The Paradox of Mexico's Export Boom Without Growth: A Demand-Side Explanation.

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Motivation

Three trends in Mexico after the liberalizing reforms in the 1980s and 1990s:

- Expansion of exports of manufactures.
  - Share of exports in the gross output of the manufacturing sector: 37.3% in 2011 vs. 3.7% in 1970.
  - Share of manufactures in total exports: 72% in 2011 vs. 32.5% in 1970.
- Increase in outsourcing (use of imported intermediate inputs).
  - Share of imports in the intermediate demand of manufacturing: 34.7% in 2011 vs. 8.2% in 1970.
  - (over 55% in Machinery and Equipment, and Transport Equipment.)
- Sluggish growth in manufacturing and in the whole economy.
  - Growth in real value added in manufacturing was just over 2%/yr after 1980, down from 7.12% in 1950-1981. Output per worker has remained virtually stagnant since 1997.

details

Motivation

Can the demand effects of outsourcing manufactured inputs help explain sluggish growth?

- Outsourcing lowers intermediate demand for domestic manufactures, and demand for domestic factors of production.
- Export demand may fail to offset decline in domestic demand, and domestic sales may be more profitable even for firms facing perfectly elastic world demand.

Our Contribution

- Obtain estimates of the demand effects of the outsourcing of manufactured inputs in Mexico during 1980-1995, and 1995-2011.
- Model the growth effects of lower domestic demand in a small open economy.

Preview of the Results

Quantitative Estimates:

- Baseline scenarios: the decline in the domestic demand for the manufacturing sector attributable to the outsourcing of manufactured inputs ranges from 6.51% to 9% of the initial level in each of the periods (1980-1995 and 1995-2011).
- The estimated shortfalls were greater among core capital-intensive industries (e.g. metal, chemical, machinery, business equipment, and transport equipment), at times exceeding 15%.

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Model:

- Lower costs of outsourcing have ambiguous effects: (i) lower unit costs; but (ii) lower ex ante demand in the domestic market.
- If firms have market power in domestic sales, growth may decelerate even if they face a perfectly elastic demand in world markets.

Quantitative Estimates

- Question: impact on domestic demand in a given initial year if, in the absence of technical change, the share of imported inputs in total intermediate demand were to change to that of a later year.
- Two periods: 1980-1995 and 1995-2011.
- Data: Input-output matrices (Inegi: 1980; OECD: 1995-2011).

Quantitative Estimates

Two identities for an economy with n sectors:

$$\begin{aligned} X_t &\equiv A_t^D X_t + F_t \\ M_t &\equiv A_t^M X_t + F_t^M \end{aligned} \tag{1}$$

where:

- X_t: $n \times 1$ vector of gross output per sector.
- A_t^D: $n \times n$ matrix of technical coefficients of production.
  - $a_{i,j,t}^D$ the share of input purchases from sector i per monetary unit of the output of sector j.
- F_t: $n \times 1$ vector of final demand (e.g. consumption, investment, government purchases, and exports) for each sector.
- M_t: $n \times 1$ vector showing the total value of imports per category to satisfy intermediate demand ($A_t^M X_t$) and final demand (F_t^M).

Quantitative Estimates

Equation (1) above implies:

$$X_t = \left[I(n) - A_t^D\right]^{-1} F_t = L_t F_t \tag{2}$$

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We compute a counterfactual matrix of domestic technical coefficients at time t reflecting the degree of outsourcing at time $t + m$ and no other sources of technical change. The associated vector of sectoral outputs is:

$$X_t^* = [I(n) - A_t^{D*}]^{-1} F_t = L_t^* F_t \tag{3}$$

Our exercise is based on the comparison of X_t^* with X_t using Mexican data.

details

Quantitative Estimates

Scenarios:

- Direction of outsourcing:
  - From manufacturing industries to manufactured inputs (M$\rightarrow$M).
  - From all sectors to manufactured inputs (A$\rightarrow$M).
- Behavior of final demand:
  - Fully exogenous (Leontieff's open system).
  - Domestic consumption is endogenous (Leontieff's closed system w.r.t households).

Manufacturing: Change in Gross Output (%)

	Exogenous Final Demand	
	1980-1995	1995-2011
Manufacturing→Manufacturing	-2.24	-4.88
All Sectors→Manufacturing	-6.51	-6.31
	Endogenous Consumption	
	1980-1995	1995-2011
Manufacturing→Manufacturing	-3.14	-6.83
All Sectors→Manufacturing	-9	-8.75

robustness

Change in Gross Output (%)

Direction of Outsourcing: All Sectors → Manufacturing

	1980-1995	
	Exogenous Final Demand	Endogenous Consumption
Food products, beverages and tobacco	1.65	-2.02
Textiles, textile products, leather and footwear	-6.94	-10.19
Wood and products of wood and cork	-6.42	-8.42
Pulp, paper, paper products, printing and publishing	-10.16	-12.5
Chemical, Rubber, Plastics, and Fuel	-6.75	-9.24
Other non-metallic Mineral Products	-4.42	-5.83
Basic Metals and Fabricated Metal	-17.39	-18.26
Transport Equipment	-9.36	-10.75
Machinery and Equipment	-18.45	-19.59
Manufacturing, n.e.c	-0.12	-3.13

Change in Gross Output (%)

Direction of Outsourcing: All Sectors → Manufacturing

	1995-2011	
	Exogenous Final Demand	Endogenous Consumption
Food products, beverages and tobacco	-1.24	-6.36
Textiles, textile products, leather and footwear	-5.78	-8.59
Wood and products of wood and cork	-8.77	-10.71
Pulp, paper, paper products, printing and publishing	-8.36	-11.37
Chemical, Rubber, Plastics, and Fuel	-13.88	-16.59
Other non-metallic Mineral Products	-3.1	-4.79
Basic Metals and Fabricated Metal	-6.63	-7.34
Transport Equipment	-6.13	-7.26
Machinery and Equipment	-3.65	-3.99
Manufacturing, n.e.c	-6.07	-8.77

A Model of Outsourcing and Growth

Main Ideas:

- A higher degree of outsourcing may lower costs per unit.
- But it may reduce total factor incomes and domestic demand.
- Even when manufacturing firms face a perfectly elastic demand in world markets, the rate of accumulation may fall if they hold market power in domestic sales.
- Evidence of market power in the domestic manufacturing sector: Dutrénit and Capdevielle (1993), Sabido (1996), Sabido and Ángeles (2000), Castañon et al (2008), Torres Fernández (2012), Vazquez Lopez (2013).
- Extension of Ros(2013, ch. 10).

Setup

- Firms produce final output using capital (K), and an intermediate input (I):

$$Y = Min[\sigma_I I, \sigma_K K] \tag{4}$$

- The intermediate input is a 'composite' of a domestic component (I_D) and an imported component (I_M):

$$I = \left[I_D^{\frac{\rho-1}{\rho}} + I_M^{\frac{\rho-1}{\rho}} \right]^{\frac{\rho}{\rho-1}} \tag{5}$$

- Perfectly elastic demand in international markets at price P_X. Market power in domestic sales at price $P_D = (1+\tau)P_X$.
- Domestic component is produced using only labor with a given money wage:

$$I_D = L \tag{6}$$

$$P_I = W \tag{7}$$

The Profit Rate

- Definition:

$$r = \frac{(1+\tau)P_X D + P_X X - \tilde{P}_I I}{(1+\tau)P_X K} \tag{8}$$

where $\tilde{P}_I$ is the minimum cost of the composite input.

- Goods market equilibrium condition with no saving out of wage income:

$$\sigma_K = \frac{W}{(1+\tau)P_X}\frac{I_D}{K} + (1-s)r + g + x \tag{9}$$

- Combining (8) and (9) yields:

$$r = \frac{1}{1+s\tau}\left[\left(1 - \frac{\tilde{P}_I}{P_X}\frac{1}{\sigma_I}\right)\sigma_K + \frac{\tau}{1+\tau}\frac{W}{P_X}\frac{I_D}{K} + \tau g\right] \tag{10}$$

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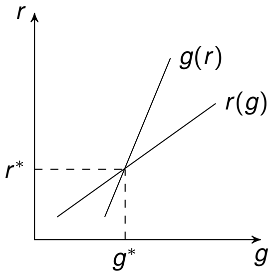
Equilibrium

- We close the model with a Keynesian investment function:

$$g = g(r - \tilde{r}) \tag{11}$$

- Equations (10) and (11) jointly determine the equilibrium rate of capital accumulation and the domestic profit rate:



Lower Costs of Outsourcing

- Modeled as a fall in the price of the imported component of the intermediate input.
- The condition for a decline P_M to lower the profit rate for any rate of accumulation (i.e. to shift the $r(g)$ schedule downwards) is:

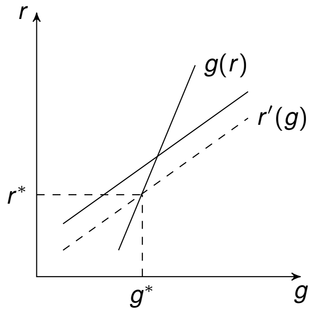
$$\frac{dr}{dP_M} > 0 \Longleftrightarrow \frac{\tau}{1+\tau}\rho > \left(\frac{\tilde{P}_I}{P_I}\right)^{\rho}\left(\frac{I}{I_D}\right)^{1+\frac{\rho-1}{\rho}} \tag{12}$$

- Assume unitary elasticity of substitution ($\rho = 1$):

$$\frac{dr}{dP_M} > 0 \Longleftrightarrow \frac{\tau}{1+\tau} > \frac{\tilde{P}_I I}{P_I I_D} \tag{13}$$

Lower Costs of Outsourcing

The Case When Lower Outsourcing Costs Reduce Growth:



Conclusions

- Mexico's liberalizing reforms and integration into global production chains may have hurt the industrial sector by narrowing the domestic market for industrial output.
- Our focus on the relationship between outsourcing and demand complements the existing literature:
  - The reforms have lowered the rate of growth consistent with a sustainable current account balance (Moreno-Brid, 1999; López and Cruz, 2000; de Lizardi, 2003; Pacheco-López, 2005; Cardero and Galindo, 2005). Critiques: (Gouvea and Lima, 2010; Ibarra, 2011; Blecker and Ibarra, 2013).
  - Outsourcing has weakened backward and forward linkages between the export-oriented sector and the rest of the economy, and led to a low-level pattern of specialization (Moreno-Brid and Ros, 2009; Moreno-Brid, 2013; Ros, 2015).

Conclusions

- Policies to develop a more vertically integrated industrial sector may not only strengthen the causal links running from export growth to productivity and aggregate demand growth, but also benefit the industrial sector by directly bolstering the domestic market for final output.

Conclusions

Thank you!

Motivation

	Share of Exports in Sectoral Gross Output (%)					
	1970	**1980**	**1995**	**2000**	**2005**	**2011**
Total Manufacturing	3.7	4.3	28.3	31.9	32.7	37.3
Machinery and Equipment	6.2	8.2	69.0	68.5	77.1	79.6
Transport Equipment	2.6	5.6	62.6	58.8	62.9	75.6
	Share in Mexico's Total Merchandise Exports (%)					
	1970	**1980**	**1995**	**2000**	**2005**	**2011**
Total Manufacturing	32.5	11.9	77.7	83.5	77.1	72.3

Sources: INEGI (1970-1980) and OECD (1995-2011) I/O tables; UN-Comtrade.

Motivation

	Share of Imports in Intermediate Demand (%)					
	1970	**1980**	**1995**	**2000**	**2005**	**2011**
Total Economy	6.4	10.9	18.9	23.1	22.3	24.6
Agriculture	1.2	2.9	9.0	10.1	14.3	18.6
Other Industries	4.5	6.8	13.5	14.4	12.7	15.6
Services	3.8	5.8	10.6	12.3	9.9	10.6
Manufacturing	8.2	15.1	24.5	30.8	31.5	34.7
Machinery and Equipment	19.8	24.1	53.2	55.3	58.2	56.5
Transport Equipment	23.9	25.3	43.2	52.1	53.0	61.0

Sources: INEGI (1970-1980) and OECD (1995-2011) I/O tables.

Motivation

Overal Economy			
Real Value Added (annual growth, %)		**Labor Productivity** (annual growth, %)	
1950-1960	5.41	1950-1960	4.32
1961-1980	6.49	1961-1970	3.21
1981-1989	2.02	1971-1980	1.72
1990-2014	2.42	1981-1988	-1.85
		1989-2014	-0.24

Source: Timmer and de Vries (2014). Periodization reflects structural breaks identified with the Bai-Perron procedure.

Motivation

Manufacturing			
Real Value Added (annual growth, %)		**Labor Productivity** (annual growth, %)	
1950-1981	7.12	1950-1957	4.83
1982-1996	2.46	1958-1968	2.77
1997-2014	2.11	1969-1980	1.04
		1981-1988	-2.49
		1989-1996	2.17
		1997-2014	0.29

Source: Timmer and de Vries (2014). Periodization reflects structural breaks identified with the Bai-Perron procedure.

return

Computing A_t^{D*}

Let $\iota_{i,j,t} = z^M_{i,j,t}/(z^M_{i,j,t} + z^D_{i,j,t})$ be the import share of the consumption of inputs of category i by sector j. Then:

$$a^M_{i,j,t} = \left(\frac{\iota_{i,j,t}}{1-\iota_{i,j,t}}\right) a^D_{i,j,t} \tag{14}$$

Using $a_{i,j,t} = a^M_{i,j,t} + a^D_{i,j,t}$ and assuming no change in $a_{i,j,t}$ gives:

$$\begin{gathered} \Delta a^D_{i,j} = -\Delta \iota_{i,j} a_{i,j,t} \\ \text{and} \\ \Delta a^M_{i,j} = -\Delta a^D_{i,j} \end{gathered} \tag{15}$$

return

Computing $\tilde{P}_I$ and I_D

- Using (5), unit cost minimization implies:

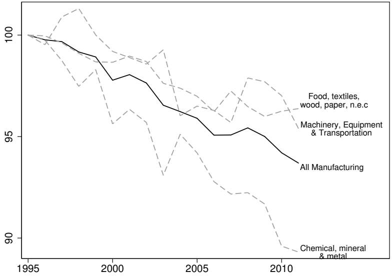
$$\tilde{P}_I = \left[{P_I}^{1-\rho} + {P_M}^{1-\rho} \right]^{\frac{1}{1-\rho}} \tag{16}$$

- The associated demand for the domestic component of the intermediate input is:

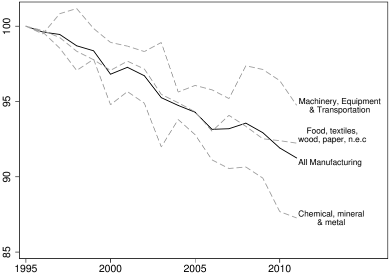
$$I_D = \left[1 + \left(\frac{P_I}{P_M} \right)^{\rho - 1} \right]^{-\frac{\rho}{\rho-1}} \frac{\sigma_K}{\sigma_I} K \tag{17}$$

return

Robustness Checks



A→M, Open System



A→M, Closed System

return