

NAFTA
and the Deepening of Economic Integration in North America

Timothy J. Kehoe
University of Minnesota
and Federal Reserve Bank of Minneapolis

NAFTA After 20 Years
Mexico Center
Rice University's Baker Institute

April 2014

Applied general equilibrium models built to predict the impact of the North American Free Trade Agreement failed in predicting the impact of NAFTA on trade by industry.

Recent research:

T. J. Kehoe and K. J. Ruhl, “How Important is the New Goods Margin in International Trade,” *Journal of Political Economy*, 2013.

T. J. Kehoe, K. J. Ruhl, and J. M. Rossbach, “Using the New Products Margin to Predict the Industry-Level Impact of Trade Reform,” Federal Reserve Bank of Minneapolis Staff Report, 2014.

Kehoe and Ruhl (2013) show that products that are traded very little or not at all account disproportionately for aggregate changes in bilateral trade following trade liberalization.

Hypothesis in Kehoe, Ruhl and Rossbach (2014): Industries with more trade due to these little-traded products should experience more growth following trade liberalization.

Product: A 5-digit SITC, rev. 2 code. There are 1,836 products.

Industry: A 3-digit ISIC code. There are 38 industries. (We are only interested in industries that produce goods in merchandise trade — agriculture, mining and extraction, and manufacturing.)

Notice that each industry, on average, consists of 48.3 products.

ISIC code	industry name
111	Agriculture and livestock production
113	Hunting, trapping and game propagation
121	Forestry
122	Logging
130	Fishing
210	Coal mining
220	Crude petroleum and natural gas production
230	Metal ore mining
290	Other mining
311–312	Food manufacturing
313	Beverage industries
314	Tobacco manufactures
321	Manufacture of textiles
322	Manufacture of wearing apparel, except footwear
323	Manufacture of leather and products of leather, leather substitutes and fur
324	Manufacture of footwear
331	Manufacture of wood and wood and cork products, except furniture
332	Manufacture of furniture and fixtures, except primarily of metal
341	Manufacture of paper and paper products

- 342 Printing, publishing and allied industries
- 351 Manufacture of industrial chemicals
- 352 Manufacture of other chemical products
- 353 Petroleum refineries
- 354 Manufacture of miscellaneous products of petroleum and coal
- 355 Manufacture of rubber products
- 356 Manufacture of plastic products not elsewhere classified
- 361 Manufacture of pottery, china and earthenware
- 362 Manufacture of glass and glass products
- 369 Manufacture of other non-metallic mineral products
- 371 Iron and steel basic industries
- 372 Non-ferrous metal basic industries
- 381 Manufacture of fabricated metal products
- 382 Manufacture of machinery except electrical
- 383 Manufacture of electrical machinery apparatus, appliances and supplies
- 384 Manufacture of transport equipment
- 385 Manufacture of professional and scientific equipment
- 390 Other manufacturing industries

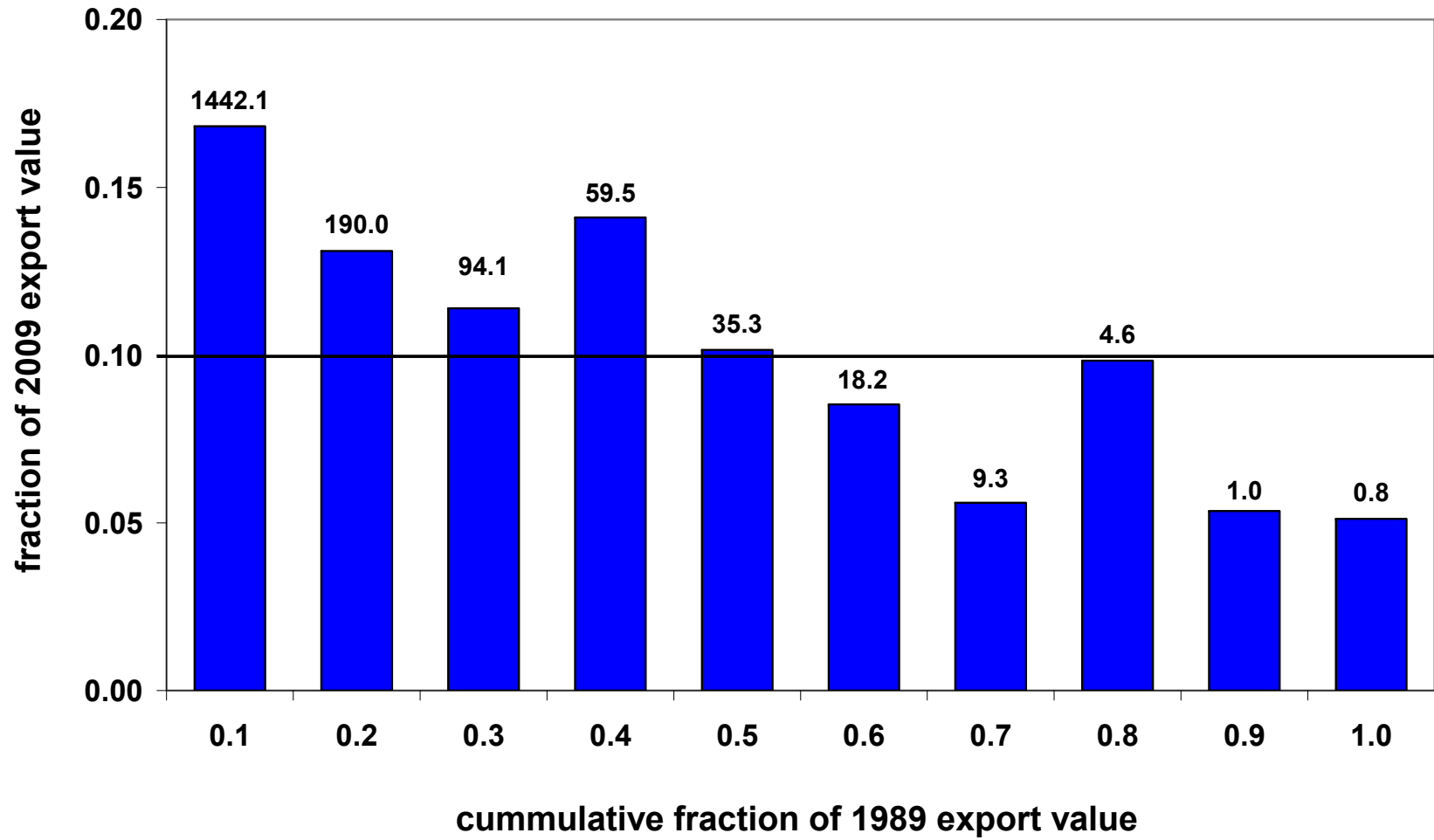
The New Product, or Extensive, Margin

We sort each of the 1,836 products by average amount of trade over the first three years of our period, 1989–1991.

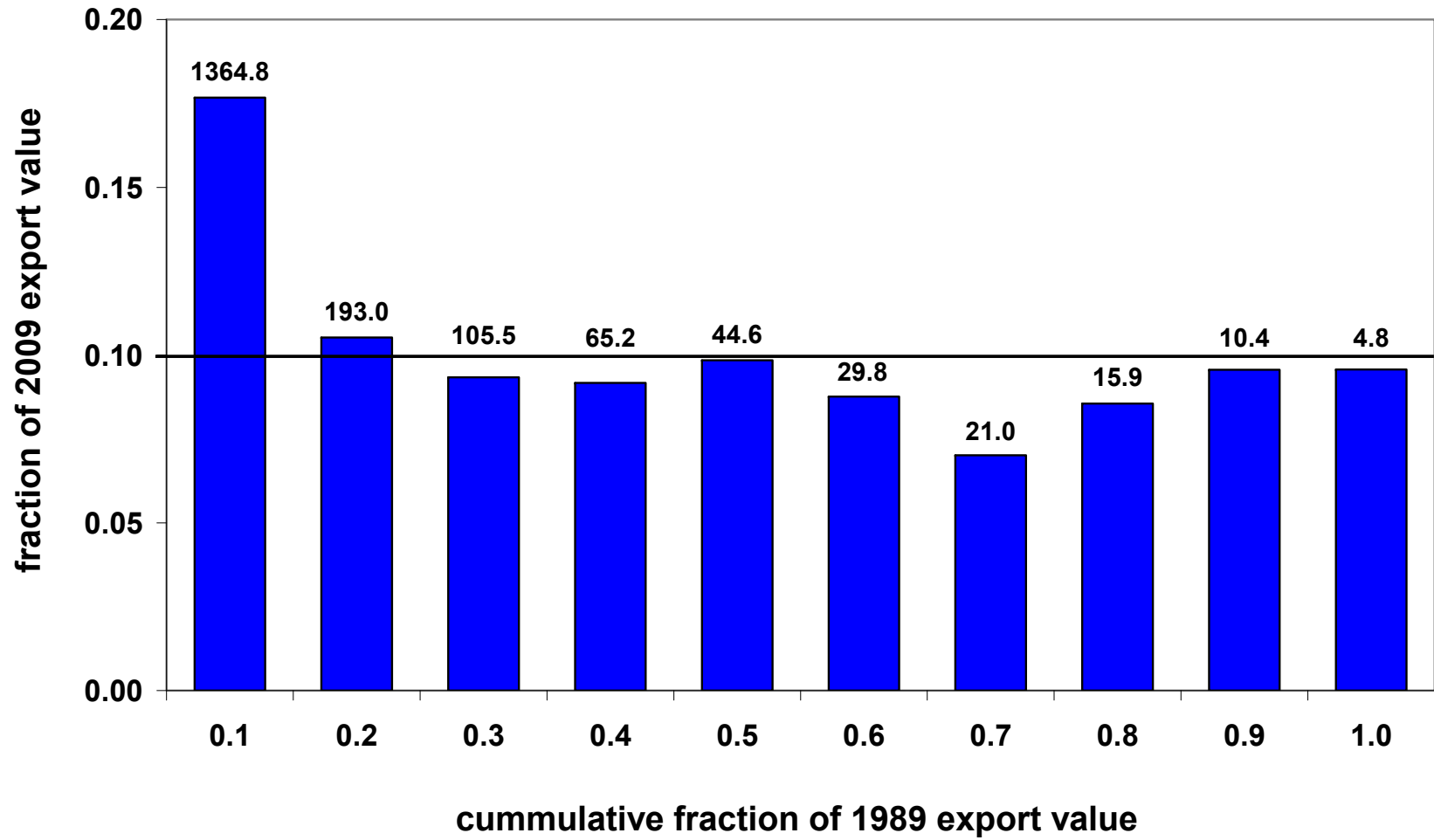
We then place each product into bins sequentially until each bin accounts for 10 percent of total trade in the base year, 1989.

We define Least Traded Products (LTP) to be the products in the final 10 percent bin, the products with the least amount of trade over the first three years, 1989–2009.

Composition of Exports: United States to Canada, 1989–2009



Composition of Exports: United States to Mexico, 1989–2009



Predicting changes in trade by industry

Compute the fraction of trade in each industry accounted for by LTP s_j in the base period t_0 . Predict

$$z_j = \alpha + \beta s_j$$

$$z_j = \frac{X_{jit}^k / GDP_{it}}{X_{jit_0}^k / GDP_{it_0}} - 1$$

and X_{jit}^k are exports of industry j from country i to country k in year t .

Our hypothesis is that $\beta > 0$.

Kehoe (2005) showed that several of the leading models built to predict the industry level effects of NAFTA performed poorly

Kehoe, Ruhl, and Rossbach (2014) confirm this finding for Brown-Deardorff-Stern (BDS), Cox-Harris, and Sobarzo models over the 1989–2009 period.

Focus on the BDS model since it has bilateral trade predictions for all importer-exporter pairs between Canada, Mexico, and the United States.

Methodology for evaluating the NAFTA models

We compute the weighted correlation coefficient between the model predictions and the results from the data

We also compute the weighted regression coefficients a and b from

$$z_j^{data} = a + bz_j^{model} + \varepsilon_j$$

Here a indicates how well the models did in matching average change ($a = 0$ is ideal) and b indicates how well the models did in matching the signs and magnitudes of the changes ($b = 1$ is ideal)

Changes in U.S. exports relative to GDP (percent)

industry	U.S. to Canada			U.S. to Mexico		
	1989–2009 data	BDS model	1989 fraction LTP	1989–2009 data	BDS model	1989 fraction LTP
Agriculture	-6.4	5.1	0.19	46.6	7.9	0.10
Mining and quarrying	51.3	1.0	0.16	86.2	0.5	0.18
Food	124.1	12.7	0.25	129.5	13.0	0.17
Textiles	-35.9	44.0	0.52	125.7	18.6	0.43
Clothing	-3.0	56.7	1.00	63.9	50.3	0.24
Leather products	-64.0	7.9	0.61	58.4	15.5	0.67
Footwear	-67.2	45.7	0.34	-58.5	35.4	0.10
Wood products	-30.6	6.7	0.07	-21.6	7.0	0.09
Furniture and fixtures	22.5	35.6	0.00	6.6	18.6	0.00
Paper products	13.7	18.9	0.15	29.4	-3.9	0.07
Printing and publishing	-19.6	3.9	0.05	194.9	-1.1	0.13
Rubber products	30.2	19.1	0.05	165.9	12.8	0.06
Chemicals	50.2	21.8	0.24	208.2	-8.4	0.23
Petroleum products	-43.1	0.8	0.13	-71.6	-7.4	0.06
Glass products	-20.0	4.4	0.23	53.8	42.3	0.39
Nonmetal mineral products	-1.9	11.9	0.59	57.8	0.8	0.57
Iron and steel	53.5	11.6	0.28	84.0	-2.8	0.24

Nonferrous metals	-20.8	-6.7	0.11	104.6	-55.1	0.12
Metal products	-5.3	18.2	0.16	84.7	5.4	0.14
Nonelectrical machinery	-38.9	9.9	0.08	102.8	-2.9	0.09
Electrical machinery	-42.6	14.9	0.05	59.5	-10.9	0.01
Transportation equipment	-37.8	-4.6	0.01	79.3	9.9	0.02
Misc. manufactures	-19.2	11.5	0.15	96.6	-9.4	0.13
weighted corr. with data		0.39	0.54		-0.06	0.47
regression coeff. $a \setminus \alpha$		-26.62	-34.54		88.47	62.31
regression coeff. $b \setminus \beta$		1.34	175.84		-0.24	265.44
BDS-LTP weighted corr.			0.70			0.21

Results for the BDS model: the BDS model fared poorly in predicting industry level changes in bilateral trade

exporter	importer	correlation	<i>a</i>	<i>b</i>
Canada	Mexico	-0.10	645.29	-7.94
Canada	United States	-0.28	21.82	-3.33
Mexico	Canada	0.06	135.79	0.16
Mexico	United States	-0.13	66.64	-0.11
United States	Canada	0.39	-26.62	1.34
United States	Mexico	-0.06	88.47	-0.24
weighted average		-0.00	19.83	-0.94
pooled regression		0.06	10.54	0.17

Correlation is the weighted correlation of predictions with the data.

Results for the LTP exercise: the LTP exercise fares much better in predicting industry level changes in bilateral trade

exporter	importer	correlation	α	β
Canada	Mexico	0.55	254.23	4468.37
Canada	United States	0.30	-20.42	185.24
Mexico	Canada	0.33	115.16	286.39
Mexico	United States	0.19	51.52	77.54
United States	Canada	0.54	-34.54	175.84
United States	Mexico	0.47	62.31	265.44
weighted average		0.39	-5.74	87.29
pooled regression		0.24	-5.30	181.18

Comparison of the BDS results and LTP exercise results: LTP exercise performs better the BDS model for every country pair.

exporter	importer	BDS correlation	LTP correlation
Canada	Mexico	-0.10	0.55
Canada	United States	-0.28	0.30
Mexico	Canada	0.06	0.33
Mexico	United States	-0.13	0.19
United States	Canada	0.39	0.54
United States	Mexico	-0.06	0.47
weighted average		-0.00	0.39
pooled regression		0.06	0.24

Our exercise shows that looking at the share of least traded products in an industry is a useful predictor of which industries will experience the most growth following trade liberalization.

Major downside to our method: As of now it is atheoretical.

We intend our results to spur the development of models able to account for the importance of the new product margin in trade.

Trade liberalization leads to booms in industries not previously heavily involved in trade and expansions of small and medium sized firms.

Least traded products with largest expansions in U.S. exports to Canada

Petroleum gases and other gaseous hydrocarbons n.e.s.

Lemonade, flavored spa waters, flavored waters

Other acyclic hydrocarbons

Iron/steel coils of other than high carbon/alloy steel

Malt extract; preparations of flour etc., for infant food

Meat of swine, fresh, chilled or frozen

Carboxyimide-function compounds etc.

Prepared foods obtained by the swelling or roasting

Articles of jewellery & parts of precious metal

Sheets & plates of other than high carbon/alloy steel

Least traded products with largest expansions in U.S. exports to Mexico

Petroleum gases and other gaseous hydrocarbons n.e.s.

Antisera and microbial vaccines

Articles of jewellery & parts of precious metal

Polyethylene in the form of monofil, seamless tubes

Parts of the pumps & compressors of air pumps

Bonded fibre fabrics, similar bonded yarn fabrics

Rice in the husk (paddy or rough rice)

Other sugars; sugar syrups; artificial honey; caramel

Reciprocating pumps, other than fuel pumps

Textile fabrics coated, with preparation of cellulose derivatives