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Mexico's slow-growth paradox

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This paper analyzes the problem of slow economic growth in Mexico. It decomposes the growth of output from the demand side and reveals the critical role played by the sluggish performance of investment. Using econometric tools, it argues that this sluggishness can be explained in part by the peso's appreciation during disinflation and its adverse impact on investment profitability. Finally, it shows that the problem has been complicated by a long-run decline in the GDP/capital ratio.

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I

Introduction

Following the “lost decade” of the 1980s, Mexico’s economic prospects brightened as the country began receiving large volumes of foreign capital and transformed itself into a major exporter of manufactures. The positive turn around came after a series of structural reforms that liberalized the trade regime and privatized most sectors of economic activity. Mexico renegotiated its foreign debt, consolidated its public finances and, with a temporary setback in 1995, decisively and successfully reined in inflation. Yet despite the export boom, the substantial inflows of foreign capital and a stabilized economy, Mexico has faced a persistent problem of slow growth.

Analysts have offered a number of explanations for this seeming paradox. In an influential study, Moreno-Brid (1999) argues that the external constraint on Mexican growth tightened after trade liberalization because of a rise in the elasticity of imports with respect to gross domestic product (GDP).¹ According to Blecker (2007), the constraint has at times been reinforced by the volatility of capital flows and the economic cycle of the United States, as well as by the recurrent appreciation of the peso. Other authors point

to the perverse effects of the country’s prolonged credit crunch, reflecting the inadequate pace of reforms in the judicial and banking systems.²

This paper offers a complementary interpretation of the slow-growth problem in Mexico. Its point of departure is the observation that since the late 1980s Mexican macroeconomic management—and monetary policy in particular—has focused on reducing inflation. As a result of this prolonged disinflationary mode, the peso has appreciated in real terms and returns on investment have consequently declined. The adverse impact that the peso’s appreciation has had on profitability has been reinforced by a long-term fall in the output/capital ratio. As a result, aggregate investment has not reflected the dynamism of exports and has been inadequate to sustain high rates of economic growth.

The paper is organized as follows: section II describes Mexico’s recent macroeconomic performance; section III estimates the contribution of exports and investment to GDP growth; section IV examines the relationship between profits, investment and the real exchange rate; and section V presents the conclusions.

II

Mexico’s recent macroeconomic performance

After the outbreak of the debt crisis in 1982, Mexico’s economic growth stalled. During 1982-1988 GDP rose barely 0.2% a year. Yet the export sector expanded rapidly, driven by the weakness of the domestic market and the trade liberalization measures implemented in 1986-1987. In relation to 1960-1977, the share of total exports in GDP more than doubled. Particularly impressive was the

expansion of manufacturing exports, which rose at an average annual rate of 18.2% (Table 1).

At the end of the 1980s a combination of factors—including a new stabilization plan, the definitive renegotiation of the country’s external debt, and renewed access for developing countries to the world capital market—turned around the outlook for the Mexican economy. Foreign investment rose sharply, from 2.4% of GDP in 1982-1988 to 6.3% in 1989-1994. The export sector continued to perform strongly, with an average annual growth of 7.8%. Manufacturing

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¹ See also López and Cruz (2000) and Pacheco-López (2005).

² See Bergoing et al. (2001) and Tornell, Westermann and Martínez (2004).

TABLE 1

Mexico: basic macroeconomic indicators for selected periods

	1960-1977	1978-1981	1982-1988	1989-1994	1996-2007
<i>Total exports (%)^a</i>					
Growth rate	6.69 ^{aa}	18.76	8.26	7.82	8.60
Share of GDP	5.31	7.43	12.14	14.86	34.35
<i>Manufacturing exports (%)</i>					
Growth rate ^b	11.26 ^{bb}	9.23	18.20	12.14	8.42
Share of goods exports ^c	26.38 ^{cc}	17.62	45.77	75.16	85.29
<i>Foreign capital inflows^d</i> (Share of GDP, %)	1.30	5.12	2.36	6.28 ^{dd}	3.43
<i>GDP growth rate (%)^e</i>	6.23	9.11	0.22	3.91	3.58
<i>CPI inflation (%)^f</i>					
Annual average rate	13.9 ^{ee}	22.5	88	16.9	10.8
Minimum rate	4.9 (1972)	17.5 (1978)	57.8 (1985)	6.9 (1994)	3.6 (2006)
Maximum rate	29.1 (1977)	27.9 (1981)	131.8 (1987)	26.7 (1990)	34.4 (1996)
Average annual change, in percentage points	3.4 ^{ff}	-0.3	12.3	-17.9	-2.6
<i>Relative labour cost (1990 = 100)^g</i>					
Average	...	...	...	116.8	115.4
Minimum	...	...	...	92.2 (1989)	75.4 (1996)
Maximum	...	...	...	138.8 (1993)	135.7 (2007)
Average annual change (%)	...	...	...	8.0	4.8
<i>CPI-based multilateral real exchange rate (1990 = 100)^h</i>					
Average	68.7 ^{gg}	76.1	100.3	87.8	76.3
Minimum	63.5 (1975)	62.0 (1981)	78.3 (1985)	100.6 (1989)	102.9 (1996)
Maximum	87.7 (1977)	87.1 (1978)	134.4 (1987)	73.4 (1993)	61.17 (2002)
Average annual change	4.0 ^{hh}	-8.1	11.2	-6.0	-3.2

^a Average annual rates from national accounts data at constant local prices. Source: World Bank (2005) and INEGI.

^b Average annual rates from balance of payments data deflated by the United States producer price index. Source: World Bank (2005) and Bank of Mexico (for the period 1982-2007).

^c Average annual rates from balance of payments data in current dollars. Source: World Bank (2005) and Bank of Mexico (for the period 1982-2007).

^d Bank loans, foreign direct investment, and portfolio investment. Annual average of quarterly flows in United States dollars. GDP was converted to dollars using the nominal exchange rate. Source: World Bank (2005), INEGI and Bank of Mexico.

^e Average annual rates. Source: INEGI.

^f Source: Bank of Mexico.

^g Mexico/United States ratio of the unit labour cost in the manufacturing sector. Source: INEGI.

^h Source: Bank of Mexico. A decrease in the real exchange rate index indicates appreciation.

^{aa} 1961-1977.

^{bb} 1963-1977.

^{cc} 1962-1977.

^{dd} Excludes fourth quarter of 1994.

^{ee} 1970-1977.

^{ff} 1971-1977.

^{gg} 1968-1977.

^{hh} 1969-1977.

exports, in particular, rose at an average rate of 12.1% and came to represent 75% of goods exports. Yet despite the export boom and surging capital inflows, growth began to slow after peaking at 5% in 1990. The average growth rate of GDP in 1989-1994 was a modest 3.9%.

As is well known, Mexico suffered a currency crisis in December of 1994 and a full-blown financial crisis in 1995. There were large outflows of capital, due mainly to the reversal of previous portfolio investments. GDP ended up falling by more than 6% in 1995. Economic activity recovered quickly, though,

and in 1996 GDP rose by more than 5%. Capital inflows returned, and averaged 3.4% of GDP annually between 1996 and 2007.³

Manufacturing exports continued to expand, although at a slower pace than in the early 1990s. Over 1996-2007, manufactures represented 85% of goods exports, and by 1998 Mexico was the world's fourth-largest exporter of manufactures (Lall 2000). Exports not only grew, but they improved in quality as well. The composition of the export basket came to look like that of countries with per capita incomes higher than Mexico's (Hausmann, Hwang and Rodrik 2007, Figure 4). The country's exports now consist for the most part of medium- or high-tech goods (Lall 2000), and they have diversified since the entry into force of the North American Free Trade Agreement (NAFTA) (Feenstra and Kee 2007).

Despite the recovery of foreign investment and the quantitative and qualitative development of exports, average annual GDP growth in 1996-2007 was only 3.6%. The problem was not that Mexico was unable to achieve relatively high GDP growth rates—indeed, it did so in 1990, 1997 and 2000—but rather that those rates did not last long. There are factors at play that reduce the growth rate and tend to keep it low. This paper argues that one of those factors is the behaviour of the real exchange rate, through its impact on profitability and investment.

While the economy failed to sustain high rates of GDP growth, macroeconomic management—and monetary policy in particular—focused on reducing inflation (Ramos and Torres 2005; Galindo and Ros, 2008; Ibarra, 2008a). This came after the economy faced a serious inflation problem throughout most of

the 1980s, with inflation climbing by 12.3 percentage points per year, and soaring to 131.8% in 1987. Average annual inflation over the period 1982-1988 was 88%.

Disinflation began in 1988. At first it was swift, with the annual inflation rate falling from around 180% at the beginning of 1988 to less than 20% a year later. Thereafter the process slowed: the average annual inflation rate between 1989 and 1994 was 16.9%, dropping to 6.9% in 1994.

The disinflationary scheme collapsed in December 1994, when Mexico was forced to abandon an explicit exchange rate band and let the peso float. The subsequent depreciation of the currency caused a surge in inflation. Yet this phenomenon was short-lived, and the economy entered into a new stage of disinflation. Inflation peaked at 34.4% in 1996 and reached a minimum of 3.6% in 2006; on average, it fell by 2.6 percentage points a year.

In short, Mexico's macroeconomic management has been in "disinflationary mode" since the late 1980s. This has had a sharp impact on the exchange rate. Given the restrictive bias of monetary policy, the rate of currency depreciation has not kept pace with the inflation differential between Mexico and the United States. As can be seen from the effective real index calculated by the Bank of Mexico (Table 1, final lines), the result is that the peso has tended to appreciate in real terms.

The peso's appreciation contributed to the success of disinflation (Ibarra 2003) but it impacted adversely on the profitability of the tradables sector. The evolution of the unit labour cost in manufactures (in dollars and relative to the United States) illustrates the impact. In 1988, after an important round of trade liberalization, the labour cost index stood at 82.9 (1990 = 100). In the first disinflationary period (1989-1994) it rose steadily at a rate of 8% a year, peaking at 138.8% in 1993. The sharp nominal currency depreciation of 1995 reduced it to the level observed in the mid-1980s (1996 = 75.4), but with renewed disinflation the relative cost of labour started rising again, and reached a level of 135.7 in 2007 (Table 1).

3 Although this figure is about half the level of capital flows Mexico recorded in the early 1990s, it is high from a historical perspective: for example, in the high-growth era from 1960 to 1977, capital inflows amounted to 1.3% of GDP.

III

Exports, investment and GDP growth in Mexico

What is the cause of the Mexican economy's meagre growth? There is broad recognition in the literature on economic growth that the issue can be usefully addressed at different levels. A distinction is usually made between the proximate and the underlying determinants of GDP growth. Decomposition exercises are an example of the first approach. The following paragraphs examine the evolution of GDP in light of the contribution of the different components of aggregate demand.⁴

The decomposition of GDP is useful for analyzing Mexico's growth experience because it highlights elements such as the sustained expansion of exports since the late 1980s, the upward trend in the import rate after trade liberalization, and the boom in consumer spending at the beginning of the 1990s. We can guess that these factors are important from a medium-term perspective. There is the question, for example, of determining the net effect of exports on aggregate growth, in a strictly accounting sense, bearing in mind the virtually simultaneous rise in the import rate. As exports rose, imports displaced local production.

The point of departure is the simple identity between GDP Y and aggregate demand, where the latter is the sum of private and government consumption ($C + G$), investment I and net exports ($X - M$). The identity can be re-stated as:

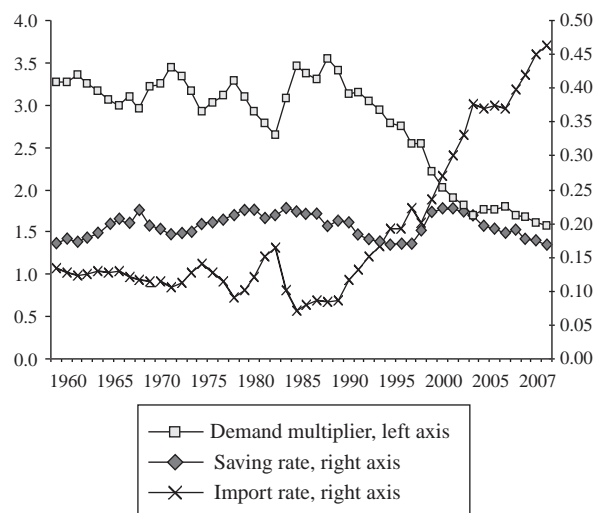
$$Y = d_0(I + X), d_0 = \frac{1}{s + m} \quad (1)$$

where d_0 , the Keynesian demand multiplier, is by definition equal to the reciprocal of the domestic saving rate [$s = (Y - C - G)/Y$] plus the import rate ($m = M/Y$).

Growth in GDP must be backed by an expansion in investment and exports, although sustained changes in the multiplier can also have an influence. Figure 1 shows that, after a period of relative stability starting in at least the 1960s, the demand multiplier began a steep descent in 1987, falling from 3.6 in 1986 to 1.6 in 2007.

FIGURE 1

Mexico: demand multiplier and its components, 1960-2007



Source: author's calculations on the basis of national accounts data from the World Bank (2005) and INEGI.

By definition, variations in the multiplier reflect the combined influence of the saving rate and the import rate. The saving rate has fluctuated around a level of 0.20. The sustained fall in the demand multiplier is explained by the behaviour of the import rate, which rose from 0.084 in 1986 to 0.46 in 2007. Following major rounds of trade liberalization in 1986-1987 and in 1994, there were sharp increases in the import rate. Figure 2 shows that all components of the rate shared this tendency.⁵

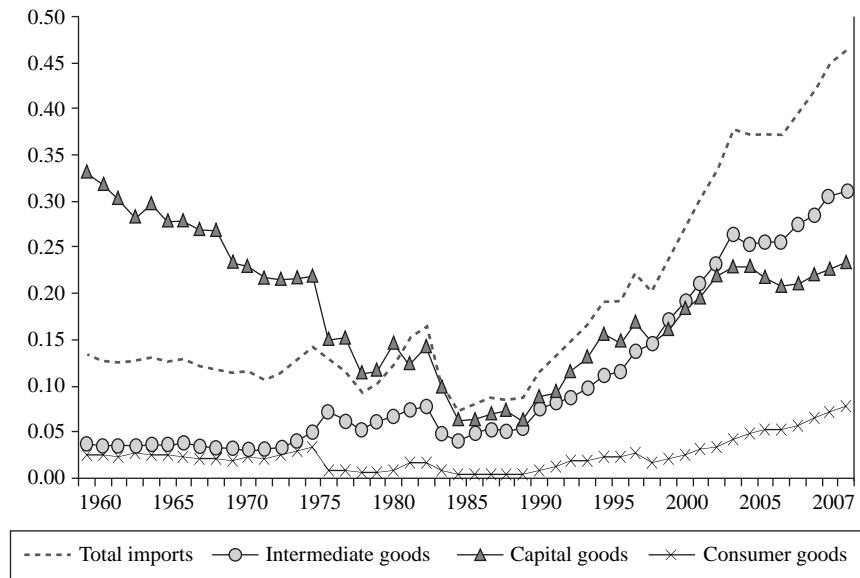
Apart from trade liberalization, changes in the real exchange rate are bound to have an influence on the import rate. Figure 3 presents the joint evolution of the import rate and the real exchange rate index based on the consumer price index (CPI). For the sake of visual effectiveness, the figure shows the reciprocal index, so that an increase indicates a real appreciation of the currency. There is a positive and substantial association

⁴ See Berg and Taylor (2000) for a similar methodology, and Ros and Lustig (2000) for its application to Mexico.

⁵ See the appendix for a definition of these components.

FIGURE 2

Mexico: import rates, 1960-2007



Source: author's calculations on the basis of external trade data from Bank of Mexico and national accounts data from the World Bank (2005) and INEGI.

between the two series, with a correlation coefficient of 0.5024. The correlation of the real exchange rate with specific import rates ranges from 0.4318 for intermediate goods to 0.6222 for capital goods (in the latter case, starting in 1978 —leaving aside the downward trend in the import rate associated with import substitution policies).

The link between the real exchange rate and the import rate would have to be subjected to a rigorous test. But the above evidence suggests that the tendency of the currency to appreciate in real terms may have accentuated the impact of trade liberalization, and may well have produced an “excessive” jump in the import rate (Moreno-Brid, Santamaría and Rivas 2005a and 2005b).

Figure 4 shows the contributions, adjusted by the multiplier, of investment and exports to GDP since 1960. GDP growth in the initial portion of the sample was supported by rising investment. Using equation (1), it can be calculated that around 80% of the cumulative GDP growth between 1960 and 1977 can be attributed to investment.

The contribution of the various components of aggregate demand reversed after trade liberalization,

with exports becoming the main source of GDP growth. Between 1988 and 2007, GDP rose by 829.1 billion 1993 pesos: 93% of this growth corresponded to exports and only 7% to investment (again, after adjusting both variables for changes in the multiplier). At first glance, it would seem that Mexico's failure to achieve strong economic growth since the 1980s can be attributed to the sluggish behaviour of investment.^{6 7}

⁶ To cast this in greater detail: the average growth rate of real investment in this period was 5%, which was mostly cancelled out by a cumulative decline of 50% in the demand multiplier. The average growth rate of investment adjusted by the multiplier was 1%; the corresponding figure for exports was 5.6%. Conclusions as to the impact of the components of aggregate demand on GDP growth depend on the length of the period considered. Following the first round of trade liberalization, GDP growth was determined by investment, with exports making only a minimal contribution (Ros, Draisma et al. 1996; Ros and Lustig 2000). The situation was reversed after the North American Free-Trade Agreement (NAFTA) came into effect.

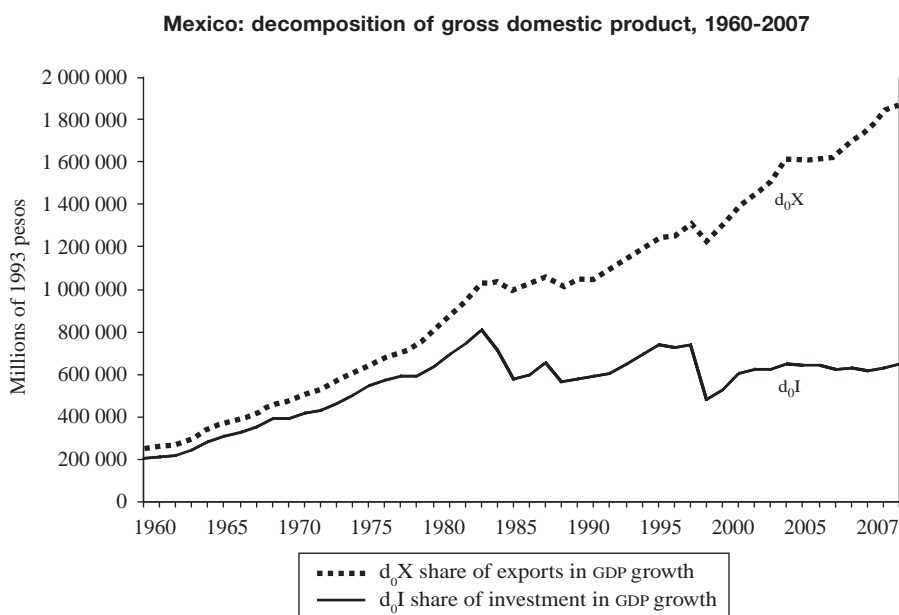
⁷ In a similar conclusion, Blyde and Fernández-Arias (2004) calculate that the capital-labour ratio in Mexico in the 1990s was more than 20% lower than what would be expected for a country at Mexico's level of development; in Latin America, only Guatemala was in a worse position.

FIGURE 3



Source: author's calculations on the basis of data from the International Monetary Fund (International Financial Statistics) and Bank of Mexico (real exchange rate), and the World Bank (2005) and INEGI (national accounts).

FIGURE 4



Source: author's calculations on the basis of national accounts data from the World Bank (2005) and INEGI.

From the standpoint of aggregate demand, the relative pace of growth in investment and exports is irrelevant: what matters is the overall pace. But from the supply side the distinction is important. In contrast to exports, investment creates installed capacity directly.

Thus, a weak investment performance also limits GDP growth indirectly, by creating bottlenecks that can slow export growth and raise the import rate even further.

The foregoing decomposition is based on equation (1), which does not distinguish between

private and public expenditure. In a more detailed analysis, government expenditure can be separated out, and the influence of variations in the tax rate can be taken into account. Starting once again with the GDP identity, this can be written as:

$$Y = d_1(I^P + I^G + G + X), d_1 = \frac{1}{s^P + t + m} \quad (2)$$

where I^P and I^G represent private and government investment. The demand multiplier now depends on the private saving rate [$s^P = (Y - T - C)/Y$, where T is taxes], the tax rate ($t = T/Y$) and the import rate.

Figure 5 illustrates the behaviour of the redefined demand multiplier and its components since 1980. Here again, the multiplier shows a downward trend from the second half of the 1980s, attributable to a rising import rate. The private saving rate and the tax rate show a marked cyclical behaviour.⁸ The private saving rate displays slightly greater fluctuations than the total saving rate presented earlier in figure 1; this reflects the fact that the evolution of the tax rate tends to mirror

the private saving rate (when the latter is calculated without the tax rate).

Figure 6 shows the contribution to GDP of the different components of aggregate demand since 1980. The figure reveals something new: in Mexico, the weakness of private investment, which has tended to depress GDP growth, has been compounded by the stagnation of public investment.

Several authors have suggested the possibility that the external sector, through a rise in the import rate, has constrained Mexico's growth. But Mexico has received significant inflows of foreign capital since the early 1990s, which would tend to alleviate this possible constraint. Thus, the behaviour of investment demand is revealing when looked at from the balance of payments perspective.

According to the balance of payments identity, in any given period, the flow of foreign capital to a country must be equal to the sum of domestic capital outflows, the accumulation of foreign exchange reserves by the central bank, and the current account deficit:

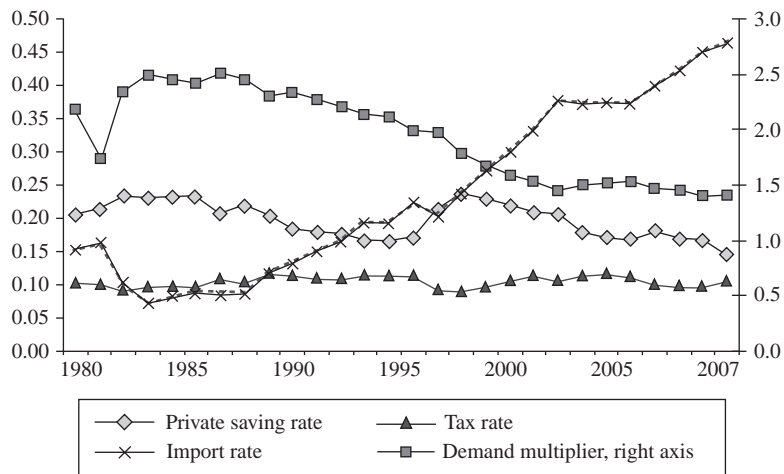
$$\text{Foreign capital inflows} = \text{domestic capital outflows} + \text{reserves accumulation} + \text{current account deficit}, \quad (3)$$

while the current account deficit must be equal to the difference between domestic saving and investment.

⁸ The tax rate includes all public sector revenues classified as taxes (basically, income tax and value added tax) derived from non-oil economic activities, plus gasoline taxes.

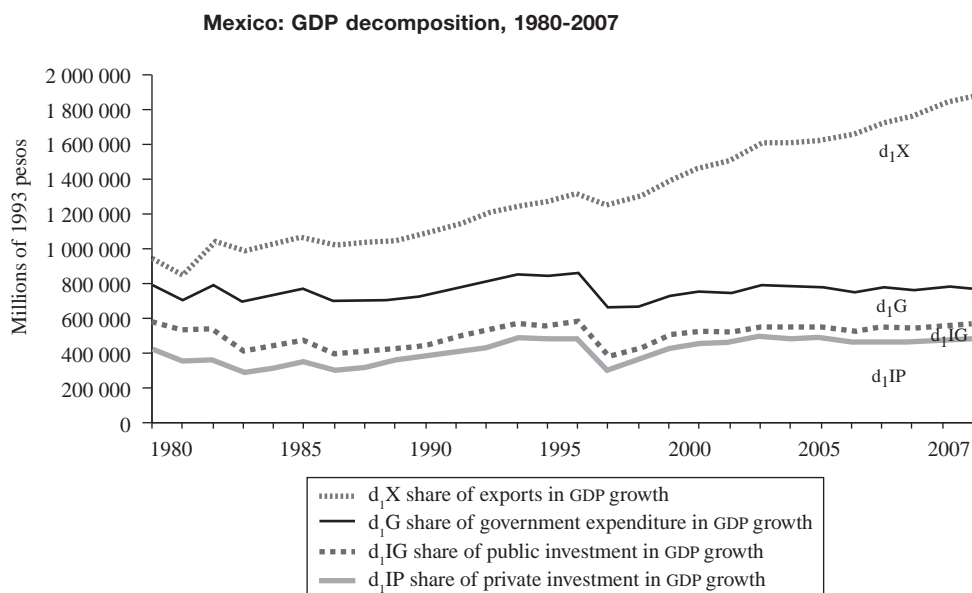
FIGURE 5

Mexico: demand multiplier and its components, 1980-2007



Source: author's calculations on the basis of data from Bank of Mexico (public finances) and the World Bank (2005) and INEGI (national accounts).

FIGURE 6



Source: author's calculations on the basis of data from Bank of Mexico (public finances) and the World Bank (2005) and INEGI (national accounts).

Figure 7 offers information on selected periods (first quarter 1983 to fourth quarter 1989, first quarter 1990 to third quarter 1994, and first quarter of 1996 to fourth quarter 2007). The initial external situation is well known. Foreign capital inflows were relatively low (averaging 1.7% of GDP), and the economy was forced to transfer resources abroad through a current account surplus (0.7% of GDP). From a balance of payments perspective, these resources were used up partly in a modest accumulation of reserves (averaging 0.6% of GDP) and mostly to sustain an outflow of capital (1.8% of GDP). During this period the (fixed) investment rate was 18.5% of GDP.

The macroeconomic context turned around completely in the following years. A combination of local and external factors sparked a great inflow of foreign capital, averaging 7.3% of GDP. There was an important shift in the current account balance, which recorded a deficit of 5.3% of GDP. Despite the heavy capital inflow, the average investment rate over the period 1990-1994 was only 19.2% of GDP, i.e. less than one point above the rate for the previous period.

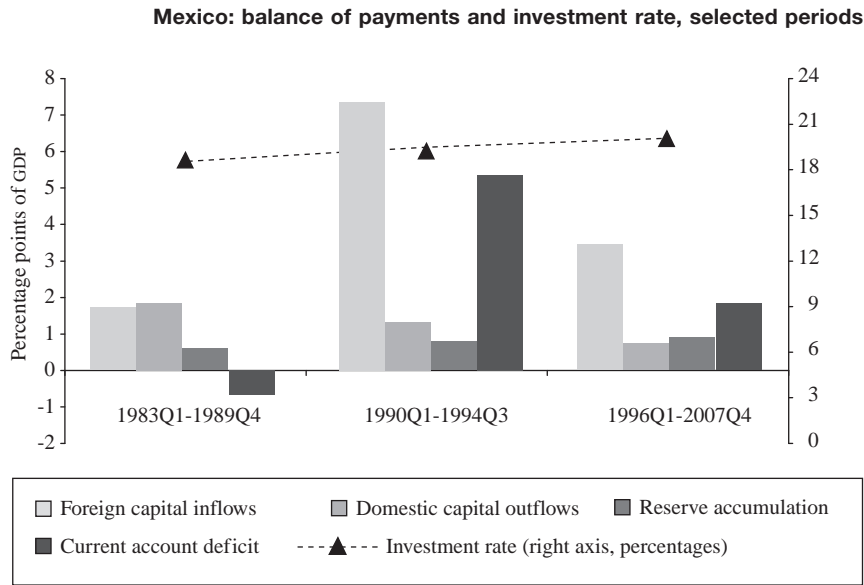
The sharp change in the current account balance had as its main counterpart a reduction in the domestic saving rate.

In 1996-2007, foreign capital inflows declined on average to 3.4% of GDP, but they remained well above the flows observed in the 1980s. Nearly a quarter of the capital inflow was accumulated as reserves. The current account deficit averaged only 1.8% of GDP, well below the 5.3% recorded in the early 1990s. As the counterpart to the lower current account deficit, there was a recovery in the domestic saving rate, while the investment rate rose slightly, from 19.2% to 19.9% of GDP.⁹

In short, during the period 1996-2007 the average investment rate exceeded that of the "lost years" of 1983-1989 by less than 1.5% of GDP, a modest adjustment that took place in the midst of substantial inflows of foreign capital.

⁹ The large accumulation of reserves during this period suggests that, although the higher import rate could have potentially tightened the external constraint on growth, the constraint did not apply.

FIGURE 7



Source: author's calculations on the basis of data from Bank of Mexico, the World Bank (2005) and INEGI (GDP in current pesos, converted to dollars using the nominal exchange rate), and the International Monetary Fund (International Financial Statistics) and INEGI (investment rate).

IV

Investment and the profit rate

The weak growth of the Mexican economy can be attributed, under one approach, to the low dynamism of investment in a context defined by disinflation and the tendency of the peso to appreciate in real terms. This section examines formally the effect of the real exchange rate on the profitability of the manufacturing sector and, by that channel, on investment.¹⁰

To conduct the empirical analysis, let us assume that the prices set by firms operating under imperfect competition depend on a (possibly varying) profit margin and the unit labour cost, according to the formula:

$$\frac{P}{S} = (1 + u)\Omega, \Omega = a \frac{W}{S} \quad (4)$$

where P is the domestic price index in local currency, u is the profit margin, a is labour employed per unit of output, W is the nominal wage, and Ω is the unit labour cost. The equation is divided by the nominal exchange rate S (defined in terms of pesos per dollar) to convert the domestic price and the unit labour cost into dollars.

We can write an equation similar to (4) for the external economy, indicating the external variables with an asterisk. Dividing the domestic price equation by its external counterpart, and restating, we obtain:

$$\frac{\Omega}{\Omega^*} = \left(\frac{1 + u^*}{1 + u} \right) \left(\frac{P}{SP^*} \right) \quad (5)$$

Equation (5) indicates that a relative increase in the country's unit labour cost must be matched by

¹⁰ Using data for the period from the first quarter of 1981 to the second quarter of 2000, Lederman, Menéndez et al. (2003) show that a higher volatility in the real exchange rate tends to depress the investment rate in Mexico. There has been much debate over the impact of the real exchange rate on the level and growth rate of GDP. Some authors have found mostly contractionary effects; see Kamin and Rogers (2000) and the references in that paper; for the opposite view, see Galindo and Ros (2008), Ibarra (2008b), and Blecker (2007).

either an increase in its relative prices or a reduction in its relative profit margin, where a lower profit margin would produce a fall in the share of profits in GDP (z) according to the formula:

$$z = \frac{u}{1 + u} \tag{6}$$

Figure 8 illustrates the evolution of Mexico’s relative labour cost and relative consumer prices (summarized earlier in table 1). It will be recalled that the first series corresponds to the ratio of the unit labour cost in manufactures, in dollars, between Mexico and the United States, while the second series corresponds to the CPI-based multilateral real exchange rate index of the Bank of Mexico; for the sake of visual effectiveness, the latter index has been inverted so that an increase indicates a real appreciation.

There is a solid association between the two series, as equation (5) suggests, with a correlation coefficient of 0.8311 during the period 1985-2007. Changes in relative costs and relative prices are closely connected. A misaligned exchange rate —i.e. one that does not isolate relative costs from changes in relative nominal wages and productivities— could cause a slowing of exports and a loss of market share.

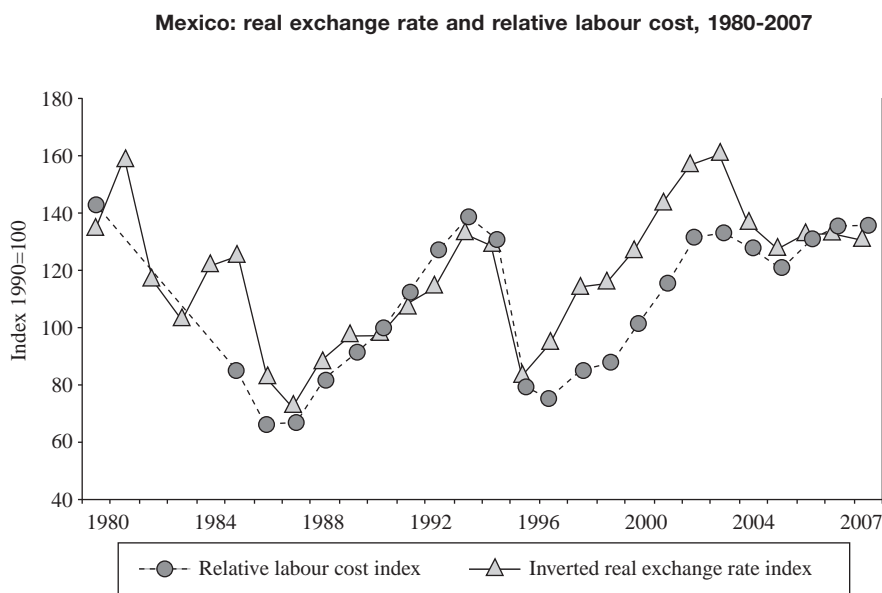
We can examine this effect by regressing the growth of exports on the real exchange rate, and controlling for market growth.¹¹ Table 2 presents the results of the unit root test on the variables used in the econometric analysis. The unit root hypothesis is rejected for nearly all variables, in particular by the Phillips-Perron test.

Some variables have borderline p-values in the augmented Dickey-Fuller test. The share of profits in value added from manufacturing is probably not stationary, or it may be stationary around a linear trend. Because of this ambiguity, the regressions include the results of unit root tests applied to the residuals of the long-term version of the estimated equations. As is well known, the possibility of a spurious regression can be discarded when the unit root hypothesis for the residuals is rejected.

The regressions were estimated with quarterly series corresponding to the period 1988-2007, i.e. the period subsequent to Mexico’s trade liberalization. In all cases the point of departure was an autoregressive distributed lag model, typically with four lags in the

¹¹ See the appendix for the source and precise definition of the variables included in the regressions of this section.

FIGURE 8



Source: author’s calculations on the basis of data from INEGI (relative labour cost) and Bank of Mexico (real exchange rate).

TABLE 2

Mexico: unit root tests^a

	Augmented Dickey-Fuller test			Phillips-Perron test		
	Level	Level with trend	First difference	Level	Level with trend	First difference
Growth rate of manufacturing exports, GEXP ^{1/}	-2.6625*	-2.8631	-7.0365***	-2.6625*	-2.9800	-8.6171***
Log. of the real exchange rate, LNRER ^{2/}	-2.5702 ^b	-2.4334	-8.1501***	-2.6780*	-2.7913	-8.2061***
Growth rate of industrial production in the United States, GUS ^{1/}	-2.5470 ^b	-2.5107	-4.1686***	-2.7817*	-2.7473	-5.2266***
Share of profits in manufacturing value added, PROFIT ^{2/}	-1.1703	-3.4572 ^{*c5/}	-9.6741***	-1.4044	-2.3108	-9.6889***
Growth rate of manufacturing production, GMPI ^{2/}	-2.0860 ^{4/}	-2.2938 ^{4/}	-9.5087*** ^{4/}	-4.0503***	-3.9804**	-10.0838***
Investment growth rate, GINV ^{3/}	-2.5554 ^{b5/}	-2.5416 ^{5/}	-8.2855*** ^{5/}	-3.2852**	-3.2640*	-6.7001***
GDP growth rate, GGD ^{3/}	-3.6762*** ^{6/}	-3.6506*** ^{6/}	-8.4493*** ^{5/}	-3.3764**	-3.3522*	-7.9005***
Nominal interest rate, NIR ^{3/}	-4.9442***	-5.3446***	-8.9183***	-5.1204***	-5.4016***	-9.4123***
Inflation rate, INF ^{3/}	-5.7769***	-5.9448***	-4.4028***	-4.5717***	-4.0284**	-4.6306***
Private saving rate, SAVING ^{3/}	-1.6223	-1.6902	-4.1920***	-2.9508**	-2.9967	-21.2476***

Source: author's estimations. See the appendix for definition and source of each variable.

***, **, *: Unit root hypothesis rejected at 1%, 5% and 10% significance levels.

^a Augmented Dickey-Fuller test with intercept and lag length determined by the Schwarz information criterion. Phillips-Perron test with intercept, Bartlett kernel, and Newey-West bandwidth. MacKinnon critical values.

^b p-value is between 0.1 and 0.11.

^c p-value is 0.0513.

Note: the sample used in each test is the same as that used in the corresponding regressions, although in some cases its size is smaller because of the inclusion of lags in the test:

^{1/} 1988-Q1 2007-Q2, 78 observations.

^{2/} 1988-Q1 2007-Q4, 80 observations.

^{3/} 1988-Q1 2007-Q3, 79 observations.

^{4/} Reduction of the sample to 1988-Q2 2007-Q4, 79 observations.

^{5/} Reduction of the sample to 1988-Q2 2007-Q3, 78 observations.

^{6/} Reduction of the sample to 1988-Q3 2007-Q3, 77 observations.

dependent variable and the regressors, although some models had to begin with five lags in the dependent variable to correct a problem of autocorrelation in the residuals. The initial lag structure was then simplified according to the statistical significance of each coefficient.

To make sure that the simplification yielding the final model is acceptable in statistical terms, all the regressions include a Wald test for the hypothesis that the eliminated variables have coefficients that are jointly equal to zero. They also include the Jarque-Bera test for the normal distribution of residuals, the Breusch-Godfrey test for the absence of up to fourth-order autocorrelation, the Engle test for the absence of ARCH

(autoregressive conditional heteroscedastic) errors, and Ramsey's RESET test for general specification.

An ordinary least squares (OLS) regression of the growth rate of manufacturing exports (GEXP) on the logarithm of the CPI-based real exchange rate index (LNRER), the growth rate of the United States Industrial Production Index (GUS) and two dummy variables to capture a temporary increment—with the formation of NAFTA—in export growth during 1994 and 1995 (or a permanent increase in the level of exports since 1994, which is equivalent) produces the following results:¹²

¹² Although not statistically significant, the fifth lag of GEXP was retained to eliminate a problem of autocorrelation in the residuals.

where g is the GDP growth rate, i is the investment rate (fixed investment/GDP) and k_m is the output/capital ratio.²⁰

The observations for k_m were derived as residuals from the annual series for the GDP growth rate and the investment rate. At this frequency, the series can be highly volatile due to fluctuations in aggregate demand and, consequently, in the degree of capacity utilization. The fluctuations were eliminated using the Hodrick-Prescott trends of the series or their averages over long periods.

Figure 10 presents the Hodrick-Prescott trends for 1960-2007 and shows that there was a decline in the GDP/capital ratio throughout the 1960s, 1970s and the beginning of the 1980s. As we might expect, the period averages in table 3 reveal the same pattern. The average GDP/capital ratio dropped from 0.35 in 1960-1977 to 0.22 in the early 1990s, and to 0.18 after 1996.²¹

Because we are focusing on Hodrick-Prescott trends and long-run average variations, the decline

in the GDP/capital ratio must have a technological basis. It could also reflect a persistent problem of capital underutilization, as suggested by the opinion surveys conducted by the Bank of Mexico among manufacturing industry executives (López, no date). In this case, aggregate demand growth would have fallen persistently short of the expectations that firms entertained when making their investment decisions.

But whether this is a technological phenomenon or the result of inadequate aggregate demand, the fact is that a fall in the GDP/capital ratio reduces not only the GDP growth rate (equation 12) but also the profit rate (equation 11). This reinforces the adverse profit-share effect of the peso's appreciation on profitability.

TABLE 3

Mexico: growth identity
(Annual averages)

	GDP growth rate	Investment rate	GDP/capital ratio ^a
1960-1977	6.23	18.14	0.35
1989-1994	3.91	18.04	0.22
1996-2007	3.58	19.80	0.18

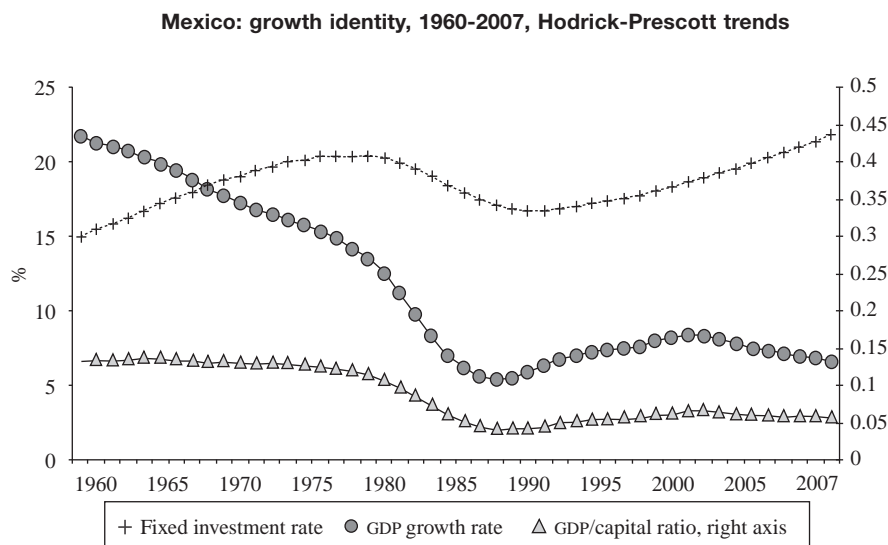
Source: national accounts data from INEGI and World Bank (2005).

^a See equation 12 in the text for the calculation of the GDP/capital ratio.

²⁰ There is a limitation in the fact that the profit rate depends on the average GDP/capital ratio, while equation 12 produces an estimate of the marginal ratio.

²¹ Working in a different analytical context, Santaella (1998) and De Gregorio and Lee (1999) offer evidence that total factor productivity growth in Mexico declined significantly since the 1970s, recording negative rates during the 1980s and 1990s. This implies a negative effect on the profit rate.

FIGURE 10



Source: author's estimates on the basis of national accounts data from the World Bank (2005) and INEGI.

V

Conclusions

At the end of the 1980s, Mexico became the recipient of large flows of capital and a top exporter of manufactured goods, but it failed to sustain high rates of economic growth. Analysts of the Mexican economy have offered various explanations for this seeming paradox. This paper argues that a simple history of relative prices and investment profitability is worth considering.

Since the late 1980s, Mexico's macroeconomic management, and its monetary policy in particular, have focused on reducing inflation. The core of that effort lasted more than 15 years, interrupted temporarily by the 1995 financial crisis.

As the disinflationary process advanced, the peso appreciated in real terms. Currency appreciation generally reduces the GDP growth rate directly through its impact on net exports, as can be seen in the slowing of export growth at the beginning of this decade. But currency appreciation can also reduce GDP growth indirectly through its impact on the share of profits in GDP. This paper looks at the indirect channel in Mexico's case, and presents econometric evidence to

show that the real exchange rate has had significant effects on the profit share of the manufacturing sector and on the share of returns on investment

The profit rate depends both on the share of profits in GDP and on the GDP/capital ratio. The paper shows that the (marginal) GDP/capital ratio in the slow-growth period has been well below the levels observed in Mexico during the era of rapid growth prior to the 1980s. By definition, a drop in the GDP/capital ratio reduces the GDP growth rate, regardless of the investment rate, but it also tends to reduce the investment rate itself because of its impact on the profit rate.

It is not surprising, then, that the bulk of GDP growth should have come from the expansion of exports, as can be seen from a simple decomposition of GDP from the demand side, while the contribution of investment has been insignificant. The slow growth of the Mexican economy is in part a history of sluggish investment and low profitability in a situation of disinflation and real currency appreciation.

APPENDIX

Definitions and data sources

Figure 2: the specific import rates were calculated as imports of intermediate goods/GDP, imports of consumer goods/aggregate consumption, and imports of capital goods/fixed investment. *Sources*: original trade data from Bank of Mexico and national accounts data from the National Institute of Statistics, Geography and Informatics (INEGI).

GEXP: four-quarter change in real manufacturing exports. The original balance of payments data in current dollars were deflated by the U.S. producer price index. *Source*: Bank of Mexico and U.S. Bureau of Labour Statistics.

LNRER: natural logarithm of the CPI-based real effective exchange rate index. *Source*: original monthly index from Bank of Mexico.

GUS: four-quarter change in the U.S. industrial production index, seasonally adjusted. *Source*: original monthly index from the United States Federal Reserve.

PROFIT: quarterly average of the profit share, calculated as unity minus the ratio of wages and salaries to value added in manufactures. The calculation used the average ratio of value added to gross production from the INEGI Annual Industrial Survey for the longest available period (1994-2003) in order to calculate value added from the monthly index. *Source*: original monthly data in current pesos, taken from the INEGI Monthly Industrial Survey.

GMPI: four-quarter change in the manufacturing production index. *Source*: original monthly index from INEGI.

GINV: four-quarter change in real gross fixed investment. *Source*: original data in thousands of 1993 pesos, INEGI.

GGDP: four-quarter change in real gross domestic product. *Source*: original data in thousands of 1993 pesos, INEGI.

NIR: quarterly average of the annualized 91-day rate on Mexican Treasury Certificates (CETES), in percentage. *Source*: original monthly data from Bank of Mexico.

INF: four-quarter change in the consumer price index, in percentages. *Source*: original monthly index, Bank of Mexico.

SAVING: unity minus the ratio of private consumption, net of taxes, to GDP. The calculation includes all public sector revenues classified as taxes derived from non-oil economic activities, plus gasoline taxes. The variable used in equation (10) is the residual of a regression of the actual saving rate on a set of quarterly dummy variables (adjusted by the estimated intercept). *Source*: original data in thousands of 1993 pesos INEGI.

(Original: English)

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