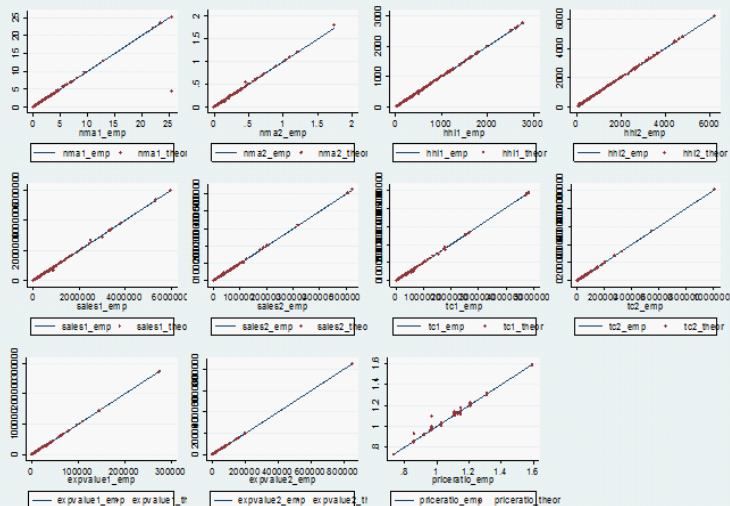
# Parameters from Data

A) Parameters from Data	Mean	Median	Standard Deviation	Minimum	Maximum
$\alpha^{US}$	1	1	1	1	1
$\alpha^{CAN}$	0.750	0.750	0.750	0.750	0.750
$N^{US}$	1574	655	3173.156	21	32800
- of which active	13.4%	9.2%	16.2%	0.3%	99.9%
$N^{CAN}$	264	127	425.8	10	3840
- of which active	47.4%	33.6%	35.2%	2.5%	100.2%
$\beta^{US}$	50	50	0	50	50
$\beta^{CAN}$	50	50	0	50	50
$\eta^{US}$	0.286	0.274	0.099	0.034	0.53
$\eta^{CAN}$	0.258	0.258	0.096	0.017	0.488
Observations	156	156	156	156	156

# Calibrated Parameters

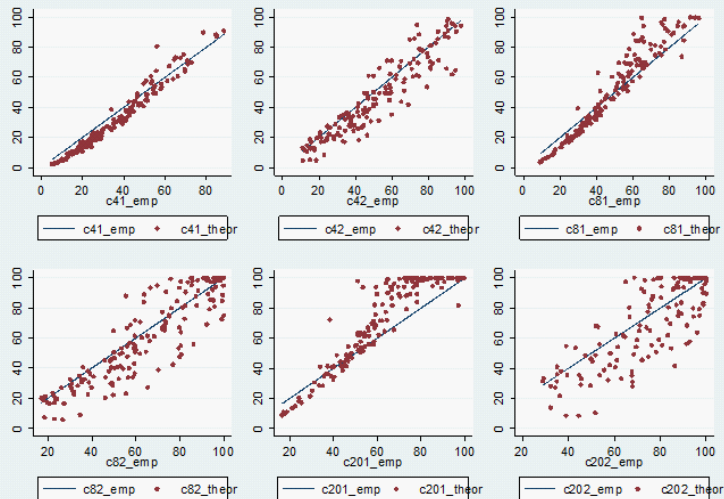
B) Calibrated Parameters	Mean	Median	Standard Deviation	Minimum	Maximum
$T^{US}$	71.017	9.615	279.863	0	2000
$T^{CAN}$	4.88	0.607	25.281	0	301
$a^{US}$	25	25	0	25	25
$a^{CAN}$	65.407	23.25	119.912	1.59	780
$1/b^{US}$	17529.46	6205	46191.56	219	460000
$1/b^{CAN}$	5080.603	496.5	29392.53	3.72	354000
$\tau^{CAN,US}$	1.758	1.445	1.159	0.837	12.8
$\tau^{US,CAN}$	1.861	1.515	1.3	0.052	8.5
$\zeta^{US}$	5.593	5.105	3.135	0.943	27.8
$\zeta^{CAN}$	22.972	8.255	138.879	2.46	1740
$x^{US}$	0.381	0.178	0.643	0.005	3.81
$x^{CAN}$	0.481	0.269	0.707	0.037	4.8
Observations	156	156	156	156	156

# Targeted Moments - All Sectors





# Non-Targeted Moments - Veto Rights Case



# Strength of Synergies - Marginal Cost Reductions

MC Reduction	Mean	Median	Standard Deviation	Minimum	Maximum
US mergers	-7.1%	-6.8%	2.8%	-19.6%	-1.8%
Canadian mergers	-11.1%	-7.2%	9.6%	-52.2%	-3.5%

The assumed distribution of synergy parameters yields reasonable values for the average cost reduction of an approved merger.

# Price Effects

Price Effect	Mean	Median	Standard Deviation	Minimum	Maximum
US merger, US price	-0.11%	-0.06%	0.12%	-0.78%	0.00%
US merger, Canadian price	-0.03%	-0.01%	0.09%	-0.77%	0.32%
Canadian merger, Canadian price	-0.14%	-0.07%	0.18%	-1.00%	0.00%
Canadian merger, US price	-0.08%	-0.01%	0.22%	-1.74%	0.00%

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