From Final Goods to Inputs: the Cascade Effect of Preferential Rules of Origin

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(Preliminary and Incomplete)

Introduction

- Two important trends in international trade in recent decades:
  - Increasing **fragmentation of production** across countries. ▸ GVC
  - Proliferation of regional trade agreements. 90% are **Free Trade Agreements (FTAs)**. ▸ RTAs
- FTAs specify **rules of origin (RoO)**, which define the conditions that a product must satisfy to obtain preferential tariff treatment.
- RoO require that, for a **final good** to obtain origin status, some of its **inputs** must be sourced within the FTA. ▸ example
- In this paper, we show that **RoO on final goods** give rise to **trade diversion in intermediate goods**.

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- A final good producer located in the FTA faces two options:
  - **Complying with RoO**, in which case it enjoys preferential tariff treatment when exporting to the FTA partners, but must source certain inputs within the FTA
  - **Not complying with RoO**, in which case it can source its inputs from the most efficient producers around the world, but faces MFN tariffs when exporting to the FTA partners

- RoO transfer protection from final goods to intermediaries (**"cascade protectionism"**): even if an input can be imported at low or zero tariffs from non-FTA members, it may be sourced within the FTA to avoid high tariffs on the final goods.

- We construct a **new dataset on NAFTA RoO**: for every final good, we can trace all its inputs that are subject to RoO requirements; similarly, for every intermediate good, we can link it to all the final goods that impose RoO requirements on its sourcing. ▸ NAFTA RoO

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Main results

- Using this dataset, we investigate the **impact of RoO on inputs of intermediate goods** from third countries.
- Our empirical analysis shows that
  - RoO on final goods **decrease imports of intermediate goods**. The effect is similar in magnitude to that of input tariffs.
  - The effect is stronger when producers have incentives to comply with RoO, i.e. for final goods that have a **positive preference margin**.
  - The impact of RoO is stronger when **exports of the final goods to NAFTA partners** are larger.

Outline of the talk

Related literature

- Several **theoretical studies** have emphasized that rules of origins on final goods can distort trade in intermediaries (e.g. Grossman, 1981; Falvey and Reed, 2002).
- Direct evidence of this effect has been lacking, due to to the **legal complexity of the rules**, which makes measurement difficult.
- To measure the restrictiveness of RoO, previous empirical studies (e.g., Cadot *et al*, 2006; Carriére and de Melo, 2006) use **synthetic indices** like the one constructed by Estevadeordal (2000), which do not capture input-output linkages.
- This is the first paper to map the **input-output linkages** embedded in preferential RoO and examine the impact of **sourcing restrictions on final goods** on **imports of intermediaries**.

Outline of the talk

A brief history of NAFTA

- **NAFTA** was signed in 1992 by Canada, Mexico, and the US and **entered into force on January 1, 1994**. It superseded the Canada-US Free Trade Agreement, signed in 1988.
- In 1990, Mexico approached the US to form a free trade agreement, with the goal of promoting economic development by attracting foreign direct investment (see Villarreal, 2010).
- In 1991, Canada joined the negotiations, with the goal of creating one free trade area in North America. Most tariffs were eliminated upon entry; the remaining ones were phased out in 10-15 years.
- This led to a **surge in trade among NAFTA members**.

▸ Intra-NAFTA trade

Outline of the talk

Construction of dataset on NAFTA RoO

- Four steps:

1. NAFTA RoO in Annex 401
2. Digitalization of Annex 401
3. Mapping output-input linkages in NAFTA RoO
4. Construction of RoO variables

Step 1: Annex 401

- **NAFTA RoO on textile fabric HS 6203.42 (men's or boys' trousers)**:

  "change[s] to subheadings 6203.41 through 6203.49 from any other chapter, except from headings 5106 through 5113, 5204 through 5212, 5307 through 5308 or 5310 through 5311, chapter 54, or heading 5508 through 5516, 5801 through 5802 or 6001 through 6002."

- Two parts:
  - **Main rule** ("change[s] to subheadings 6203.41 through 6203.49 from any other chapter"): any input that falls within chapter 62 must be sourced within NAFTA for the textile fabric to obtain origin status.
  - **Additional requirements** (from "except from headings 5106" to the end): any input falling into the listed tariff items must be sourced within NAFTA (e.g. 5106 through 5113: yarn or fabrics of wool).
- To qualify for preferential treatment, final good producers must obtain a **certificate of origin**, proving that they fulfill NAFTA RoO.
- In 2002 a Mexican producer of trousers was denied origin because he had used a fabric falling under heading 5204 through 5212 from the Philippines.

Step 2: Digitalization of Annex 401

Figure 1: RoO on HS 6203.42

Output	Main Rule	AdReq 1	AdReq 2	AdReq 3	AdReq 4	AdReq 5
62.03.41-62.03.49	chapter 62	51.06-51.13	52.04-52.12	53.07-53.08	53.10-53.11	chapter 54

Step 3: Mapping output-input linkages in NAFTA RoO

output	input
620342	550810
620342	550820
620342	550911
620342	550912
620342	550921
620342	550922
620342	550931
620342	550932
620342	550941
620342	550942
620342	550951
620342	550952
620342	550953
620342	550959
620342	550961
620342	550962
620342	550969
620342	550991
620342	550992

Step 4: Creation of RoO variables

input	output
550810	620342
550810	620343
550810	620349
550810	620411
550810	620412
550810	620413
550810	620419
550810	620421
550810	620422
550810	620423
550810	620429
550810	620431
550810	620432
550810	620433
550810	620439
550810	620441
550810	620442

- We define the dummy variable RoO_{ij}, which is equal to 1 if NAFTA RoO on final good i impose sourcing restrictions on input j.

Step 4: Creation of RoO variables

input	output	RoO_index
550810	620342	313
550810	620343	313
550810	620349	313
550810	620411	313
550810	620412	313
550810	620413	313
550810	620419	313
550810	620421	313
550810	620422	313
550810	620423	313
550810	620429	313
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- Our variable of interest is $\sum_i RoO_{ij}$, the number of final goods i that have RoO rules imposing sourcing restrictions on input j (313 in the example).

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Creation of RoO variables

- We construct the variable $\sum_i RoO_{ij}$ for rules written at the level of a chapter (2 digits), heading (4 digits) and sub-heading (6 digits).
- RoO should only have an impact if they apply to vertically-related goods, i.e. if j is an input in the production of i.
- To verify this, we have converted I-0 tables into HS classification.

conversion

- Percentage of RoO that apply to vertically-related goods:
  - Rules defined at 2 digits: between 6.0-10.6% of the cases
  - Rules defined at 4 digits: between 14.5-19.8% of the cases
  - Rules defined at 6 digits: between 46.2-71.8% of the cases
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Creation of RoO variables (2)

- $\sum_i RoO_{ij}^x$, where $x = \{1, 2\}$ denotes different treatments:
  - $x = 1$ includes all final goods i imposing sourcing restrictions on j
  - $x = 2$ includes all final goods i imposing sourcing restrictions on j for which the preference margin is positive

Outline of the talk

Empirical methodology

- We want to study the impact of **RoO on final goods** on **imports of intermediaries** from non-NAFTA countries.
- To deal with endogeneity concerns, we focus on imports of **Mexico**.
  ▸ Drafting of NAFTA RoO
- **Difference-in-differences approach**: some goods were "treated" by the introduction of NAFTA RoO that restricted their sourcing:

$$\Delta Imports_{j,o}^{Mex} = \alpha + \beta_1 \Delta MFN\ Tariff_j^{Mex} + \beta_2 \sum_i RoO_{ij}^x + \delta_j + \delta_o + \epsilon_{j,o}$$

  - $\Delta Imports_{j,o}^{Mex}$: change in Mexican imports of good j from non-NAFTA countries (between 1991 and 2003, in logs)
  - $\Delta MFN\ Tariff_j^{Mex}$: change MFN tariffs applied by Mexico to imports of good j (between 1991 and 2003, in logs)
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Table 1: Change in Mexican imports and NAFTA RoO: difference-in-differences

	Panel A only positive imports			Panel B including zero imports		
	(1)	(2)	(3)	(1)	(2)	(3)
$\Delta MFN\ Tariff_j^{Mex}$	-0.338***					
	(0.071)					
$\sum_i RoO_{ij}^1$	-0.076					
	(0.075)					
$\sum_i RoO_{ij}^2$						
Industry fixed-effects (HS3)	yes					
Country of origin fixed-effects	yes					
Observations	8,987					
R-squared	0.208					

- Roo on final goods have a negative effect on imports of intermediaries.
- Larger impact for final goods with positive preference margins (columns 2-3).

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$\Delta MFN\ Tariff_j^{Mex}$	-0.338***	-0.316***				
	(0.071)	(0.071)				
$\sum_i RoO_{ij}^1$	-0.076					
	(0.075)					
$\sum_i RoO_{ij}^2$		-0.262***				
		(0.073)				
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	(0.071)	(0.071)	(0.071)	(0.043)	(0.043)	(0.043)
$\sum_i RoO_{ij}^1$	-0.076			-0.062		
	(0.075)			(0.043)		
$\sum_i RoO_{ij}^2$		-0.262***	-0.273***		-0.130***	-0.135***
		(0.073)	(0.073)		(0.043)	(0.044)
Industry fixed-effects (HS3)	yes	yes	yes	yes	yes	yes
Country of origin fixed-effects	yes	yes	yes	yes	yes	yes
Observations	8,987	8,987	8,987	34,639	34,639	34,639
R-squared	0.208	0.208	0.208	0.209	0.209	0.209

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Table 2: Change in Mexican imports and NAFTA RoO: difference-in-differences

	Panel A only positive imports		Panel B including zero imports	
	(1)	(2)	(1)	(2)
$\Delta MFN\ Tariff_j^{Mex}$	-0.535***	-0.499***	-0.456***	-0.408***
	(0.195)	(0.193)	(0.095)	(0.095)
$\sum_i RoO_{ij}^2$	-0.992***	-1.064***	-0.350*	-0.535***
	(0.375)	(0.370)	(0.073)	(0.207)
$\sum_i Exports_i^{Mex,NAFTA}$	0.054**	0.049**	0.032***	0.032***
	(0.021)	(0.021)	(0.012)	(0.011)
$\sum_i RoO_{ij}^2 \times \sum_i Exports_i^{Mex,NAFTA}$	-0.010*	-0.008	-0.007**	-0.005**
	(0.005)	(0.005)	(0.003)	(0.002)
Industry fixed-effects (HS3)	yes	yes	yes	yes
Country of origin fixed-effects	yes	yes	yes	yes
Observations	712	712	2,376	2,376
R-squared	0.420	0.426	0.437	0.438

- Based on Panel B (1), the marginal effect of $\sum_i RoO_{ij}^2$ on $\Delta Imports_{j,o}^{Mex}$ is:

  -0.385 at the 25th percentile of $\sum_i Exports_i^{Mex,NAFTA}$

  -0.513 at the 75th percentile of $\sum_i Exports_i^{Mex,NAFTA}$

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$\sum_i RoO_{ij}^2 \times \sum_i Exports_i^{Mex,NAFTA}$	-0.010*	-0.008	-0.007**	-0.005**
	(0.005)	(0.005)	(0.003)	(0.002)
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- These results are a **lower bound** for the effects of NAFTA RoO:

  1. In 2003, many **firms were still unaware of NAFTA RoO** and had yet to adjust their sourcing decisions.

  2. We have some **noise in the definition of treatment**:

     - We exclude RoO defined at 2 and 4 digits, though some apply to vertically-related goods.
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Next steps

- Include **all RoO** that apply to vertically-related goods.

- Instrument RoO in NAFTA agreement with those inherited from the **CUSFTA** (correlation between RoO in the two agreements 0.89).

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- Instrument RoO in NAFTA agreement with those inherited from the **CUSFTA** (correlation between RoO in the two agreements 0.89).

Conclusions

- This is the first paper to study how preferential **rules of origins on final goods** affect **imports of intermediate goods**.
- To do so, we have constructed a **unique dataset** mapping all input-output linkages in NAFTA RoO.
- Our **preliminary results** show that
  - RoO on final goods **decrease imports of intermediate goods**. The effect is similar in magnitude to that of input tariffs.
  - The impact of RoO is stronger for final goods that have a **positive preference margin**.
  - The impact of RoO is stronger when **exports of the final goods to NAFTA partners** are larger.
- **Policy implications**: RoO in FTAs are equivalent to **input tariffs** and thus violate Article XXIV of the GATT.

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Thank you!

Fragmentation of production across different countries

- Improvements information and communication technology have led to the **emergence of global value chains**, with various production stages performed across different locations and firms increasingly sourcing their inputs from suppliers located in foreign markets.

- As a result, there has been a surge in the share of volume of international trade that is accounted by shipments of **intermediate goods**, which now accounts for accounts for up to **two thirds of international trade** (Johnson and Noguera, 2012).

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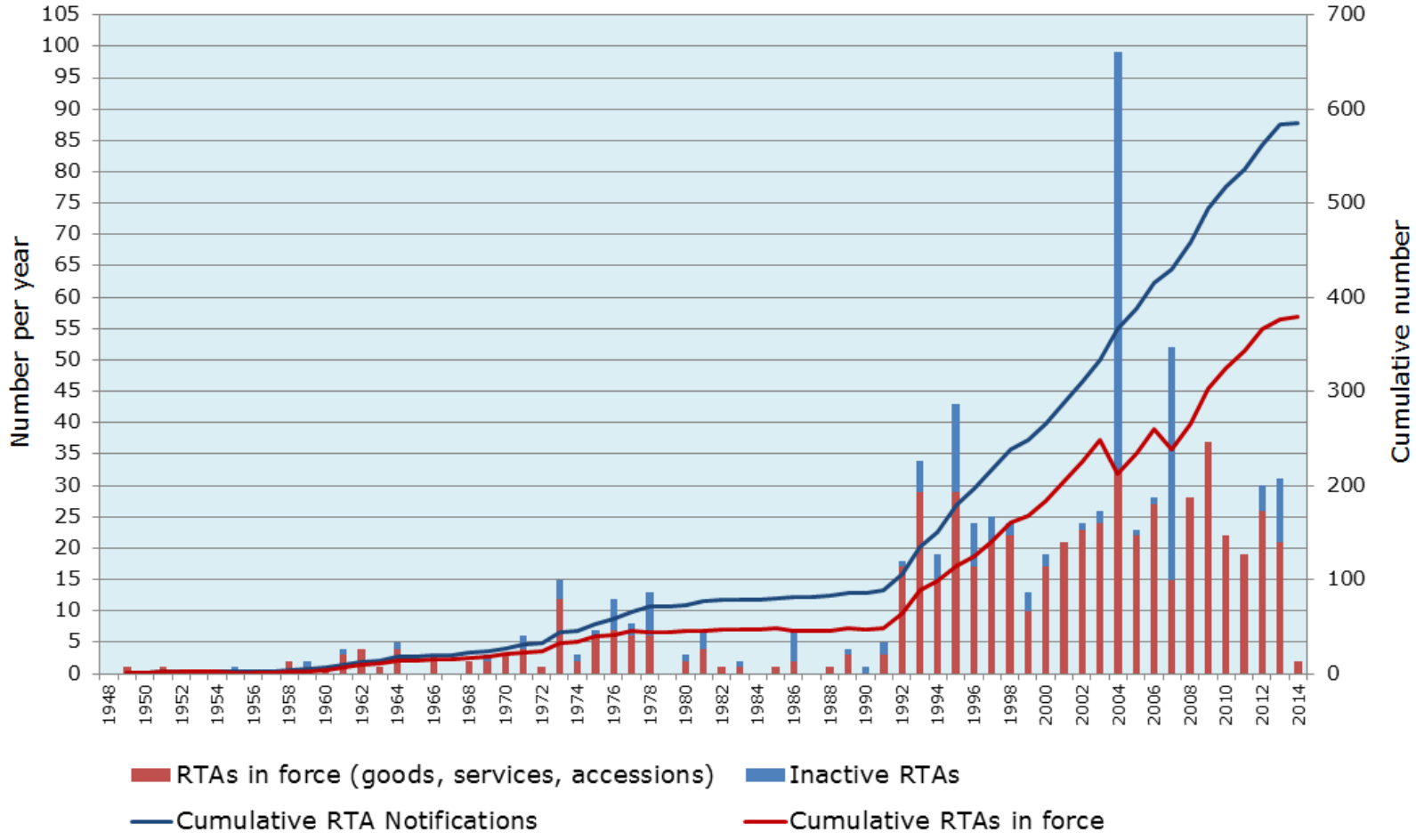
Figure 2: Number of RTA notifications and RTA in force (source, WTO Secretariat)



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Example of preferential RoO

- Defining the origin of a good is not easy: between the "conception" of a product and its "delivery" to the final consumer, a wide range of activities are involved (e.g. manufacturing, assembly, packaging), which might occur in different countries.
- The definition of origin is often based on **tariff classification shifts**: a good earns preferential treatment if it has a different HS classification than its imported inputs specified statistical level.
- Example from **North American Free Trade Agreement (NAFTA)**: **motorbikes** (HS 87.11) can only be traded duty free among NAFTA members if the **wheels** (HS 87.14.10) used to produce them are sourced within the FTA.

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RoO in NAFTA

- NAFTA is the **world's largest FTA**, which now links 450 million people producing $17 trillion worth of goods and services.
- The focus on NAFTA is due to the **specific features of its RoO**:
  - Very disaggregated, with each product having specific rules
  - Mostly defined in terms of change of tariff classification
- These features allow us to **codify Annex 401** of NAFTA agreement in a **unique dataset** mapping all input-output linkages in its RoO.

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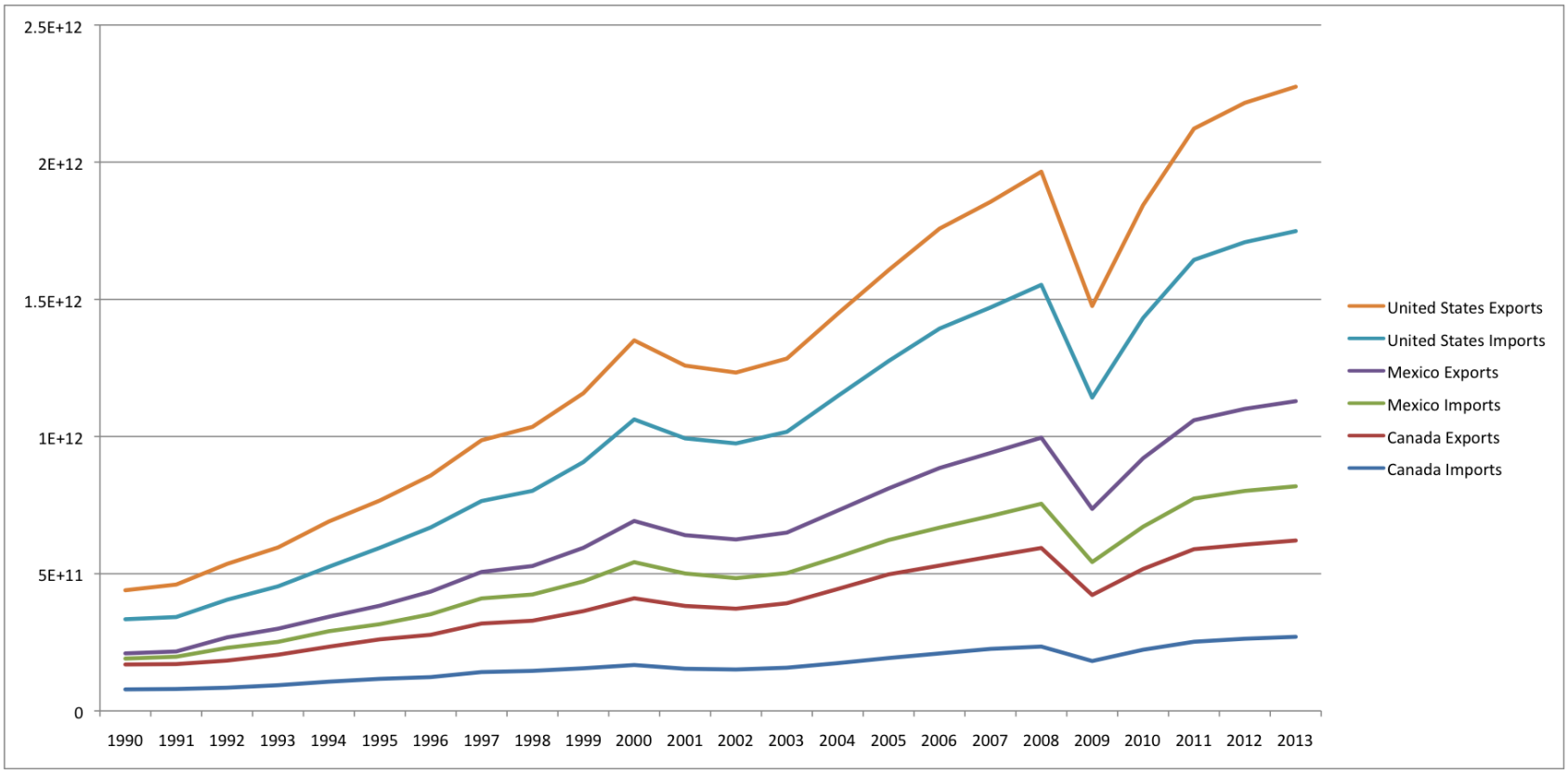
Figure 3: NAFTA trade evolution 1993-2011 (Source: OECD)



Mexico has less diversified trade partners: in 2011, intra-NAFTA exports (imports) accounted for 81.72% (52.59%) of Mexican exports (imports); the corresponding statistics for the US were 32.32% and 25.83%

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Drafting of NAFTA RoO

- The rules in Annex 401 were to a large extent **inherited from the RoO in Canada-US Free Trade Agreement** (correlation of 0.89).
- The **US had a predominant role** in drafting RoO
  - In some sectors, it pushed for **strict rules**, under the pressure of final good producers wanting to ensure that foreign assembly companies would not be eligible for favorable tariff treatment (e.g., automobile).
  - In other sectors, it pushed for **lenient rules**, under the pressure of firms highly dependent on multinational supply chains (e.g., IT).
- **Mexico tried without success to change some rules**, e.g. making RoO more lenient in automobile and textiles.

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- Converting **Input-Output tables into HS classification**:

1. Match NAICS goods (I-O tables from BEA) with HS6 goods (RoO).
2. Each NAICS good may match into multiple HS6 goods.
3. Randomly pick one good to convert I-O table into HS6 classification.

- Iterate steps 1-3 to ensure that results are stable across matches.

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