Nearshoring: Possible Scenarios of its Size and Impact on Mexico´s Economy

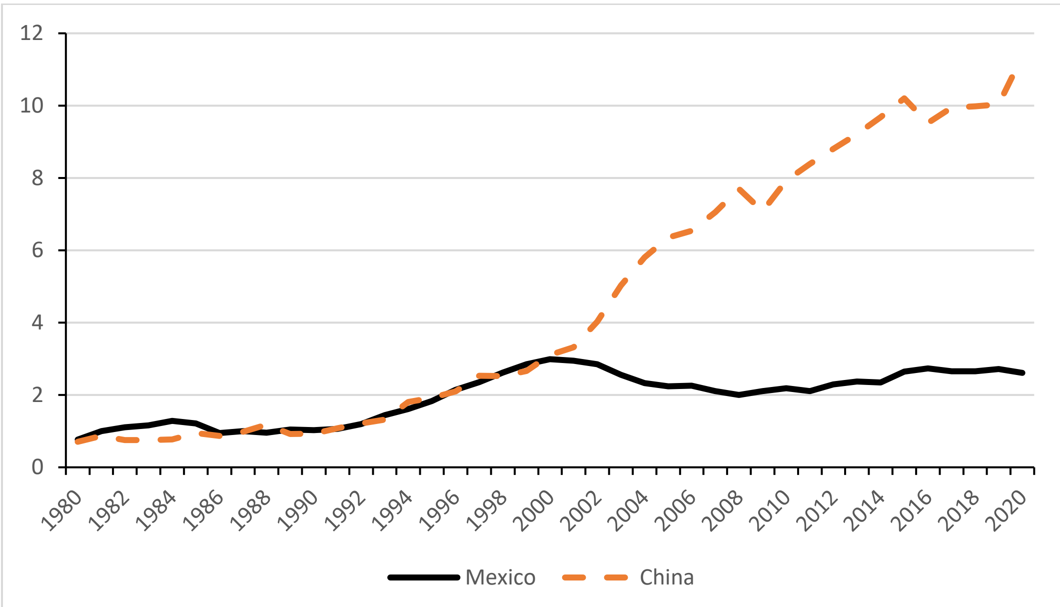
January 2024

Appendix

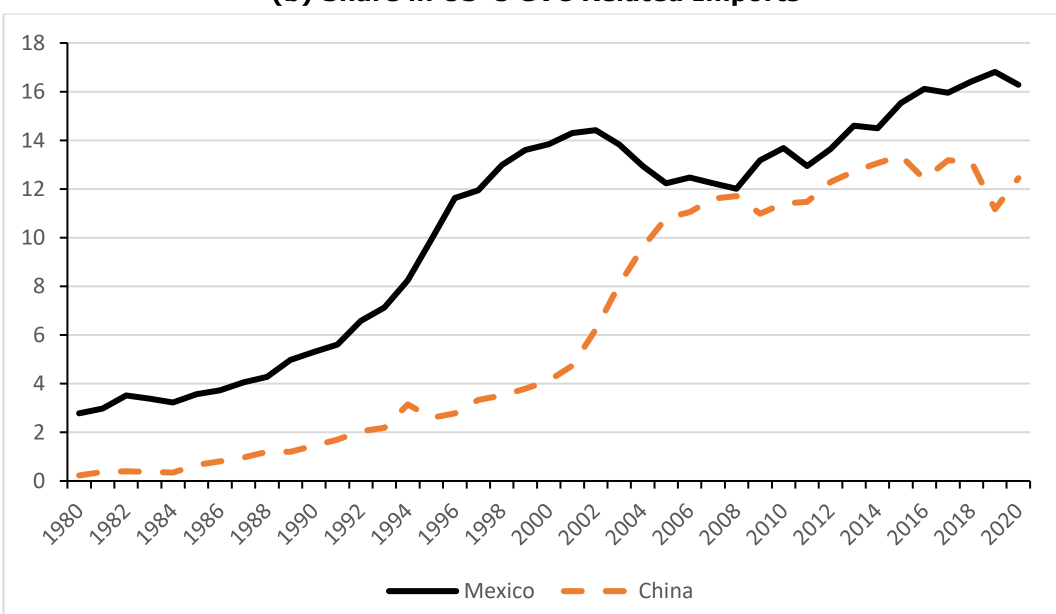
Appendix A.1

Figure A.1.1

(a) Share in Global GVC Related Imports



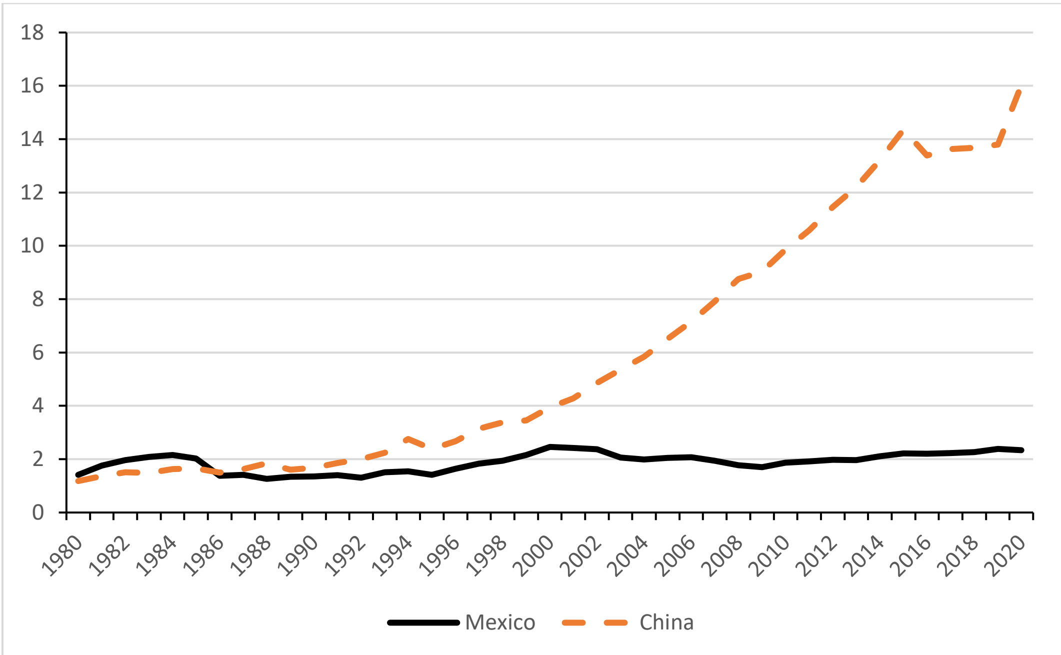
(b) Share in US´s GVC Related Imports



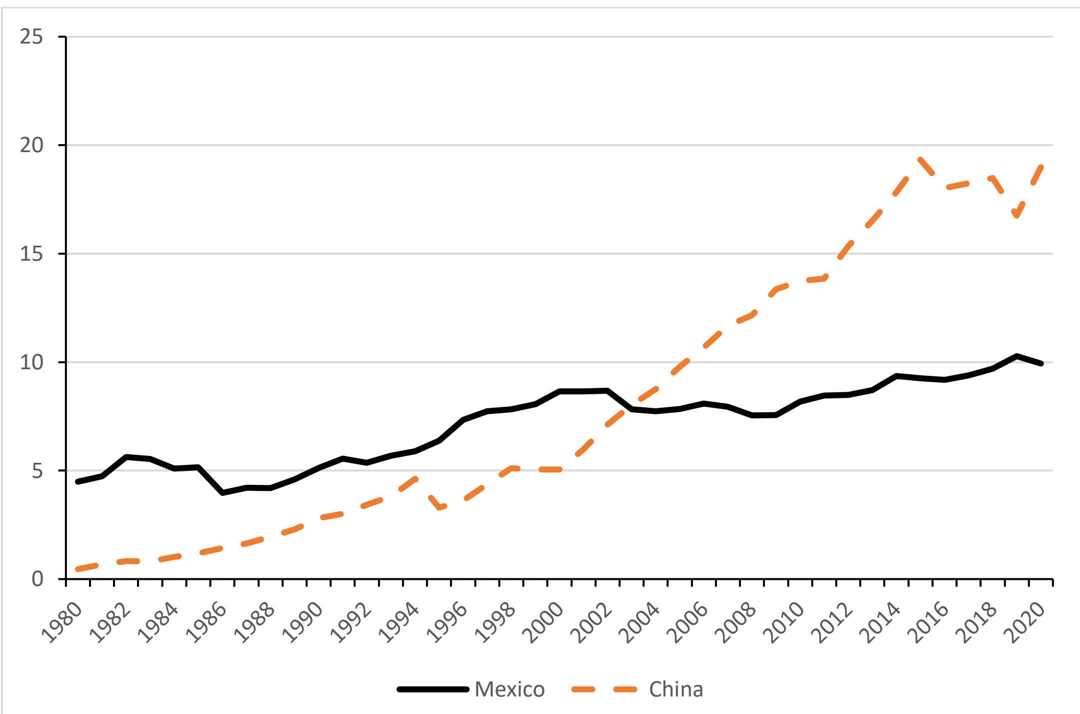
Sources: Computed using WITS data: https://wits.worldbank.org/gvc/gvc-data-download.html. The data used for global GVCs related imports in (a) excludes China and Mexico´s imports.

Figure A.2.2

(a) Share in Global Traditional Imports



(b) Share in US´s Traditional Imports



Sources: Computed using WITS data: https://wits.worldbank.org/gvc/gvc-data-download.html. The data used for global traditional imports in (a) excludes China and Mexico imports.

Appendix A.2

Sector-specific contribution to GVC-generated value-added in Mexico

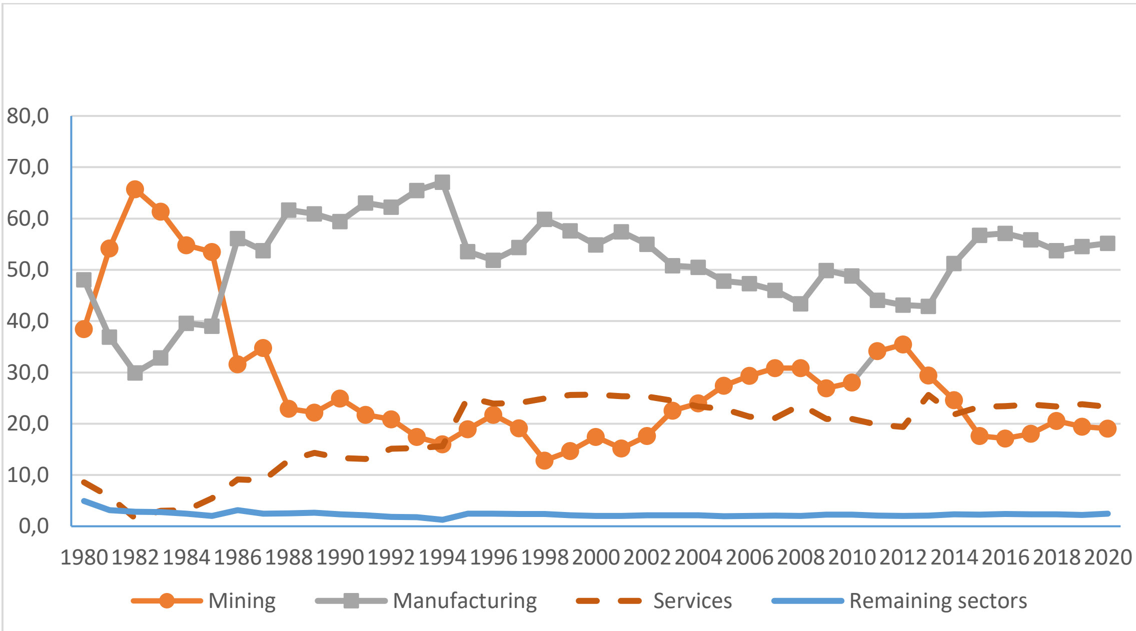
Using data from the World Bank database (Borin, Mancini and Taglioni, 2021), we calculate the share of each exporting sector within Mexico's total GVC-related domestically generated value-added. Figure A.2.1, panel (a), shows that the manufacturing industry is the most important in these terms. It is worth noting, however, that prior to trade liberalization in the early 1980s, the mining sector played a key role in generating GVC-related value-added. This reflects the exports of crude oil and other commodities to other countries, which in turn may have been used as inputs for re-exporting processed goods.

The shares calculated in the previous paragraph, however, do not capture precisely the contribution of each sector in the economy to the generation of value-added as a result of Mexico’s insertion into GVCs. This is because the final exporting sector is not the sole sector responsible for generating the value-added within domestic production chains that is embedded in GVC-related exports. In the case of manufacturing GVC-related exports, for example, part of the value-added embedded in its exports is generated by other sectors that provide inputs or services used by the manufacturing industry. Therefore, even if these sectors do not directly export value-added, they indirectly contribute to the value-added that is ultimately exported by the manufacturing industry. To address this point, we again follow Borin, Mancini, and Taglioni (2021) and decompose the total value-added resulting from GVCs participation based on the sector of the economy that generates it. Figure A.2.1, panel (b), illustrates this decomposition and reveals that the services sector is currently the main contributor to the value-added generated by Mexico's involvement in GVCs, accounting for slightly over 40% of the total. It is followed by the manufacturing sector, which contributes around 30%.

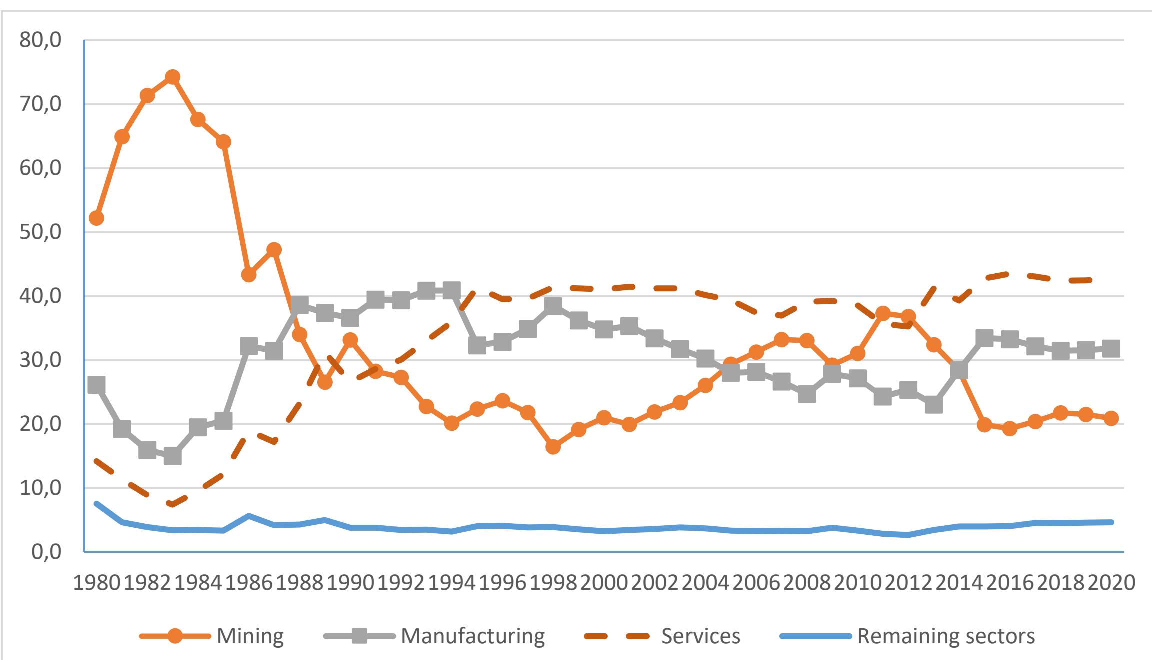
Now focusing on the manufacturing sector, Table A.2.1 shows the contribution of each industry within this sector to the total value-added generated through its GVCs participation (the figures related to the share of each industry´s exports within the forward component of manufacturing GVC-related exports are very similar). Currently, approximately one-third of the total value-added generated by the manufacturing sector's involvement in GVC comes from the transport equipment industry, followed by the basic metals and fabricated metals industry and the electrical and optical equipment industry. It is worth noting that while the share of the transport equipment industry has been steadily increasing over time, the share of the electrical and optical equipment industry increased significantly before China's entry into the WTO but has diminished substantially since then. Similarly, although with a relatively smaller contribution to value-added, the share of the machinery industry exhibited a steadily increasing trend following the implementation of NAFTA, but in the last few years has lost momentum and shown an incipient decrease. These trends are relevant since, as seen in section 4 of the chapter, it is within these two broad sectors where most of the opportunities to enhance Mexico’s exports as a consequence of nearshoring are present, so new investments to increase the export capacity of these sectors may be needed in the near future.

Figure A.2.1

(a) Sectoral Share in Total GVC Related Value Added (By Sector Exporting the Value Added)



(b) Sectoral Share in Total GVC Related Value Added (by Sector Generating the Value Added)



Sources: Computed using WITS data: https://wits.worldbank.org/gvc/gvc-data-download.html.

Table A.2.1 Share in manufacturing GVCs related value-added

	Total Manufacturing	Food, Bevs. & Tobacco	Textiles	Pulp, paper and publishing	Coke and petroleum	Chemicals and pharmaceutical	Rubber and Plastic	Other non metallic	Basic Metals and products	Machinery and equipment	Electrical and optical	Transport equipment	Repair and installation
1980	100.00	16.13	9.78	2.21	7.77	22.88	1.84	4.33	10.92	3.10	13.32	5.55	2.18
1981	100.00	10.06	6.76	2.50	16.24	21.51	2.02	3.84	11.34	2.77	15.26	5.22	2.49
1982	100.00	8.88	6.60	2.54	13.34	20.99	2.57	4.35	13.21	2.91	15.18	6.89	2.53
1983	100.00	9.21	5.94	1.92	13.17	14.38	2.91	4.26	15.92	4.33	15.39	11.19	1.39
1984	100.00	7.19	6.51	2.20	9.02	16.46	3.78	4.32	14.79	2.55	13.00	19.08	1.10
1985	100.00	6.90	5.23	2.33	8.19	15.19	4.43	5.13	13.01	2.11	15.25	20.95	1.28
1986	100.00	9.07	4.57	2.54	3.74	13.46	4.38	4.68	13.50	1.89	15.27	25.79	1.12
1987	100.00	7.23	6.19	3.07	3.04	12.85	4.64	4.23	16.37	2.13	17.31	21.69	1.26
1988	100.00	5.52	5.18	3.72	2.33	12.61	4.98	4.05	19.19	2.02	20.26	18.66	1.48
1989	100.00	3.63	5.05	4.82	8.79	8.72	3.18	3.04	16.55	1.98	19.53	20.99	3.73
1990	100.00	2.39	4.55	2.78	2.74	14.10	5.15	3.79	19.13	1.95	23.38	18.37	1.67
1991	100.00	1.89	4.26	2.51	2.24	13.86	5.28	3.95	17.94	1.74	23.86	20.70	1.78
1992	100.00	1.63	4.13	2.31	2.24	13.52	5.61	3.89	18.18	1.91	23.98	20.61	1.99
1993	100.00	1.32	3.50	2.15	2.31	12.53	5.44	4.11	19.26	1.92	24.95	19.97	2.52
1994	100.00	1.41	4.29	4.48	1.86	11.00	5.73	4.05	17.23	2.06	21.51	22.83	3.54
1995	100.00	1.64	6.16	3.42	2.67	6.28	5.12	2.02	17.98	2.69	28.05	20.90	3.07
1996	100.00	1.67	5.89	3.00	2.24	6.07	4.79	1.91	17.73	2.38	30.65	20.94	2.74
1997	100.00	1.47	5.22	2.60	2.07	5.03	4.44	1.68	15.35	2.59	36.65	20.16	2.73
1998	100.00	1.34	4.79	2.50	1.49	5.10	4.20	1.61	13.69	2.49	39.68	20.68	2.43
1999	100.00	1.33	4.40	2.54	1.70	5.14	3.89	1.56	13.34	2.32	39.72	21.54	2.53
2000	100.00	1.33	3.80	2.41	2.18	5.38	3.84	1.54	13.00	2.27	39.58	22.23	2.43
2001	100.00	1.37	3.58	2.45	2.02	6.17	3.89	1.47	12.36	2.49	39.54	22.25	2.41
2002	100.00	1.57	3.64	2.43	2.18	6.20	4.17	1.63	12.83	2.68	36.57	23.48	2.61
2003	100.00	1.82	3.50	2.45	1.57	6.65	4.27	1.63	14.78	2.86	34.00	23.75	2.71
2004	100.00	1.83	3.04	2.33	2.42	7.41	3.93	1.49	18.21	3.34	31.00	22.70	2.32
2005	100.00	1.91	2.70	2.26	1.60	7.59	3.94	1.54	20.52	3.82	27.83	23.94	2.34
2006	100.00	1.77	2.07	1.99	3.42	7.86	3.41	1.24	22.81	4.04	26.40	22.92	2.09
2007	100.00	1.87	1.84	2.00	2.90	8.05	3.24	1.31	24.96	4.35	23.84	23.57	2.08
2008	100.00	1.73	1.59	1.94	3.21	7.94	3.28	1.12	28.58	3.18	22.45	22.87	2.12
2009	100.00	2.33	2.01	2.34	2.82	9.24	3.59	1.20	24.27	5.35	21.55	22.88	2.42
2010	100.00	2.22	1.90	2.03	2.64	8.94	3.49	1.08	26.13	5.63	18.69	25.18	2.07
2011	100.00	2.43	1.80	1.92	2.48	7.81	3.64	1.03	26.92	6.19	16.66	27.11	2.01
2012	100.00	2.36	1.75	1.81	2.85	8.24	3.45	1.00	26.22	6.08	16.22	27.71	2.31
2013	100.00	2.32	1.54	1.73	2.80	6.91	2.97	1.47	27.75	3.87	15.92	30.43	2.29
2014	100.00	2.43	1.77	1.73	3.47	6.65	3.50	1.28	22.74	5.26	17.86	31.08	2.24
2015	100.00	2.18	1.59	1.68	3.68	6.84	3.68	1.30	19.60	5.03	18.56	33.78	2.08
2016	100.00	2.30	1.77	1.72	1.70	7.00	3.70	1.27	19.81	5.25	18.76	34.65	2.09
2017	100.00	2.25	1.70	1.70	2.60	5.89	3.46	1.29	20.39	5.03	17.48	36.18	2.02
2018	100.00	2.30	1.72	1.67	2.90	6.03	3.44	1.24	21.21	5.09	16.67	35.58	2.14
2019	100.00	2.28	1.63	1.70	2.71	5.76	3.48	1.25	21.16	5.09	16.81	36.04	2.08
2020	100.00	2.05	1.38	1.86	2.72	6.74	3.51	1.23	22.75	4.65	16.20	34.82	2.09

Sources: Computed using WITS data: https://wits.worldbank.org/gvc/gvc-data-download.html.

Appendix A.3

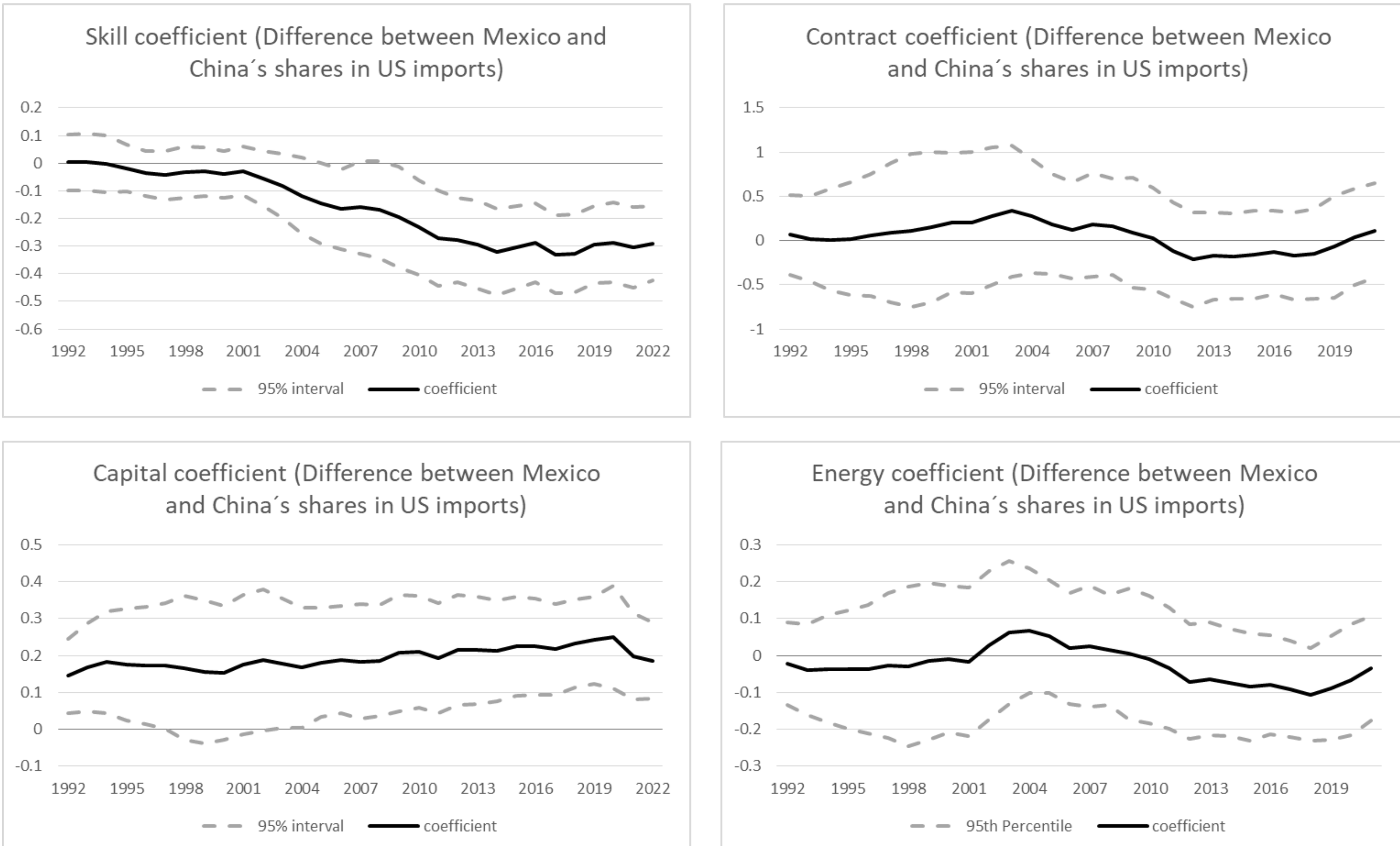
Econometric evidence on specialization patterns of China and Mexico

In this appendix we provide additional evidence supporting the hypothesis that China has tended to specialize in higher skill-intensive industries than Mexico in the past, using an approach based on Romalis (2004). In particular, to assess differences in the specialization patterns of Mexico and China in terms of the skill intensity of the goods they export to the United States, controlling for other factors that may influence these patterns, we conduct a regression analysis in which the dependent variable is the difference between Mexico's and China's shares of U.S. imports in a specific manufacturing industry. The independent variables are indicators of skill, contract, physical capital and energy intensities in the respective industries. We estimate this regression for each year from 1992 to 2022. The skill intensity measure is the one described in the main text. The contract intensity measure is from Nunn (2007). Physical capital intensity is measured as the log of the ratio of total investment spending to total payroll. The energy intensity is measured by the log of the ratio of energy spending to the value of total shipments.[1]

Figure A.3.1 summarizes the results. We illustrate the year-specific coefficient estimates and their 95% confidence intervals. Both the level and the change in the coefficient related to skill intensity aligns with the hypothesis that China has specialized in industries that are on average more skill intensive than Mexico’s export mix. Indeed, this coefficient is consistently negative and turns out to be statistically significant after China’s entry to the WTO. The results in the figure suggest that China has a relatively larger share than Mexico in industries that are relatively more skill intensive, and that this difference in specialization patterns became more accentuated from 2002 to 2017.

[1] The data for these measures are for 2005 and come from the NBER-CES Manufacturing Industry Database (https://www.nber.org/research/data/nber-ces-manufacturing-industry-database).

Figure A.3.1


Skill coefficient (Difference between Mexico and China´s shares in US imports)
0.2
0.1
0
-0.1
-0.2
-0.3
-0.4
-0.5
-0.6
1992
1995
1998
2001
2004
2007
2010
2013
2016
2019
2022
95% interval
coefficient
Contract coefficient (Difference between Mexico and China´s shares in US imports)
1.5
1
0.5
0
-0.5
-1
1992
1995
1998
2001
2004
2007
2010
2013
2016
2019
95% interval
coefficient
Capital coefficient (Difference between Mexico and China´s shares in US imports)
0.5
0.4
0.3
0.2
0.1
0
-0.1
1992
1995
1998
2001
2004
2007
2010
2013
2016
2019
2022
95% interval
coefficient
Energy coefficient (Difference between Mexico and China´s shares in US imports)
0.3
0.2
0.1
0
-0.1
-0.2
-0.3
1992
1995
1998
2001
2004
2007
2010
2013
2016
2019
95th Percentile
coefficient

Appendix A.4

Theoretical model proofs

In this appendix we briefly sketch the proof that the relative demand for skilled labor in country *B* $D_B(\frac{q_B}{w_B}, z^*, z^{**})$ in equation (14) of the chapter is increasing in both $z*$ and $z**$. The proofs that $D_A(\frac{q_A}{w_A}, z^*)$ is increasing in $z*$ and that $D_C(\frac{q_C}{w_C}, z^{**})$ is also increasing in $z**$ follow the same steps (see Feenstra and Hanson, 2016; Lee and Sim, 2016).

First, let $L_B(z*) = \frac{[\theta a_L(z^*)\alpha(z^*)E]}{[w_B a_L(z^*)+q_B a_H(z^*)]}$ be the demand for unskilled labor to produce $z*$ if this input is only produced in *B*, and likewise let $H_B(z*) = \frac{[\theta a_H(z^*)\alpha(z^*)E]}{[w_B a_L(z^*)+q_B a_H(z^*)]}$ be the demand for skilled labor to produce the same $z*$ if it is only produced in *B*. Then, differentiating $ln(D_B(\frac{q_B}{w_B}, z^*, z^{**}))$ with respect to $z*$ we get:

$$\frac{\partial ln(D_B(\frac{q_B}{w_B}, z^*, z^{**}))}{\partial z^*} = \frac{-H_B(z^*)}{H_B} - \frac{-L_B(z^*)}{L_B} = \frac{L_B(z^*)}{L_B} - \frac{H_B(z^*)}{H_B} = \frac{L_B(z^*)}{H_B}\left[\frac{H_B}{L_B} - \frac{H_B(z^*)}{L_B(z^*)}\right]$$
$$= \frac{L_B(z^*)}{H_B}\left[\frac{H_B}{L_B} - \frac{a_H(z^*)}{a_L(z^*)}\right] > 0$$

where the last inequality follows from the fact that the average relative demand for skilled labor in country *B*, $\frac{H_B}{L_B}$, exceeds the relative skill intensity at point $z*$, given by $\frac{a_H(z^*)}{a_L(z^*)}$.

Now let $L_B(z**) = \frac{[\theta a_L(z^{**})\alpha(z^{**})E]}{[w_B a_L(z^{**})+q_B a_H(z^{**})]}$ be the demand for unskilled labor to produce $z**$ if this input is only produced in *B*, and $H_B(z**) = \frac{[\theta a_H(z^{**})\alpha(z^{**})E]}{[w_B a_L(z^{**})+q_B a_H(z^{**})]}$ be the demand for skilled labor to produce the same $z**$ if it is only produced in *B*. Differentiating $ln(D_B(\frac{q_B}{w_B}, z^*, z^{**}))$ with respect to $z**$ we get:

$$\frac{\partial ln(D_B(\frac{q_B}{w_B}, z^*, z^{**}))}{\partial z^{**}} = \frac{H_B(z^{**})}{H_B} - \frac{L_B(z^{**})}{L_B} = \frac{L_B(z^{**})}{H_B}\left[\frac{H_B(z^{**})}{L_B(z^{**})} - \frac{H_B}{L_B}\right] = \frac{L_B(z^{**})}{H_B}\left[\frac{a_H(z^{**})}{a_L(z^{**})} - \frac{H_B}{L_B}\right] > 0$$

where the last inequality follows now from the fact that the average relative demand for skilled labor in country *B*, $\frac{H_B}{L_B}$, is lower than the relative skill intensity at point $z**$.

Appendix A.5

Comparative statics examples with the three-country theoretical model

A.5.1 A reduction in the costs of importing inputs from country A or country B.

Figure A.5.1 panel (a), shows the implications of a reduction in the costs of importing inputs (T_i) from country *A*, for example, due to a reduction in tariffs or transport costs. This increases z^* and leaves z^{**} unchanged. Thus, the relative demand for skilled labor and the skill premium increase in both *A* and *B*, while remaining unchanged in country *C*. In contrast, when there is a reduction in the costs of importing from country *B* (panel b), z^* diminishes and z^{**} increases. Thus, country *A* stops producing the most skill intensive inputs it produced before and its relative demand for skilled labor and skill premium diminish. On the other hand, the relative demand for skill and the skill premium increase in *C*, since this country now offshores the inputs with the lowest skill intensity within its original output mix towards *B*. The effect is ambiguous for country *B* because it starts producing some less skill intensive inputs and some more skill intensive inputs, as compared to its original export mix.

A.5.2 A movement of capital from country C to country A or to country B.

Consider a situation in which country *C* shifts capital to the developing countries *A* or *B* to relocate the production of some inputs. As in Feenstra and Hanson (1996, 1997), at constant wages this movement shifts the cost schedule of the host country down and that of country *C* up, by increasing the price of capital in *C* and lowering it in the host country.[2] Panels (a) and (b) in Figure A.5.2 show the effects on the worldwide equilibrium when countries *A* and *B* are the recipients of capital, respectively.

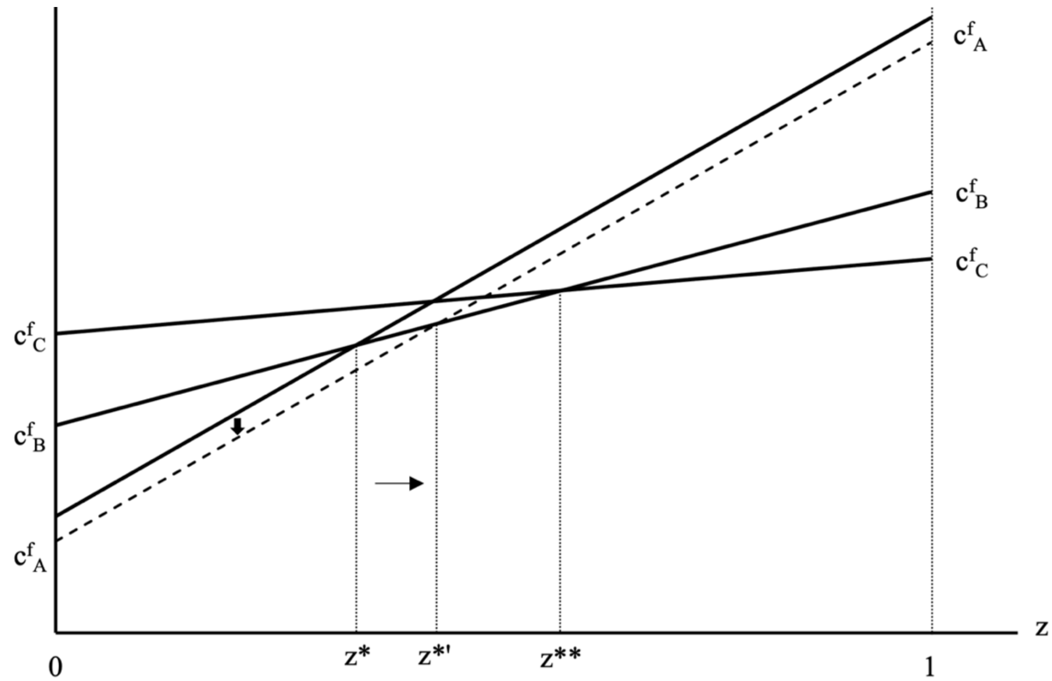
When capital moves towards *A* -the least skill abundant country-, both z^* and z^{**} increase. Thus, there is an increase in the relative demand for skilled labor in the three countries since all of them now produce a mix of inputs with a higher average skill intensity. In contrast, when capital shifts to *B*, z^* decreases and z^{**} increases. This leads to the same implications as those of a reduction in the costs of importing from country *B*: the relative demand for skilled labor and the skill premium increase in *C* and decrease in country *A*, while the net effect is ambiguous for country *B*.

---

[2] This shock would affect wages in general equilibrium. However, as Feenstra and Hanson (1996) show, such effects do not change the qualitative predictions described here.

Figure A.5.1

(a)



(b)

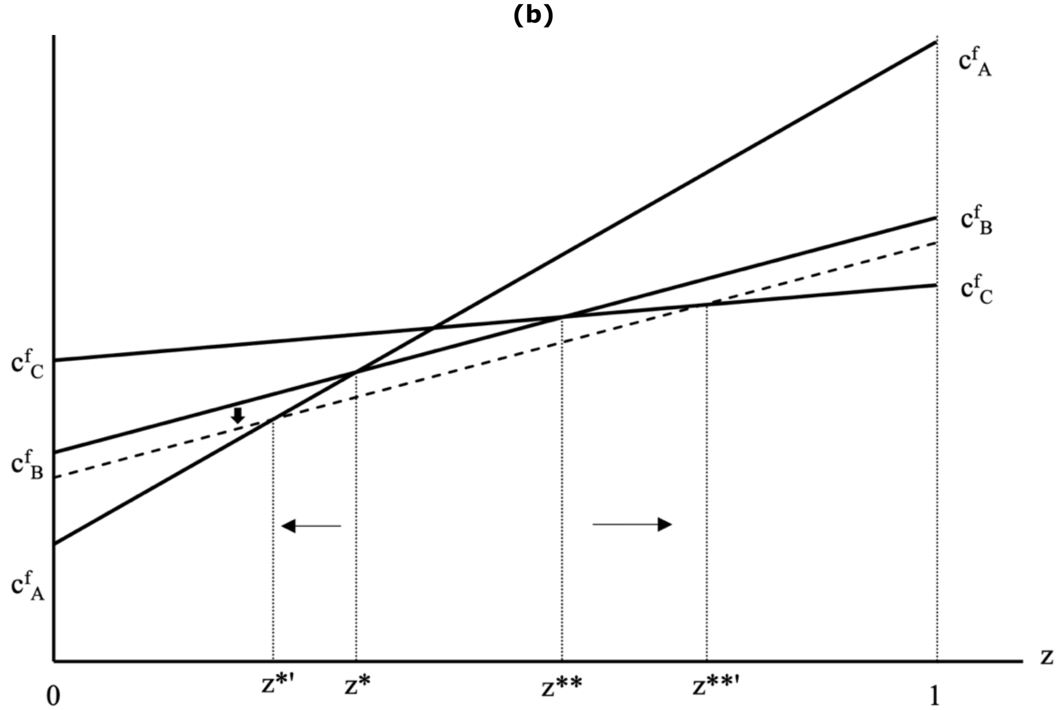
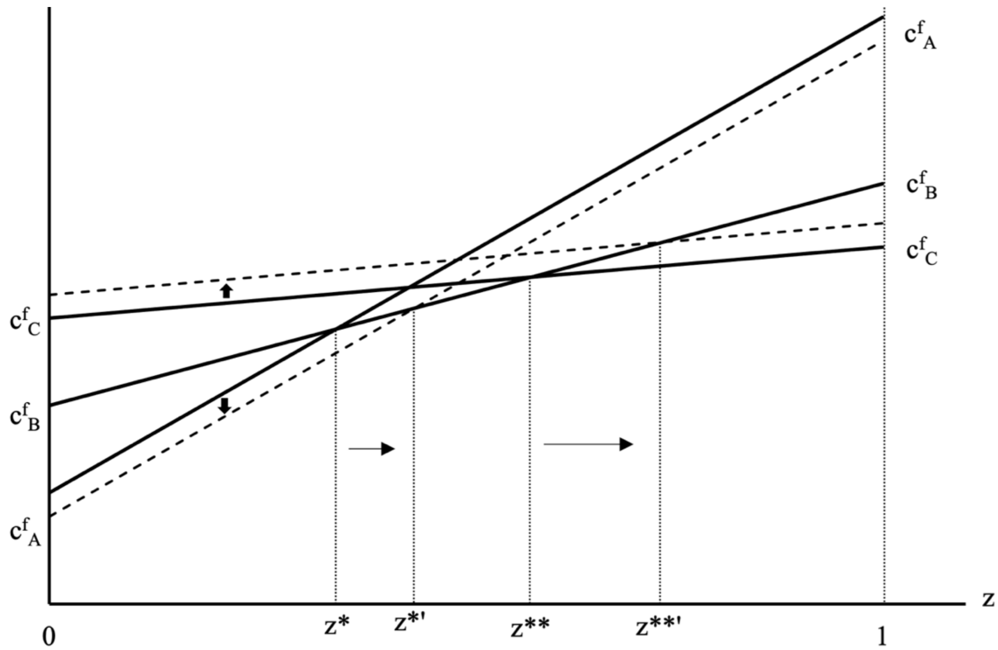
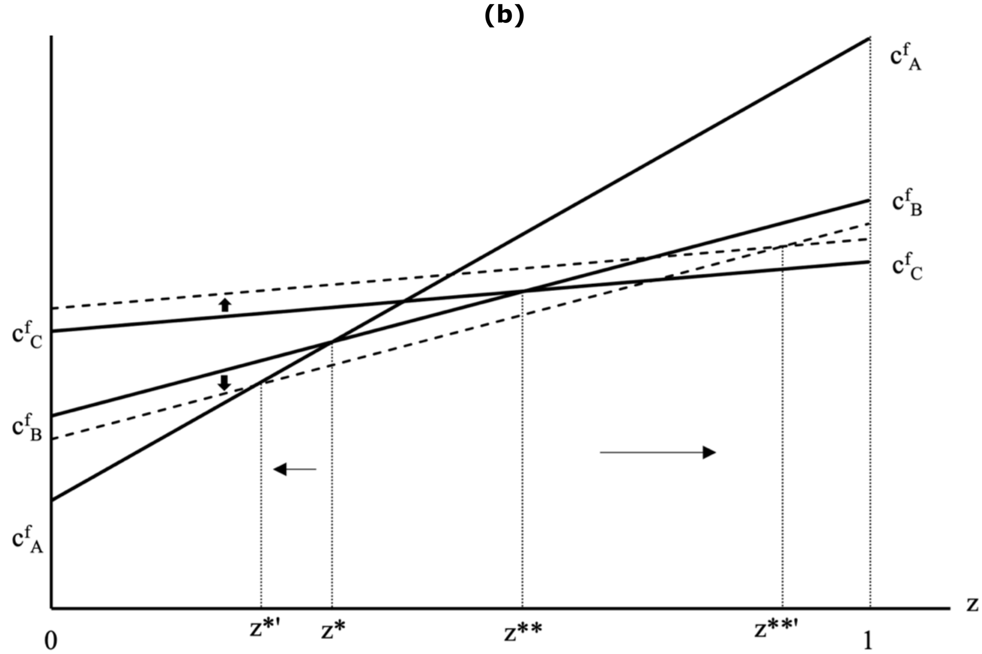


Figure A.5.2

(a)



(b)



Appendix A.6

Regression results of Mexico´s product-level exports growth towards the United States, China and Rest of the World.

	1.017 ***	1.351 **	0.768 ***
	(0.106)	(0.533)	(0.153)
	-0.070	-2.175 ***	-0.942 ***
	(0.126)	(0.655)	(0.172)
	-0.348 **	-2.334 **	-2.309 ***
	(0.167)	(1.021)	(0.252)
	-0.471 **	10.803 ***	-1.817 ***
	(0.219)	(2.349)	(0.306)
Pre existing trend control	yes	yes	yes
Sector FE	yes	yes	yes
R squared	0.028	0.099	0.024
N	2,730	408	1,924

Notes. The table reports estimates of regressions (16). The data are weighted by the initial value of product-level exports. Standard errors are reported in parentheses. All the regressions include sector fixed effects for products contained in each 2-digit HS chapter and pre-trend controls, corresponding to the product-level export growth to each destination in 2014 to2015 and 2016 to 2017. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

References

Borin, Alessandro, Michele Mancini and Daria Taglioni (2021). Measuring Exposure to Risk in Global Value Chains. Policy Research Working Paper 9785, World Bank Group. The database is available at: https://wits.worldbank.org/gvc/gvc-data-download.html

Feenstra, Robert and Gordon Hanson (1996). Foreign Investment, Outsourcing and Relative Wages. In R. Feenstra, G. Grossman and D. Irwin (eds.), Political Economy of Trade Policy: Essays in Honor of Jagdish Bhagwati, MIT Press.

Feenstra, Robert and Gordon Hanson (1997). Foreign Direct Investment and Relative Wages: Evidence from Mexico's Maquiladoras. Journal of International Economics 42, 371-393.

Lee, Hongshik and Soonhyung Sim (2016). Global Outsourcing and Wage Inequality in Middle-Income Countries: Evidence from South Korea. Global Economic Review 45 (1), 19-41.

Nunn, Nathan (2007). Relationship-Specificity, Incomplete Contracts, and the Patterns of Trade. Quarterly Journal of Economics, 122 (2), 569-600.

Nunn, Nathan and Daniel Trefler (2013). Incomplete Contracts and the Boundaries of the Multinational Firm. Journal of Economic Behavior & Organization 94, 330-344

Romalis, John (2004). Factor Proportions and the Structure of Commodity Trade. American Economic Review 94 (1), 67-97.

BANCO DE DESARROLLO
DE AMÉRICA LATINA

caf.com
@AgendaCAF