



Global Value Chains in Mexico: A Historical Perspective

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^{*/} The opinions expressed herein are those of the author and do not necessarily represent those of Banco de México.



Introduction

- In the 1990s, improvements in communication and transportation technologies reduced the costs of trading services and goods, accelerating the process of globalization.
 - ✓ The world gave important steps towards liberalization, like the signature of important trade agreements including the North American Free Trade Agreement (NAFTA), giving rise to Global Value chains (GVCs).
- However, over the last two decades, there have been political and economic developments suggesting that globalization may take a step back or at least take a different form (Antràs, 2020):
 - ✓ Political backlash. In the economic arena, the anti-globalization rhetoric blamed international trade for generating inequality and triggered the imposition of tariffs, for example, the trade war between China and the US.
 - ✓ Economic developments. Firms realized became the risks of relying on a small number of distant input suppliers, particularly during Covid-19 (Javorcik, 2020).
- Thus, these political and economic developments have increased the interest in GVC reconfiguration, including the possibility of nearshoring to shorten supply chains and minimize costs of disruptions.

Introduction

- The possibility of nearshoring is particular important for a country like Mexico, which is close to the US and already has strong commercial links with that country. Hence, in this presentation:
 - ✓ I will take a historical perspective and review the experience of Mexico's insertion in GVCs from NAFTA to the late 2010s;
 - ✓ I will compare this experience with what happened later during the US-China trade war.
 - ✓ I will use this comparison to draw potential implications for the current process of nearshoring.
- **Historical Perspective**. In particular, I will extend a conceptual framework of Antras et al (2012) and characterize Mexico's historical experience over two dimensions:
 - ✓ **1st Dimension: Insertion into GVC**. The number of GVS stages Mexico has produced;
 - ✓ **2nd Dimension: Skill Intensity**. The skill content of underlying trade flows; Mexico's trade specialization pattern.
- **US-China Trade War and Nearshoring**. Then, I will investigate whether Mexico kept the trade war between the US and China changed Mexico's insertion model into GVCs over these two dimensions.

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US-China Trade Conflict and Mexico's insertion into GVCs

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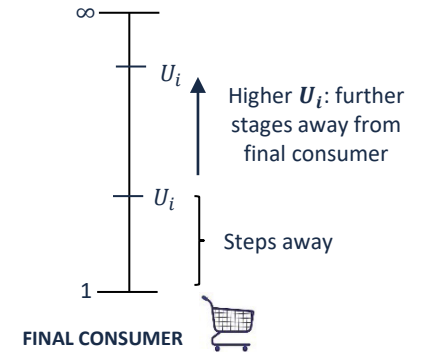
Methodology. 1st Dimension: Insertion into GVCs

- I construct the upstreamness indicator of Antràs et al. (2012) in 2 steps:

- I build the following measure of upstreamness (U_i) at the industry-level (for industry i):

$$U_i = \textcircled{1} \cdot \frac{F_i}{Y_i} + \textcircled{2} \cdot \frac{\sum_{j=1}^N d_{ij} F_j}{Y_i} + \textcircled{3} \cdot \frac{\sum_{j=1}^N \sum_{k=1}^N d_{ik} d_{kj} F_j}{Y_i} + \dots$$

F_i and Y_i : industry i 's gross output and final use; and d_{ij} : the amount of i 's output required to produce 1 unit in industry j .

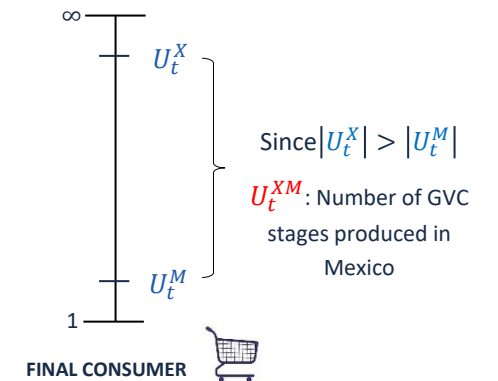


Weighted average of the number of stages away from final consumer at which output Y_i enters as an input in production

- I combine this measure at the industry-level (U_i) with data on trade flows to obtain the (final) upstreamness indicator as:

$$U_t^{XM} = \underbrace{\sum_{i=1}^N \frac{X_{it}}{X_{tot,t}} U_i}_{\text{Average upstreamness of exports } (U_t^X)} - \underbrace{\sum_{i=1}^N \frac{M_{it}}{M_{tot,t}} U_i}_{\text{Average upstreamness of imports } (U_t^M)}$$

$\frac{X_{i,t}}{X_{tot,t}}$: industry i 's share in exports in t . $\frac{M_{i,t}}{M_{tot,t}}$: industry i 's share in imports in t .



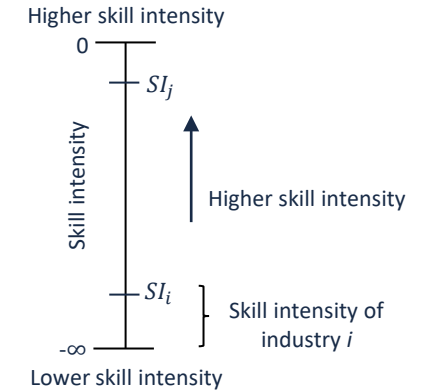
Methodology. 2nd Dimension: Skill Intensity

■ To address the second dimension, I build an indicator of skill content in two steps.

1. I consider the following measure at the industry-level proposed by Nunn and Trefler (2013) (SI_i):

$$SI_i = \ln \left[\frac{npw_i}{tw_i} \right]$$

npw_i and tw_i : non production worker wages in industry i and total wage bill, respectively.

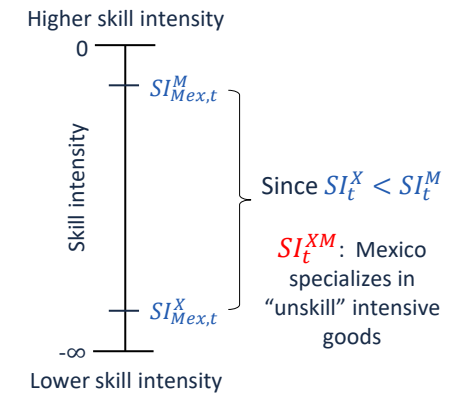


The ratio of non-production worker wages to total wages

2. I combine this measure at the industry level (SI_i) with data on trade flows to obtain the indicator of skill-content:

$$SI_t^{XM} = \underbrace{\sum_{i=1}^N \frac{X_{it}}{X_{tot,t}} SI_i}_{\text{Average skill intensity of exports } (SI_t^X)} - \underbrace{\sum_{i=1}^N \frac{M_{it}}{M_{tot,t}} SI_i}_{\text{Average skill intensity of imports } (SI_t^M)}$$

$\frac{X_{i,t}}{X_{tot,t}}$: industry i 's share in exports in t . $\frac{M_{i,t}}{M_{tot,t}}$: industry i 's share in imports in t .



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3.1 Historical Perspective

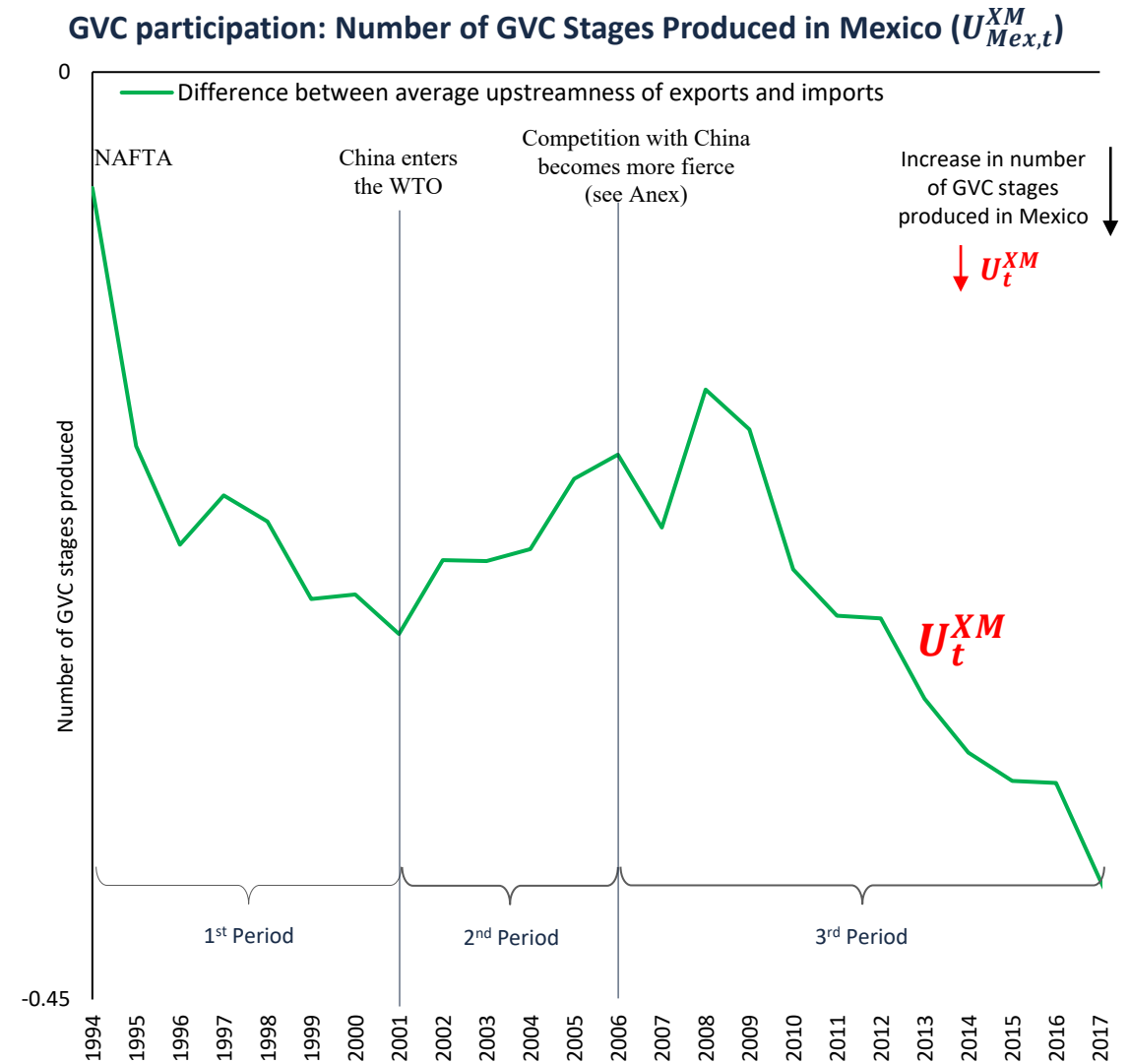
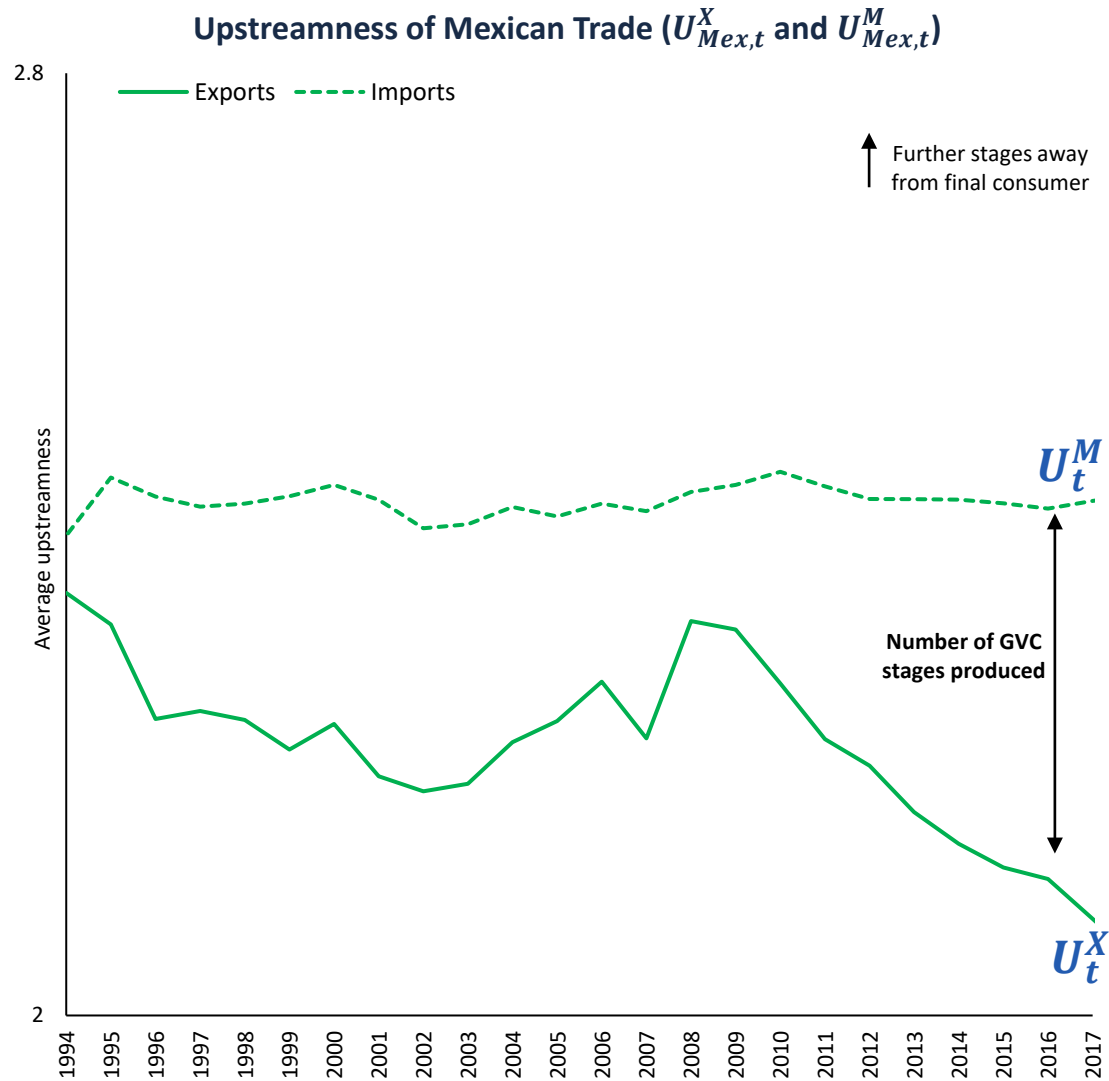
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4 US-China Trade Conflict and Mexico's insertion into GVCs

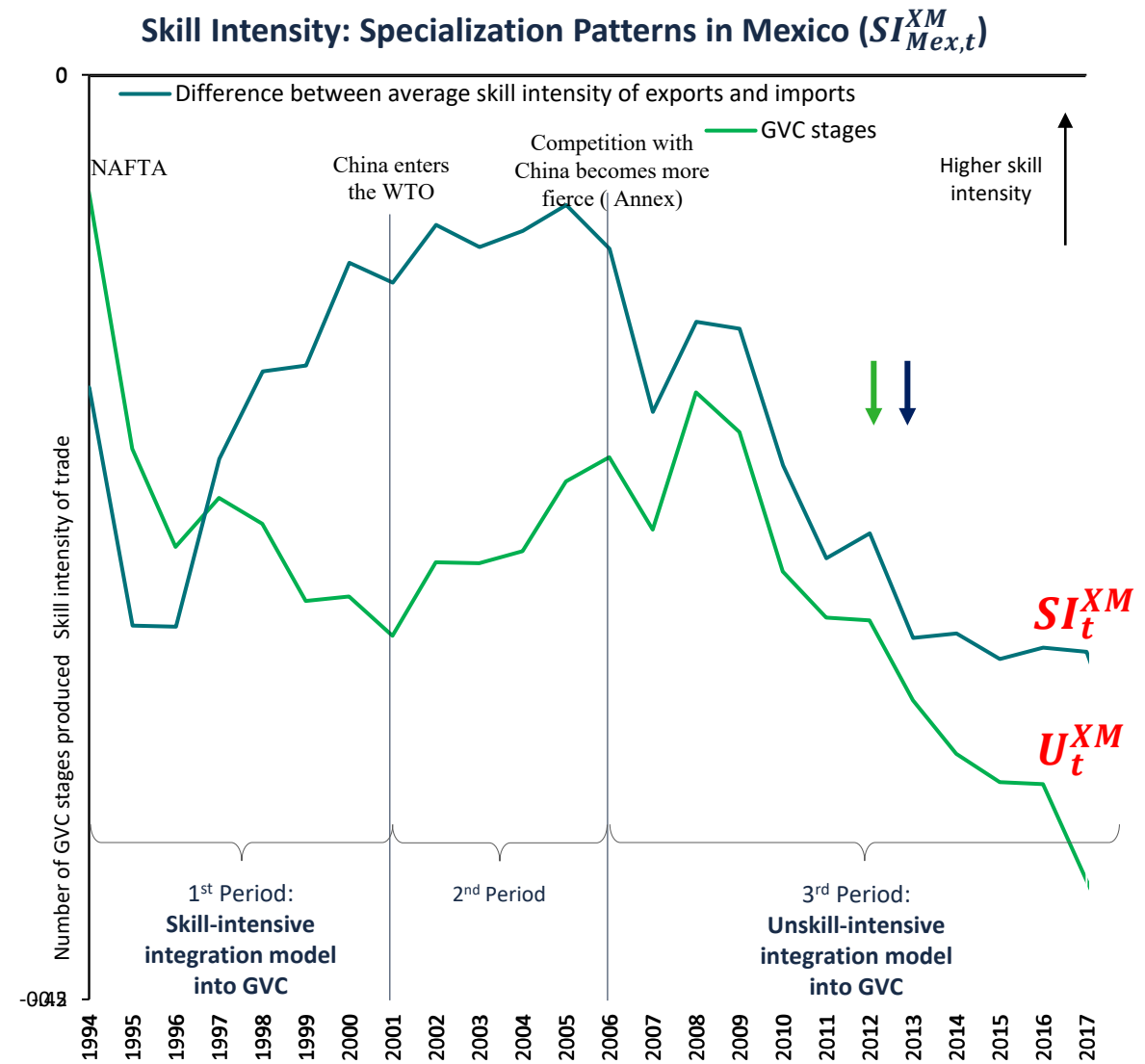
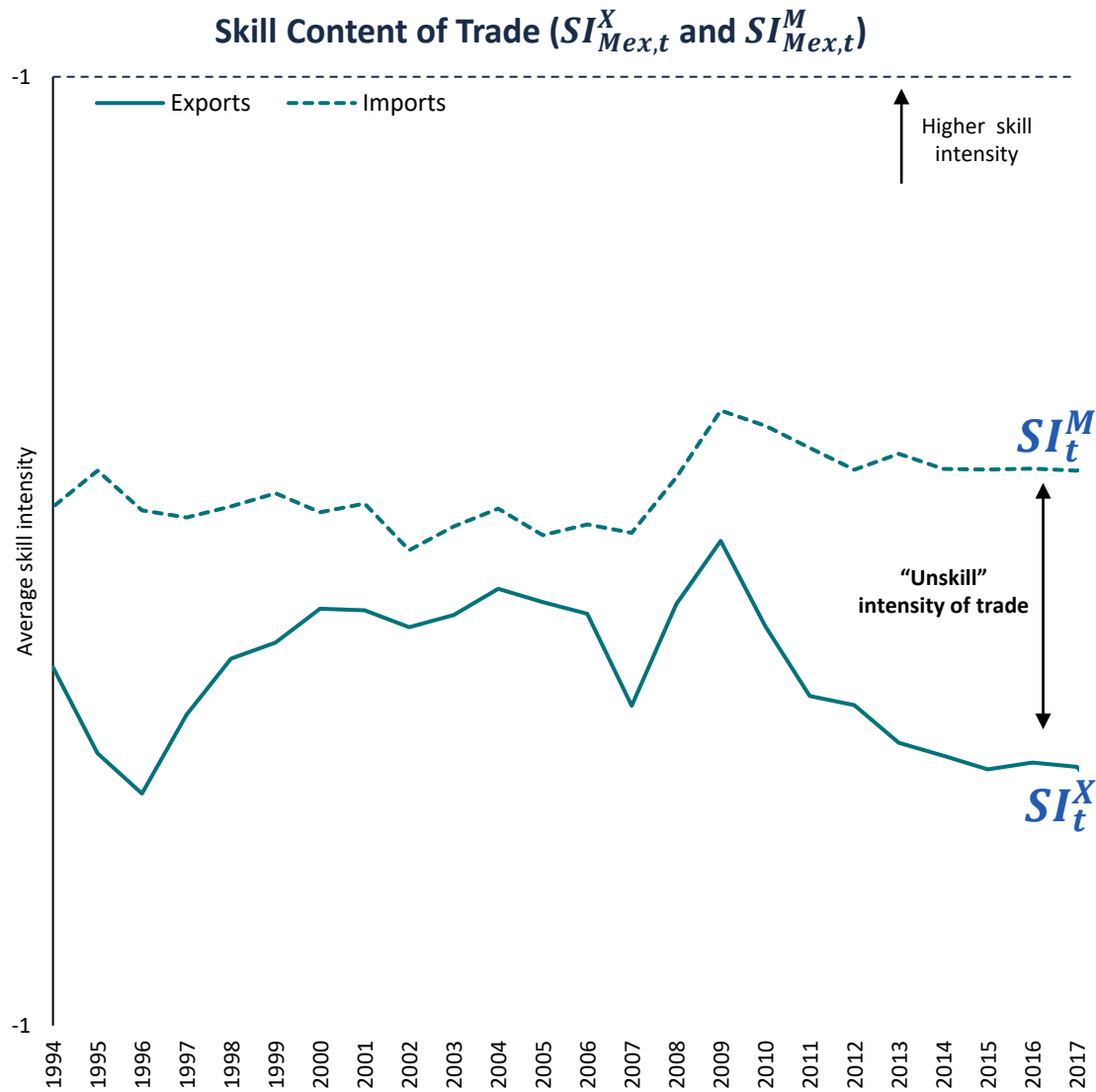
5 Looking Forward and Concluding Remarks

Mexico's insertion into GVCs: Historical perspective



Source: Own calculations with data from Bank of Mexico, Comtrade, National Institute of Statistics and Geography (INEGI) and Pierce and Schott (2012).
 Notes: The upstreamness levels are computed as weighted averages of industry-level measures of upstreamness using trade flows by industry as weights.

Historical perspective. 1st Dimension: Mexico's insertion into GVCs.

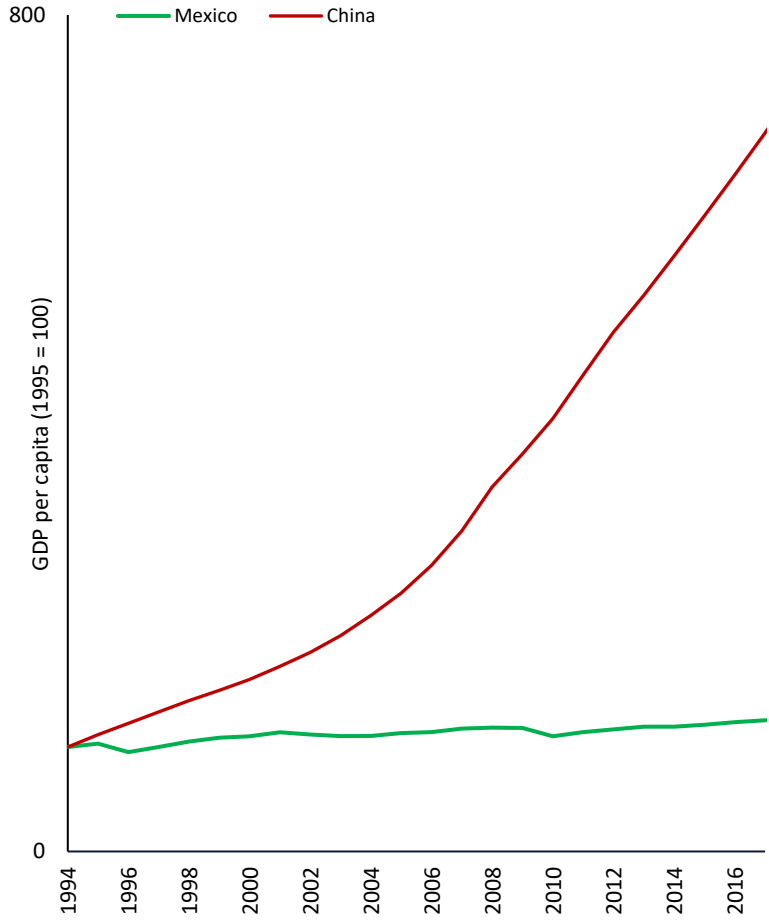


Source: Own calculations with data from Bank of Mexico, Comtrade, National Institute of Statistics and Geography (INEGI), Nunn and Trefler (2013) and Pierce and Schott's (2012).

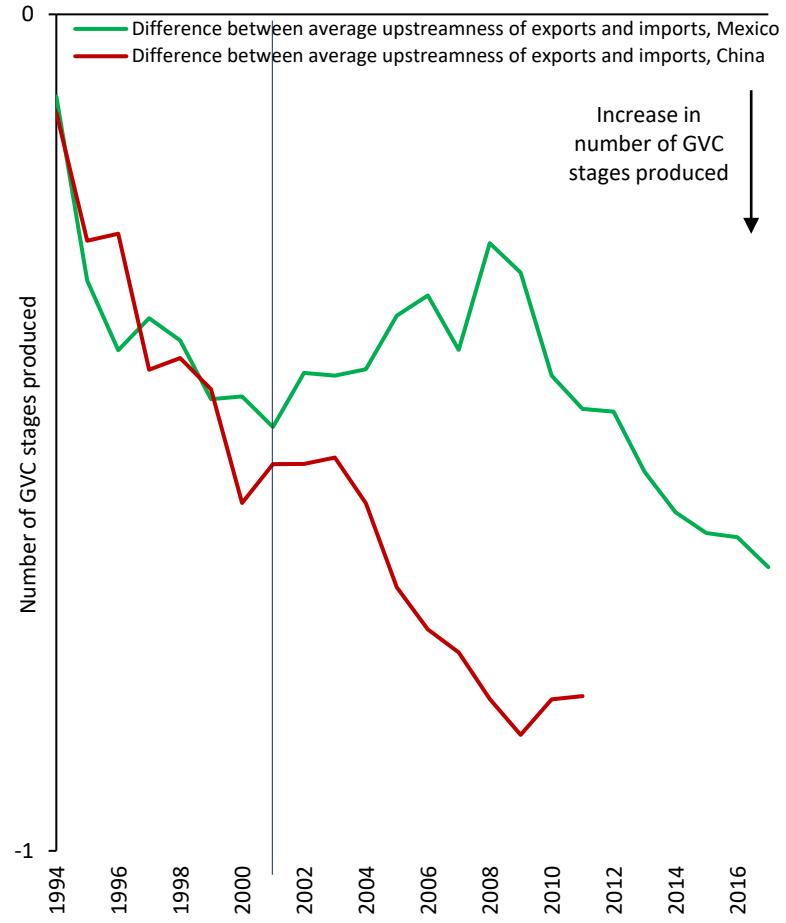
Notes: The skill intensity levels are computed as weighted averages of industry-level measures of skill intensity using trade flows by industry as weights.

Mexico's insertion into GVCs: Historical perspective

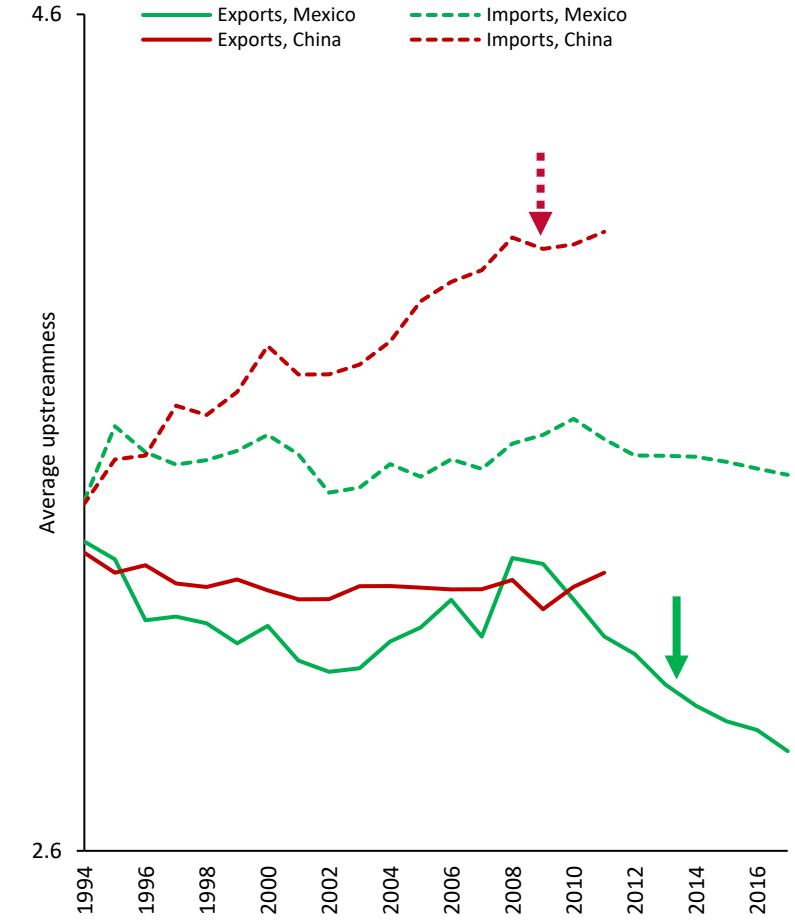
GDP per capita



GVC Participation: Number of GVC Stages Produced in Mexico and China



Upstreamness of Mexican and Chinese Trade



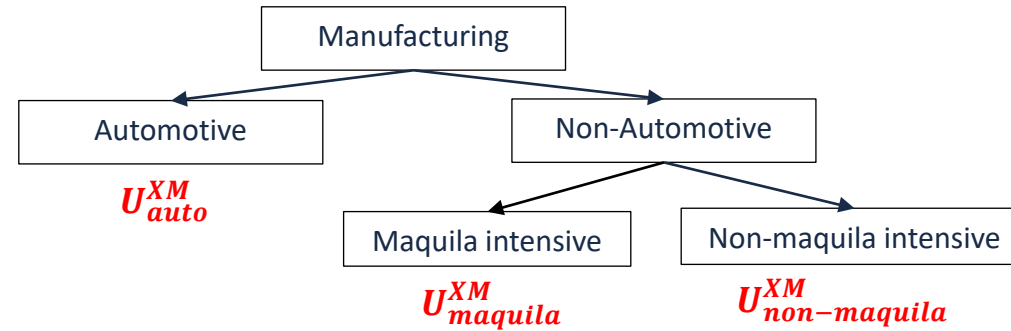
Source: Own calculations with data from World Bank, Bank of Mexico, National Institute of Statistics and Geography (INEGI), Chor et al. (2014) and Pierce and Schott (2012).

Notes: GDP per capita in PPP at constant 2017 international dollars. The upstreamness measure for China were taken from Chor et al. (2014). In order to achieve comparability between Mexico and China, the measures of upstreamness at the industry-level of Mexico were adjusted in manner that the upstreamness value of its sixth most upstream industry was equal to the most upstream industry in China.

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Mexico's insertion into GVCs: Decomposition of the Aggregate Measures

- To characterize the 2 Mexican models of insertion into GVCs, I depart from previous studies that focus on the manufacturing sector as a whole.
- I take a sectorial approach and consider 3 sub-sectors within manufacturing: auto, maquila & non-maquila:



- For that, I decomposes the change in the number of stages ($\Delta U_{Manuf,t}^{XM}$) in the manufacturing sector into 2 terms:

$$\Delta U_{Manuf,t}^{XM} = \sum_{s=auto, maquila, non-maquila} [Sh_{s,t}^X \Delta U_{s,t}^X - Sh_{s,t}^M \Delta U_{s,t}^M] + \sum_{s \neq j} [\Delta Sh_{s,t}^X (U_{s,t}^X - U_{j,t}^X) - \Delta Sh_{Mex,s,t}^M (U_{s,t}^M - U_{j,t}^M)]$$

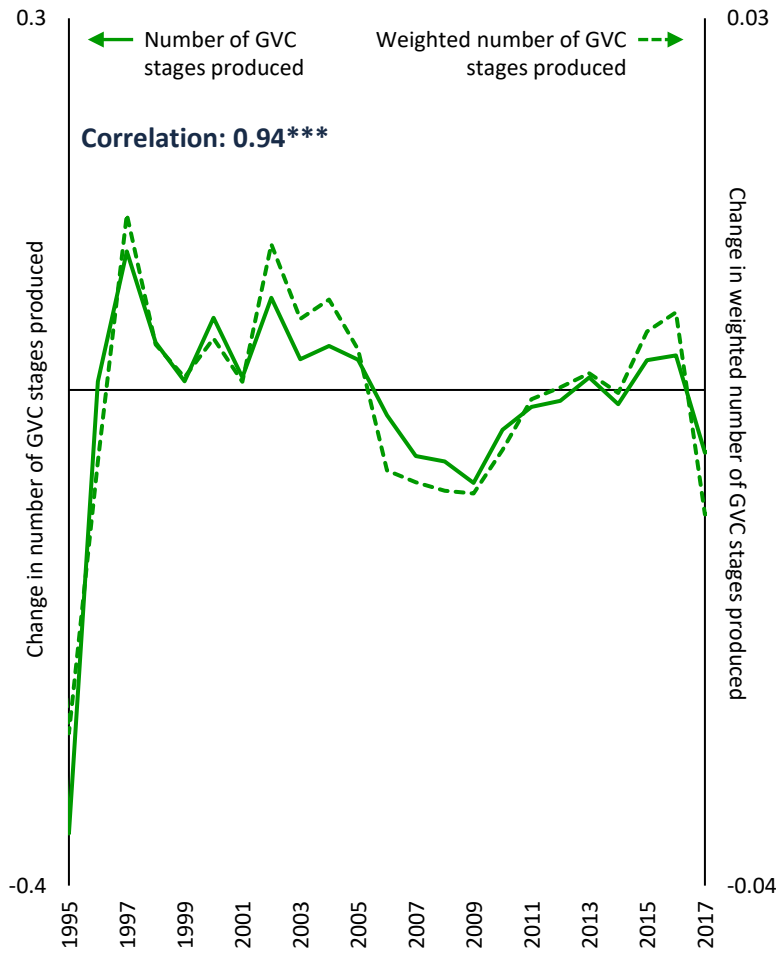
1st Term: Change in average upstreamness of 3 subsectors: it “looks like” the change in the number of GVC stages produced in each sector ($\Delta U_{s,t}^X - \Delta U_{s,t}^M$)
 ↓
 Change in weighted number of stages
 ↓
Within sub-sectors: Partial equilibrium effects

2nd Term: previously no investigated term: change in shares of sector s in total exports and imports
 ↓
 Reallocation of resources between sectors
 ↓
General equilibrium effects

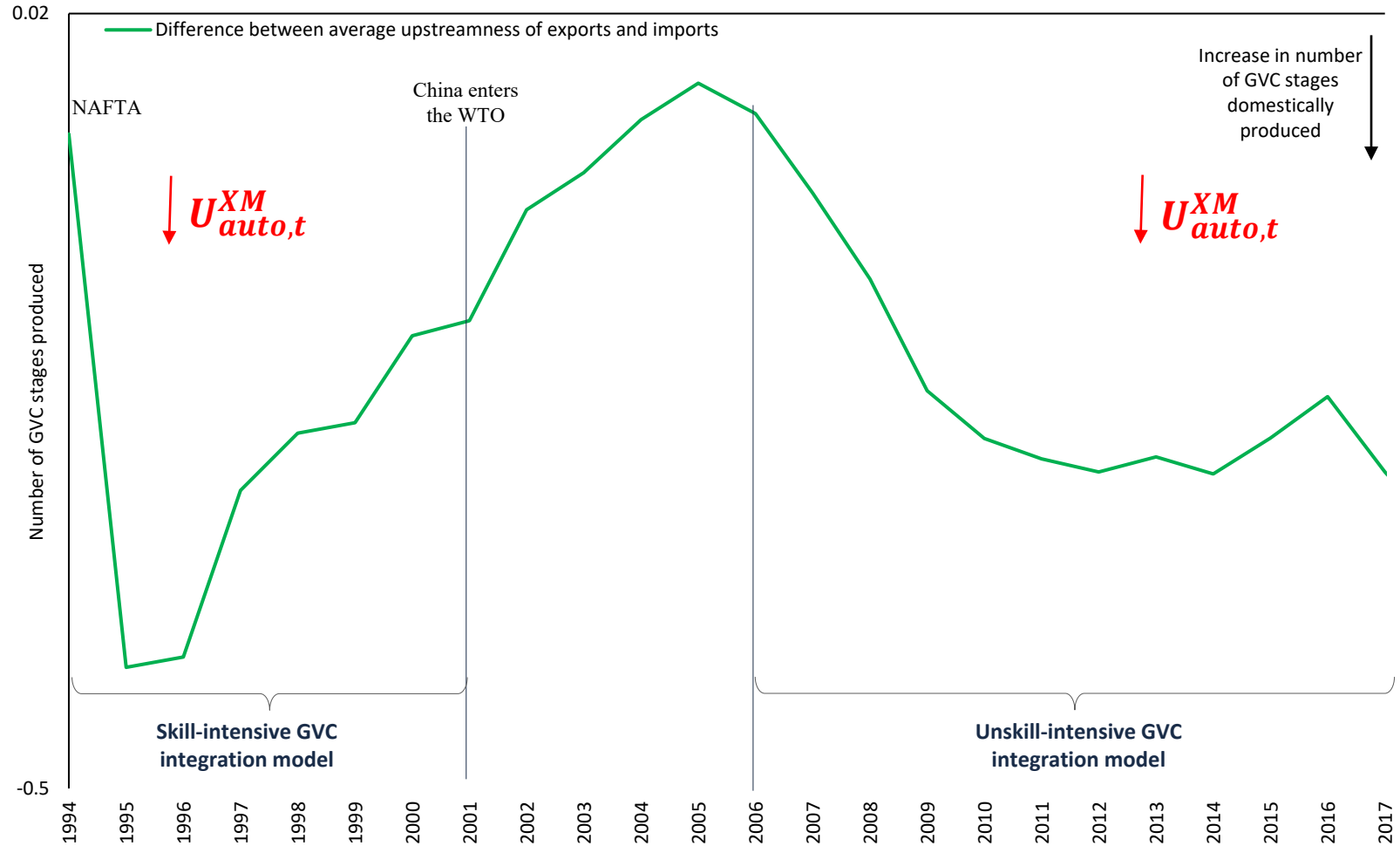
$Sh_{s,t}^X$ & $Sh_{s,t}^M$: sector s 's share in total exports and imports; $U_{s,t}^X$ & $U_{s,t}^M$: average upstreamness of sector s exports and imports

Partial Equilibrium: Automotive Sector

Change in Number and Weighted Number of Stages of the Automotive GVCs Produced in Mexico



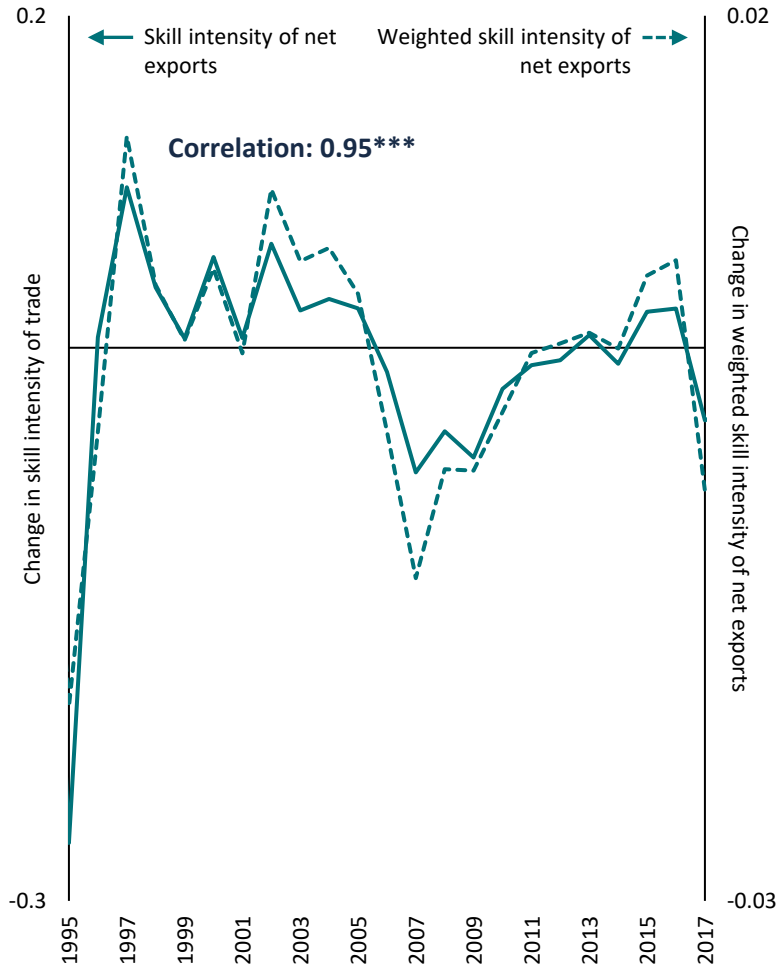
GVC Participation: Number of Automotive GVC Stages Produced in Mexico



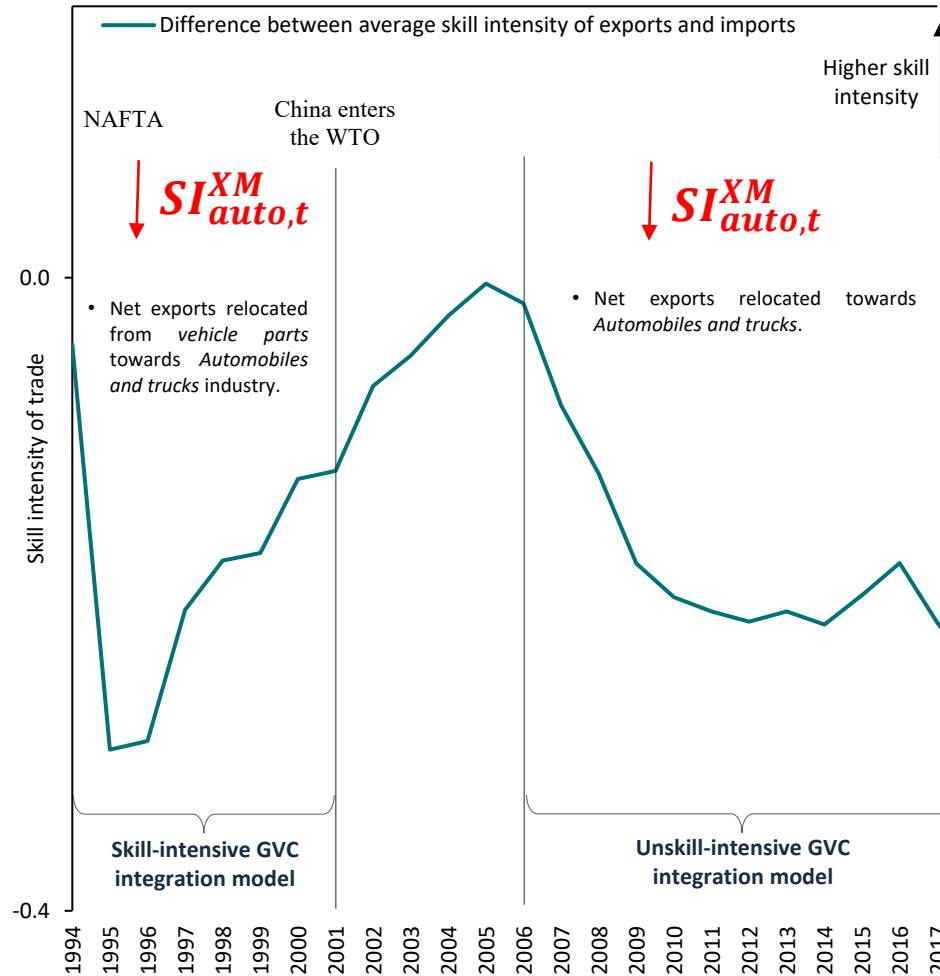
Source: Own calculations with data from Bank of Mexico, Comtrade, National Institute of Statistics and Geography (INEGI) and Pierce and Schott (2012).
 Notes: The Automotive sector comprises Automobiles and Trucks, Motors Vehicles Bodies and Trailers, and Motor Vehicle Parts industries.

Partial Equilibrium: Automotive Sector

Change in Skill Intensity and Weighted Skill Intensity of Net Exports of the Automotive Sector



Skill Intensity: Specialization Patterns in Mexican Automotive Trade



Summary of Mexico's insertion into the Automotive GVCs

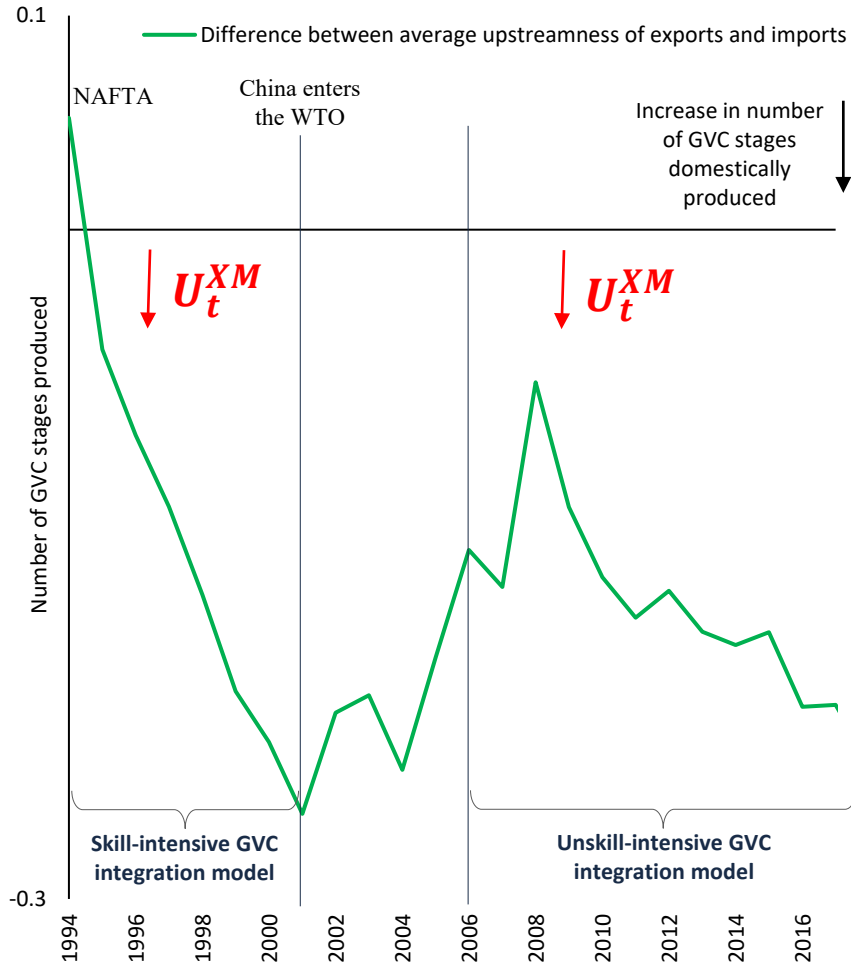
	Skill-intensive integration model (1994-2001)	Unskill-intensive integration model (2006-2017)
Change in number of GVC stages produced	↑	↑
Change in skill intensity of net exports	↓	↓

Source: Own calculations with data from Bank of Mexico, Comtrade, National Institute of Statistics and Geography (INEGI), Nunn and Trefler (2013) and Pierce and Schott's (2012).

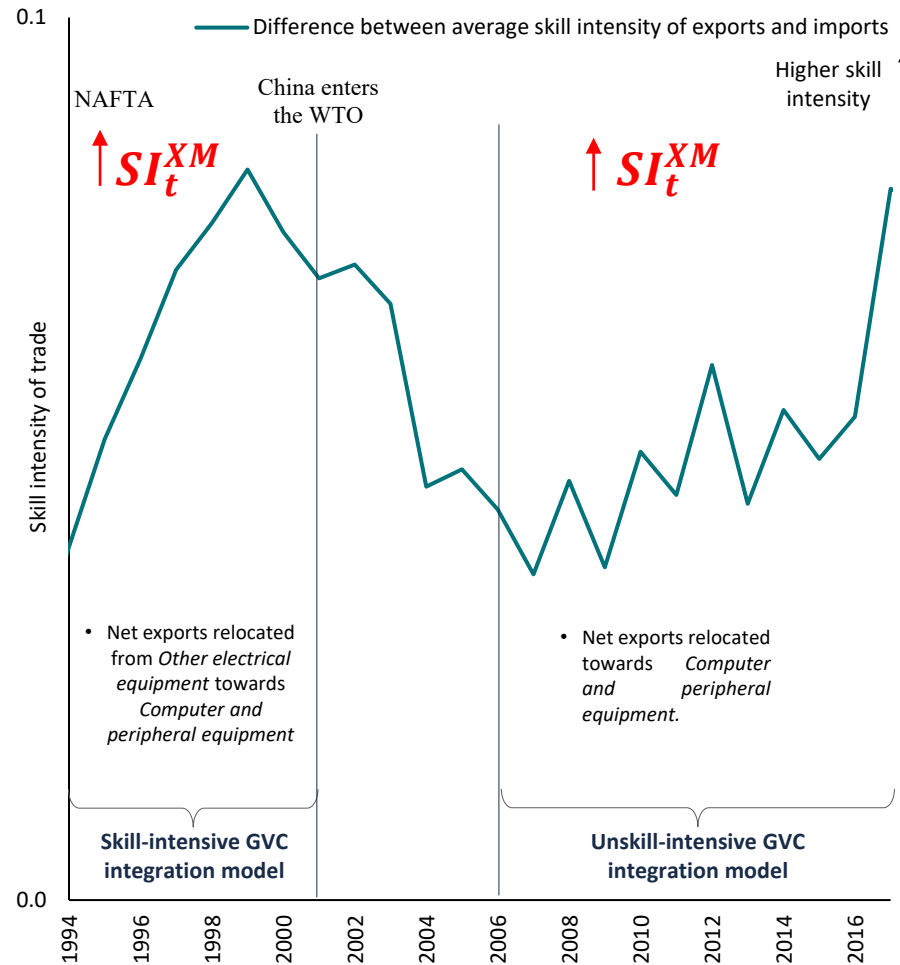
Notes: The Automotive sector comprises *Automobiles and Trucks*, *Motors Vehicles Bodies and Trailers*, and *Motor Vehicle Parts* industries.

Partial Equilibrium: Maquila Intensive Sectors

GVC Participation: Number of “Maquila” GVC Stages Produced in Mexico



Skill Intensity: Specialization Patterns in Mexican “Maquila” Trade



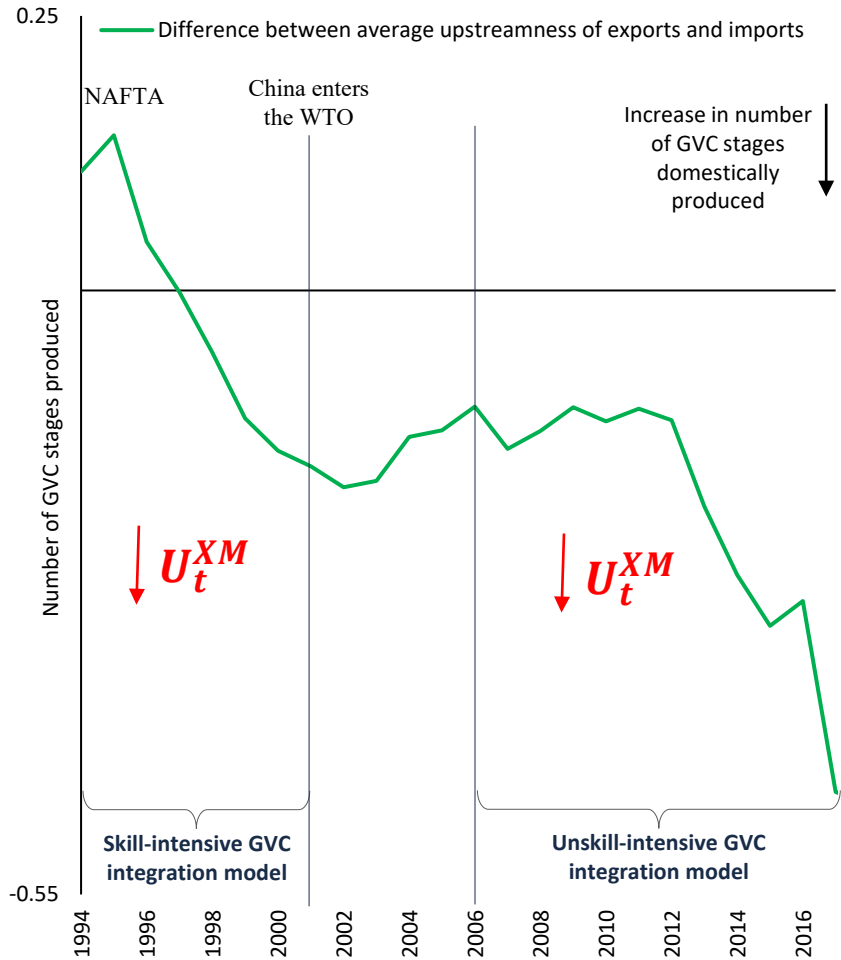
Summary of Mexico’s insertion into the “Maquila” GVCs

	Skill-intensive integration model (1994-2001)	Unskill-intensive integration model (2006-2017)
Change in number of GVC stages produced	↑	↑
Change in skill intensity of net exports	↑	↑

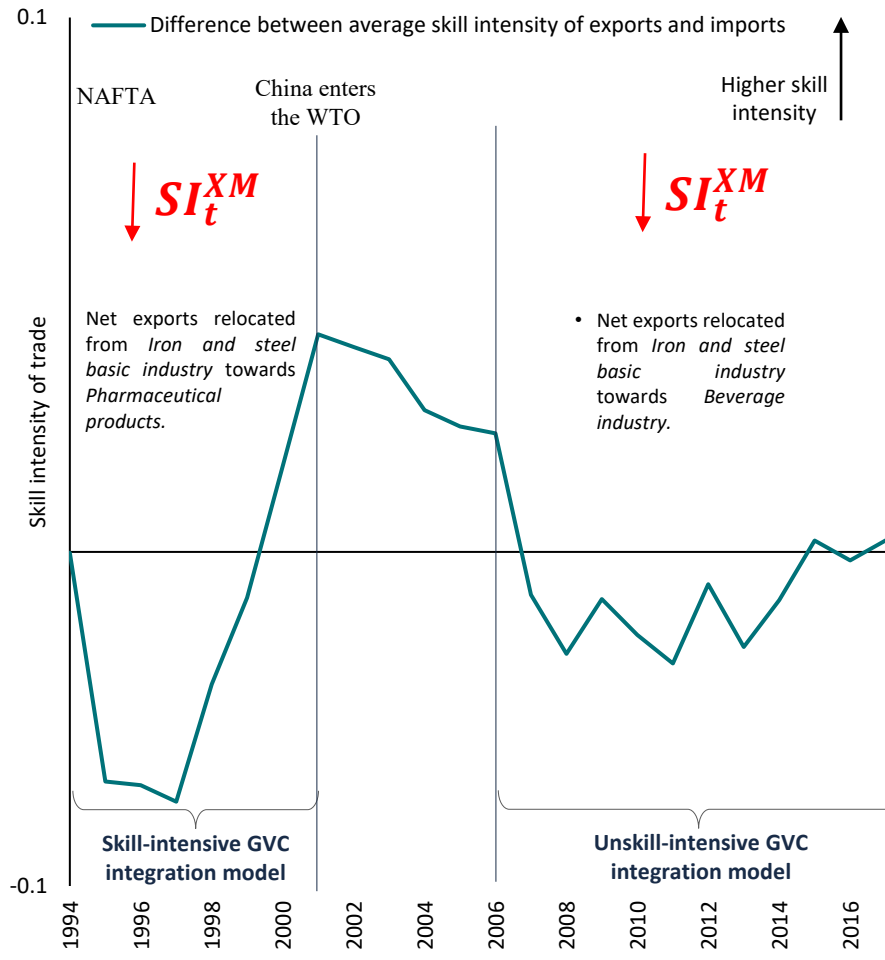
Source: Own calculations with data from Bank of Mexico, Comtrade, National Institute of Statistics and Geography (INEGI) Nunn and Trefler (2013) and Pierce and Schott (2012).
 Notes: The “maquila” sector comprises those industries with a share of the sum of its maquila exports and imports over the sum of its total exports and imports greater than 0.50.

Partial Equilibrium: Non-maquila Intensive Sectors

GVC Participation: Number of “Non-maquila” GVC Stages Produced in Mexico



Skill Intensity: Specialization Patterns in Mexican “Non-maquila” Trade



Summary of Mexico’s insertion into the “Non-maquila” GVCs

	Skill-intensive integration model (1994-2001)	Uskill-intensive integration model (2006-2017)
Change in number of GVC stages produced	↑	↑
Change in skill intensity of net exports	↑	↓

Summary

	Skill-intensive integration model (1994-2001)	Uskill-intensive integration model (2006-2017)
1 st Dimension: GVC insertion		
2 nd Dimension: Skill content of trade		

Source: Own calculations with data from Bank of Mexico, Comtrade, National Institute of Statistics and Geography (INEGI) Nunn and Trefler (2013) and Pierce and Schott (2012).

Notes: The “non-maquila” sector comprises those industries with a share of the sum of its maquila exports and imports over the sum of its total exports and imports lower or equal than 0.50.

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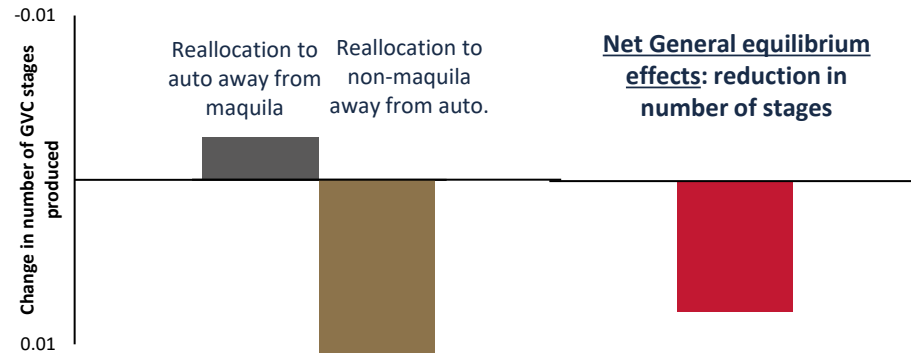
Looking Forward and Concluding Remarks

General Equilibrium Effects: Skill Intensive GVC Integration Model (1994-2001)

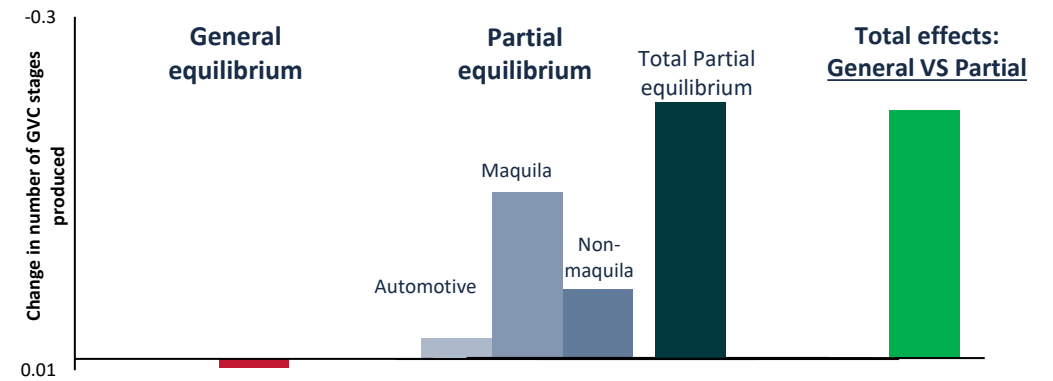
- In studying the general equilibrium effects, it is necessary to define 1 of the 3 sectors as the *numeraire*: I choose the automotive industry, and thus consider resource reallocations from this industry to the maquila and non-maquila intensive sectors.

Change in number of GVC Stages Produced (General equilibrium effects)

Number of GVC stages produced is greater in auto than in maquila and non-maquila

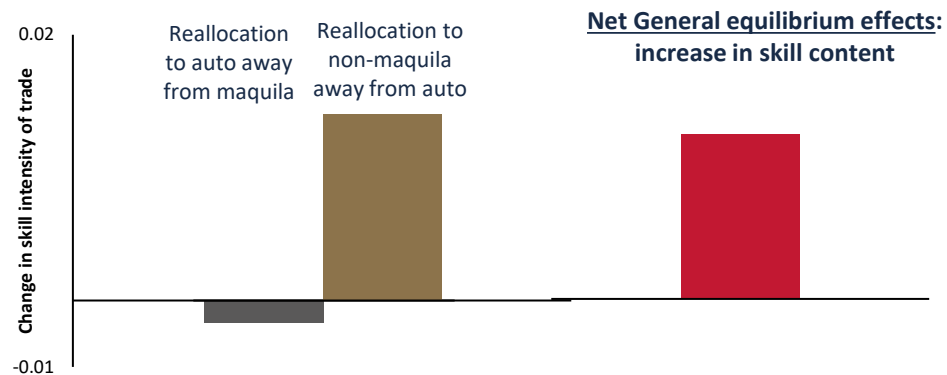


1994-2001 Model: Summary of the effects in GVC participation

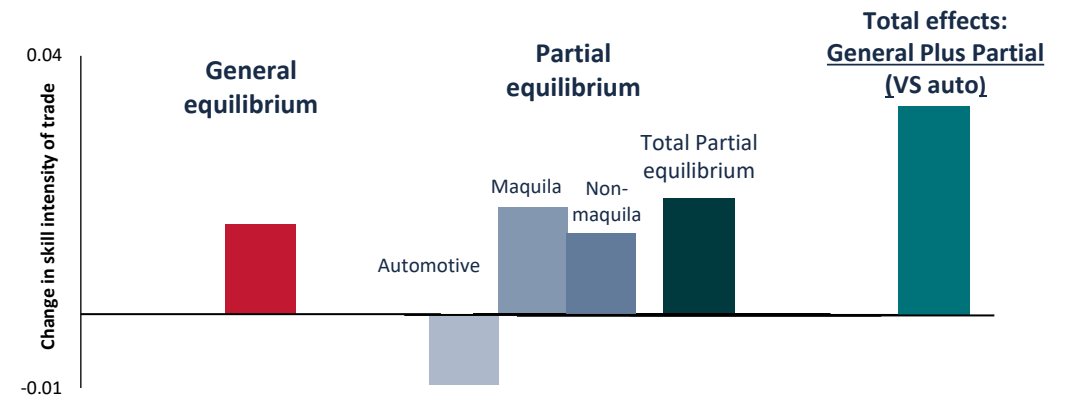


Changes in Skill Content of Trade (Reallocation across Sectors)

Skill intensity is lower in auto than in maquila and non-maquila



1994-2001 Model: Summary of the Effects in Skill Content



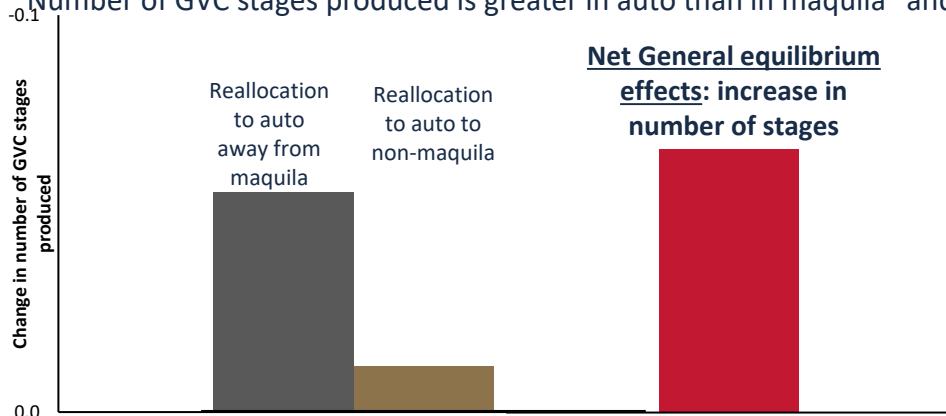
Source: Own calculations with data from Bank of Mexico, Comtrade, National Institute of Statistics and Geography (INEGI), Nunn and Trefler (2013) and Pierce and Schott (2012).

Notes: The Automotive sector comprises *Automobiles and Trucks, Motors Vehicles Bodies and Trailers, and Motor Vehicle Parts* industries. The "maquila" sector comprises those industries with a share of the sum of its maquila exports and imports over the sum of its total exports and imports greater than 0.50. The "non-maquila" sector comprises those industries with a share of the sum of its maquila exports and imports over the sum of its total exports and imports lower or equal than 0.50.

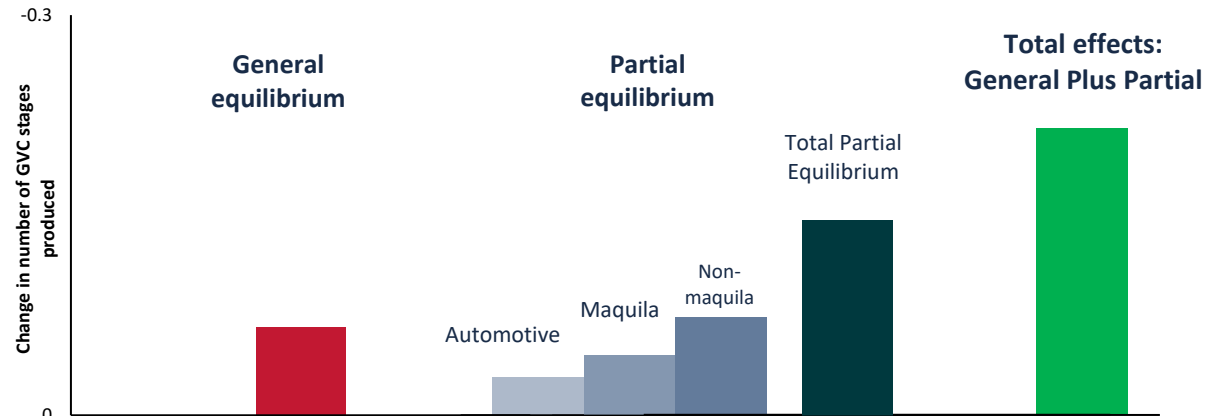
General Equilibrium Effects: Unskill Intensive GVC Integration Model (2006-2017)

Change in number of GVC Stages Produced (General equilibrium effects)

Number of GVC stages produced is greater in auto than in maquila” and “non-maquila

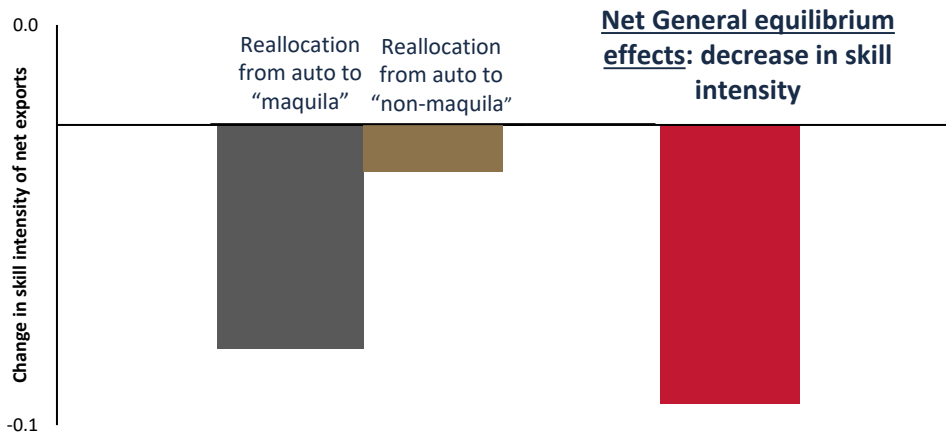


2006-2017 Model: Summary of the Effects in GVC Participation

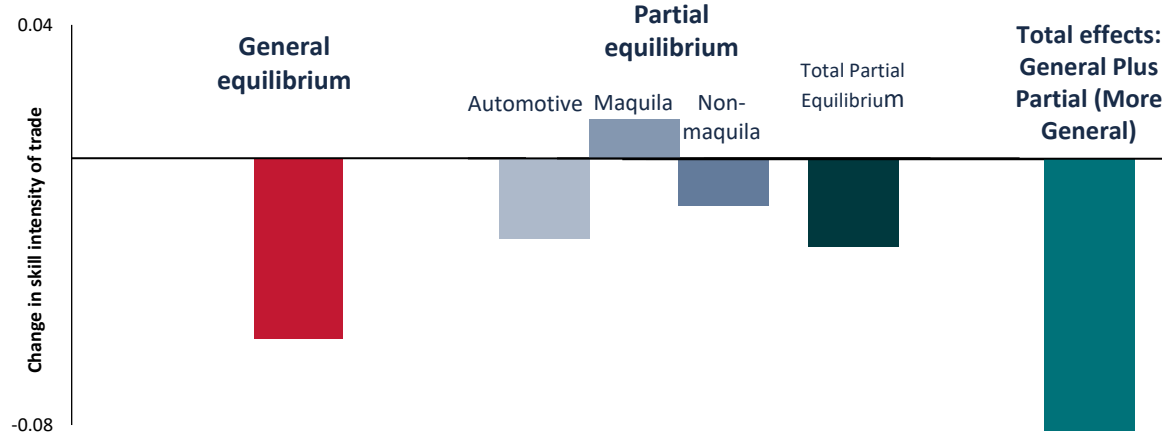


Change in Skill Content of Trade (General equilibrium effects)

Skill intensity is lower in auto than in maquila and non-maquila



2006-2017 Model: Summary of the Effects in Skill Content



Source: Own calculations with data from Bank of Mexico, Comtrade, National Institute of Statistics and Geography (INEGI), Nunn and Trefler (2013) and Pierce and Schott (2012).

Notes: The Automotive sector comprises *Automobiles and Trucks, Motors Vehicles Bodies and Trailers, and Motor Vehicle Parts* industries. The “maquila” sector comprises those industries with a share of the sum of its maquila exports and imports over the sum of its total exports and imports greater than 0.50. The “non-maquila” sector comprises those industries with a share of the sum of its maquila exports and imports lower or equal than 0.50.

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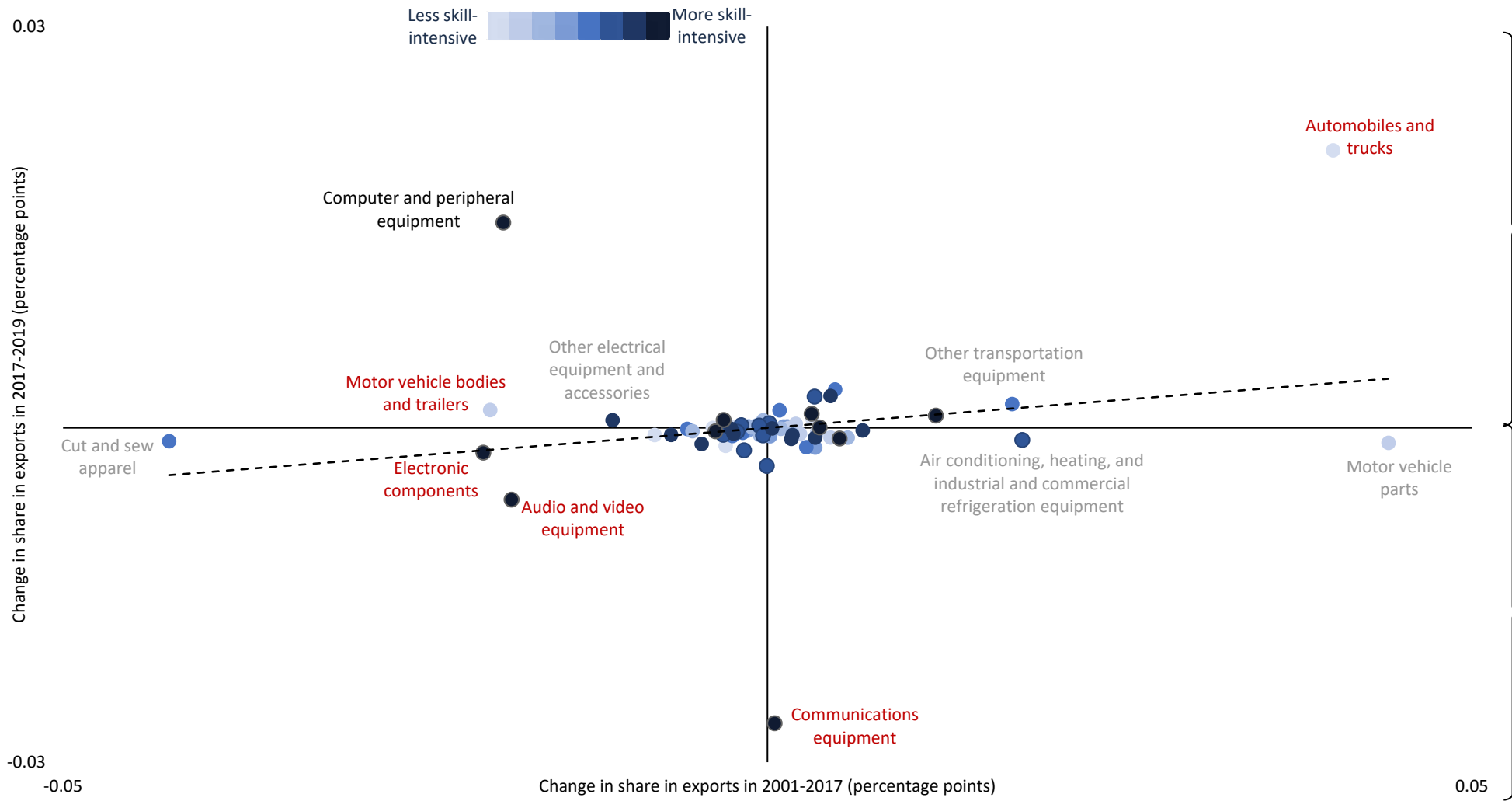


US-China Trade Conflict and Trade Diversion Effects

- The 2nd GVC integration model was unskill-intensive and partially led by China's entry into the WTO. Since the mid-2018, the US's tariffs started to target imports from China. This last country retaliated, engaging both countries in a trade conflict.
- Since the US-China trade war diminished the attractiveness of the Asian country in the US market, it could have led Mexico back to the 1st (skill intensive) model. Was that the case?

The US-China Trade Conflict and Mexico's Export Patterns

Change in Mexico's Export Shares in 2001-2017 and 2017-2019, by industry



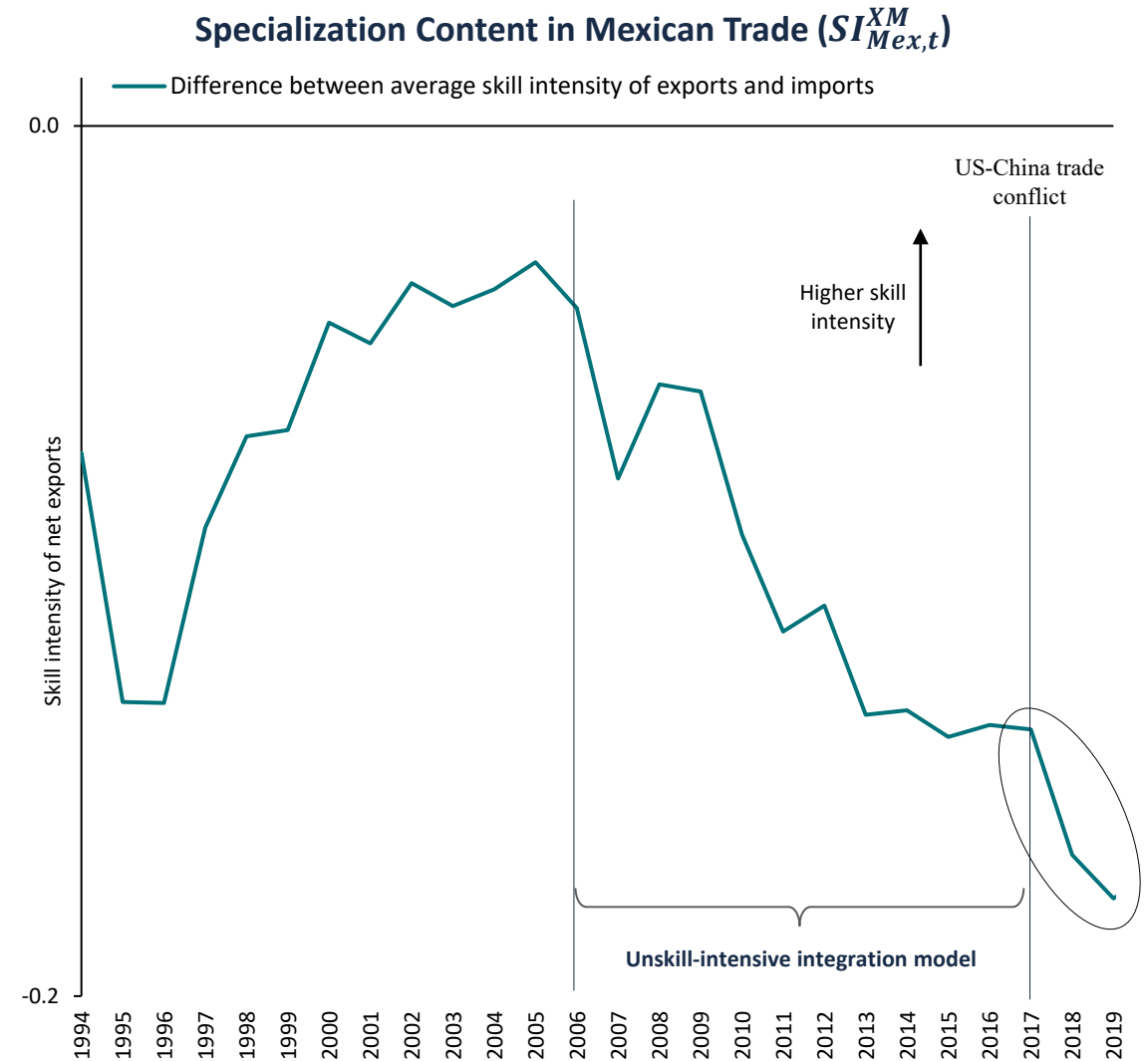
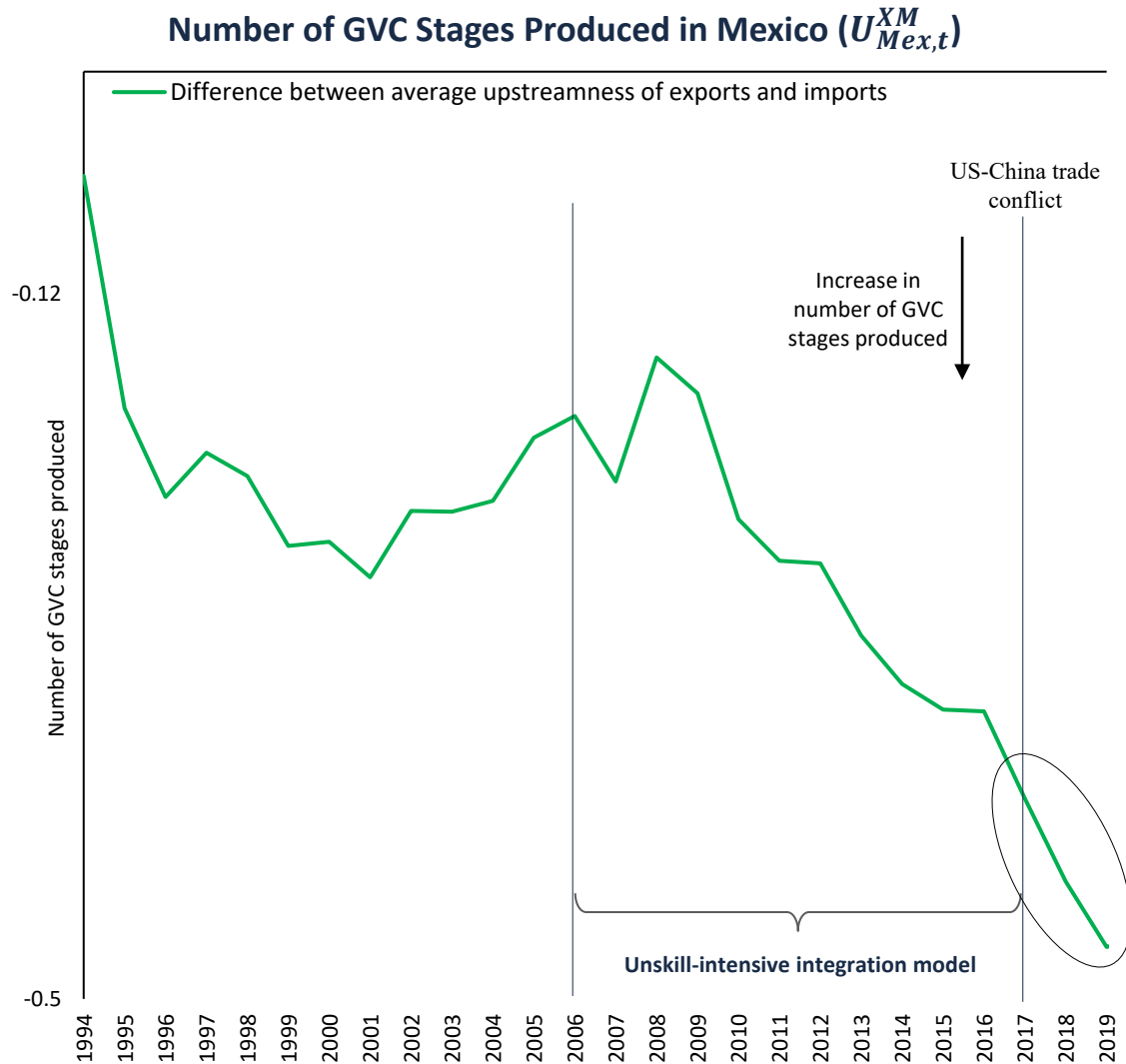
Skill distribution within each industry-group



Source: Own calculations with data from Bank of Mexico, Comtrade, National Institute of Statistics and Geography (INEGI) and Pierce and Schott (2012).

Notes: The skill distribution within each group is calculated as the sum of the number of industries (weighted by their change in export share in 2019-2019) in each skill group over the total number of industries (also weighted).

The US-China Trade conflict and Mexico's insertion into GVCs

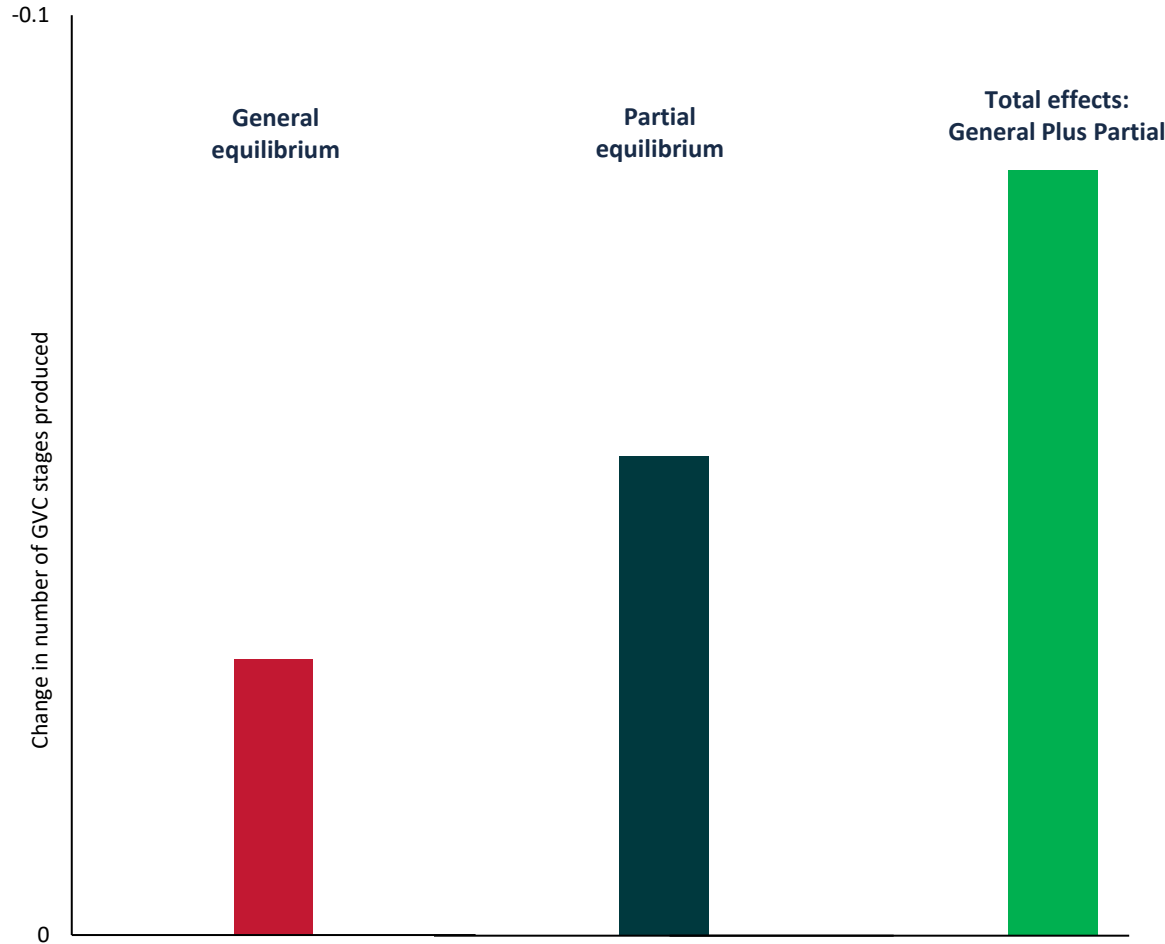


Source: Own calculations with data from Bank of Mexico, Comtrade, National Institute of Statistics and Geography (INEGI), Nunn and Trefler (2013) and Pierce and Schott (2012).

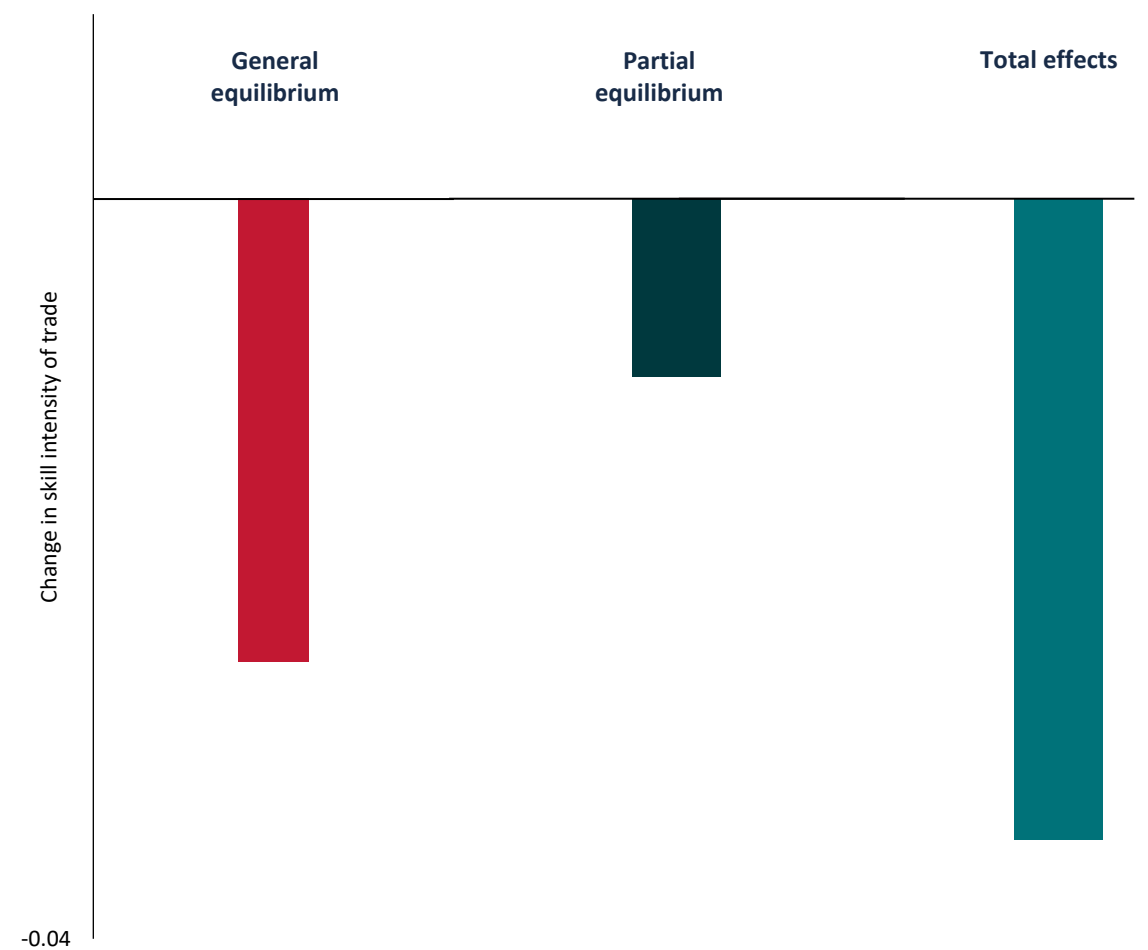
Notes: The number of GVC stages produced is computed as the difference between the average upstreamness of exports and imports. The skill intensity of net exports is computed as the difference between the average skill intensity of exports and imports.

US-China Trade Conflict and Partial and General Equilibrium Effects

Summary of the Effects in GVC Participation in 2017-2019



Summary of the Effects in Skill Intensity in 2017-2019



Source: Own calculations with data from Bank of Mexico, Comtrade, National Institute of Statistics and Geography (INEGI), Nunn and Trefler (2013) and Pierce and Schott (2012).

Notes: The Automotive sector comprises *Automobiles and Trucks*, *Motors Vehicles Bodies and Trailers*, and *Motor Vehicle Parts* industries. The “maquila” sector comprises those industries with a share of the sum of its maquila exports and imports over the sum of its total exports and imports greater than 0.50. The “non-maquila” sector comprises those industries with a share of the sum of its maquila exports and imports over the sum of its total exports and imports lower or equal than 0.50.

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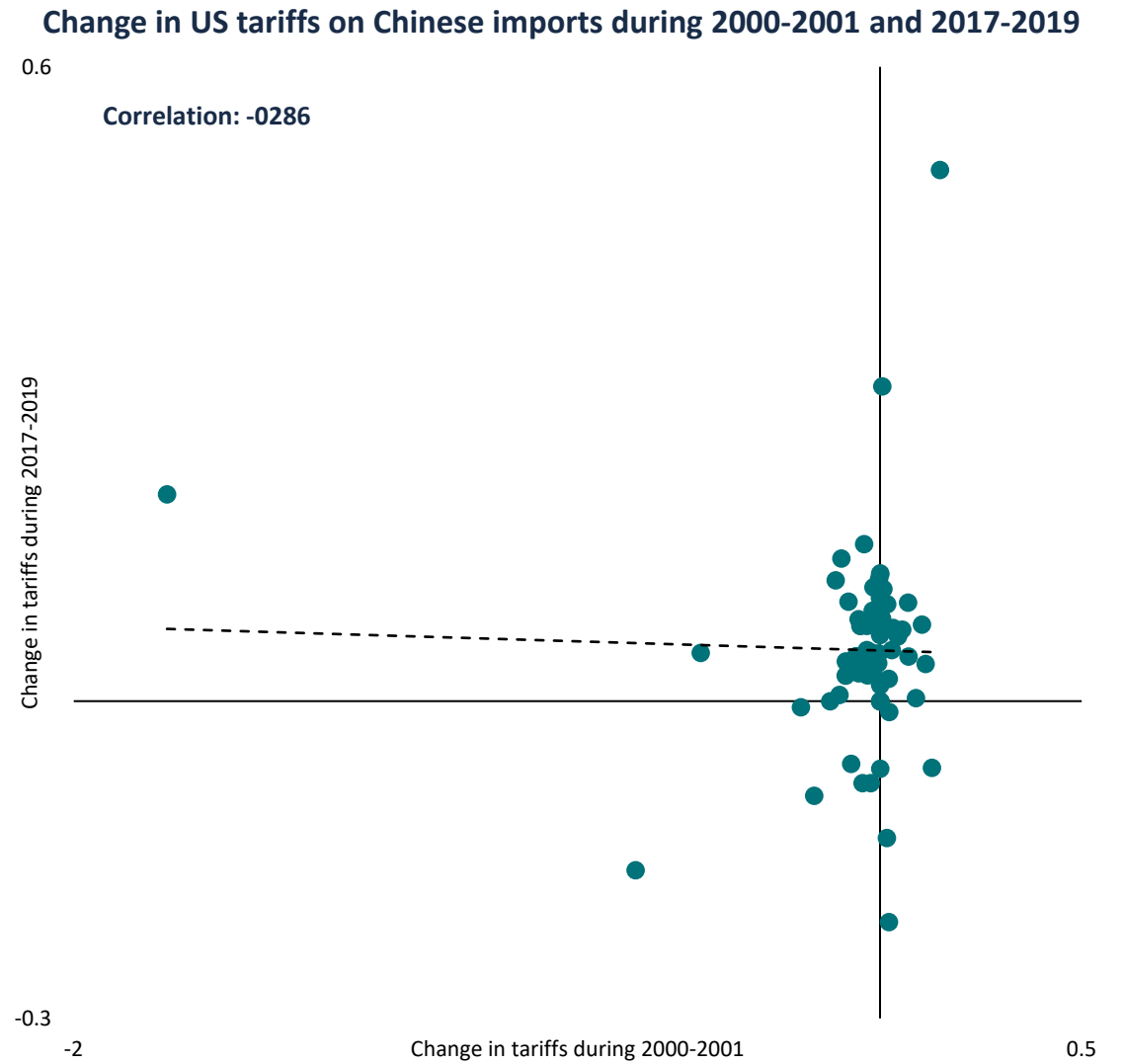
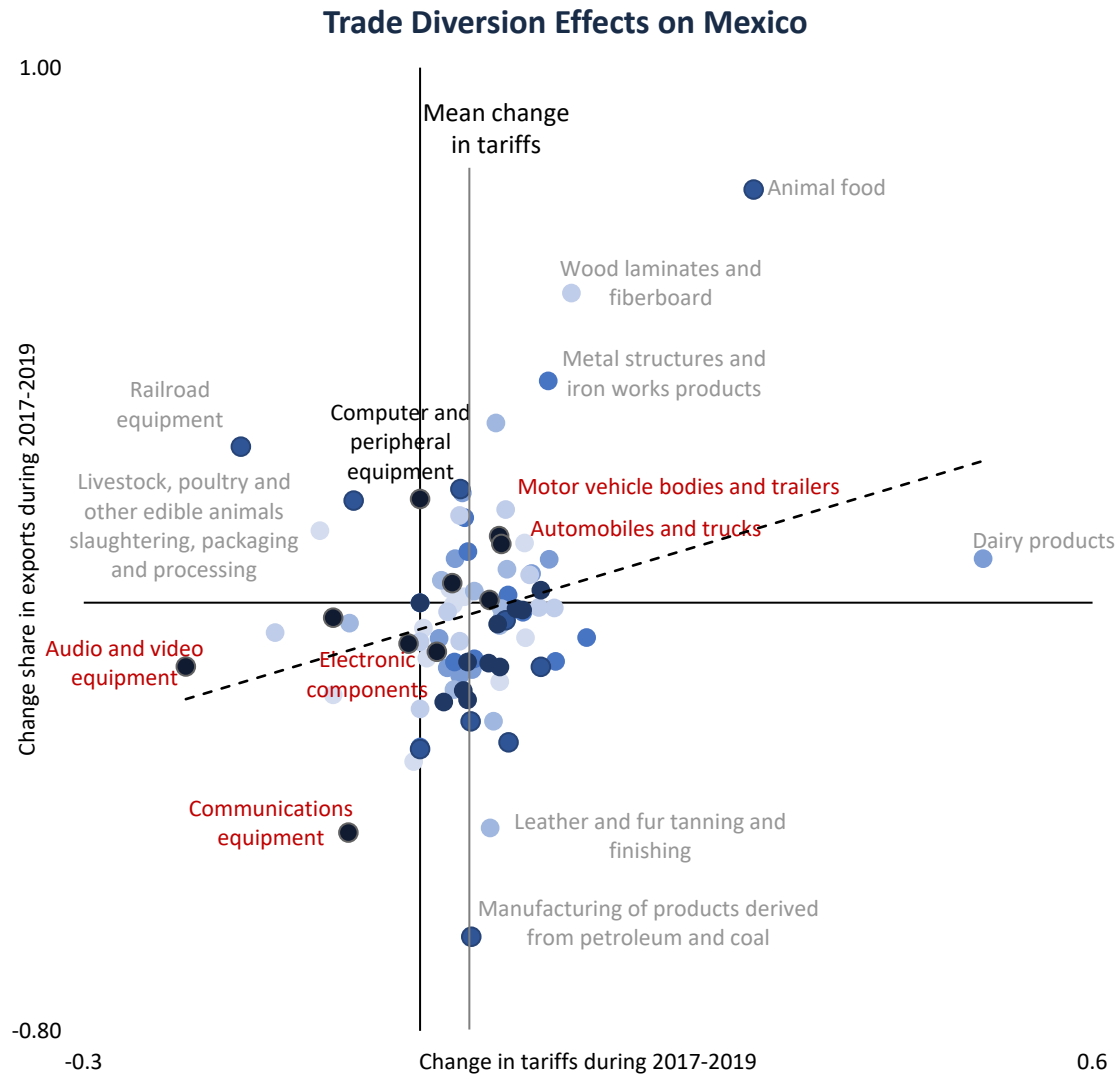
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US-China Trade Conflict and Trade Diversion



Source: Own calculations with data from Bank of Mexico, Comtrade, National Institute of Statistics and Geography (INEGI) and Pierce and Schott (2012).

Looking forward and Concluding Remarks

- During the 2017-2019 period Mexico deepened the unskill-intensive model of integration into GVC, so that there was an increase in the number of GVC stages it produced and a reduction in the skill-content of its exports.
- In the context of a traditional *static* General Equilibrium model of international trade, this type of resource reallocation towards the production of unskill-intensive goods may be the optimal response to the entry of a new global competitor.
- However, *in real life*, which is dynamic, this response may be insufficient to foster long-term growth and economic development.
- Since part of the response was associated with the specific characteristics of the tariffs the US imposed to China, there is hope looking ahead.
- In particular, it is not clear that the current process of nearshoring will follow the same pattern across industries as the tariffs imposed by the US.
- Hence, it is possible that it will help shift resources to more skill intensive goods; however, policies that favor that shift, including structural policies, will help to that end.

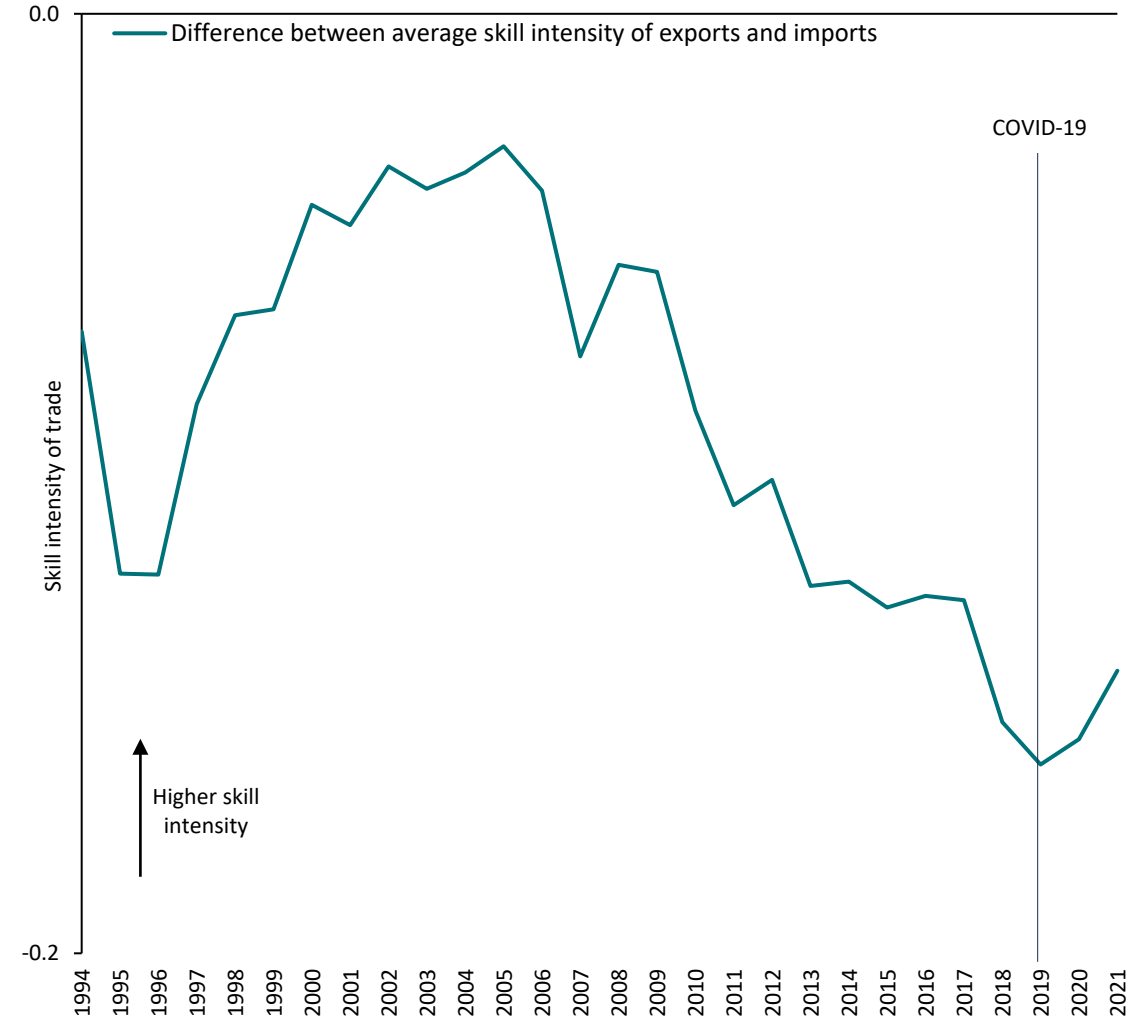
Anexo

Mexico's insertion into GVCs after COVID-19

GVC participation: Number of GVC Stages Produced in Mexico ($U_{Mex,t}^{XM}$)



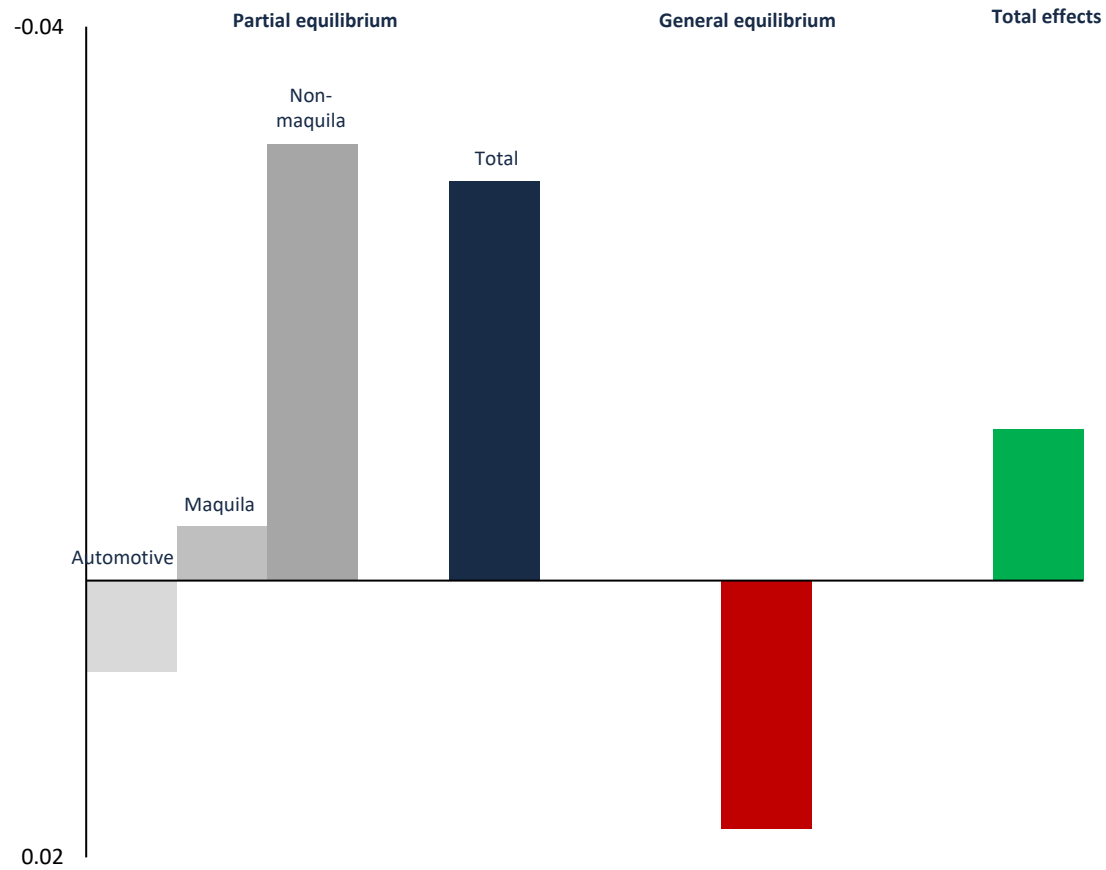
Skill Intensity: Specialization Patterns in Mexico ($SI_{Mex,t}^{XM}$)



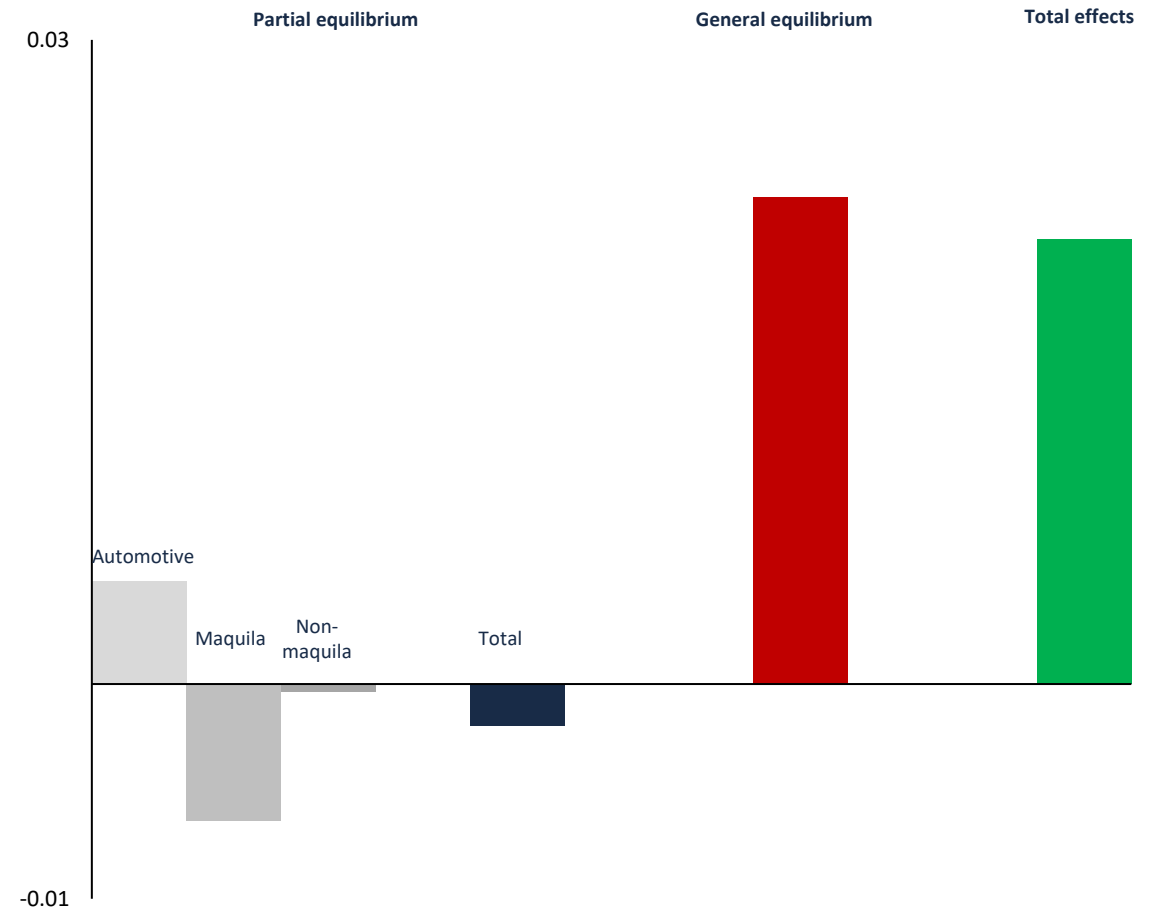
Source: Own calculations with data from Bank of Mexico, Comtrade, National Institute of Statistics and Geography (INEGI) and Pierce and Schott (2012).

Mexico's insertion into GVCs after COVID-19: Partial and General Equilibrium Effects

Summary of the Effects in GVC Participation in 2019-2021



Summary of the Effects in Skill Intensity in 2019-2021

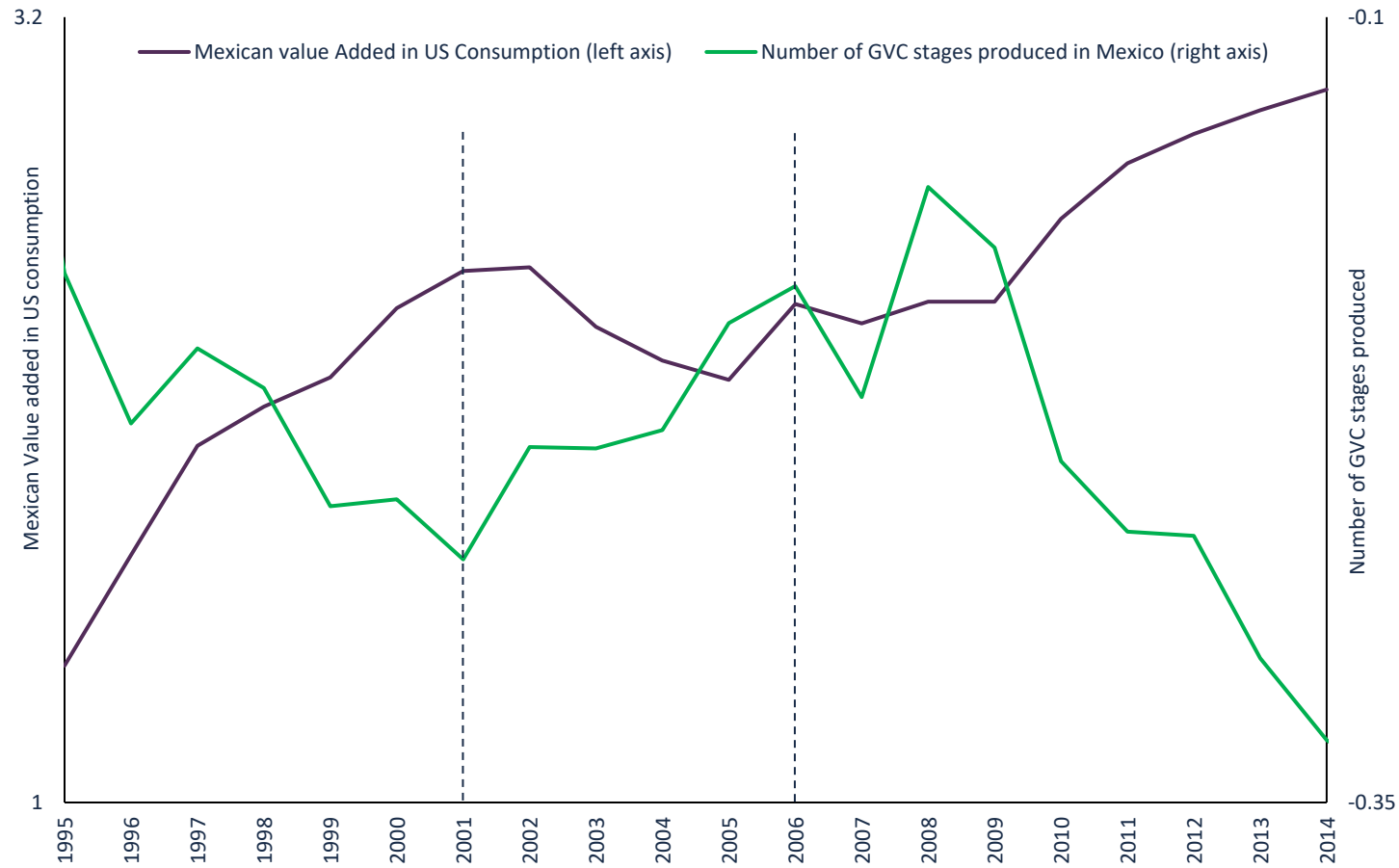


Source: Own calculations with data from Bank of Mexico, Comtrade, National Institute of Statistics and Geography (INEGI), Nunn and Trefler (2013) and Pierce and Schott (2012).

Notes: The Automotive sector comprises *Automobiles and Trucks*, *Motors Vehicles Bodies and Trailers*, and *Motor Vehicle Parts* industries. The "maquila" sector comprises those industries with a share of the sum of its maquila exports and imports over the sum of its total exports and imports greater than 0.50. The "non-maquila" sector comprises those industries with a share of the sum of its maquila exports and imports over the sum of its total exports and imports lower or equal than 0.50.

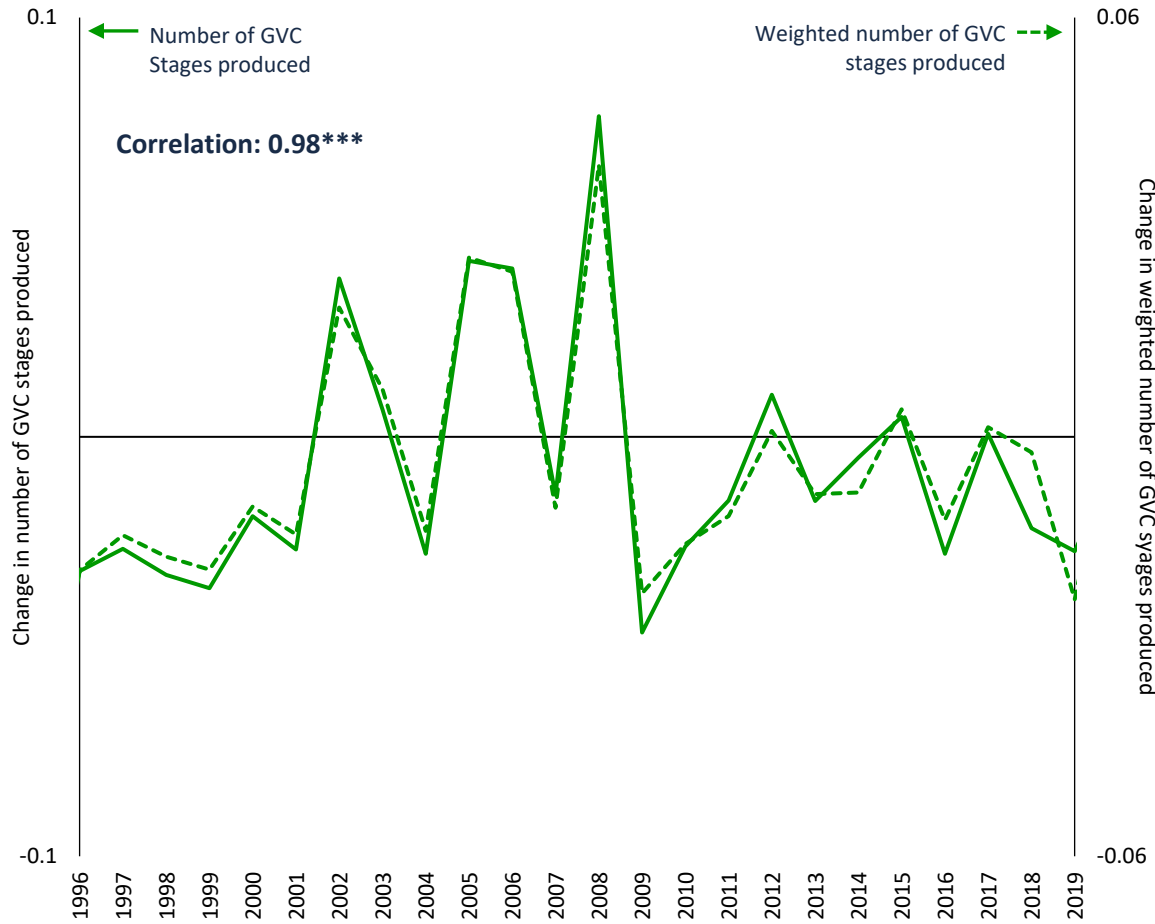
Value Added and Number of GVC Stages domestically Produced

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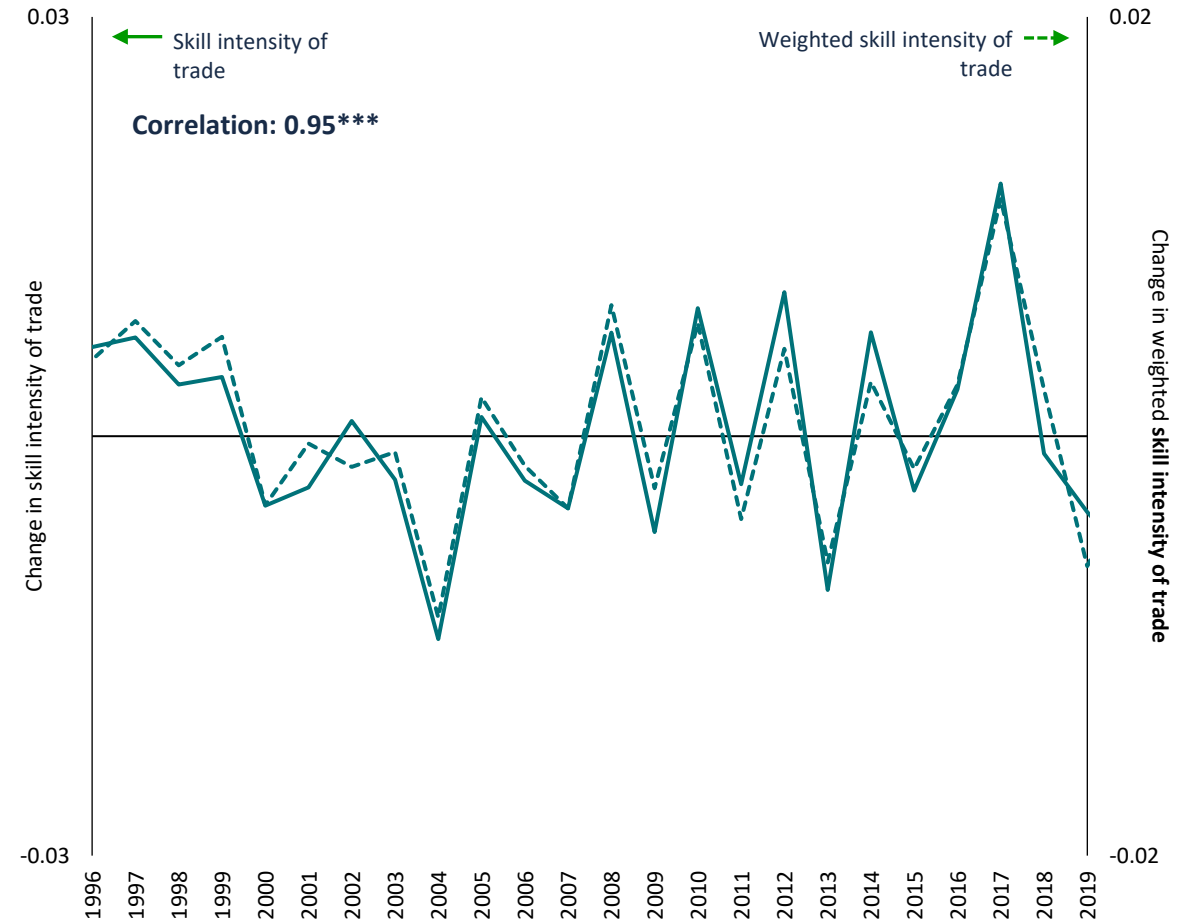


Partial Equilibrium: “Maquila” Sector

Change in the Number and in the Weighted Number of GVC Stages Produced in Mexico “Maquila” Sector



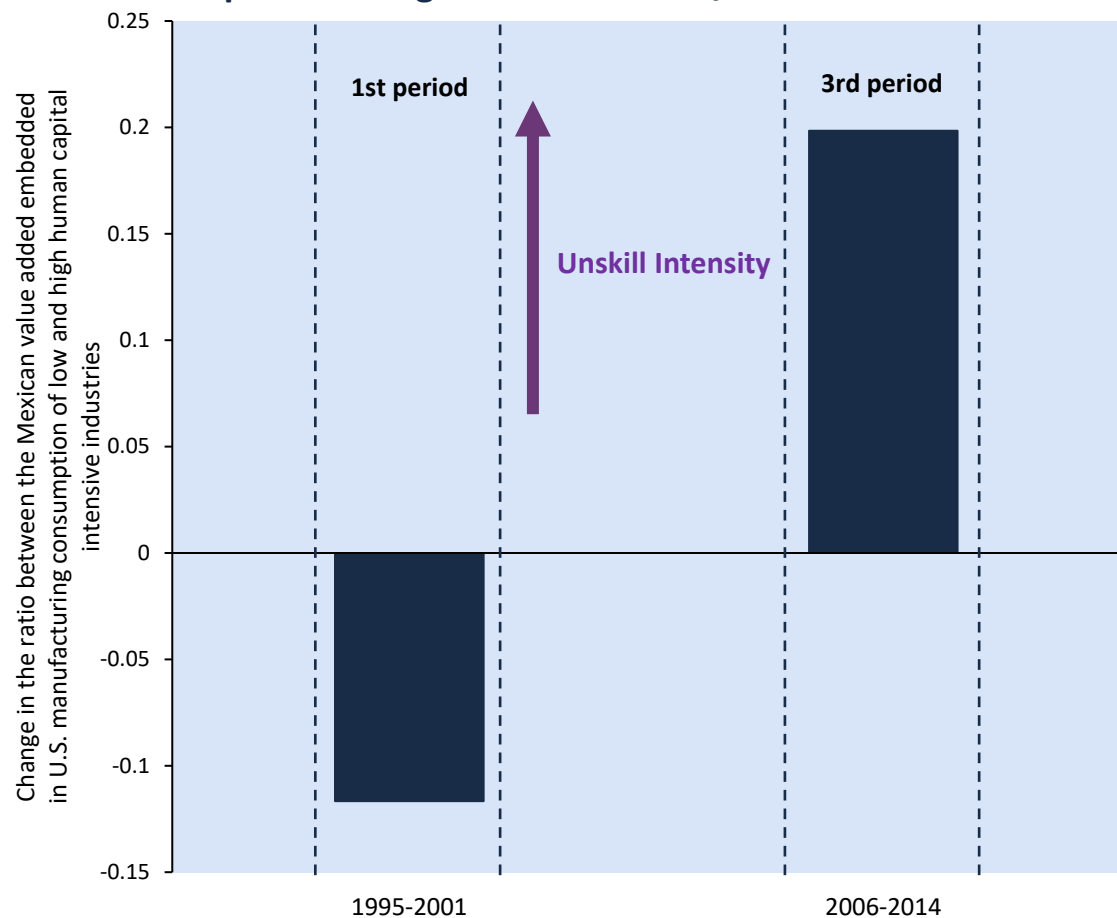
Change in the Skill Intensity and in the Weighted Skill Intensity of Net Exports “Maquila” sector



Two Different Strategies of Integration into GVCs

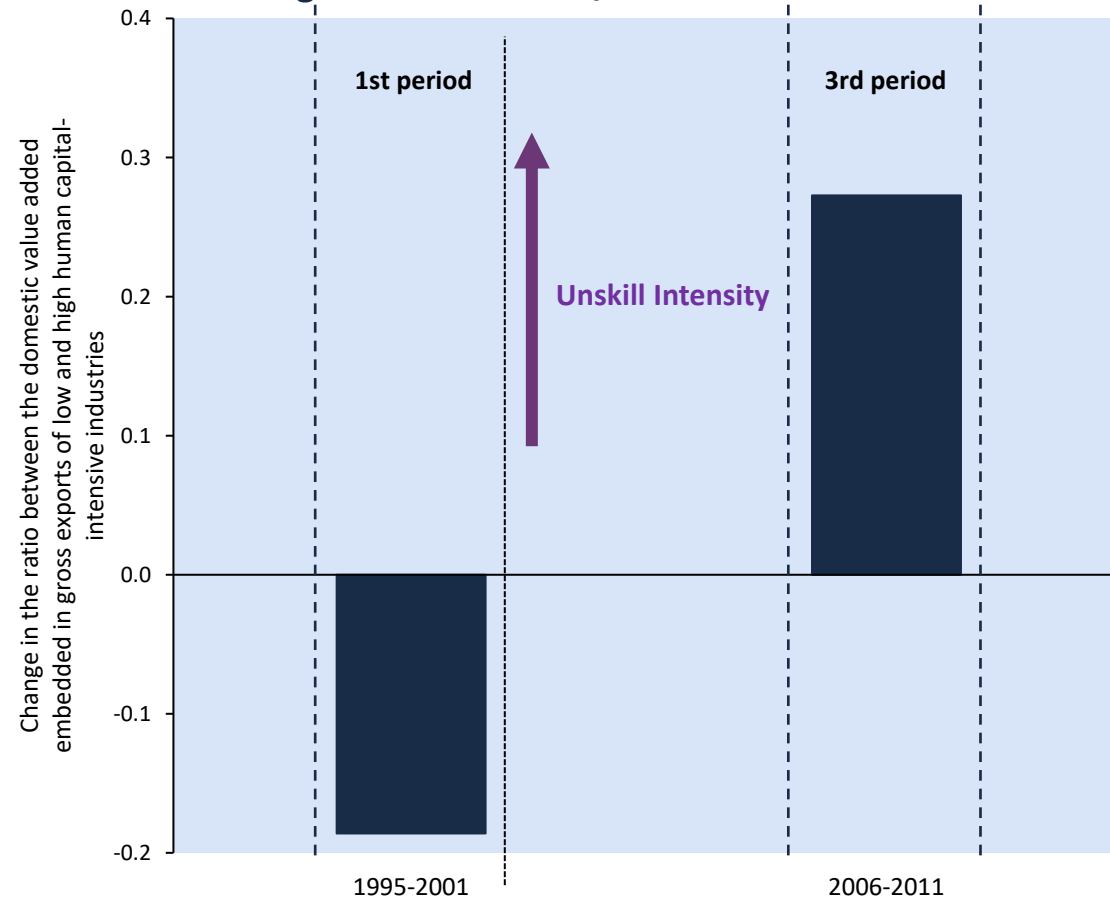
Mexico's 2 different integration remains models robust to different data and methodologies.

Mexican Value Added (VA) Embedded in U.S. Manufacturing Consumption: Change in VA of Unskill/Skill-Intensive Industries



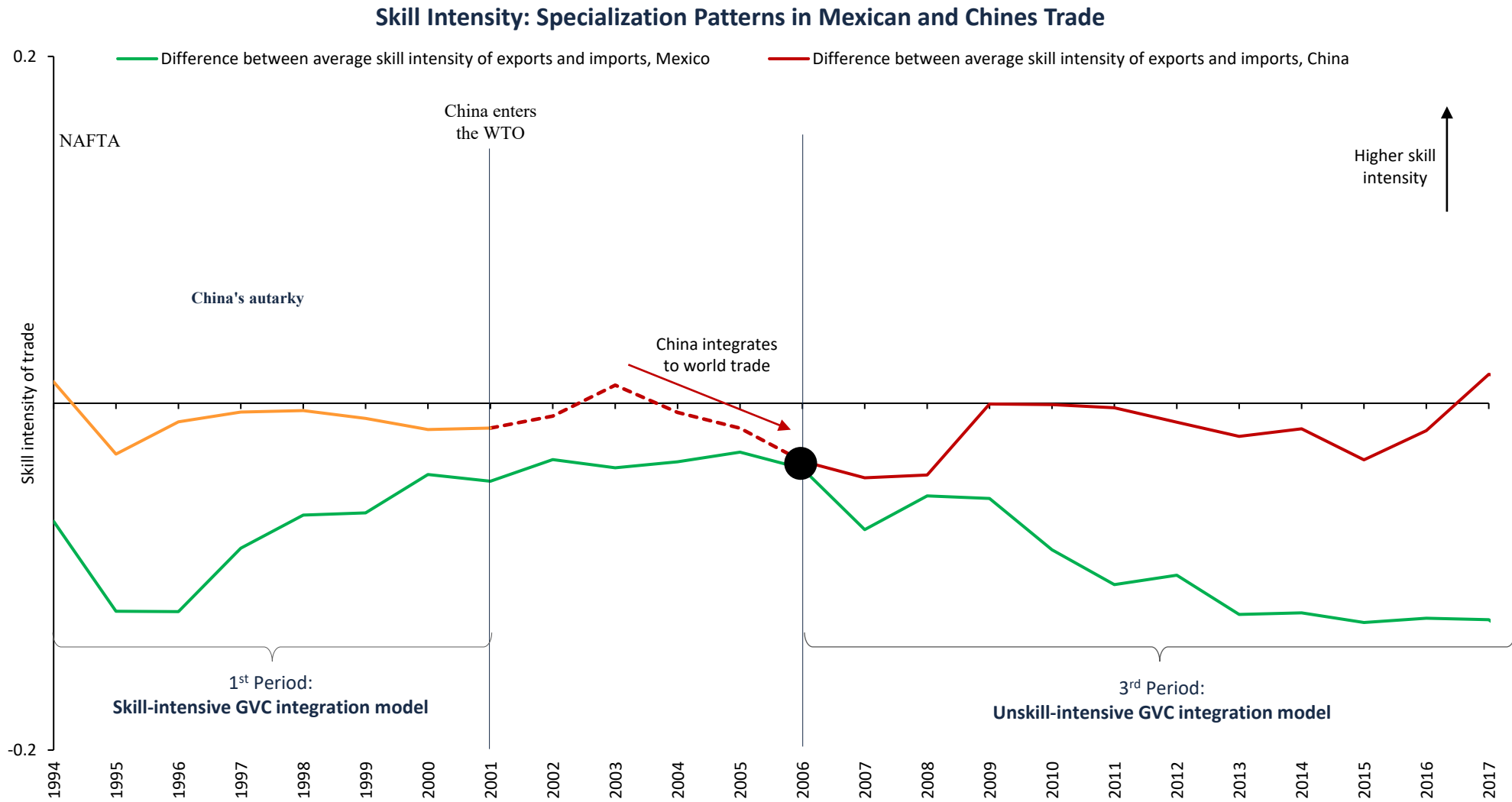
Source: Own calculations with data from WIOD and Nunn and Trefler (2013).

Value Added Embedded in Gross Mexican Exports: Change in VA of Unskill/Skill-Intensive Industries



Source: Own calculations with data from Trade in Value Added (TiVA) database and Nunn and Trefler (2013).

Mexico's insertion into GVCs: Historical perspective

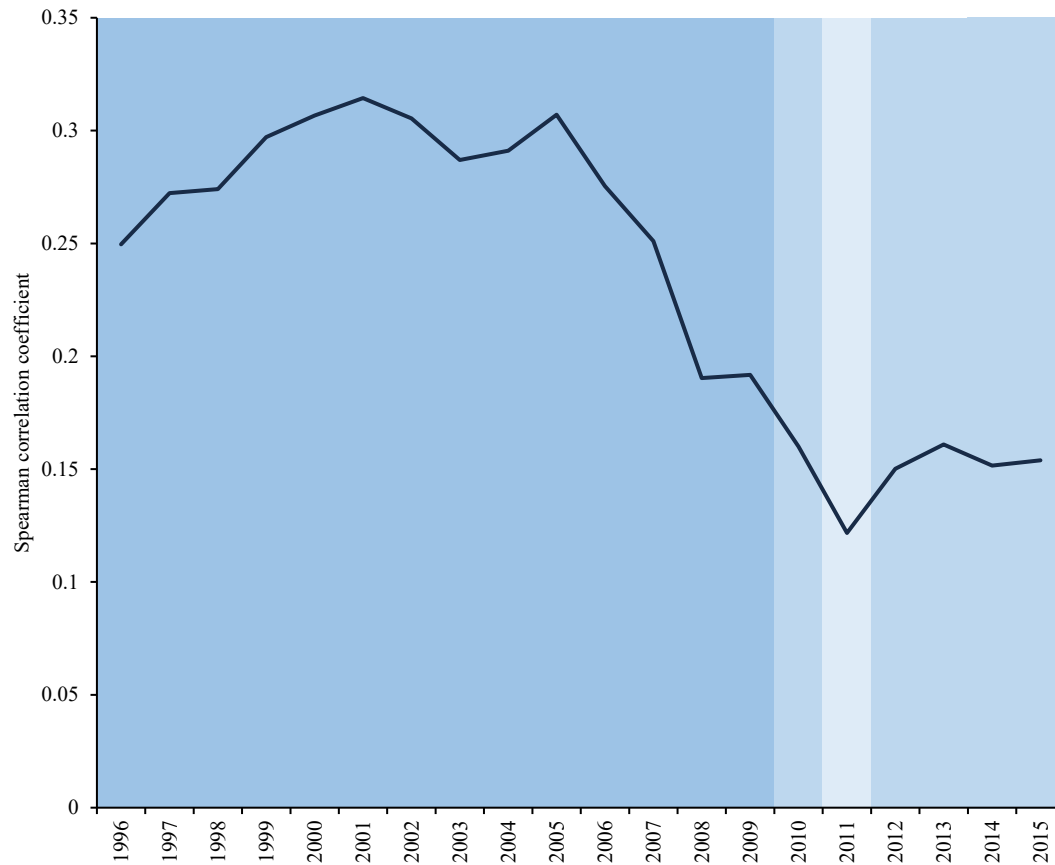


Source: Own calculations with data from World Bank, Bank of Mexico, National Institute of Statistics and Geography (INEGI), Chor et al. (2014) and Pierce and Schott (2012).

Notes: GDP per capital in PPP at constant 2017 international dollars. The upstreamness measure for China were taken from Chor et al. (2014). In order to achieve comparability between Mexico and China, the measures of upstreamness at the industry-level of Mexico were adjusted in manner that the upstreamness value of its sixth most upstream industry was equal to the most upstream industry in China.

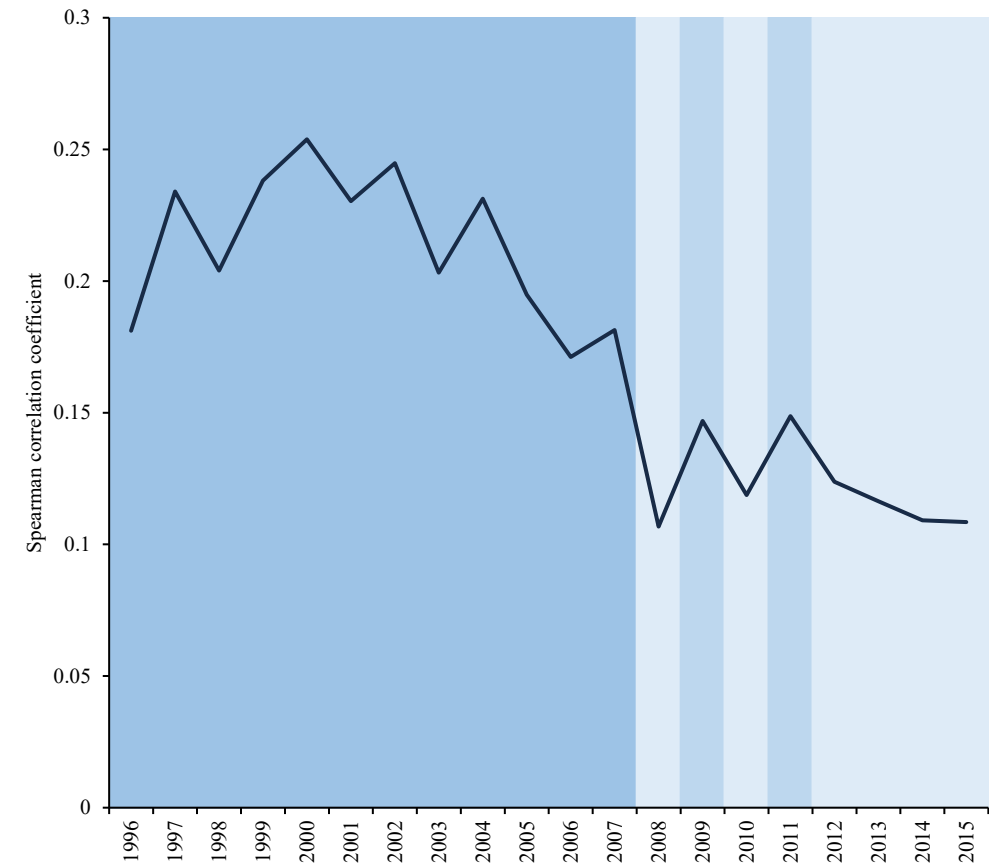
Trade Competencia with China

Correlation between Revealed Comparative Advantage of Mexico and China in the International Market



Fuente: Cálculos propios con datos del COMTRADE.

Correlation between Revealed Comparative Advantage of Mexico and China in the US Market



Fuente: Cálculos propios con datos del COMTRADE.