

# NAFTA and the Evolving Structure of Canadian Patterns of Trade and Specialization\*

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*\*All opinions expressed are solely those of the authors and do not necessarily reflect those of the Department of International Trade and Foreign Affairs Canada.*

# 1. Introduction

- An attempt to understand how Canadian trade has changed given:
  - CUSFTA (1988) and NAFTA (1994);
  - Globalization forces;
  - The recent commodity boom.
- The analysis here is largely historical and descriptive using detailed trade data;
- No formal attempt is made to provide causal explanations of the observed trends although several different narratives are used throughout the paper.

- Canada has moved from a country heavily specialized in the export of natural resources to one where manufacturing growth was seen as the engine of growth
  - Auto Pact (1965)
  - CUSFTA-NAFTA (1988 and 1994)
  - Commodity prices were low during most of the 1980s and 1990s.
- Two main developments since the end of 1990s:
  - Commodity and energy prices started to rise significantly;
  - Manufacturing production became more global (global supply chains);
- Services also became more important.

- We concentrate on the effects linked to the Resources and Manufacturing trade

- **Main questions:** How did NAFTA and these additional forces

- modify revealed comparative advantage?

- change the volumes of trade?

- change the composition of trade?

- What does this tell us about the role of NAFTA for the Canadian trade performance?

- How did the first decade of NAFTA compare to the second decade?

- In most of what follows, we work with two main periods:
  1. 1965-1990: the pre-NAFTA period
  2. 1990-2012: the NAFTA period.
- We further divide each of these periods in two:
  - 1965-80 and 1980-90
  - 1990-2000 and 2000-12

**Data:**

- 2 and 4 digit SITC Rev 1, 1965-2012 from WITS;
- All flows are in constant US \$;
- BEC Concordance for Primary, Intermediate and Finished Products.

## **Main points of the presentation:**

- A strong trade expansion associated with NAFTA (1990-2000);
- A change in composition of trade with respect to pre-NAFTA
- A strong trade contraction (the Great Reversal) during the 2000-12 period;
- Mostly volume effects on manufacturing since NAFTA;
- Dutch Disease may not be as strong as suggested by some.

## Road Map of the Talk:

1. Introduction
2. Aggregate Trade Data for Canada and Partners;
3. Composition of Trade;
4. The Great Reversal;
5. Conclusions.

## 2. Aggregate Trade Data

Basic merchandise trade measured (or not) with respect to GDP between:

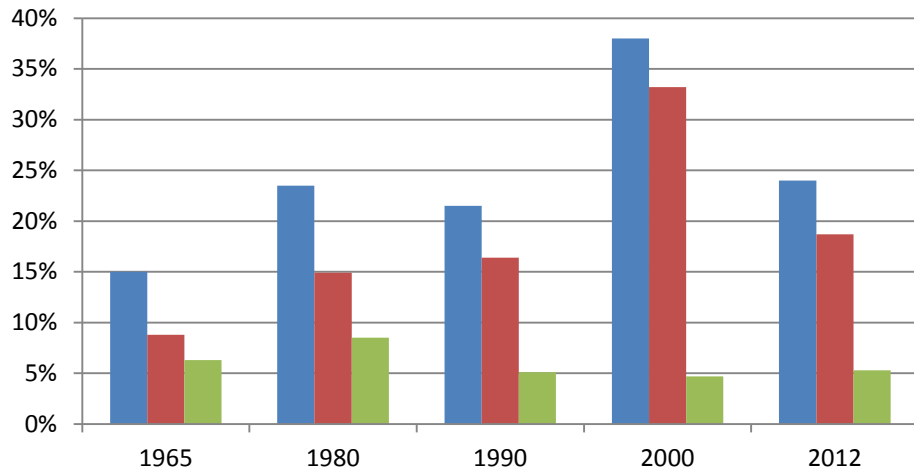
- Canada and the Rest of the World
- Canada and NAFTA partners
- Canada and non-NAFTA partners
- Canada, US, Mexico shares by product types
- Canada, US, Mexico, non-NAFTA shares by product types

In what follows:  $ROW = NAFTA + \text{non NAFTA}$

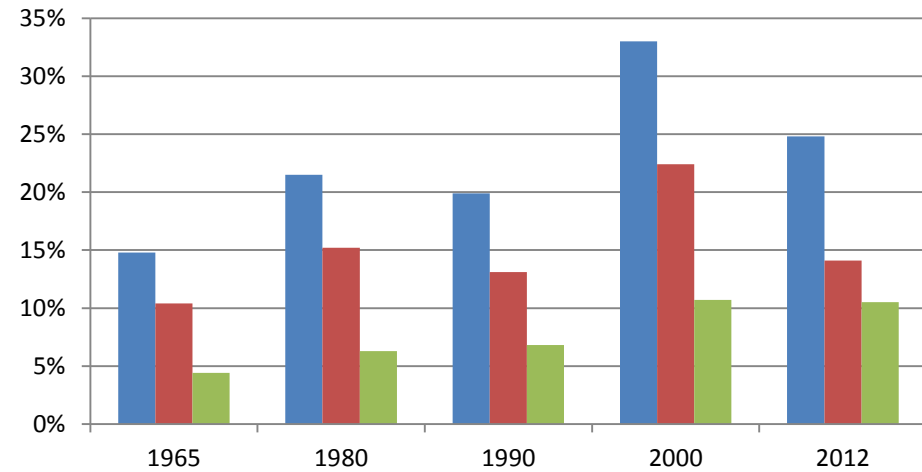


# Aggregate Trade - Canada versus ROW, NAFTA and Non-NAFTA

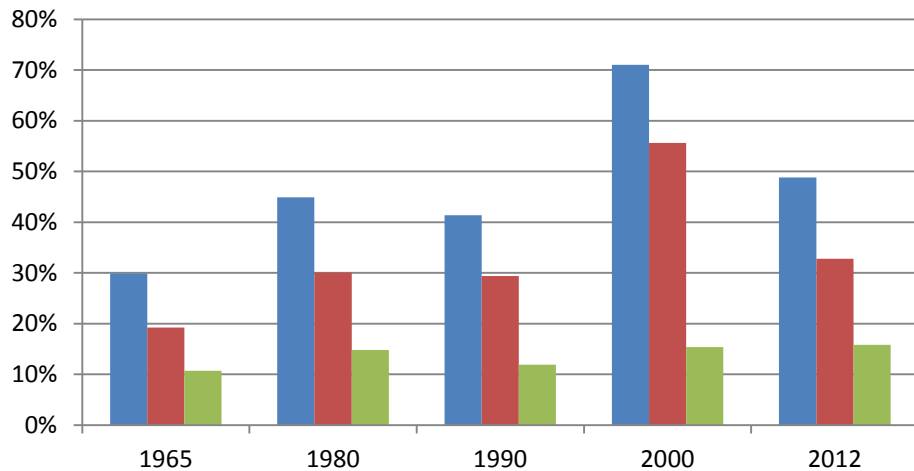
## X/GDP



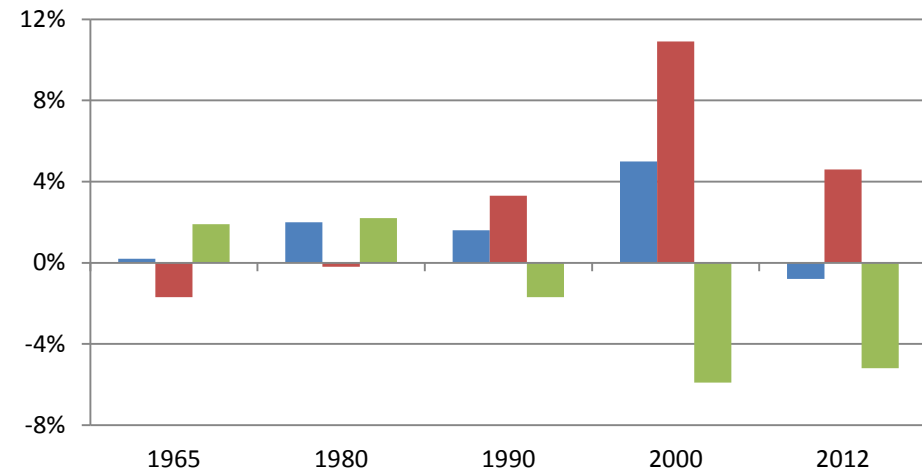
## M/GDP



## (X+M)/GDP



## (X-M)/GDP



Canada-ROW

Canada-NAFTA

Canada-non-NAFTA

# Share of Intra-NAFTA trade

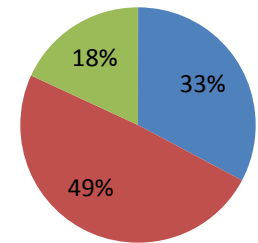
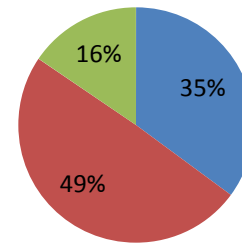
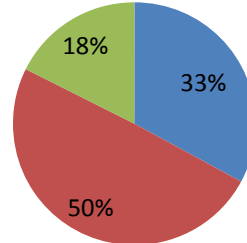
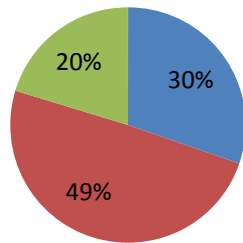
1980

1990

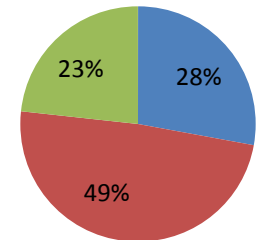
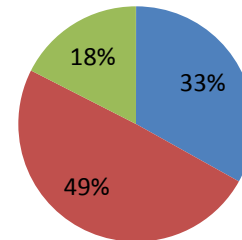
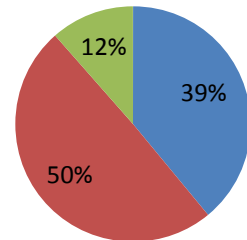
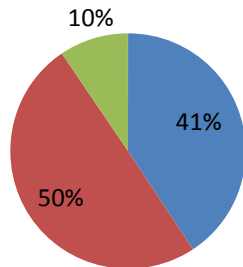
2000

2012

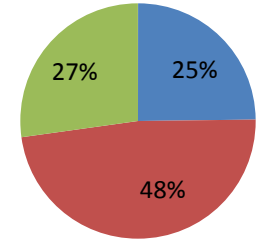
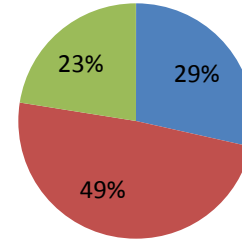
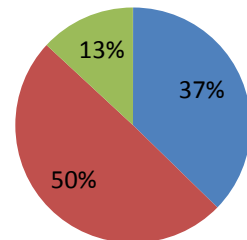
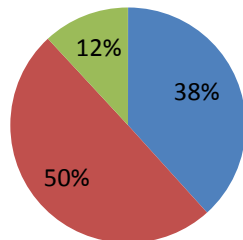
Primary



Intermediate



Finished



Canada

US

Mexico

# Share of US Total Imports

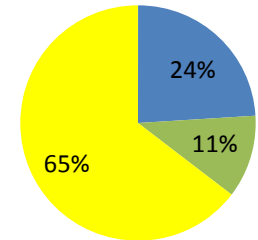
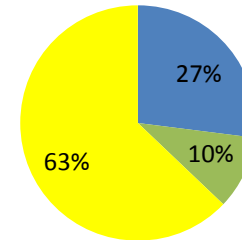
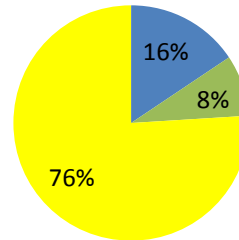
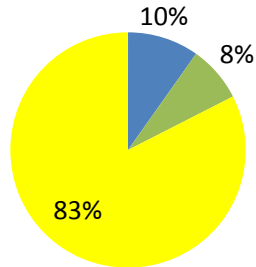
1980

1990

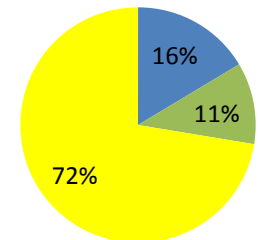
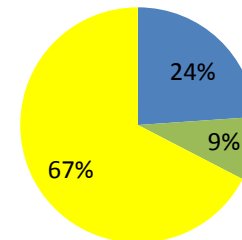
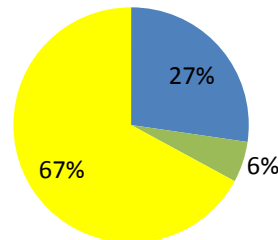
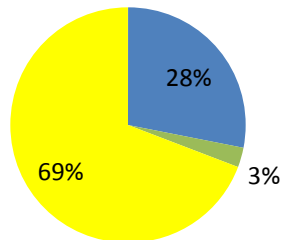
2000

2012

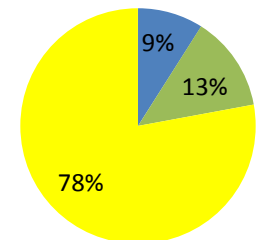
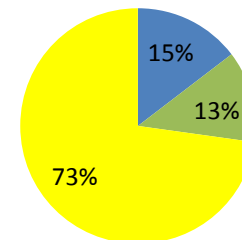
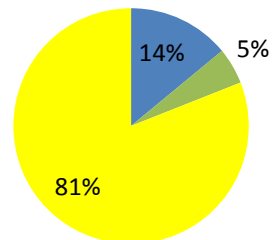
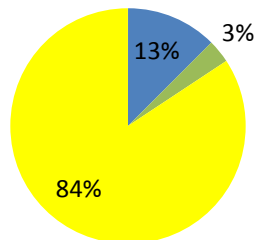
Primary



Intermediate



Finished



Canada



Mexico



Non-NAFTA

# Table 2.5 Share of Canadian total Imports

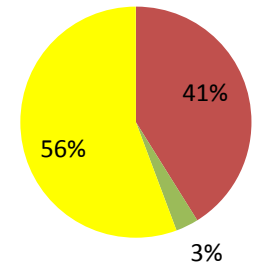
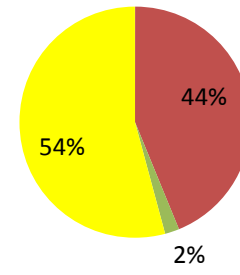
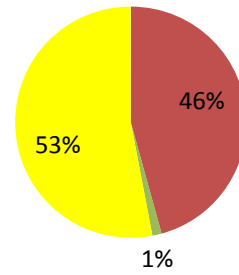
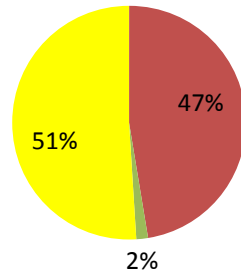
1980

1990

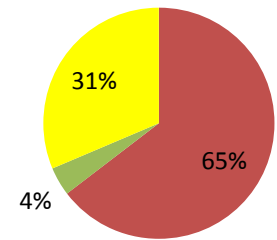
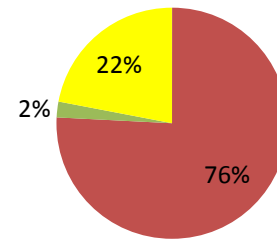
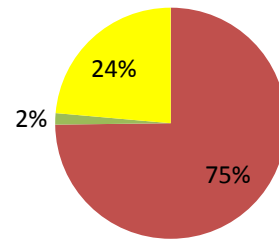
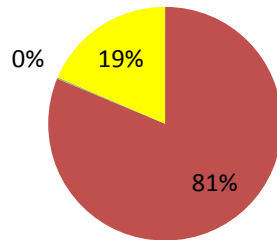
2000

2012

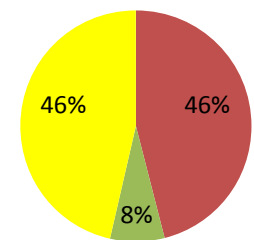
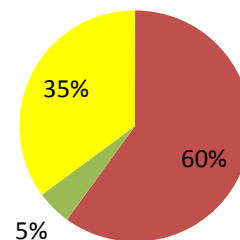
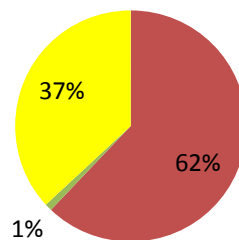
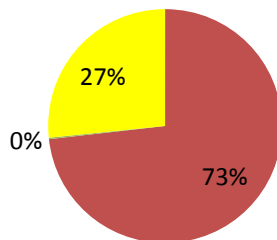
Primary



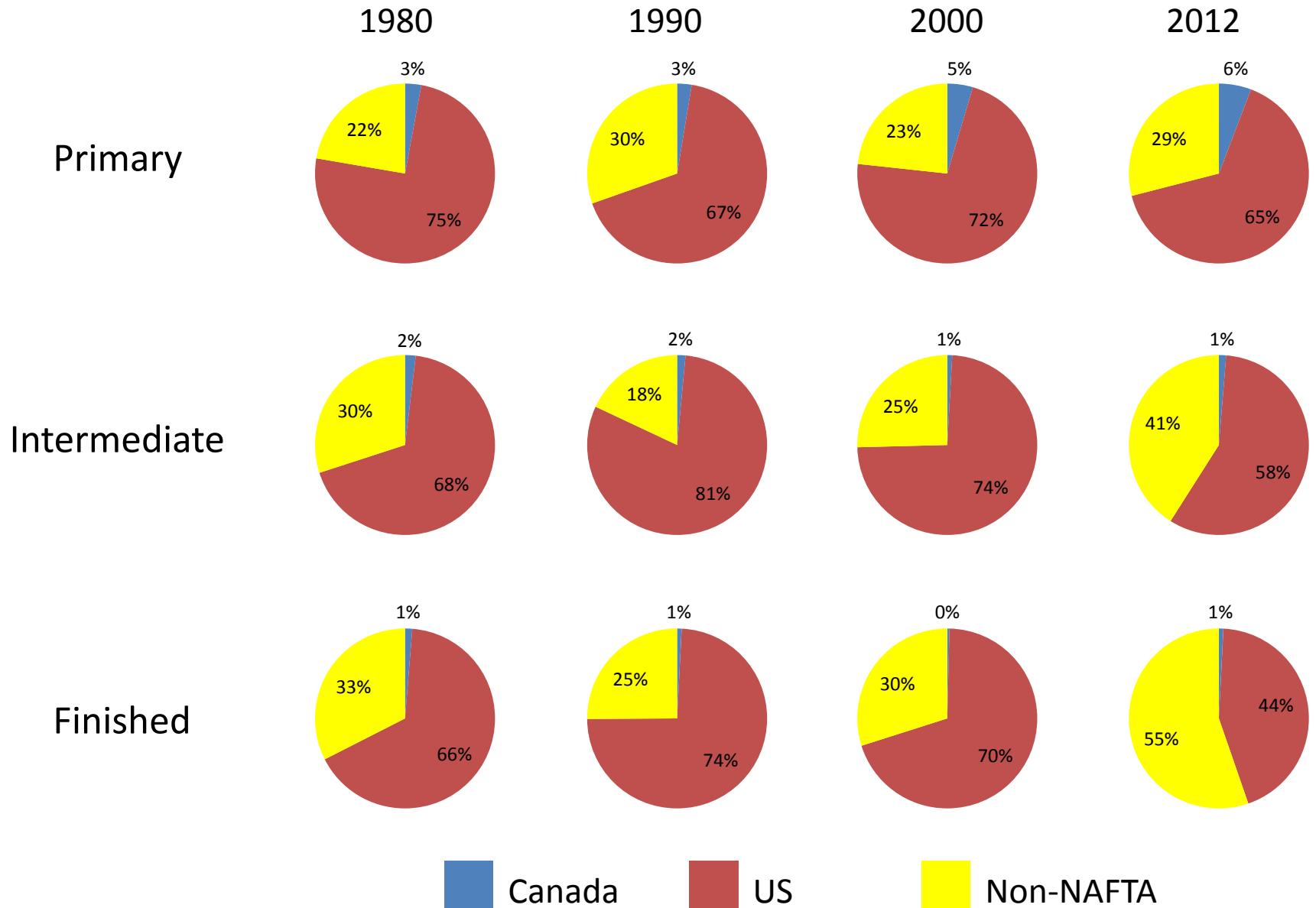
Intermediate



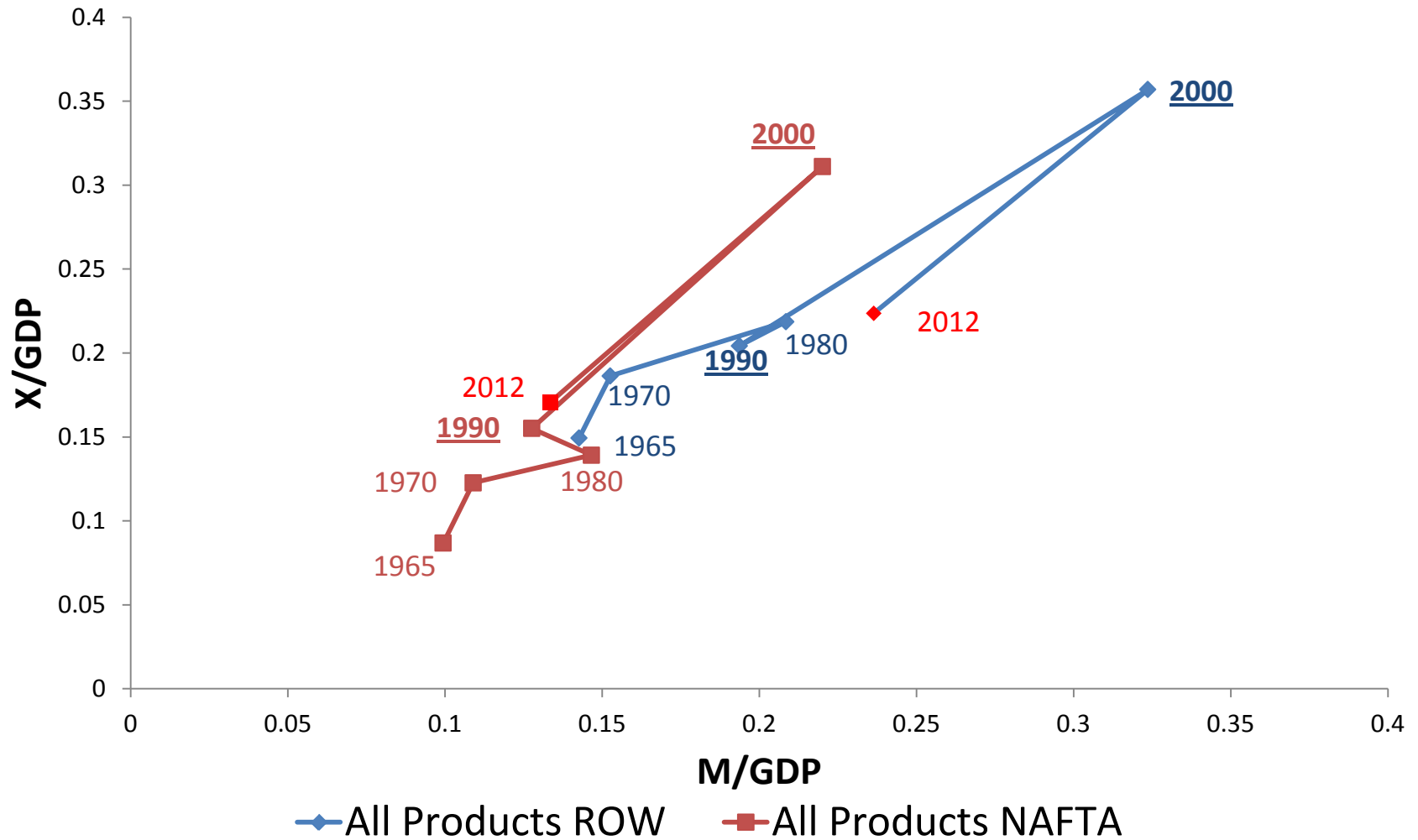
Finished



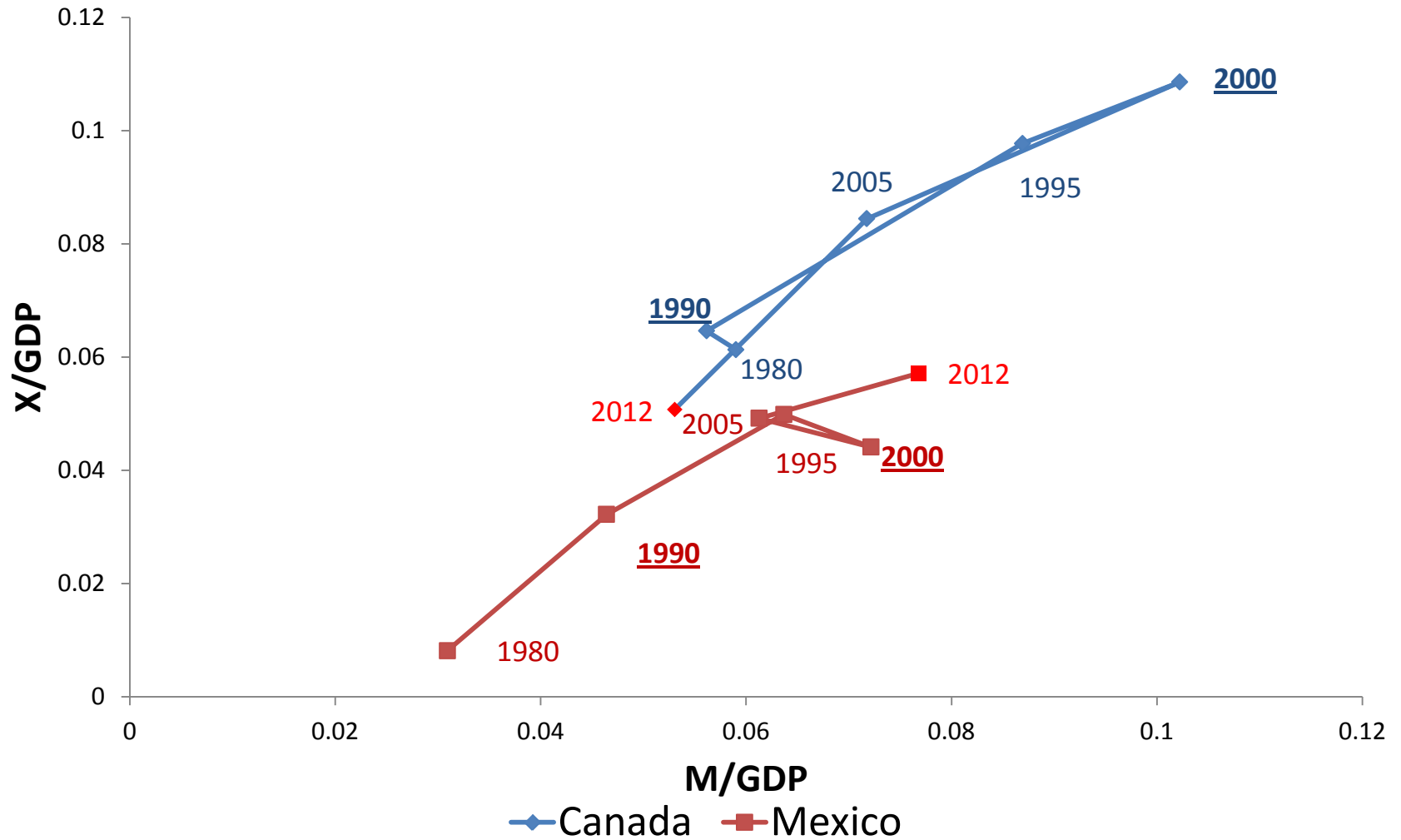
# Table 2.5 Share of Mexican total Imports



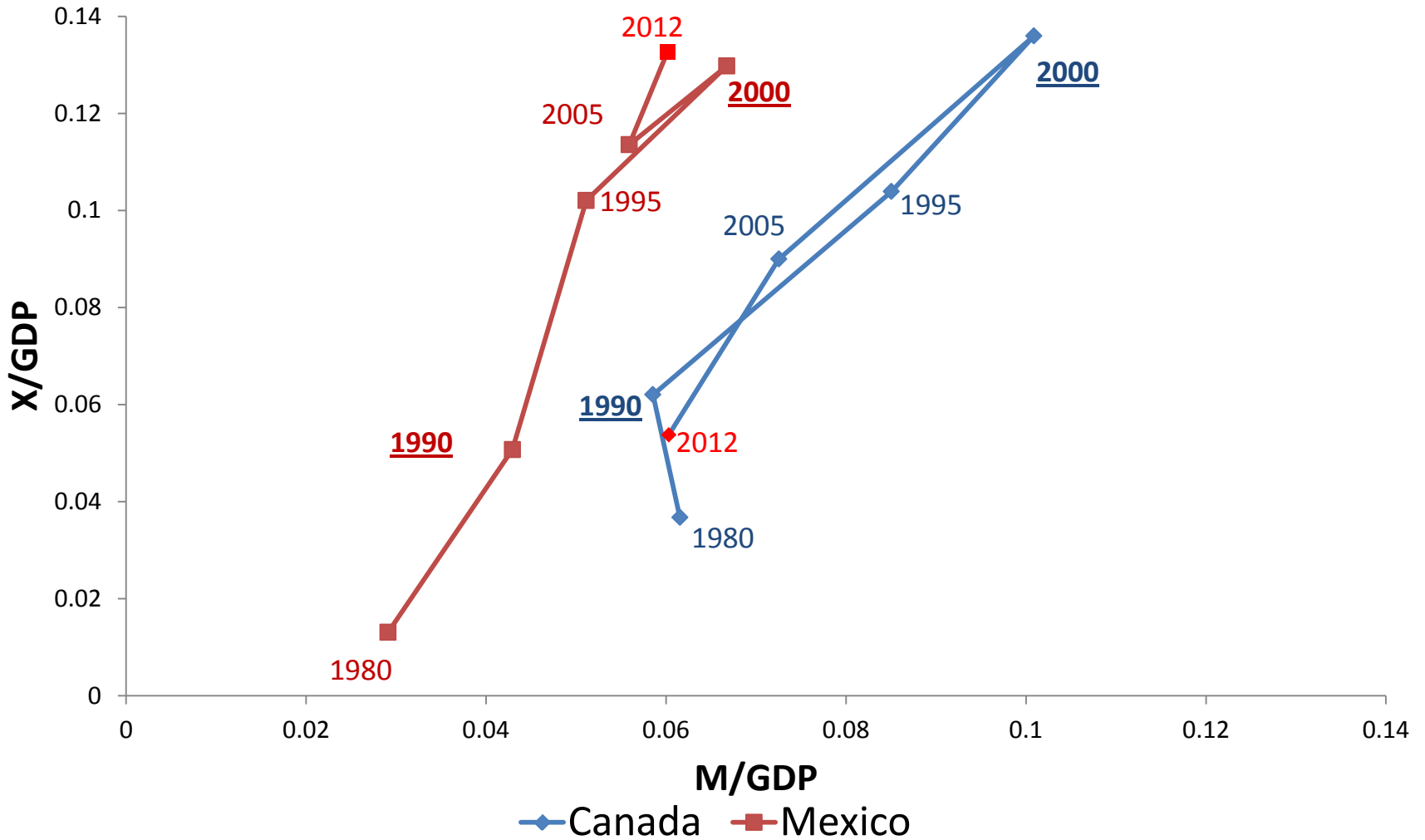
# Canada Trade 1965-2012



# Intermediate Product NAFTA Trade

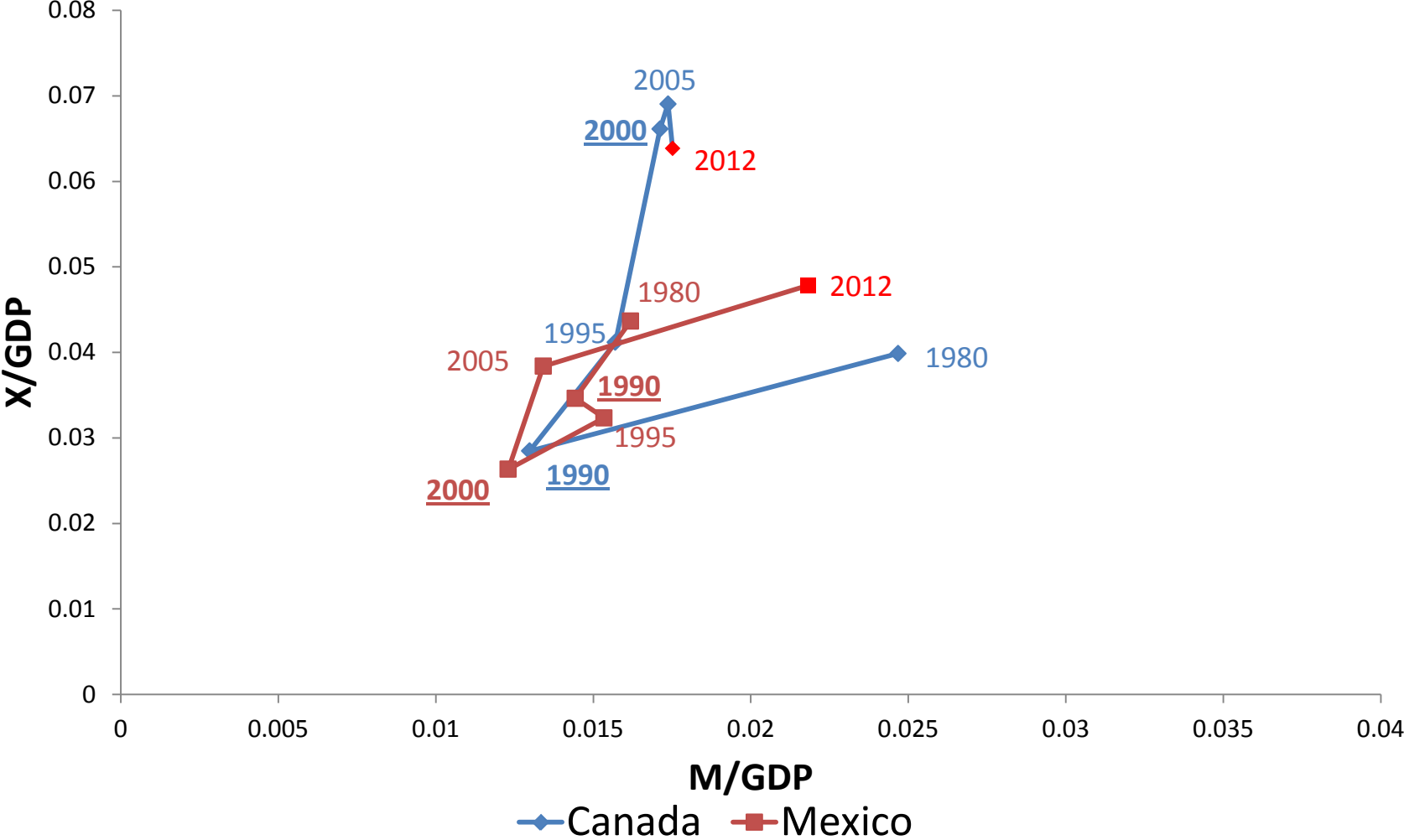


# Finished Product NAFTA Trade

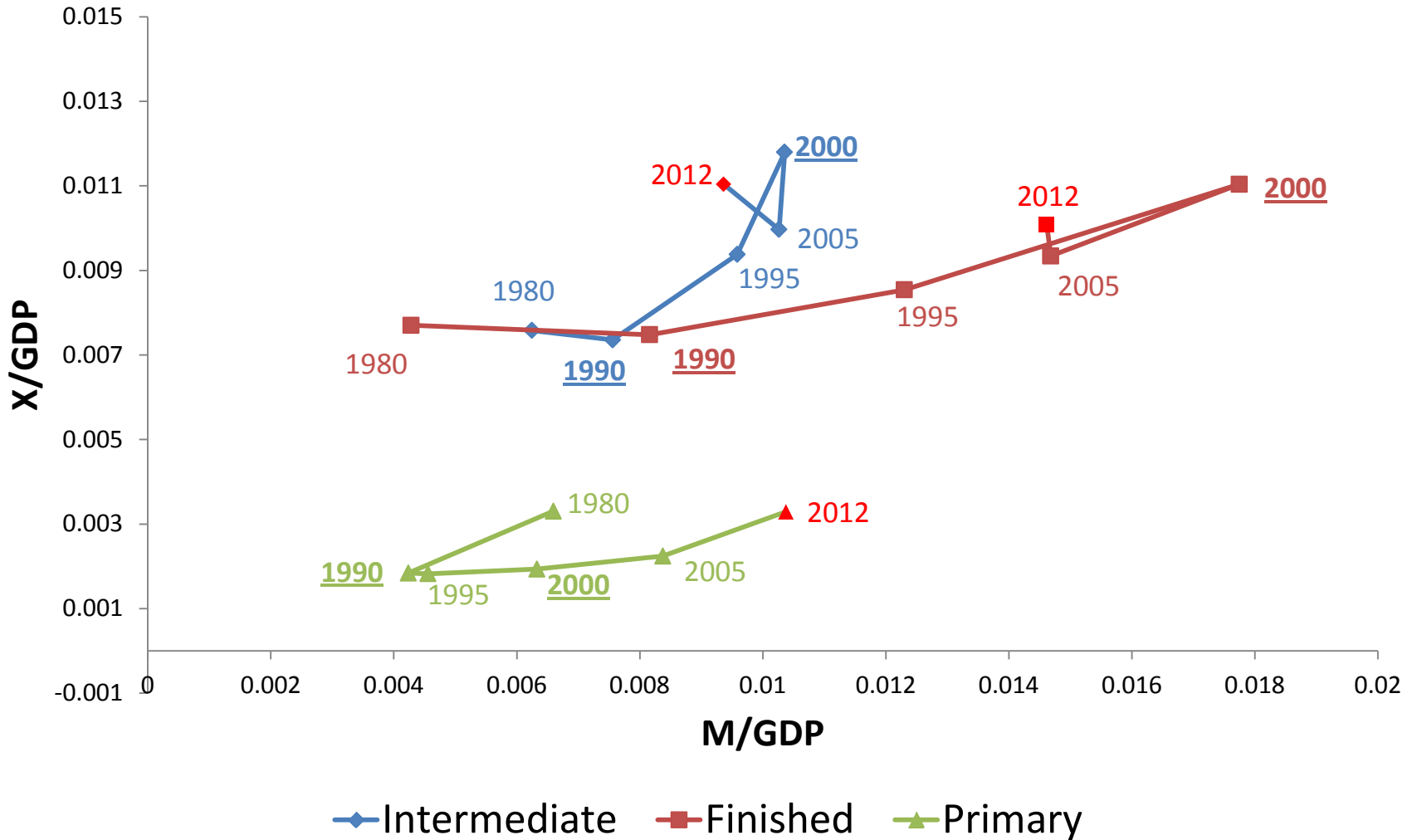




# Primary Product NAFTA Trade



# US NAFTA Trade



## Findings so far:

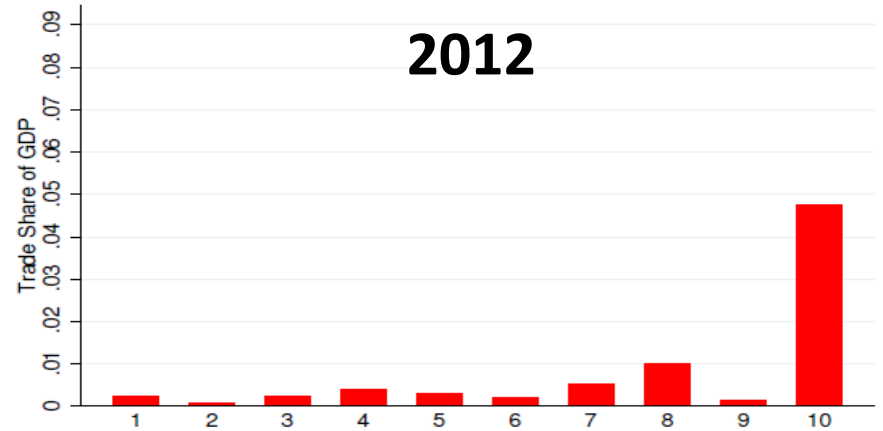
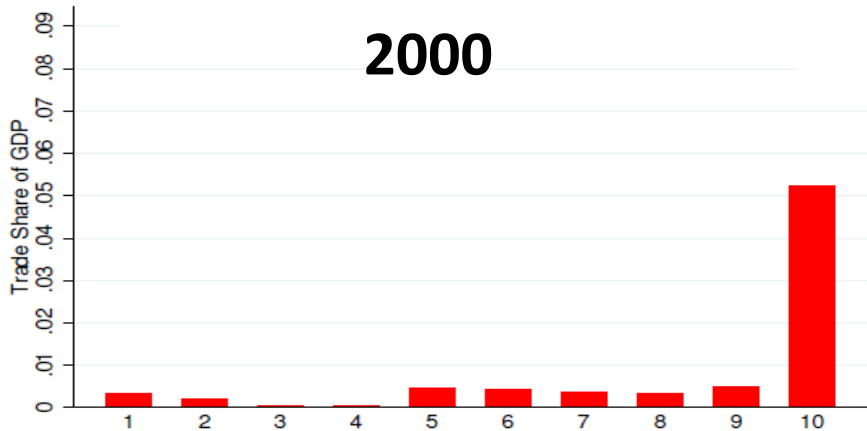
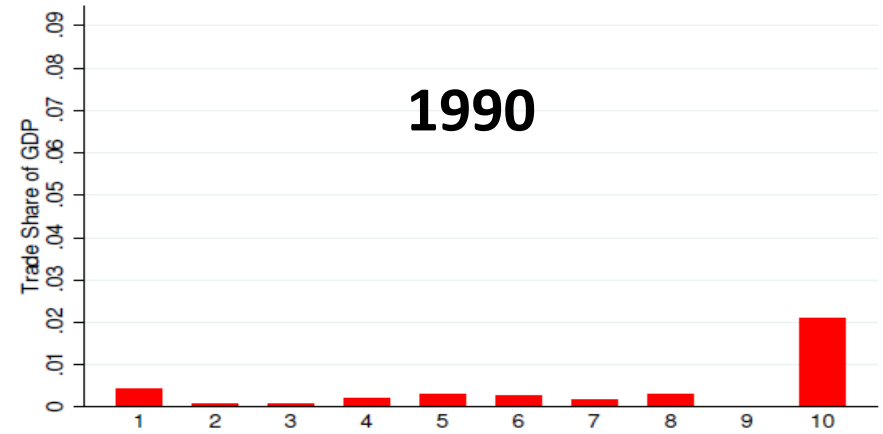
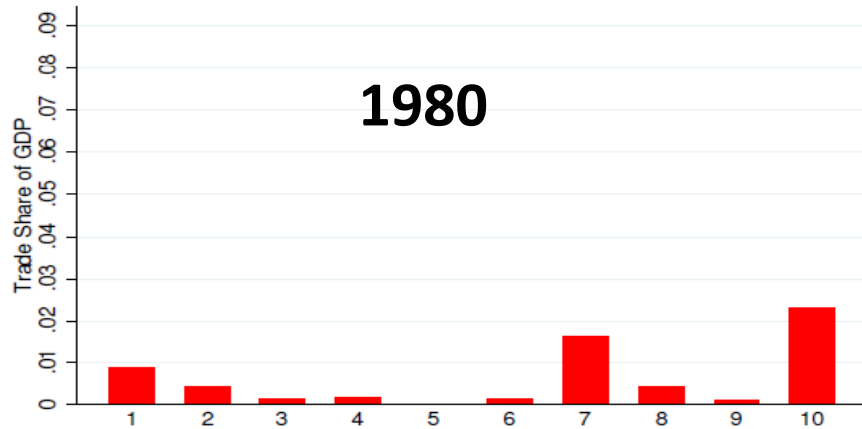
- Whether it is with respect to finished or intermediate products, Canada has suffered a sharp contraction of its trade in relation to its GDP measured in US \$ from 2000;
- This contraction is mainly with respect to NAFTA trade;
- Mexico trade expansion in finished and intermediate products in relation to its own GDP (in US \$) has been significant.
- The Canadian trade contraction does not date back to 2008 but has started in early 2000.
- There is a noticeable 'bullwhip' type-effect (intermediate products contracting more than finished products). This is usually noted as a short-term phenomenon.

### 3. Non-Commodity Composition of Trade

We use three different metrics mostly at the two digit level:

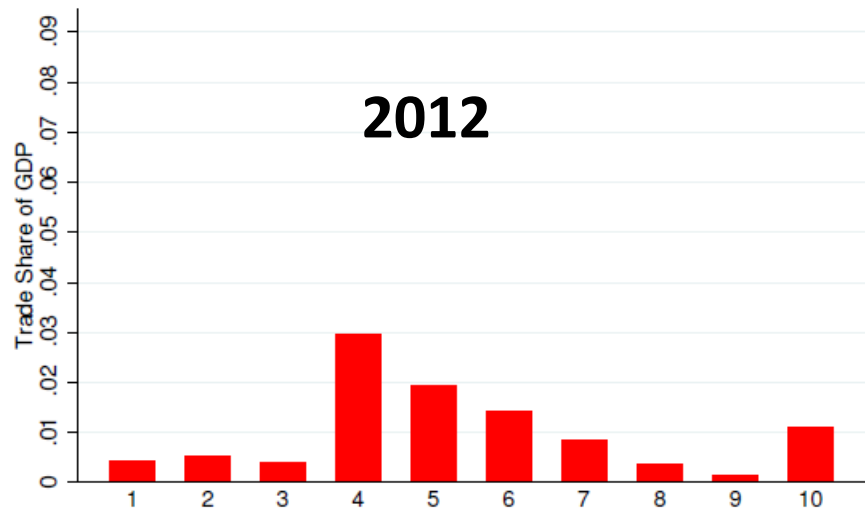
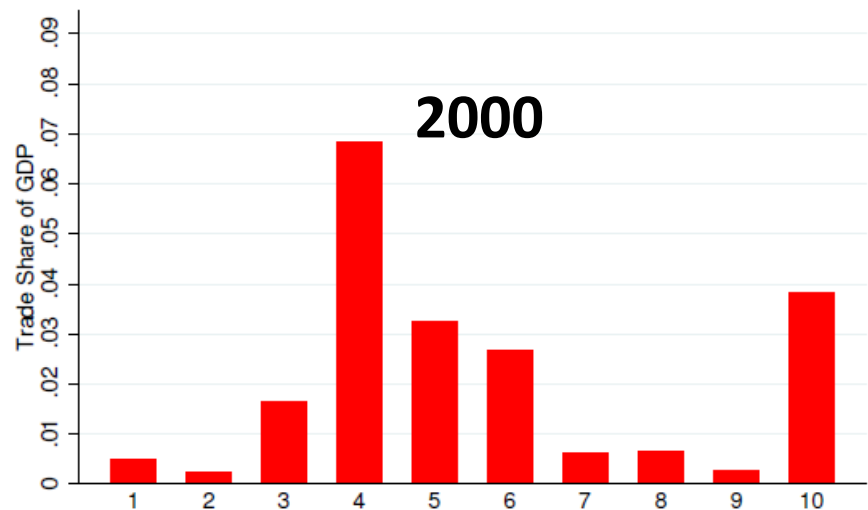
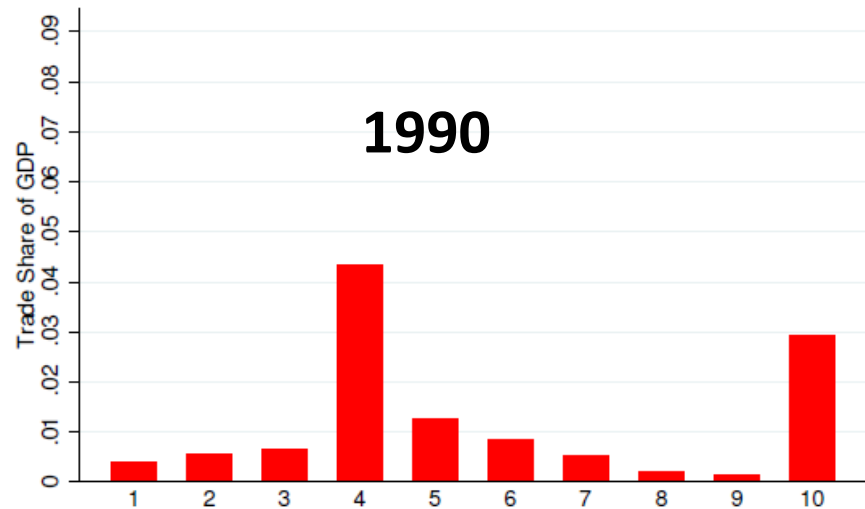
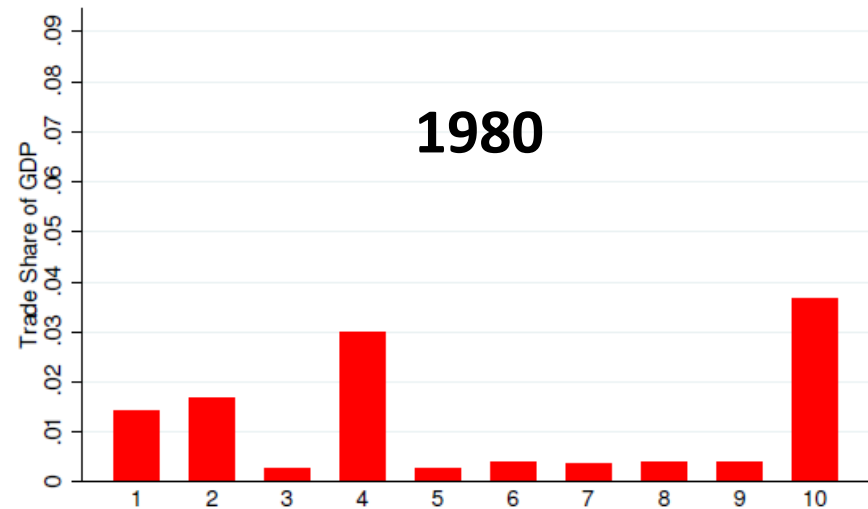
1. The export-import intensity:  $XMI_i = X_i / M_i$
  2. Trade-GDP ratio:  $Vol_i = (X_i + M_i) / GDP$
  3. Revealed Comparative Advantage:  $RCA_i = X_i - M_i$
- XMI is interpreted as a proxy for international competitiveness of the home relative to the foreign partner (whether due to comparative advantage differences, wages, exchange rates, taxes, scale economies, market size, etc);
  - Vol is interpreted as a proxy for openness.

# Canada-NAFTA Trade Shares of GDP Primary Products



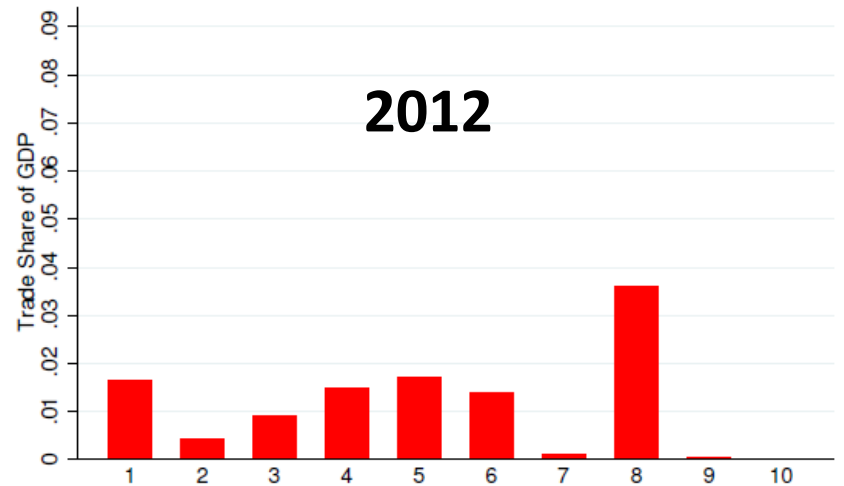
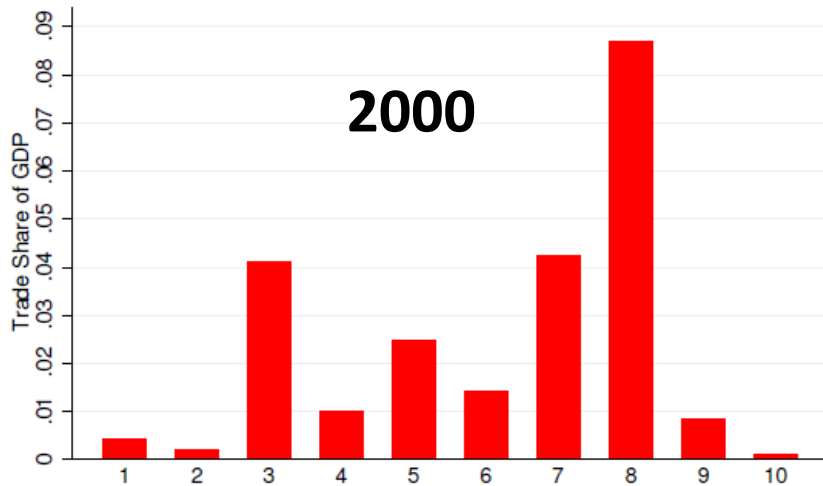
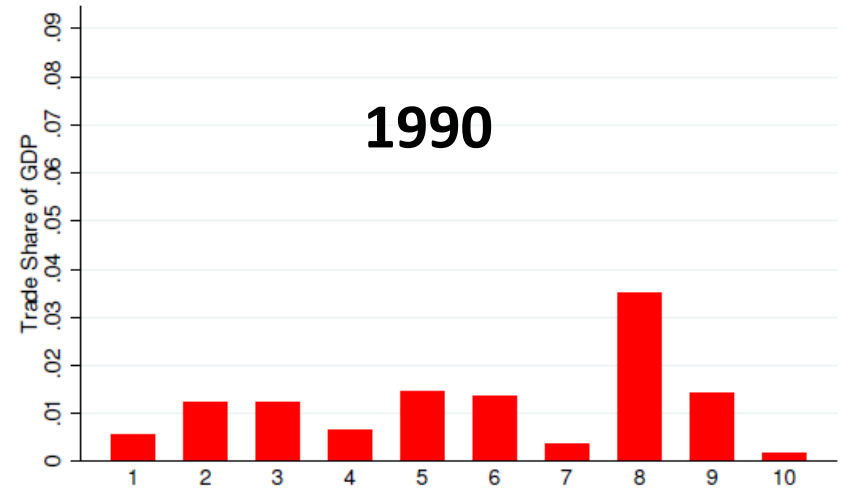
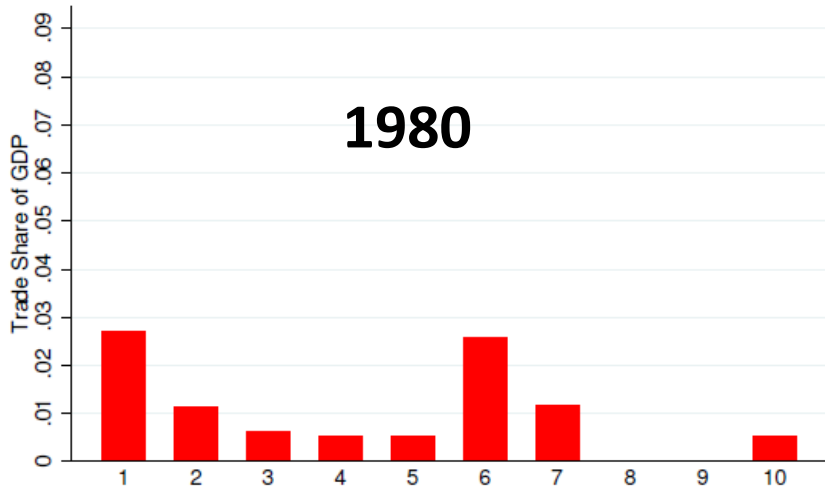
Bins are defined over ranges of  $\log(\text{exports}/\text{imports})$ , centred at 0. Bin interval: 0.17474.

# Canada-NAFTA Trade Shares of GDP Intermediate Products



Bins are defined over ranges of  $\log(\text{exports}/\text{imports})$ , centred at 0. Bin interval: 0.17474.

# Canada-NAFTA Trade Shares of GDP Finished Products



Bins are defined over ranges of  $\log(\text{exports}/\text{imports})$ , centred at 0. Bin interval: 0.17474.

# Trade Volume

Trade volumes relative to GDP increased substantially during the first NAFTA decade (1990-2000) with respect to ROW:

This can also be measured with:

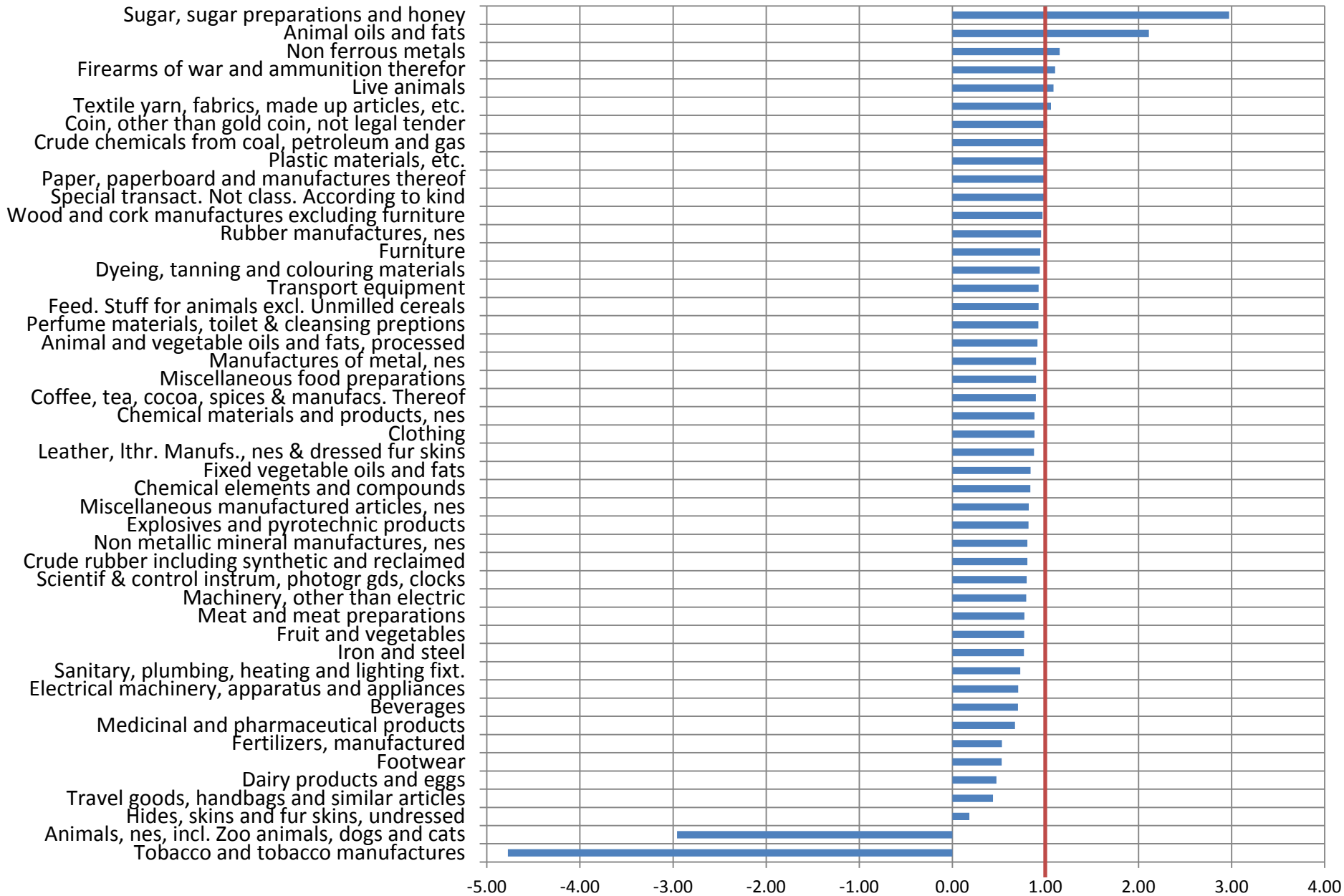
$$\frac{\Delta(X + M)_{1990-2000}^{NAFTA}}{\Delta(X + M)_{1990-2000}^{ROW}}$$

In the next two Tables, we concentrate on non-commodity sectors only (i.e. without commodity sectors as defined by BofC).

- In only a few sectors did NAFTA and ROW trade volumes changed in a different direction;
- The unweighted mean of the positive ratios is 0.91;
- Thus, on average, NAFTA had a very strong across the board volume effect.



# Ratio of NAFTA Trade Volume Increase to ROW (1990 to 2000)



# Revealed Comparative Advantage Rankings, Non-Commodity Trade 1990 and 2000

SITC	Name	Rank 1990	Rank 2000		SITC	Name	Rank 1990	Rank 2000	
71	Machinery, other than electric	1	1		57	Explosives and pyrotechnic products	25	29	↓
72	Electrical machinery, apparatus and appliances	2	2		23	Crude rubber including synthetic and reclaimed	26	25	↑
89	Miscellaneous manufactured articles, nes	3	3		11	Beverages	27	23	↑
86	Scientif & control instrum, photogr gds, clocks	4	4		43	Animal and vegetable oils and fats, processed	28	31	↓
84	Clothing	5	10	↓	8	Feed. Stuff for animals excl. Unmilled cereals	29	30	↓
5	Fruit and vegetables	6	11	↓	96	Coin, other than gold coin, not legal tender	30	38	↓
65	Textile yarn, fabrics, made up articles, etc.	7	8	↓	94	Animals, nes, incl. Zoo animals, dogs and cats	31	32	↓
69	Manufactures of metal, nes	8	5	↑	42	Fixed vegetable oils and fats	32	36	↓
66	Non metallic mineral manufactures, nes	9	16	↓	2	Dairy products and eggs	33	27	↑
59	Chemical materials and products, nes	10	9	↑	41	Animal oils and fats	34	34	
58	Plastic materials, etc.	11	18	↓	12	Tobacco and tobacco manufactures	35	33	↑
85	Footwear	12	14	↓	52	Crude chemicals from coal, petroleum and gas	36	35	↑
54	Medicinal and pharmaceutical products	13	6	↑	51	Chemical elements and compounds	37	12	↑
7	Coffee, tea, cocoa, spices & manufacs. Thereof	14	20	↓	1	Meat and meat preparations	38	40	↓
62	Rubber manufactures, nes	15	17	↓	21	Hides, skins and fur skins, undressed	39	37	↑
53	Dyeing, tanning and colouring materials	16	15	↑	82	Furniture	40	42	↓
6	Sugar, sugar preparations and honey	17	26	↓	63	Wood and cork manufactures excluding furniture	41	43	↓
55	Perfume materials, toilet & cleansing preptions	18	13	↑	0	Live animals	42	39	↑
67	Iron and steel	19	7	↑	56	Fertilizers, manufactured	43	41	↑
81	Sanitary, plumbing, heating and lighting fixt.	20	19	↑	93	Special transact. Not class. According to kind	44	47	↓
95	Firearms of war and ammunition therefor	21	28	↓	68	Non ferrous metals	45	44	↑
61	Leather, lthr. Manufs., nes & dressed fur skins	22	22		25	Pulp and paper	46	45	↑
83	Travel goods, handbags and similar articles	23	21	↑	73	Transport equipment	47	48	↓
9	Miscellaneous food preparations	24	24		64	Paper, paperboard and manufactures thereof	48	46	↑

Changes in Rank: ■ : [0,2] ■ : [3,5] ■ : [6,10] ■ : >10

- Revealed comparative advantage for non-commodity sectors shows remarkable stability during the period 1990-2000.
- The sum of absolute rank changes is lowest during 1990-2000 with respect to all other periods during 1965-2012.

**Thus the NAFTA decade is mainly about changes in the volume of trade in non-commodities, not so much about inter-industry changes or changes in the patterns of specialization within manufacturing.**

## 4. The Great Reversal

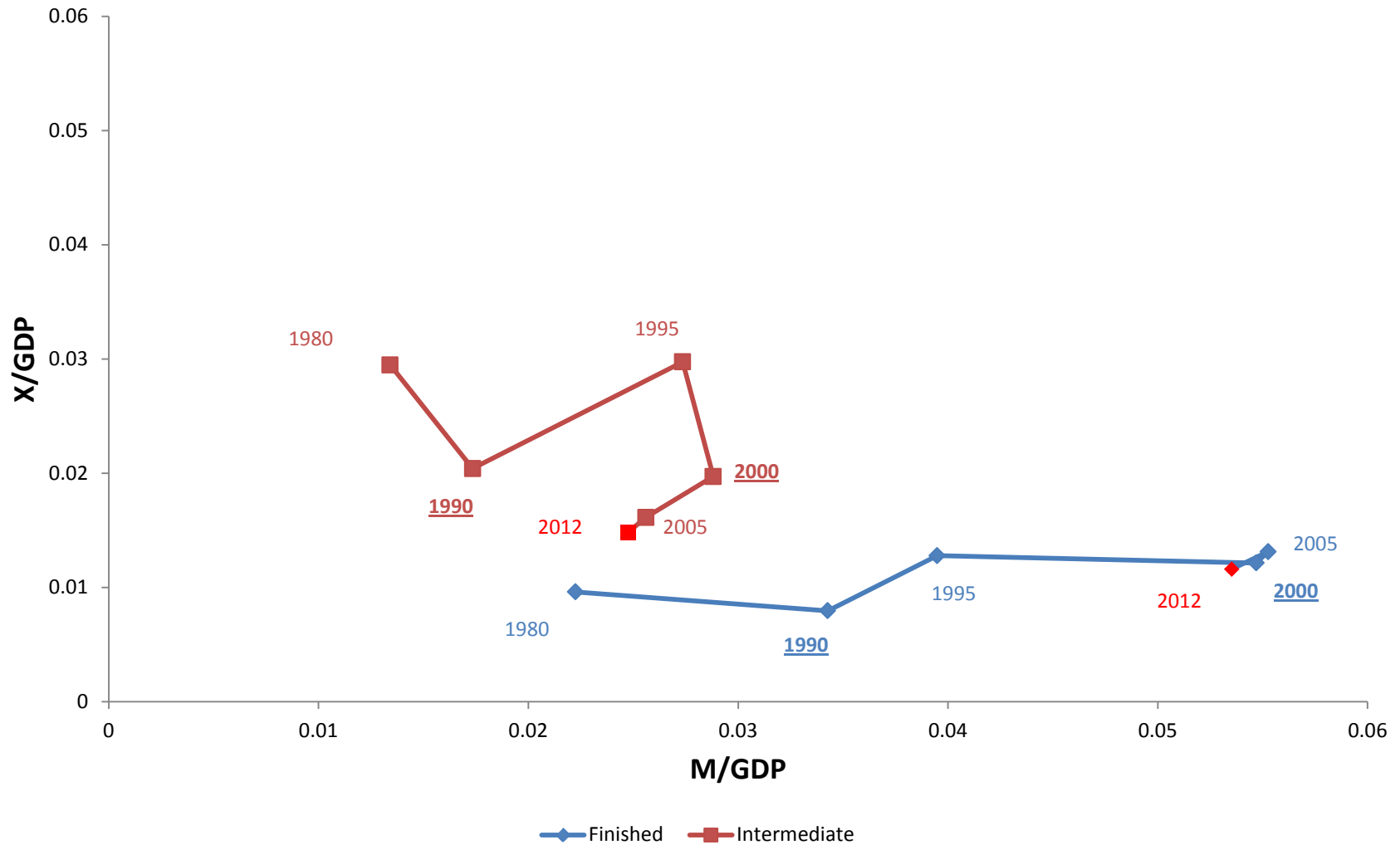
What could account for the simultaneous collapse of export and import volumes relative to GDP during the 2000-12 period?

1. Non-NAFTA trade effects (China and other low cost competitors);
2. Services;
3. Dutch Disease.

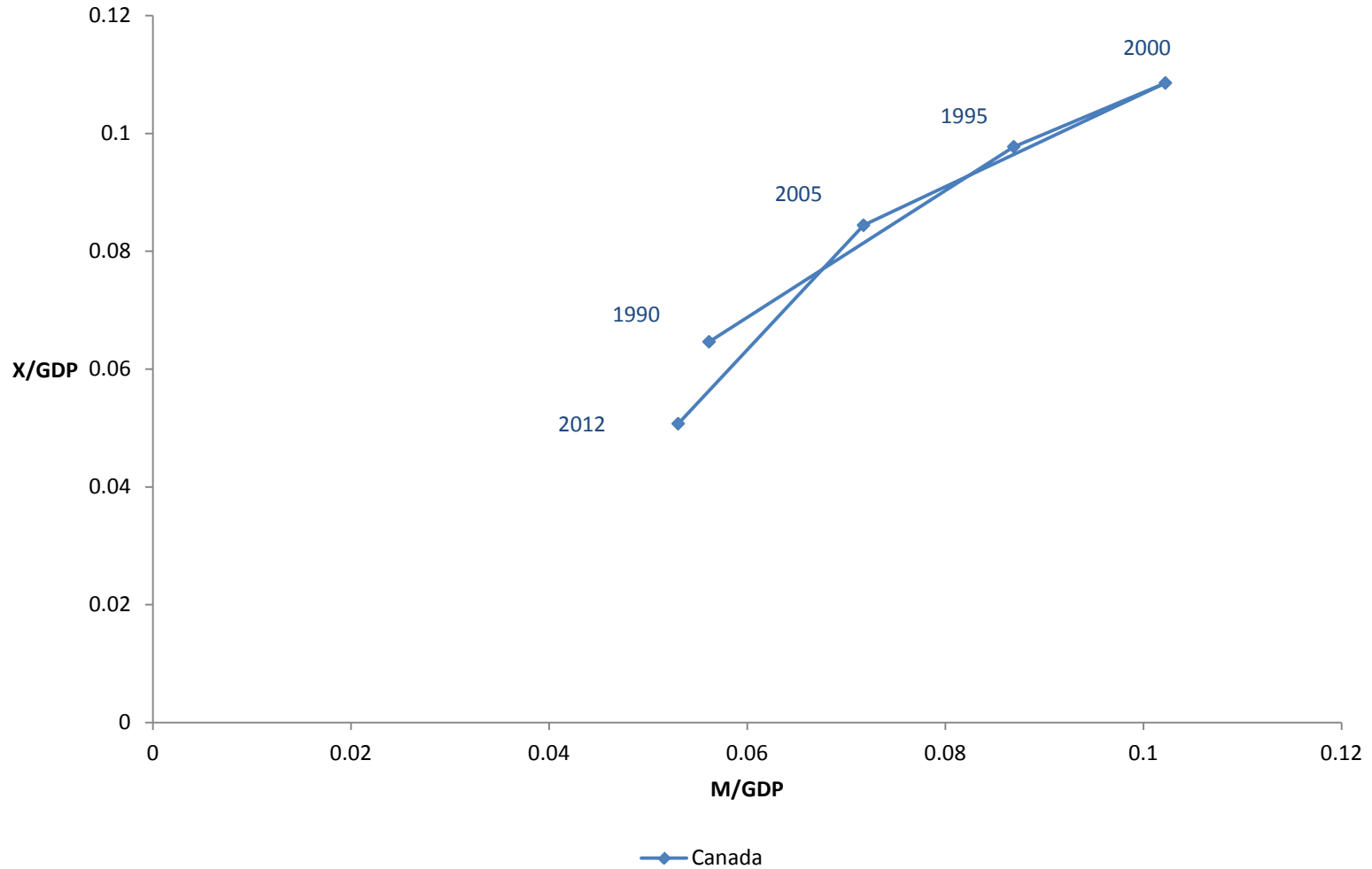
## 4.1 Non-NAFTA effects

- There is some evidence of an increase in the share of non-NAFTA trade in intermediate products.
  - This was reflected already in the higher ratio of non-NAFTA to NAFTA trade in this category of products;
- This is even more the case for finished products.

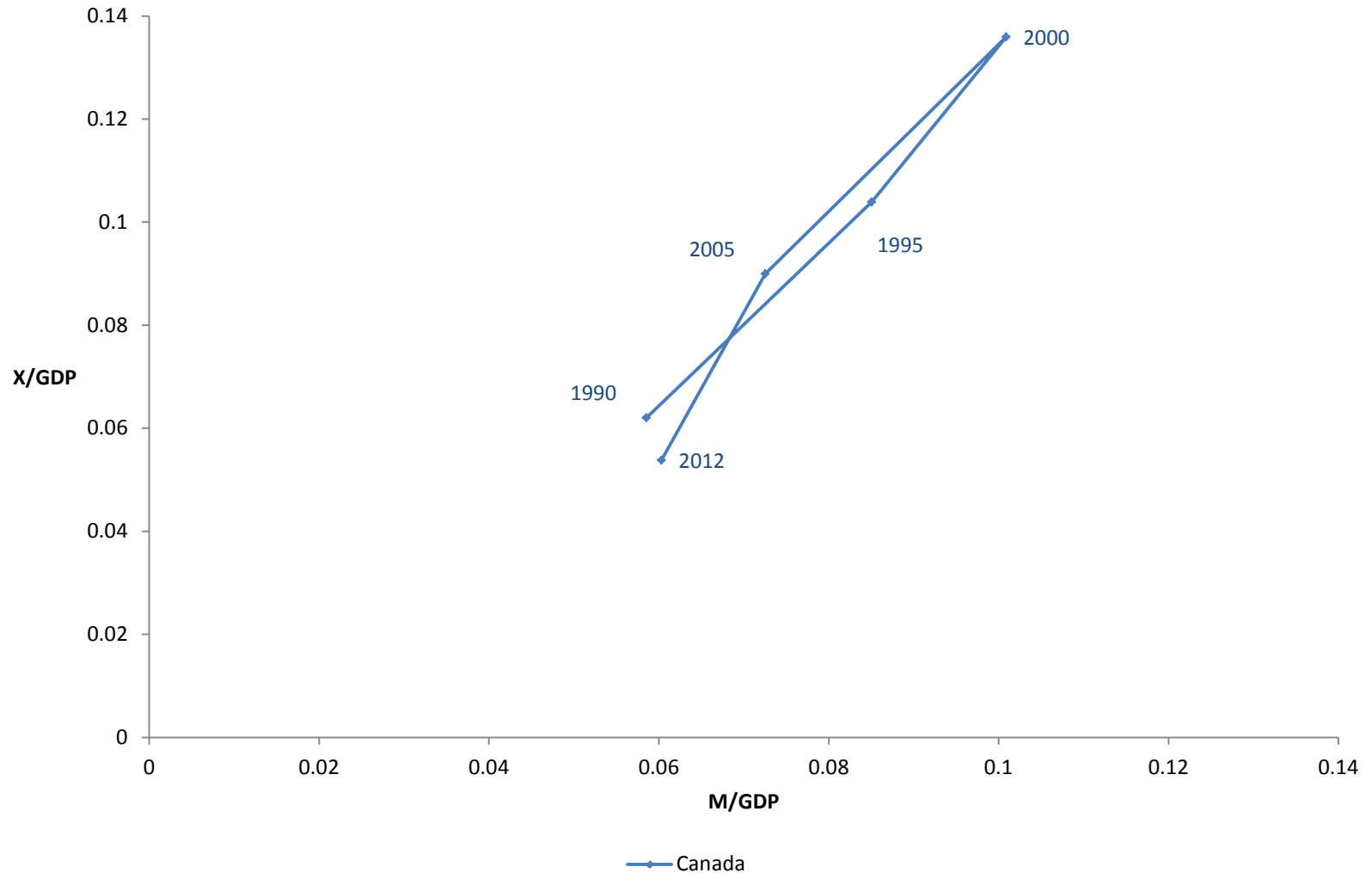
# Canada Non-NAFTA Trade in Intermediate and Finished Products



# Intermediate Product NAFTA Trade



# Finished Product NAFTA Trade



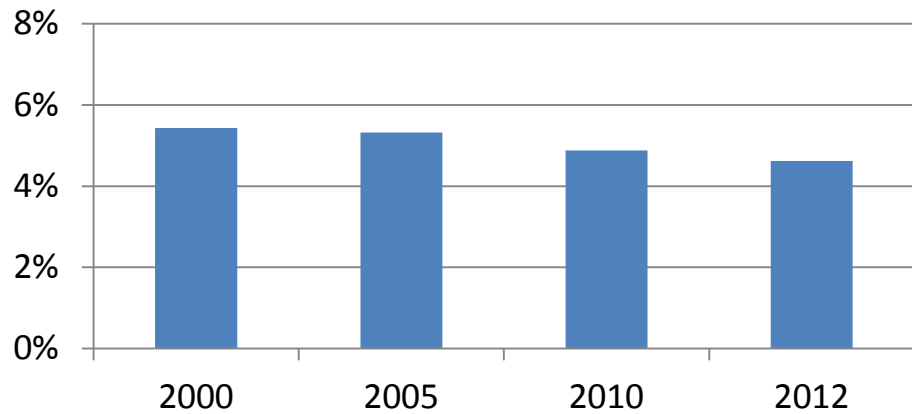


## 4.2 Services

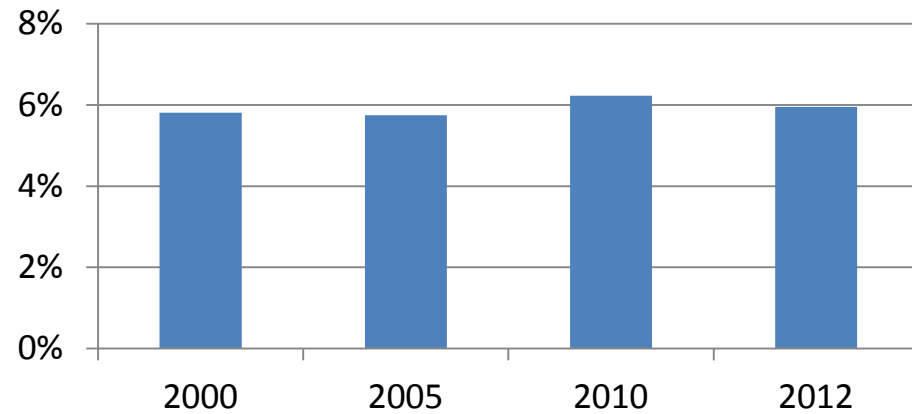
- Could the decrease in good trade after 2000 reflect a change in the structure of trade with service trade increasing a lot?
- Unlikely to be a valid explanation: service trade as a proportion of GDP has remained fairly constant from 2000 to 2012.

# Canada Service Trade Ratios

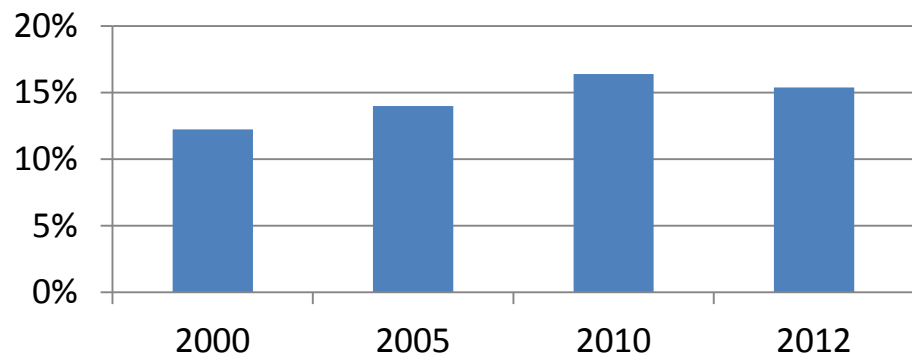
## Ratio service exports to GDP



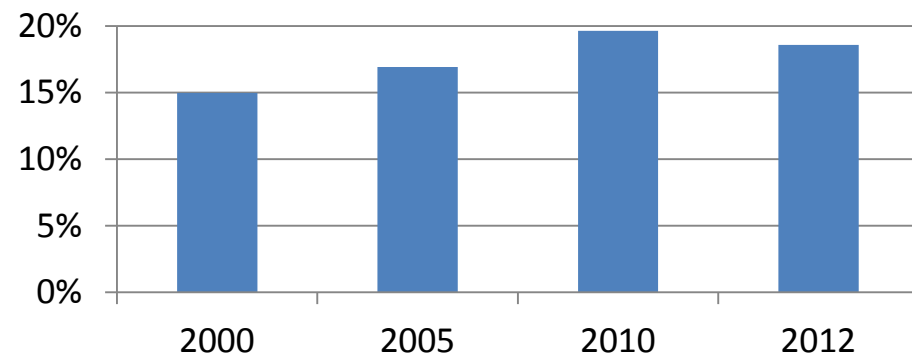
## Ratio service imports to GDP



## Ratio service exports to total export



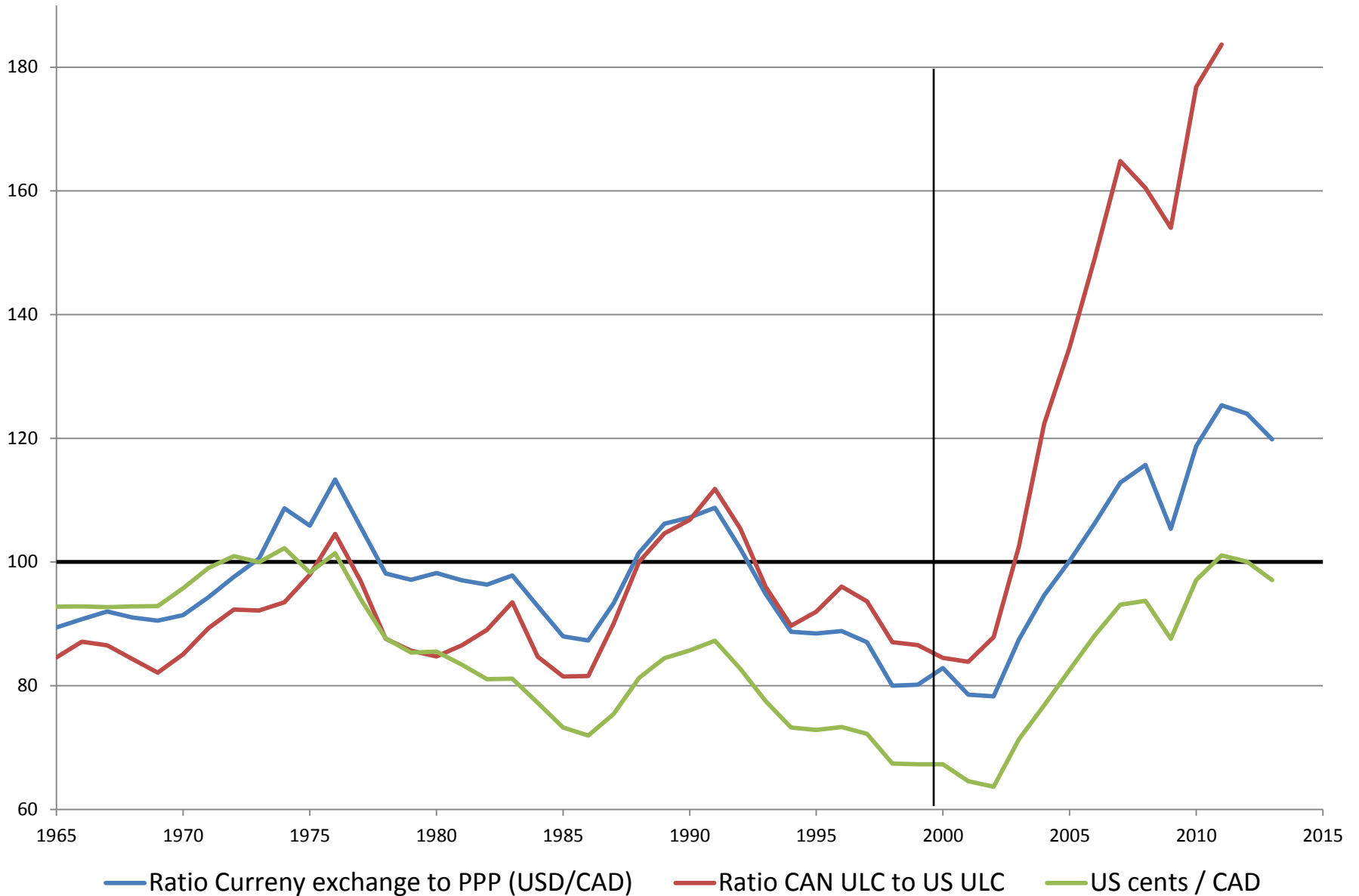
## Ratio service imports to total imports



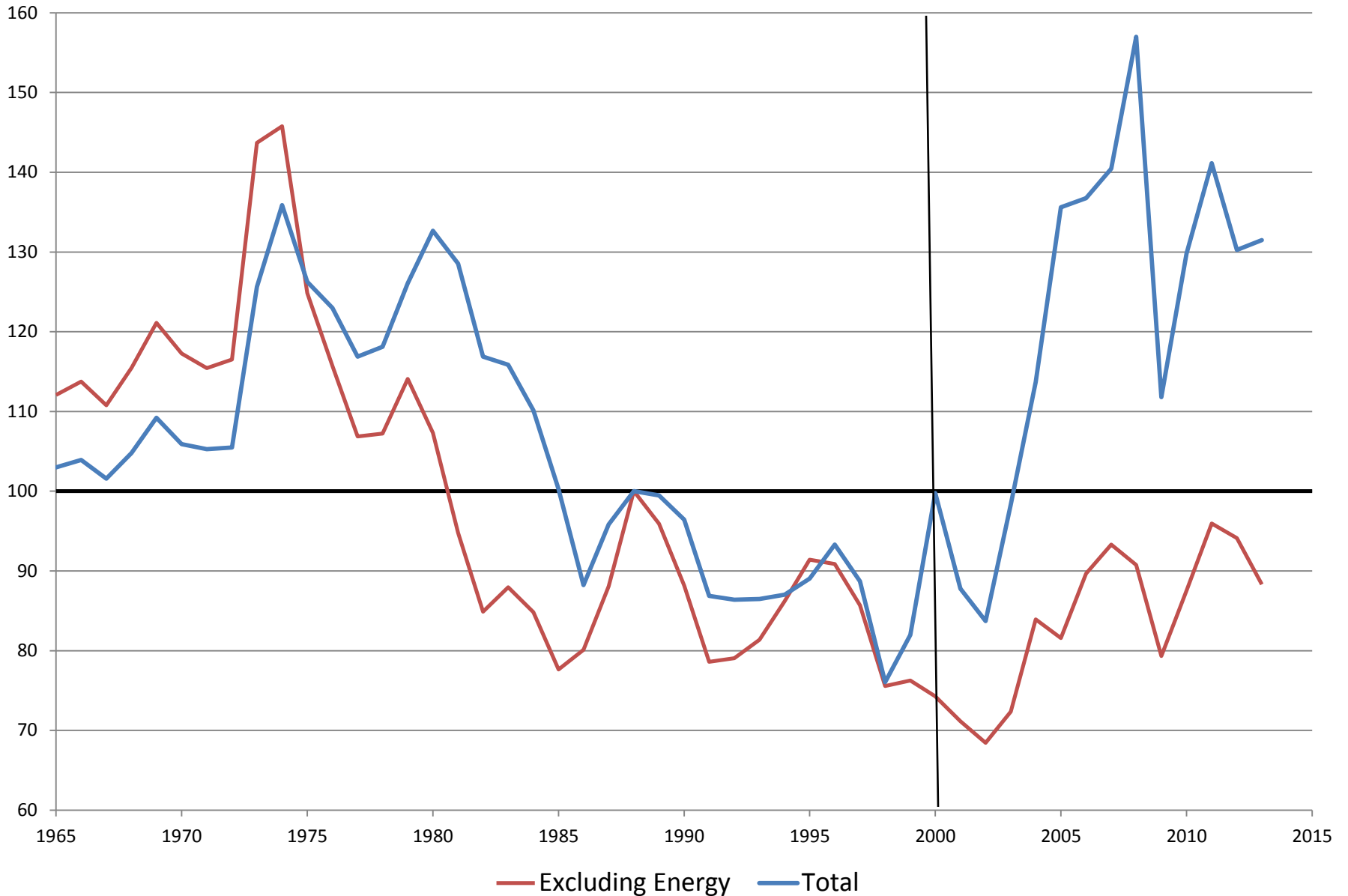
## 4.3 Dutch Disease

- The commodity composition of natural resource exports has shifted strongly toward energy:
  - 60% of primary exports in 2012; 30% in 1990.
- The Canadian dollar has appreciated from 62 cents in 2002 to above par in 2011.
- The commodity/industrial terms of trade have increased by 30% between 2000 and 2012
- There is virtually no debate that since 2000 the energy sector qualifies as Canada's booming sector

# Exchange rate indexes (1988 = 100)



# Commodity Terms of Trade Indexes (1988 = 100)



This has led to arguments about **Dutch Disease** in Canadian Manufacturing exports due to exchange rate appreciation.

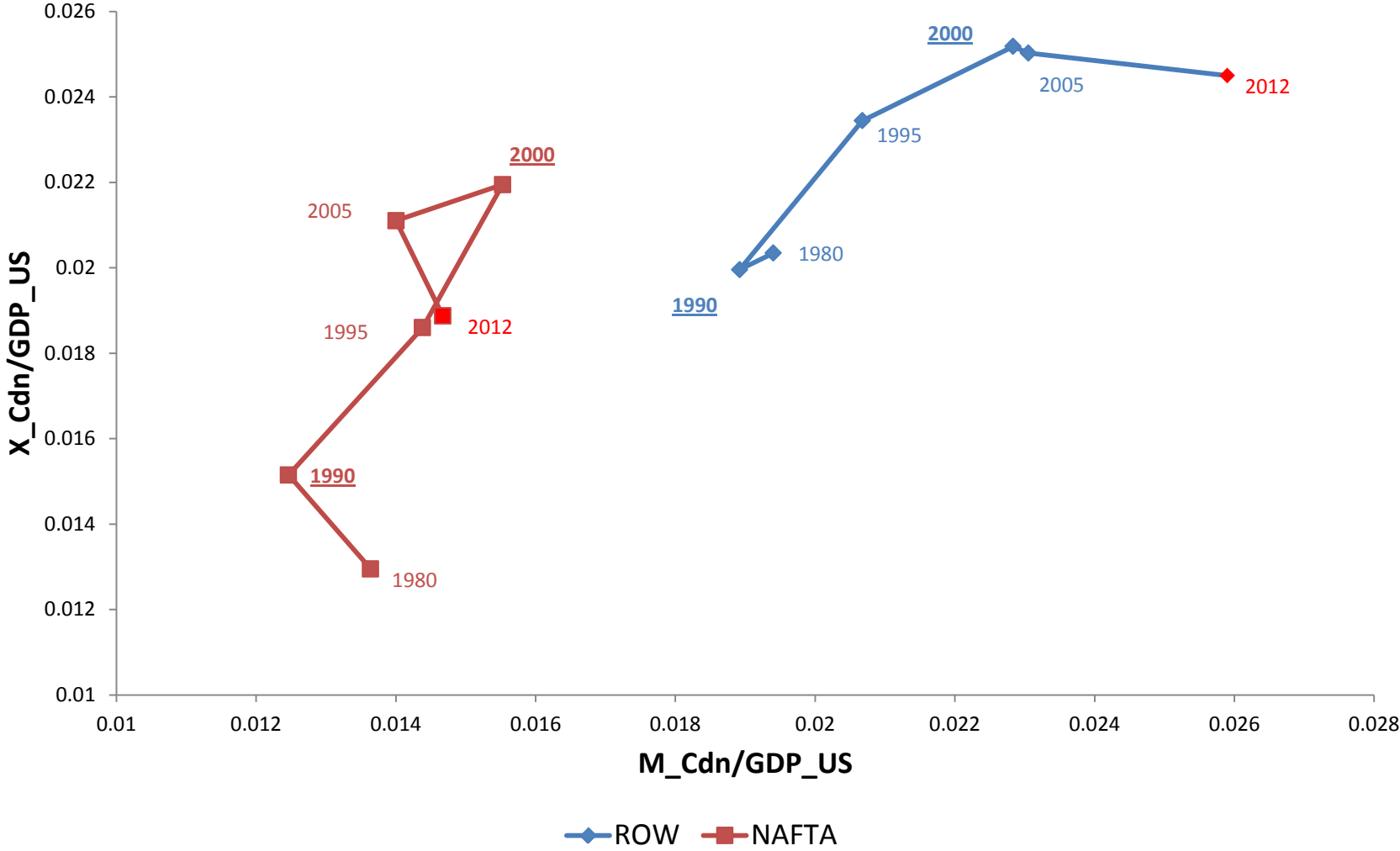
Focus here on two channels of influence of the exchange rate:

Channel 1: Exchange rate affects reflects relative competitiveness of Cdn goods in other market and thus USD revenues of Canadian exporters per USD of foreign income;

Channel 2: Appreciation of the Canadian dollar raises the USD value of Canadian income relative to US income at market exchange rates.

To appreciate this second channel, suppose we measured Canadian trade with respect to US GDP (next slide) –where is reversal in exports for NAFTA?

# Canada Trade/US GDP Ratio



How important is each of these channels quantitatively?

**Channel 2:**

US to Can market size in common currency	2000	2012
Y_US/Y_Cdn in current USD	14.103	8.919

- Exclude any impact of the exchange rate change on relative competitiveness (expenditure switching) by assuming export demand in foreign market is unit elastic or constant expenditure share of foreign income is spent on Canadian non-commodity exports; assume supply is perfectly elastic.
- These imply  $X=cY^*$  where  $Y^*$  foreign income and  $c$  a constant
- Given US is most of Canada's export market, assume  $Y^*/Y_{can}=Y_u/Y_{can}$ ;
- $Y^*/Y_{can}$  **fell by 37%** from 2000 to 2012 (see above table)
- Under these assumptions, the trade ratio  $X/Y_{can}$  would have fallen by 37% to approximately 0.19 taking income changes as exogenous.



Actual data: export/GDP ratio for manufacturing	2000	2012
X_Cdn/Y_Cdn	.300	<b>.161</b>

- 79% of the observed change in the export trade ratio can be attributed to this 2<sup>nd</sup> channel and thus by the impact of the Canadian dollar appreciation on Canadian income when measured in USD;
- This is NOT a loss of competitiveness in US market leading to lower revenues for Canadian exporters per dollar of US income.

### **Channel 1:**

- There is still some role left for the relative price effect of the exchange rate on export competitiveness but this is quantitatively much less important—about 20% of observed trade ratio change.
- Using an export price elasticity of -1.4 fully explains the collapse in the trade ratio from 0.30 to 0.16 using a basic export demand model with perfectly elastic supply.
- Most trade models assume much large (absolute) elasticities.

- Our interpretation then is that rapid Canadian GDP growth relative to the US when measured in a common currency was responsible for the collapse and this in turn was mostly due to the exchange rate valuation impact and not a competitiveness effect on export revenues benchmarked against US income.
- In the face of a historically unprecedented increase in the exchange rate Canadian exporters managed to retain a surprisingly stable share in the NAFTA market—possibly a major under appreciated side effect of NAFTA although it is difficult to know what the counterfactual would have been without NAFTA.
- This is at least consistent with the view that the export to GDP ratio is reversible, not permanent, and therefore Canada is not destined to suffer Dutch Disease.

## Second part of Reversal: the Import contraction:

Import-GDP ratio (all goods)	2000	2012
M_Cdn/Y_Cdn	.306	.220

- This data cannot be rationalized by using a simple import demand model depending on prices and incomes as imports should have risen as exchange rate appreciated and not fallen—this is a major paradox and not part of a usual Dutch Disease story
- Partial resolution of the paradox involves the role of imports as inputs to export production (global value chains)
- Divide total imports  $M$  into  $M_d$  (for domestic use) and  $M_x$  (for use as inputs into export production)
- Assume unitary import price elasticity of demand for imports for domestic use; thus  $M_d = bY_{can}$

- If  $M_x = mX$ , value-added exports are given by  $X - M_x = (1 - m)X$ , a constant fraction of total exports;
- Use the equation  $M = bY_{\text{can}} + mX$  and fit to observed trade ratios  $M/Y_{\text{can}}$  and  $X/Y_{\text{can}}$  for 2000 and 2012;
- This calibration exercise gives a value for  $m$  of 58%—a relatively high number for the import content of exports in manufacturing for Canada, but not inconsistent with some of the evidence on this number which are quite high (in range of 30 to 50%);
- Recent JIE study by Johnson and Noguera(2012) using 2004 data estimate ratio for Canadian manufacturing at 0.56—remarkably close to our calibrated value of 0.58.

## **Conclusion for the import contraction:**

- Fall in the import ratio can be explained in substantial part by the fall in the export ratio and a high import content of export production although explanation does not appear complete;
- An elasticity of substitution greater than one between imports and other inputs in the production of exports could go some ways to a more plausible parameterization of this effect now taking into account the role of the exchange rate on input substitution— as Canadian dollar appreciated imported inputs became cheaper— with substitution elasticity greater than one this would increase total spending on imported inputs per dollar of export sales thus raising  $m$ .
- The import reversal is inconsistent with the basic Dutch Disease model and even if that theory were correct for exports it cannot be reconciled with the observed import data.

## 5. Conclusions

- Canadian trade in non-commodity goods has increased steadily since the 1960's;
- This growth accelerated after the Canada-US Free Trade Agreement signed in 1988 and NAFTA in 1994;
- Trade specialization within the non-commodity sector has been remarkably stable since the implementation NAFTA;
- The principal feature of the NAFTA decade (1990-2000) was a substantial growth in trade volumes in the non-commodity sector;
- During the same period commodity trade was fairly stable but with a significant shift towards energy exports;
- There is evidence of increased specialization within the primary goods sector and most of the trade increase is with NAFTA partners.

- Since 2000 Canada's trade ratios have contracted significantly to the extent that by 2012 most of the trade expansion observed in the first NAFTA decade was completely reversed;
- How can this be explained and is it related in any way to NAFTA itself?
- Several explanations have been suggested but the most plausible is the exchange rate effect of the large Canadian dollar exchange rate appreciation since 2000;
- From a measurement perspective it seems that in the case of exports this is true but the paper argues this does not necessarily indicate a loss of competitiveness of Canada within NAFTA or give evidence of Dutch Disease;
- Explaining the fall in imports since remains a puzzle but can be explained in part by the increased use of imported inputs into manufacturing exports.

- Overall Canada's trade since the CUSFTA-NAFTA implementation is consistent with a positive view of Canada's integration with the global economy;
- Despite the trade reversal for Canada since 2000, NAFTA remains by far Canada's most important trading arrangement for both commodity and non-commodity trade.