

# Estimates of Trade and Welfare effects of NAFTA

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- Background and motivation of the article
- History of NAFTA.

- Tariff
- Intermediate Goods
- Sectoral Linkages

- $u(C_n) = \prod_{j=1}^J C_n^j \alpha_n^j$ , where  $\sum_{j=1}^J \alpha_n^j = 1$
- Income is derived from two sources; households supply labour and receive transfers on a lump-sum basis

# Intermediate goods

- Two types of inputs, labour, and composite intermediate goods
- $q_n^j(w^j) = z_n^j(w^j)(\mu_n^j w^j)^{\gamma_n^j} \prod_{k=1}^j (m_n^{k,j}(w^j))^{\gamma_n^{k,j}}$

# Composite intermediate goods

■ The production technology of  $Q_n^j$  is an Ethier (1982) or Dixit and Stiglitz (1977) aggregator given by

■ 
$$Q_n^j = \left( \int r_n^j(w^j)^{1-\frac{1}{\sigma^j}} dw^j \right)^{\frac{\sigma^j}{\sigma^j-1}}$$

# International trade cost and price

- Iceberg trade costs
- Ad-valorem flat-rate tariffs

# Relative Changes

- Solving for an equilibrium
- Solving for changes in prices and wages



# Advantages of solving in Relative Changes

- We can match exactly the model to the data in a base year
- We can identify the effect on equilibrium outcomes from a pure change in tariffs, which is what we are after in this article
- We can solve for the general equilibrium of the model without needing to estimate parameters which are difficult to identify in the data

# Welfare effects from tariff changes

- Terms of trade
- Volume of trade

- The trade elasticities are the key parameters for quantitative trade policy evaluation.
- It determines how trade flows react to changes in tariffs.

- If productivity is less dispersed represented by larger trade elasticities values, tariffs will not change the share of traded goods in a substantial way.
- If there is a high dispersion (lower trade elasticities) small changes in tariffs can translate to large adjustments in the share of goods traded.

- First counterfactual exercise
- Second counterfactual exercise

# Welfare effects from NAFTA's Tariff reduction

## First Counterfactual Exercise

TABLE 2  
*Welfare effects from NAFTA's tariff reductions*

Country	Welfare			
	Total	Terms of trade	Volume of Trade	Real wages
Mexico	1.31%	-0.41%	1.72%	1.72%
Canada	-0.06%	-0.11%	0.04%	0.32%
U.S.	0.08%	0.04%	0.04%	0.11%

# Bilateral Welfare effects From NAFTA's tariff reduction

TABLE 3  
*Bilateral welfare effects from NAFTA's tariff reductions*

Country	Terms of trade		Volume of Trade	
	NAFTA	Rest of the world	NAFTA	Rest of the world
Mexico	-0.39%	-0.02%	1.80%	-0.08%
Canada	-0.09%	-0.02%	0.08%	-0.04%
U.S.	0.03%	0.01%	0.04%	0.00%

# Sectoral contribution

TABLE 4  
Sectoral contribution to welfare effects from NAFTA's tariff reductions

Sector	Mexico		Canada		United States	
	Terms of trade	Volume of trade	Terms of trade	Volume of trade	Terms of trade	Volume of trade
Agriculture	-0.13%	2.87%	3.41%	-0.01%	3.41%	0.65%
Mining	-3.01%	0.25%	4.04%	-0.20%	1.54%	0.04%
Manufacturing						
Food	0.45%	1.17%	3.56%	2.37%	3.16%	1.04%
Textile	3.30%	12.00%	1.15%	16.20%	4.32%	22.20%
Wood	0.30%	2.26%	4.17%	0.24%	1.31%	0.41%
Paper	0.39%	3.82%	5.86%	0.49%	2.83%	0.33%
Petroleum	-0.09%	14.60%	0.60%	30.40%	1.85%	11.40%
Chemicals	0.57%	2.15%	5.74%	0.08%	5.60%	1.11%
Plastic	0.62%	4.21%	2.53%	7.56%	1.61%	0.32%
Minerals	0.05%	0.73%	0.93%	0.47%	0.70%	0.57%
Basic metals	1.07%	3.02%	10.10%	1.48%	3.40%	1.05%
Metal products	0.90%	5.56%	2.22%	7.99%	1.61%	1.06%
Machinery n.e.c.	3.68%	4.32%	5.16%	-0.02%	5.63%	0.65%
Office	8.37%	4.72%	2.32%	-0.83%	3.50%	1.43%
Electrical	41.20%	25.80%	1.37%	7.18%	24.20%	42.20%
Communication	21.00%	3.64%	2.67%	0.15%	11.60%	4.58%
Medical	4.72%	1.34%	0.94%	-0.23%	3.48%	4.46%
Auto	13.80%	4.78%	29.50%	27.80%	15.80%	4.47%
Other Transport	0.21%	0.82%	12.90%	-0.97%	1.51%	0.32%
Other	2.63%	1.92%	0.81%	-0.11%	2.90%	1.69%



TABLE 5  
*Trade effects from NAFTA's tariff reductions*

	Mexico	Canada	U.S.
Mexico's imports	-	116.60%	118.31%
Canada's imports	58.57%	-	9.49%
U.S.'s imports	109.54%	6.57%	-

# Sectoral specialization

*Export shares by sector before and after NAFTA's tariff reductions*

Sector	Mexico		Canada		U.S.	
	Before	After	Before	After	Before	After
Agriculture	4.72%	3.03%	4.99%	5.04%	6.91%	6.35%
Mining	15.53%	7.85%	8.99%	8.96%	1.72%	1.52%
Manufacturing						
Food	2.33%	1.48%	4.82%	4.68%	5.09%	4.73%
Textile	4.42%	6.92%	1.05%	1.49%	2.68%	3.49%
Wood	0.59%	0.52%	8.12%	8.05%	2.02%	1.98%
Paper	0.62%	0.51%	8.34%	8.44%	4.99%	4.89%
Petroleum	1.62%	5.28%	0.59%	0.78%	4.30%	5.71%
Chemicals	4.40%	2.53%	5.58%	5.40%	10.00%	9.25%
Plastic	0.80%	0.48%	2.06%	2.06%	2.28%	2.43%
Minerals	1.32%	0.84%	0.81%	0.78%	0.94%	0.92%
Basic metals	3.24%	2.00%	10.29%	10.19%	3.05%	3.11%
Metal products	1.22%	1.03%	1.47%	1.53%	2.23%	2.59%
Machinery n.e.c.	4.30%	2.53%	4.69%	4.49%	10.37%	9.70%
Office	3.34%	5.07%	2.44%	2.54%	7.70%	7.29%
Electrical	20.79%	34.07%	2.50%	2.35%	6.07%	7.97%
Communication	8.57%	7.08%	3.11%	3.02%	7.19%	6.81%
Medical	2.48%	3.28%	0.98%	1.03%	5.16%	4.79%
Auto	16.43%	13.05%	24.42%	24.07%	8.20%	8.09%
Other Transport	0.28%	0.26%	3.21%	3.58%	7.32%	6.65%
Other	3.02%	2.20%	1.55%	1.52%	1.77%	1.74%
Normalized Herfindahl	0.092	0.138	0.083	0.081	0.042	0.040

# Welfare effects from world tariff reductions

## Second Counterfactual Exercise

TABLE 7  
*Welfare effects from world tariff reductions*

Country	Welfare	Terms of trade	Volume of trade	Country	Welfare	Terms of trade	Volume of trade
Argentina	0.58%	0.10%	0.48%	Ireland	0.19%	-0.04%	0.23%
Australia	0.30%	-0.01%	0.31%	Italy	0.10%	-0.05%	0.15%
Austria	2.02%	0.38%	1.64%	Japan	0.21%	0.13%	0.08%
Brazil	0.32%	-0.10%	0.43%	Korea	0.20%	-0.21%	0.40%
Canada	0.10%	-0.08%	0.17%	Mexico	1.36%	-0.40%	1.76%
Chile	0.26%	-0.52%	0.78%	Netherlands	0.10%	-0.07%	0.16%
China	13.90%	-1.68%	15.57%	New Zealand	0.71%	-0.14%	0.84%
Denmark	0.08%	-0.13%	0.21%	Norway	0.54%	0.34%	0.20%
Finland	0.78%	0.12%	0.66%	Portugal	12.70%	11.48%	1.21%
France	0.25%	0.10%	0.15%	South Africa	1.87%	0.04%	1.83%
Germany	0.12%	-0.03%	0.15%	Spain	0.67%	0.49%	0.18%
Greece	1.15%	1.01%	0.13%	Sweden	0.84%	0.38%	0.46%
Hungary	1.63%	-0.16%	1.78%	Turkey	0.53%	0.20%	0.33%
India	3.64%	-0.72%	4.36%	U.S.	0.22%	0.11%	0.11%
Indonesia	1.91%	-0.54%	2.46%	U.K.	0.04%	-0.11%	0.15%
				ROW	2.83%	-0.22%	3.05%

# Bilateral welfare effects from world's tariff reductions

TABLE 8  
*Bilateral welfare effects from world's tariff reductions*

Country	Terms of trade		Volume of Trade	
	NAFTA	Rest of the world	NAFTA	Rest of the world
Mexico	-0.39%	-0.01%	1.64%	0.13%
Canada	-0.10%	0.02%	0.05%	0.12%
U.S.	0.03%	0.08%	0.04%	0.08%

# Welfare effects from NAFTA given world tariff changes

TABLE 9  
*Welfare effects from NAFTA given world tariff changes*

Country	Welfare			
	Total	Terms of trade	Volume of trade	Real wages
Mexico	1.17%	-0.38%	1.55%	1.63%
Canada	-0.06%	-0.09%	0.03%	0.31%
U.S.	0.08%	0.04%	0.04%	0.11%

# Bilateral welfare from NAFTA given world tariff changes

TABLE 10  
*Bilateral welfare effects from NAFTA given world tariff changes*

Country	Terms of trade		Volume of Trade	
	NAFTA	Rest of the world	NAFTA	Rest of the world
Mexico	-0.37%	-0.01%	1.78%	-0.23%
Canada	-0.08%	-0.01%	0.08%	-0.05%
U.S.	0.03%	0.01%	0.04%	0.00%

- The article develops a general equilibrium model to evaluate trade policies with few data and parameter requirements.