

LIBERALIZATION, GROWTH AND FINANCIAL CRISES
Lessons from Mexico and the Developing World

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1. Introduction

By now, there has been widespread agreement that trade liberalization enhances growth. No such agreement exists, however, on the growth-enhancing effects of financial liberalization, in large part because it is associated with risky capital flows, lending booms, and crises. The Mexican experience is often considered a prime example of what can go wrong with liberalization. Mexico liberalized trade and finance and entered the North American Free Trade Agreement (NAFTA); yet, despite these reforms and the advantage of proximity to the United States, Mexico's growth performance has been unremarkable in comparison with that of its peers. A particularly worrisome development is that, since 2001, exports have stopped growing.

That financial liberalization is bad for growth because it leads to crises is the wrong lesson to draw from the data. Our empirical analysis shows that, in countries with severe credit market imperfections financial liberalization leads to higher growth, but it also leads to a higher incidence of crises. In fact, most of the fastest growing countries of the developing world have experienced boom-bust cycles. We argue that liberalization leads to higher growth because it eases financial constraints, but that this occurs only if agents take on credit risk, which makes the economy fragile and prone to crises. An implication of our analysis is that the international bank flows that follow financial liberalization and increase financial fragility are an important component of a high-growth path.

We find that asymmetries between the tradables (T) and nontradables (N) sectors are key to understanding the link between liberalization and growth, boom-bust cycles, and the Mexican experience. Asymmetric sectoral responses to liberalization and crisis are the norm.

At first glance, the experience of Mexico, a prominent liberalizer, challenges the argument that liberalization promotes growth. However, when we compare Mexico to an international norm, we find that the growth in Mexico's exports during the 1990s was outstanding. We also find that, while its pattern of boom and crisis is similar to that of the average country, Mexico's credit crunch in the wake of crisis is atypically severe and long-lasting. The resulting stagnation of the N-sector and the bottlenecks it has generated have contributed to Mexico's less-than-stellar growth performance and to the more recent fall in exports.

In order to fundament these points we analyze the empirical relationship between liberalization, crises, and growth across the set of countries with active financial markets, and we characterize the typical boom-bust cycle. To substantiate our interpretation of the data and to explain the Mexican experience, we present a model that establishes causal links between liberalization, financial fragility, and growth, and leads us to divide our data set into countries with high and middle degrees of contract enforceability (HECs and MECs, respectively).

Our data analysis shows that across MECs, trade liberalization has typically been followed by financial liberalization, which has led to financial fragility and to occasional crises. On average, however, both trade and financial liberalization have led to higher long-run per-capita growth in gross domestic product (GDP) across the set of countries with active financial markets. Furthermore, we find that this positive link is not generated by a few high-growth countries that experienced no crisis. Instead, the countries that have experienced crises are typically the

fastest-growing ones. This suggests that the same mechanism that links liberalization with growth in MECs also generates financial fragility and occasional crises.

These facts do not contradict the negative link between growth and the *variance* of several macroeconomic variables (which is the typical measure of volatility in the literature). We should not confuse the uneven progress or “bumpiness” associated with occasional crises with variance, which also captures high-frequency shock. Here, bumpiness is measured by the (negative) *skewness* of real credit growth. Our findings show that fast-growing MECs tend to have negatively skewed credit growth paths.

Our explanation for the link between liberalization, bumpiness, and growth is based on the fact that countries like Mexico have severe contract-enforceability problems. Since liberalization has not been accompanied by judicial reform, these problems have persisted. The key point is that these problems affect firms asymmetrically: While many T-sector firms can overcome these problems by accessing international capital markets, most N-sector firms cannot. Thus, N-sector firms are financially constrained and are dependent on domestic bank credit.¹

Trade liberalization increases GDP growth by promoting T-sector productivity. Financial liberalization adds even more to GDP growth by accelerating financial deepening and thus increasing the investment of financially constrained firms, most of which are in the N-sector. However, the easing of financial constraints is associated with the undertaking of credit risk, which often takes the form of foreign currency–denominated debt backed by N-output. Credit risk occurs because financial liberalization not only lifts restrictions that preclude risk taking, but also is associated with explicit and implicit systemic bailout guarantees that cover creditors against systemic crises.² Not surprisingly, an important share of capital inflows takes the form of risky bank flows, and the economy as a whole experiences aggregate fragility and occasional crises.

High N-sector growth helps the T-sector grow faster by providing abundant and cheap inputs. Thus, as long as a crisis does not occur, growth in a risky economy is greater than in a safe one. Of course, financial fragility implies that a self-fulfilling crisis may occur. And during crises, GDP growth falls. Crises must be rare, however, in order to occur in equilibrium—otherwise agents would not find it profitable to take on credit risk in the first place. Thus, average long-run growth may be greater along a risky path than along a safe one. Our model follows this intuition to establish a causal link from liberalization to financial fragility to GDP growth. This link is independent of the nominal exchange rate regime.

The argument imposes restrictions on the behavior of credit and of the N-to-T output ratio (N/T) that help us identify the mechanism. First, credit growth and N/T should fall drastically in the wake of crisis, and due to infrequency of crises they should exhibit a negatively skewed distribution. Second, during normal times N/T should co-move with

¹ Using microlevel data from the Mexican economic census and from stock market listed firms, we document this asymmetry for the case of Mexico.

credit. Finally, N/T should decrease following trade liberalization and increase following financial liberalization. We show that the bumpiness of credit and these asymmetric responses are indeed an empirical regularity across MECs. We are not aware of other empirical work that relates the N-to-T output ratio to crises and that explains the empirical regularities we have found.

Let us now look at Mexico's experience. As we noted previously, relative to its initial GDP, Mexico's growth has been decent, but not stellar. However, when we control for bumpiness, Mexico is an underperformer. Even in the postliberalization period, it has grown 2% less per year than countries with comparably risky paths. When we compare Mexico's boom-bust cycle to that of the typical MEC, we find that Mexico's boom phase is typical—it is its response to the crisis that is the outlier. Relative to the typical MEC, Mexico's credit crunch was both more severe and more protracted. The credit-to-GDP ratio in Mexico fell from 51% in 1994 to 14% in 2002.

This severe credit crunch is in contrast to the fast recovery of GDP growth in the wake of the Tequila crisis. GDP growth masks a sharp sectoral asymmetry between an impressive increase in exports and a lagging N-sector. The N-to-T output ratio fell about five times as much in Mexico as in the average MEC. Microlevel data reveal that the prolonged postcrisis credit crunch affected mainly the N-sector, whereas the T-sector, in contrast, received a large share of foreign direct investment (FDI) and was insulated from the credit crunch because it could access international financial markets and shift away from domestic bank credit. Over the past eight years, tight credit has limited investment and growth in the financially constrained N-sector, with the result that it is the T-sector, in large part, that has enjoyed the beneficial effects of liberalization and NAFTA.

Mexico's persistent credit crunch is puzzling. It cannot be explained by falling loanable funds: deposits have grown together with GDP, and a large share of the banking system (88% by 2001) has been sold to foreigners. What accounts, then, for the credit crunch? Evidence suggests that the fall in credit has been associated both with a sharp deterioration in contract enforceability, and with the policy response to the non-performing loans problem.

Since 2001 Mexican exports and GDP have stopped growing. The empirical evidence indicates that the U.S. recession can account for part of this slowdown, but not for all of it. Our conceptual framework points out some internal factors that can help us account for this residual growth. Access to international financial markets combined with the real depreciation allows the T-sector to buy inputs at fire-sale prices and thus to grow rapidly in the wake of the crisis. However, this rosy scenario cannot go on forever. Lack of credit depresses N-sector investment, and this generates bottlenecks that eventually block T-sector growth. Does this prediction of the model apply to Mexico? Sectoral evidence shows that the subsectors where exports have declined the most are those that use N-inputs most intensively. Given the lackluster performance of the N-sector, this suggests that bottlenecks are contributing to the slowdown.

² We should distinguish two types of bailout guarantees: unconditional and systemic. The former are granted whenever there is a default by an individual borrower, while the latter are granted only if a critical mass of borrowers goes bust. Throughout this paper we focus on systemic guarantees.

Next, consider the question of the structure of capital flows. While several observers have advocated limiting bank flows and promoting FDI as a way to reduce financial fragility, our framework makes it clear that limiting bank flows may hinder growth. We document that the lion's share of FDI goes to the T-sector or financial institutions, and, moreover, that the small share that goes to the N-sector is allocated to very large firms. Thus, most of the inflows that end up in the N-sector are intermediated by domestic banks. In countries with severe contract-enforcement problems, a policy that limits bank flows constrains the N-sector at best, and at worst, prevents the N-sector from growing for years. Thus, FDI is not a substitute for risky bank flows.

The findings of this paper do not imply that crises are good. The first-best action is to improve domestic credit markets by implementing judicial reform. If this is not feasible, liberalization will likely lead to financial fragility, as risky bank flows are the only source of finance for a large group of firms. Such flows are necessary to avoid bottlenecks and ensure long-run growth.

The link between liberalization and growth has generated controversy, as some researchers have found no significant positive link between the two. This might be due either to the country sample being considered or to the use of openness indicators. The model we present shows that the asymmetric sectoral responses and the link between liberalization, bumpiness, and growth arise only if contract enforceability problems are severe without being *too* severe. This underlies the importance of the country sample one considers, and leads us to focus on the set of countries with functioning financial markets. In order to analyze the effects of liberalization, we construct de facto indexes of trade and financial liberalization that distinguish the year of liberalization. This allows us to compare the behavior of several macroeconomic variables in both closed and open country-years.

The remainder of the paper is structured as follows. Sections 2 and 3 analyze the link between liberalization, bumpiness, and growth. Section 4 analyzes Mexico's performance. Section 5 analyzes the structure of capital flows. Section 6 contains the model. Section 7 presents some economic policy lessons, and Section 8 concludes.

2. The Effects of Liberalization

In this section we analyse empirically the link between liberalization, financial fragility and growth across the set of countries with functioning financial markets.

The mechanism we have described in the Introduction is operative only in countries with a basic level of contract enforcement that permits agents to attain high enough leverage and reap the benefits of liberalization. Thus, we restrict our data set to countries where the stock market turnover-to-GDP ratio is greater than 1% in 1998. This set consists of 66 countries, 52 of which have available data for the period 1980 to 1999. Throughout the paper we partition this set into 17 high and 35 middle enforceability countries (HECs and MECs). The former group includes the G7 and the countries in which the "rule of law" index of Kaufman and Kraay (1998) is greater than 1.4.^{3 4}

³ The HECs are: Australia, Austria, Canada, Denmark, Finland, France, Germany, Italy, Japan, Luxembourg, Netherlands, New Zealand, Norway, Sweden, Switzerland, UK, and United States. The MECs are: Argentina, Belgium, Brazil, Chile, China, Columbia, Ecuador, Egypt, Greece, Hong Kong, Hungary, Indonesia, India, Ireland,

To assess the effects of liberalization we will analyse the evolution of several macro variables before and after liberalization dates. In order to do this we construct two de-facto indexes that signal the year during which a MEC switches from closed to open. The trade liberalization index signals that a country is open if its ratio of exports plus imports over GDP exhibits a trend break or if it is greater than 30%. The financial liberalization index signals an opening when the series of cumulative capital inflows experiences a trend break, or if it is more than 10% of GDP. The idea is that a large change in a measure of openness indicates that a policy reform has taken place and that the reform has had a significant effect on actual flows.

As we explain in more detail in the appendix, we identify the breakpoints using the cumulative sum of residuals method (CUSUM). In most cases the opening dates identified by our indexes are similar to the stock market liberalization index of Bekaert et.al. (2001), the financial liberalization index of Kaminski and Schmukler (2002), and the trade liberalization index of Sachs and Warner (1995).⁵

We would like to point out that the country-years identified as liberalized by our indexes do not coincide with “good times” during which capital is flowing in and the economy is booming. Liberalized country-years include both boom and bust episodes.

All the HECs have been open since 1980, which is the beginning of our sample period. Figure 1 exhibits the share of MECs in our sample that have become open to trade and financial flows. As we can see, in 1980 only 23% of the MECs in our sample were open to trade. Most of these countries started to liberalize in the mid 1980s, and 83% had liberalized trade by 1999.

Several observers have suggested that to avoid volatility countries should liberalize trade but not financial flows. The next stylized fact indicates that this has typically not occurred.

Stylized Fact 1. *Over the last two decades trade liberalization has typically been followed by financial liberalization.*

Our indexes show that by 1999, 77% of the countries that had liberalized trade had also liberalized financial flows. This has brought the share of MECs that are financially liberalized from 23% in 1980 to 70% in 1999. This close

Israel, Jordan, Korea, Morocco, Mexico, Malaysia, Sri Lanka, Pakistan, Peru, Philippines, Poland, Portugal, South Africa, Spain, Thailand, Tunisia, Turkey, Bangladesh, Uruguay, Venezuela and Zimbabwe.

⁴ Our sample contains 41 of the 44 countries in the IFC emerging markets database, except Costa Rica, Jamaica and Singapore. The first two do not satisfy the 1% stock market turnover criterion. For Singapore we do not have data.

⁵ Bekaert et.al. (2001) focus on stock market liberalization, which although highly correlated is distinct from financial or capital account liberalization. Listed firms are a privileged set. Stock market liberalization gives them even more opportunities, but does not relax by itself the credit constraints of all other firms. Our argument is that financial liberalization promotes growth because it eases the borrowing constraints faced by the latter set of firms. Kaminski and Schmukler (2002) have constructed an index of financial liberalization. However, they consider only a small subset of countries.

association suggests that an open trade regime is usually sustained with an open financial regime as exporters and importers need access to international financial markets. Since capital is fungible, it is difficult to insulate financial flows associated with trade transactions. There are few exceptions like India, Sri Lanka and Venezuela, that have liberalized trade but have not liberalized financially.

The hypothesis that trade liberalization leads to financial liberalization can be tested with Granger causality tests. The null hypothesis that trade liberalization does not lead to financial liberalization is rejected with an F-test statistic of 4.854, which corresponds to a p-value of 0.02. By contrast, the null hypothesis that financial liberalization does not lead to trade liberalization cannot be rejected with an F-statistic of only 0.157, which corresponds to a p-value of 0.85.

a) Liberalization and GDP Growth

In this subsection we show that across the set of countries with functioning financial markets, both trade and financial liberalization have been, on average, good for growth. This result confirms similar links established in the literature. Then in subsections 3b and 3c we address the point made by several observers that liberalization might not be growth-enhancing because it leads to crises. We will show that, indeed, financial liberalization has typically been followed by booms and busts. But, we will show that financial fragility has been associated with higher GDP growth in spite of the fact that it leads to crises.

Before we present a formal statistical analysis we want to call the reader's attention to Figure 2 which shows that financial liberalization is associated with higher GDP growth. The figure depicts GDP growth rates after controlling for initial per-capita income and population growth. For each country two growth rates are depicted: one before and one after financial liberalization.⁶ This simple graphical representation allows us to see two patterns. First, growth is on average higher in open country-episodes than in closed.⁷ Second, in almost every country the open episode exhibits higher growth than the closed episode.⁸

In order to assess the link between liberalization and growth we will add our liberalization dummies to a standard growth regression:

$$\Delta y_{it} = \lambda y_{i,ini} + \gamma X_{it} + \phi_1 TL_{it} + \phi_2 FL_{it} + \varepsilon_{jt}, \quad (1)$$

where Δy_{it} is the average growth rate of per-capita GDP; $y_{i,ini}$ is the initial level of per-capita GDP; and X_{it} is a vector of control variables that includes initial human capital, the average population growth rate, and life

⁶ Countries that are always open or always closed only have just one growth rate. Country episodes with less than 5 years are excluded.

⁷ Except for China which did better than predicted in spite of being closed, and Greece which is an underperforming open economy.

⁸ One exception is Indonesia, which grew marginally less during the open period. But, given the major crisis in the post-liberalization period, a growth rate above the predicted value in the second period is still remarkable. Note that even in cases where the growth rate is smaller than predicted, the gap to the predicted value is smaller in the open period (e.g., Brazil and the Philippines).

expectancy. Lastly, TL_{it} and FL_{it} are our trade and financial liberalization indicators. We do not include investment in the controls as we expect trade and financial liberalization to affect GDP growth through higher investment.

We estimate the regression in three different ways. First, we estimate a standard cross-section regression by OLS. In this case 1980 is the initial year. The TL_{it} and FL_{it} dummy variable take a value between 0 and 1, specifying the share of years that the country was liberalized during our sample period $\{0, 0.05, 0.1, \dots, 1\}$. Second, we estimate a panel regression using two non-overlapping windows: 1980-1989 and 1990-1999. Here, the liberalization dummies take again a value between 0 and 1 during each sub-period, $\{0, 0.1, \dots, 1\}$. Lastly, we use overlapping windows as in Bekaert et.al. (2001). For each country and each variable, we construct 10-year averages starting with the period 1980-1989 and rolling it forward to the period 1990-1999. Thus, each country has up to 10 data points in the time series dimension. In this case the liberalization dummies take values in the interval $[0,1]$ depending on the proportion of liberalized years in a given window. We estimate the panel regressions using generalized least squares. We deal with the resulting autocorrelation in the residuals by adjusting the standard errors according to Newey and West (1987).⁹

Table 1 reports the estimation results. The financial liberalization dummy enters significantly at the 5% level in all regressions. The cross section regression shows that following financial liberalization, per-capita GDP growth increases by 2.16% per year, after controlling for the standard variables. The corresponding estimate is 1.32% in the non-overlapping panel regression, and 1.81% in the overlapping windows regression. The last regression is similar to those estimated by Bekaert et.al. (2001) using stock market liberalization dates. They find GDP growth increases in the range of 0.41 to 1.46%.

The fourth column in Table 1 shows that following trade liberalization, GDP growth increases 1.23% per year. This estimate is similar to the 2% found by Sachs and Warner (1995). Notice that the increase in GDP growth is greater following financial liberalization than following trade liberalization. Moreover, we can see in the fifth column that when we include both dummies in the growth regression, the marginal effect of trade liberalization falls to 0.76%, while that of financial liberalization remains basically the same (1.98%). The larger effect of financial liberalization suggests that, in addition to the productivity gains from trade liberalization, the easing of financial constraints has been an important source of growth. The effect of financial liberalization will be the focus of the model we present below. Finally, the last column shows that the positive link between liberalization and growth is evident in the larger sample that includes HECs as well as MECs. For further reference we summarize our findings.

Stylized Fact 2. *Over the period 1980-1999 both trade liberalization and financial liberalization are associated with higher per-capita GDP growth across the set of countries with functioning financial markets.*

⁹ Our panel is unbalanced because not all series are available for all periods. Our source of data is World Development Indicators (WDI) of the World Bank. See Appendix for exact sources.

In the existing literature there is mixed evidence that openness promotes long-run growth.¹⁰ This can be attributed either to the indicators of openness used or to the sample considered. We find a statistically significant link for two reasons. First, like Bekaert et. al. (2001), we identify liberalization *dates* that allow us to compare the performance of liberalized country-years with that of non-liberalized ones. Second, we restrict our analysis to the set of countries that have functioning financial markets, because only in these countries do we expect our conceptual mechanism to work.

In contrast, many papers that do not find a significant link use de jure liberalization indexes or de facto indexes that do not identify liberalization dates. First, existing de jure indexes that are available for a large set of countries do not reflect accurately the de facto access to international financial markets. A country that has liberalized de jure may not implement the new policy for many years or may simply not have access to international financial markets. A prime example is the case of some African countries, which are de jure more financially liberalized than most Latin-American countries, but have much lower international financial flows. Second, there are several de facto “openness indexes” that measure the size of some capital flow categories over the sample period. Because these openness indexes do not identify a specific year of liberalization, they are not appropriate to compare the behaviour of macroeconomic variables before and after liberalization.

b) Liberalization and Financial Fragility

We have seen that there is a positive link between liberalization and growth. Is this link driven by high growth countries that have had no crises? Or is it that countries that grow faster tend to have crises? We will show that financial liberalization does indeed lead to a greater incidence of crisis, and that there is a strong statistical link between the incidence of crises and long run growth.

In this section we will not say anything about causality. In Section 6, we present a model that shows that in the presence of credit market imperfections liberalization leads to higher growth because it allows constrained firms to undertake credit risk, which both eases borrowing constraints and generates financial fragility, leading to occasional crises. The model establishes a causal link from liberalization to fragility to growth and has testable implications, which we will use to identify the mechanism in Section 3.

To address systematically the issues discussed above we need a metric of financial fragility. Unfortunately, there are no indexes of financial fragility that are comparable across countries. In keeping with the spirit of this paper we use a de facto measure of fragility: negative skewness of credit growth. That is, we capture the existence of fragility by one of its symptoms: infrequent, sharp and abrupt falls in credit growth. These abrupt falls occur during the banking crises that are characteristic of the boom-bust cycles that typically follow financial liberalization. During the boom, bank credit expands very rapidly and excessive credit risk is undertaken. As a result, the economy becomes financially fragile and prone to crises. Although the likelihood that a lending boom will crash in a given year is low,

¹⁰ See for instance Bekaert et.al. (2001), Edison et.al. (2002), Edwards (1998), Eichengreen (2001), Prasad et.al. (2003), Quinn (1997), and Rodrick (1998).

many lending booms end eventually in a crisis.¹¹ During a crisis new credit falls abruptly, and it only recuperates gradually over time.

It follows that a country that experiences a boom-bust cycle exhibits high credit growth during the boom, a sharp and abrupt downward jump during the crisis, and slow credit growth during the credit crunch that develops in the wake of the crisis. Since credit does not jump during the boom and crises happen only occasionally, in financially fragile countries the distribution of credit growth rates is characterized by negative outliers. In statistical terms, countries that experience boom-bust cycles exhibit a *negatively skewed* distribution of credit growth. In plain language, we may say that the path of credit growth is “*bumpy*.”¹²

If we had infinite data series, the index would be an ideal measure of financial fragility. But in a finite sample the index may overlook some cases of fragility that do not -- yet -- reflect bumpiness. Because most MECs that have followed risky credit paths have experienced at least one major crisis during our sample period (1980-1999), we find that negative skewness of credit growth is a good indicator of the riskiness of the credit path followed by a given country.

Figure 3 depicts the kernel distributions of credit growth rates for India, Mexico and Thailand.¹³ Credit growth in India, a typical example of a non-liberalized country, has a low mean, and is quite tightly distributed around the mean --with skewness close zero. Meanwhile, credit growth in Thailand, a prime example of a liberalized economy, has a very asymmetric distribution and is characterized by negative skewness. Mexico, like Thailand, has a very asymmetric distribution and its mean is closer to that of Thailand than to that of India.

Table 2 shows that the link between financial liberalization and bumpiness holds more generally across MECs. The table partitions country-years in two groups: post- and pre-financial liberalization years. As we can see, financial liberalization leads to an increase in the mean of credit growth by 4 percentage points (from 3.8% to 8%), a fall in skewness of credit growth from near zero to -1.1, and has only a negligible effect on the variance of credit growth. This shows that:

Stylized Fact 3. *Across MECs, financial liberalization has been followed by financial deepening. This process, however, has not been smooth but is characterized by booms and occasional busts.*

¹¹ See Gourinchas et al. (2001) and Tornell and Westermann (2002).

¹² During a lending boom there are positive growth rates that are above normal. However, they are not positive outliers because the lending boom takes place for several years, and so most of the distribution is centred around a very high mean. Only a positive one-period jump in credit would create a positive outlier in growth rates and generate positive skewness. For instance, the increase in capital inflows that take place when a country liberalizes might generate such positive skewness.

¹³ The simplest nonparametric density estimate of a distribution of a series is the histogram. The histogram, however, is sensitive to the choice of origin and is not continuous. We therefore choose the more illustrative kernel density estimator, which smoothes the bumps in the histogram (see Silverman 1986). Smoothing is done by putting less weight on observations that are further from the point being evaluated. The kernel function by Epanechnikov is given by: $(3/4)(1-(\Delta B)^2)I(|\Delta B| \leq 1)$, where ΔB is the growth rate of real credit and I is the indicator function that takes the value of one if $|\Delta B| \leq 1$ and zero otherwise.

Notice that across HECs credit growth exhibits near zero skewness, and both the mean and variance are smaller than across MECs. As we will argue below this difference reflects the absence of severe credit market imperfections in HECs.

The effect of financial liberalization on the mean and the bumpiness of credit growth is represented visually in the event study of Figure 4. Time t in this figure corresponds to the date of financial liberalization. Panel (a) shows the deviation of the credit-to-GDP ratio from its mean in normal times.¹⁴ Over the six years following the liberalization date, the credit-to-GDP ratio increases on average by 6% and this cumulative increase is significant at the 5% level. Panel (b) shows the increase in (negative) skewness, which reflects the increase in bumpiness.¹⁵ Here, the average (negative) skewness increases from about 0 to (minus) 2.5, which is also significant at the 5% level.

In the literature, variance is the typical measure of volatility. We choose not to use variance to identify growth-enhancing credit risk because high variance of credit growth reflects not only the presence of boom-bust cycles, but also the presence of high frequency shocks. This may lead to false inferences about the link between liberalization, fragility and growth. In the sample we consider this problem is particularly acute because high frequency shocks are more abundant than the rare crises that punctuate lending booms.

In short, variance is not a good instrument with which to distinguish economies that have followed risky growth-enhancing credit paths from those that have experienced high frequency shocks. By contrast, negative skewness of credit growth is a good indicator of the incidence of occasional crises. There might be other more complex indicators of crises. We have chosen skewness because it is a parsimonious way to capture the existence of risky credit paths. Furthermore, it complements the variance in the regressions we estimate by allowing us to distinguish between good volatility (bumpiness) and bad volatility (variance).^{16 17}

c) Financial Fragility and Growth

¹⁴Normal times refers to the years not covered by the dummies in the regression.

¹⁵ Skewness is computed over a 10 year period. Since the event window is only based on 10 data points, we consider a shorter window.

¹⁶ In principle one could argue that other low frequency shocks affect both safe and risky economies. Therefore, the skewness could pick up countries that did not undertake credit risk, but had exogenous negative low frequency shocks that lead to a negatively skewed distribution. We are not aware that such shocks have hit MECs during the last two decades.

¹⁷ Skewness is sufficient to identify a risky path. High kurtosis may come on top of it, but is neither necessary nor sufficient. The combination of the two is sufficient, but identifies the extreme cases only. For instance, it does not capture many countries that have experienced boom-bust cycles (such as Chile, Mexico, Turkey). Kurtosis, could in principle provide further information about the distribution. However, in practice it is not useful to identify the risky and safe paths. If there is a single short-lived crisis, an outlier in the distribution leads to a long tail on the left and a high kurtosis. However, if a) there is autocorrelation in the growth rates and crisis are somewhat persistent or b) there is more than one crisis, the distribution becomes double peaked and Kurtosis can become easily very low. It is therefore an excessively sensitive measure of bumpiness. Depending on the degree of autocorrelation in the shock it could be anything from one to infinity (the kurtosis of a normal distribution is equal to 3).

We have seen that trade liberalization is typically followed by financial liberalization, which in turn leads not only to financial deepening, but also to booms and busts. On the one hand, in an economy with severe credit market imperfections financial deepening is good for growth because financing constraints are eased. On the other hand, crises are bad for growth as they generate systemic insolvencies and firesales. Ultimately, which of these two effects dominates is an empirical question. The following stylized fact summarizes the results that will be discussed below.

Stylized Fact 4. *Over the last two decades countries with bumpy credit paths have grown faster than those with smooth credit paths, controlling for the standard variables.*

Our results are foreshadowed by Figure 5, which shows the link between GDP growth and the moments of credit growth across MECs, controlling for initial GDP and population growth. High long run GDP growth is associated with (a) a higher mean growth rate in credit, (b) negative skewness and (c) lower variance.

As we can see, countries that have followed a risky path, like Chile, Korea and Thailand, exhibit a negatively skewed credit growth and high GDP growth. In contrast, countries that have followed a safe path, do not exhibit negative skewness and have low growth, examples are Pakistan, Bangladesh and Morocco. China and Ireland are notable exceptions: they have experienced very high GDP growth in the last twenty years, but have not experienced a major crisis despite high levels of credit growth.

In order to assess the link between bumpiness and growth we add the three moments of real credit growth to regression (1).

$$\Delta y_{it} = \lambda y_{i,1980} + \gamma X_{it} + \beta_1 \mu_{\Delta B,it} + \beta_2 \sigma_{\Delta B,it} + \beta_3 S_{\Delta B,it} + \phi_1 TL_{it} + \phi_2 FL_{it} + \varepsilon_{j,t}, \quad (2)$$

where Δy_{it} , $y_{i,ini}$, X_{it} , TL_{it} and FL_{it} are defined in equation (1), and $\mu_{\Delta B,it}$, $\sigma_{\Delta B,it}$ and $S_{\Delta B,it}$ are the mean, standard deviation and skewness of the real credit growth rate, respectively. We do not include investment as a control variable because we expect the three moments of credit growth, our variables of interest, to affect GDP growth through higher investment.

We estimate equation (2) using the same type of overlapping panel data regression as in equation (1). For each moment of credit growth and each country, we construct 10-year averages starting with the period 1980-1989 and rolling it forward to the period 1990-1999. Similarly, the liberalization dummies take values in the interval [0,1] depending on the proportion of liberalized years in a given window.¹⁸ Given the dimension of system (2), the overlapping windows regression is the most appropriate method for the analysis we perform here.¹⁹

¹⁸ Since the higher moments of credit growth cannot be computed in a meaningful way, we consider only series for which we have at least ten years of data.

¹⁹ The overlapping windows regression captures the spirit of the model we present below for the following reason. In the risky equilibrium of a liberalized economy there is a probability $1-u$ that a crisis will occur at $t+1$, given that a crisis does not occur at t . Meanwhile, in a non-liberalized economy the probability of crisis is always zero. Therefore, according to the model, ten-year windows with more liberalized years should exhibit both greater negative skewness and higher growth than windows with fewer liberalized years.

Table 3 reports the estimation results. Consistent with the literature, we find that, after controlling for the standard variables, the mean growth rate of credit has a positive effect on long-run GDP growth, while the variance of credit growth has a negative effect. Both variables enter significantly at the 5% level in all regressions.²⁰

The first key point established in Table 3 is the bumpiness of credit that accompanies high GDP growth. The first and second columns show that bumpy credit markets are associated with higher growth rates across countries with functioning financial markets. That is, negative skewness --a bumpier growth path-- is on average associated with higher GDP growth. This estimate is significant at the 5% level.²¹

To interpret the estimate of 0.26 for bumpiness consider India, with near zero skewness, and Thailand with skewness of minus two. A point estimate of 0.26 implies that an increase in the bumpiness index of two (0-(-2)), increases the average long run GDP growth rate by 0.52% per year. Is this estimate economically meaningful? To address this question note that after controlling for the standard variables Thailand grows about 2% more per year than India. Thus, about a quarter of this growth differential can be attributed to credit risk taking, as measured by the skewness of credit growth.

We can interpret the negative coefficient on variance as capturing the effect of ‘bad volatility’ generated by, for instance, procyclical fiscal policy.²² Meanwhile, the positive coefficient on bumpiness captures the ‘good volatility’ associated with the type of risk taking that eases financial constraints and increases investment. Notice that a country with high variance need not have negative skewness.²³

The second key point is that the association between bumpiness and growth does not imply that crises are good for growth. Crises are costly. To see this, consider the third column in Table 3. When financial liberalization is included in the growth regression, bumpiness enters with a negative sign and it is significant at the 5% level. In the MEC set, given that there is financial liberalization, the lower the incidence of crises the better. This result remains unchanged when trade liberalization is also included in the regression. However, if we include the trade liberalization dummy by itself, we do not find a significant reversal of the coefficient on skewness. In the last column, that includes all countries, bumpiness enters positively. The reason for the positive sign is that all HECs are liberalized and have near zero skewness. Thus, negative skewness acts like a dummy that selects MECs.

Clearly, liberalization without fragility is best, but the data suggests that this combination is not available to MECs. Instead, the existence of contract enforceability problems implies that liberalization leads to higher growth because

²⁰ The link between financial deepening and growth is well established in the literature. See for instance Levine, et.al. (2000).

²¹ Notice that the estimated coefficient on bumpiness is not capturing country fixed effects. Recall that, for each country, skewness varies over time, like all other variables, as we use 10-year rolling averages.

²² Ramey and Ramey (1995) and Fatas and Mihov (2002) show that fiscal policy induced volatility is bad for economic growth. Bar-Levy (2002) shows a negative link between variance and growth.

²³ Imbs (2002) results are consistent with this view.

it eases financial constraints but, as a by-product, it also induces financial fragility. Despite the occurrence of (rare) crises, on net, financial liberalization has led to higher long-run growth, as shown by the estimates in Table 1.

3. Identifying the Mechanism: Sectoral Asymmetries and the Boom-Bust Cycle

We have documented statistically significant correlations between: (a) liberalization and growth; (b) liberalization, financial deepening and bumpiness; and (c) between the latter two and growth. But what mechanism underlies these links? Which way does causation go?

In Section 6 we present a model that establishes a causal link from liberalization to financial fragility, and from the latter to growth. The theoretical mechanism has unambiguous implications for the behaviour of credit and the ratio of nontradables to tradables output (N/T). Testing whether these predictions are present in the data will help us identify the direction of causation.

We start by describing the model intuitively. In subsection 3b we test the N/T predictions of the model, and in subsection 3c we explain how the model accounts for the main features of the typical boom-bust cycle experienced by MECs. In Section 4 we will use this international norm to evaluate the economic performance of Mexico.

a) The Mechanism

The mechanism is based on the existence of two credit market imperfections. These imperfections interact to generate both finance constraints and financial fragility. Severe contract enforceability problems are the first imperfection found in MECs. These problems affect firms asymmetrically as T-firms can, in general, access international capital markets and overcome these problems more easily than most N-firms. The latter are financially constrained and dependent on domestic bank credit --except for the very large firms, which are in telecommunications, electricity and finance.²⁴

Since trade and financial liberalization have not been accompanied by judicial reform, enforceability problems have remained. Thus, liberalization has exacerbated the sectoral asymmetric financing opportunities. The model captures this asymmetry by considering a two-sector economy where N-sector firms face contract enforceability problems so they are financially constrained, while T-firms do not.

The second imperfection found in MECs is that financial liberalization not only lifts restrictions that preclude risk taking, but also is associated with explicit and implicit bailout guarantees that cover creditors against systemic crises. Since domestic banks have been the prime beneficiaries of these guarantees, this has created incentives for investors to use domestic banks to channel resources to firms that cannot pledge international collateral. Thus, liberalization has resulted in biased capital inflows. T-sector firms and very large N-sector firms are the recipients of

²⁴ There are several reasons why T-sector firms can access international financial markets more easily than N-firms. For instance, since T-firms tend to export, they can more easily establish long-term relationships with foreign firms, and they can pledge export receivables as collateral. Furthermore, on average, T-firms are larger than N-firms (see Section 4).

FDI and portfolio flows, while most of the inflows that end up in the N-sector are intermediated through domestic banks –which enjoy systemic bailout guarantees.

This biased structure of capital inflows combined with credit risk undertaken by banks and their clients generates aggregate fragility. Systemic guarantees are promises to step in and repay debt obligations in case of widespread insolvencies. If there is systemic risk in the economy, agents can exploit the subsidy implicit in the guarantees by undertaking credit risk. If a borrower goes bankrupt in a state of nature where many other borrowers go bankrupt, lenders will get repaid in full by the bailout agency. Since this contingent subsidy is anticipated by the market, taking on credit risk reduces the cost of capital. Thus, borrowers will find it profitable to take on credit risk if the probability of insolvency is small enough.

How is the systemic risk generated? Over the past few decades, credit risk has become common in banks' and corporate balance sheets of MECs via short-term maturities and currency mismatch. As a result, an important share of banks' liabilities is denominated in foreign currency, while their assets are either denominated in domestic currency or are loans to the N-sector. If a reversal of capital inflows were to take place, there would be a real depreciation, firesales and a meltdown of banks balance sheets. It is in these circumstances that bailouts are generally granted. In other words, the interaction of contract enforceability problems and systemic bailout guarantees sets in motion a self-reinforcing mechanism. On the one hand, expected real exchange rate variability makes it optimal for agents to denominate debt in foreign currency and run the risk of going bust. On the other hand, the resulting currency mismatch at the aggregate level makes the real exchange rate variable, validating agents' expectations.²⁵

The model thus explains why financial liberalization leads to financial fragility and bumpiness in countries with severe contract enforceability problems. We now explain how the credit risk associated with financial fragility leads to higher mean GDP growth.

We have seen that in the presence of contract enforceability problems the credit of most N-sector firms is constrained by their cash flow and their collateral. This is because lenders will lend only what they are sure that the borrower will be willing to repay. The key observation is that taking on credit risk reduces expected debt repayments because the bailout agency will cover part of the debt obligation in states of systemic crisis. Thus, the bailout guarantee allows constrained firms to borrow more than they would otherwise be able to. This increase in borrowing and investment is accompanied by an increase in credit risk. When many firms take on credit risk, aggregate financial fragility arises together with higher N-sector investment and growth.

Higher N-sector growth helps the T-sector grow faster because N-goods are used in T-production. Therefore, the T-sector will enjoy more abundant and cheaper inputs than otherwise. As a result, as long as a crisis does not occur, growth in a risky economy is greater than in a safe one. This does not, however, guarantee that average growth in a

risky economy is also greater than in a safe one. This is because financial fragility implies that a self-fulfilling crisis may occur. And during crises, GDP growth falls.²⁶

As we show in the model section, if crises are rare events, average long-run growth will be greater along a risky path than under a safe path unless crisis costs are excessively high. In fact, if crises were not rare, then agents would not find it profitable to take on credit risk in the first place. This explains why financial fragility leads to higher mean GDP growth.

The argument has thus established a causal link from credit risk, which generates financial fragility, to GDP growth. Since in any equilibrium crises are both rare and result in an abrupt and drastic fall in credit, which recuperates only gradually, credit growth will be *negatively skewed* if the time sample is long enough. Thus, negative skewness of credit growth is a symptom of financial fragility. This explains why skewness of credit growth is a valid RHS variable in the regressions we estimate.

Before moving on to the other predictions of the model, let us consider the set of countries over which financial fragility leads to higher growth. The degree of contract enforceability is key in the model. On the one hand, borrowing constraints arise in equilibrium only if contract enforceability problems are severe. On the other hand, credit risk can arise and be growth enhancing only if contract enforceability is not so severe that firms cannot attain high enough leverage. Thus, we find that credit risk may be growth-enhancing only in the set of countries where contract enforceability problems are severe, but not too severe. Notice that if enforceability problems were either not severe or too severe, there would be no endogenous force that would make growth rates negatively skewed to begin with. Thus, the link between negative skewness and growth would not exist.

To link these remarks to the data, we have identified countries where contract enforceability problems are “not too severe” as those where the stock market turnover-to-GDP ratio is greater than 1% in 1998. We partition this set into countries with either a high or a middle degree of contract enforceability (HECs or MECs).

b) Sectoral Asymmetries

We have seen that in MECs T-firms can, in general, access international markets and overcome these problems more easily than N-firms. This asymmetry in financing opportunities imposes restrictions on the behavior of credit and the response of the N-to-T output ratio to various shocks. Testing whether these restrictions are present in MEC data will help us identify the mechanism that links liberalization, fragile and long-run growth.

²⁵ From a theoretical perspective, there are several other self-reinforcing mechanisms that link credit risk with aggregate financial fragility. We focus on currency mismatch because it captures the recent experience of MECs.

²⁶ The fact that T-production uses N-inputs is key. This is an essential difference between our model and the traditional dependent economy model where the linkage between the N- and T-sectors derives from the fact that both use the same non-reproducible factor (e.g., Obstfeld and Rogoff). In such a model high N-sector growth does not cause high T-sector growth and there is no bottleneck effect. In the short run, a shock that affects negatively the N-sector’s investment and output, generates a real depreciation and benefits the T-sector in both models. In the medium-run, the predictions of the two models differ. In our model, the T-sector will suffer a bottleneck as N-inputs will be scarce. This is not the case in the dependent economy model.

First, consider the response of the N-to-T output ratio to trade and financial liberalization. Since trade liberalization benefits mostly T-firms and allows them to establish financing channels in international markets, the N-to-T output ratio should decrease following trade liberalization. Because financial liberalization is typically followed by a lending boom that benefits the financially constrained N-sector relatively more than the T-sector, the N-to-T output ratio should increase following financial liberalization.

Second, consider the response of the N-to-T output ratio to a crisis. The sharp real depreciation that occurs during crises deteriorates the balance sheets of the N-sector and leads to fire-sales that benefit the T-sector at the expense of the N-sector. Thus, the N-to-T output ratio falls in the wake of crises. Since N-sector credit is constrained by its net worth, and since it takes a long time for N-sector net worth to recover, the N-to-T output ratio might continue to fall for a prolonged period of time.

Third, if the N-sector is more financially constrained than the T-sector, and banks are highly exposed to the N-sector, N/T should move together with credit in normal times, and should collapse together with credit during crises.

In order to test whether these patterns are present in the data we construct two different indexes of N and T production for our set of countries. We then estimate regressions of the following form:

$$\Delta N/T_{it} = c + \beta_1 TL_{it} + \beta_2 FL_{it} + \beta_3 credit_{it} \sum_{j=0}^5 \delta_j crisis_{i,t+j} + \varepsilon_{it}, \quad (3)$$

where N/T_{it} is the N-to-T output ratio in country i at time t ; $credit_{it}$ is real credit growth; $TL_{it}(FL_{it})$ equals one if there has been trade(financial) liberalization in country i on or before year t , and zero otherwise; and $crisis_{i,t+j}$ equals 1 in country i and year $t+j$, where t denotes the year when twin banking and currency crises occur in country i , and j denotes the number of years after the crisis.²⁷

Our first N/T index is used in Table 4. This index is constructed by looking at the behavior of the sectoral export-to-GDP ratio. For each country we classify as tradable the sector in which this ratio is the highest. In the appendix we consider another index based on the variability of the sectoral real exchange rate. The correlation between both indexes is 0.74 and the regression results are very similar.

We estimate equation (3) using the MEC sample in a panel data regression that includes fixed effects and uses a GLS estimator. The sample covers the period from 1980 to 1999 with annual data. The first column in Table 4 shows that across MECs the N-to-T output ratio responds in the way predicted by the model. The liberalization dummies are significant at the 5% level in all regressions. The estimates show that N/T falls following trade liberalization, while it increases following financial liberalization. Furthermore, the table shows that N/T falls in the

²⁷ Rajan and Zingales (1998) look at the sectors that use external finance more intensively in the US. They then test whether these sectors have grown faster in countries that have experienced greater financial deepening.

wake of crisis. The strongest effect is observed in the period after the eruption of the crisis. After a small rebound in $t+2$, N/T continues falling until $t+4$!

Consider now the link between bank credit and the N-to-T output ratio. As we can see in the second column of Table 4, credit growth enters with a positive sign and it is significant at the 5% level. This indicates that the co-movement of credit and N/T is not conditional on the occurrence of either crises or policy reforms. To control for the fact that N/T can move due to other shocks that generate movements in the real exchange rate, we estimate regression (3) including the rate of real depreciation. As we can see in the third column both liberalization dummies and credit enter significantly at the 5% level. The $crisis_{i,t+j}$ dummies enter significantly at the 5% level in almost all cases.

An alternative way to see the close link between N/T and credit growth is through VARs. If we impose the restriction that output within a quarter is predetermined by past investment, and thus it does not respond to credit innovations, the model of Section 6 implies that we can run bivariate VARs of credit with N/T, or credit with GDP. Figure 6 shows the impulse responses of N/T and GDP to a one standard deviation shock in real credit growth in Mexico and the US. The contrast is impressive. In Mexico, both GDP and N/T react significantly to a shock in credit even when we account for the effects of crisis and liberalization.²⁸

By contrast, in the US the effect of credit on GDP is only mildly significant and negligible in magnitude. Similarly, the effect on N/T in the US is smaller than in Mexico and not statistically significant. This difference is consistent with the view that contract enforceability problems are more severe in Mexico than in the US. While T-firms can overcome them, most N-firms cannot and this asymmetry is reflected in a strong response of N/T. Furthermore, this effect is strong enough to be reflected in aggregate GDP, which is an average of N and T production.

c) The Boom-Bust Cycle Across MECs

In addition to helping us identify the mechanism that links liberalization, bumpiness and long-run growth, an attractive feature of our approach is that it can also account for the typical boom-bust cycles experienced by MECs. This will allow us to evaluate the Mexican performance in Section 4.

We represent the typical boom-bust cycle by means of an event study. The left panel in Figure 7 shows the average behaviour, across our set of 35 MECs, of several macroeconomic variables around twin currency and banking crises during the period 1980-1999. Index t refers to the year during which twin currency and banking crises take place.²⁹ The graphs depict the behavior of several macroeconomic variables before, during and after twin crises. The heavy

²⁸ The crisis and liberalization dates have been dummied out in the VARs.

²⁹ We say that there is a crisis at t if both a currency and a banking crisis occur during year t , or if one occurs at t and the other at $t+1$.

line represents the average deviation relative to tranquil times. The thin lines represent the 95% confidence interval.³⁰

Typically, prior to a crisis there is a real appreciation and a lending boom during which credit grows unusually fast. During a crisis there is a drastic real depreciation that coincides with a meltdown of the banking system, widespread insolvencies and fire-sales. In the aftermath of a crisis there is typically a short-lived recession and a fall in credit that is both sharper and more long-lasting than the fall in GDP. Thus, there is a decline in the credit-to-GDP ratio. The milder fall in aggregate GDP than in credit masks the asymmetric sectoral response we emphasize in this paper: N-output falls more than T-output in the wake of crises and it recuperates more sluggishly thereafter. This asymmetry is also present during the boom that precedes the crisis as the N-sector grows faster than the T-sector and the real exchange rate appreciates.³¹ Finally, we can see that investment fluctuations are quite pronounced along the boom-bust cycle, while those of consumption are not.

The model can account for these features because financial constraints and credit risk (in the form of currency mismatch) coexist in equilibrium, and their interaction generates real exchange rate variability. In a risky equilibrium currency mismatch is optimal and borrowing constraints bind, so there can be self-fulfilling steep real exchange rate depreciations that generate widespread bankruptcies of N-sector firms and the banks that lend to them. Because N-sector net-worth falls drastically and it recuperates only gradually, there is a collapse in credit and N-sector investment, which take a long time to recuperate. Since T-firms do not face financial constraints and the real depreciation allows them to buy inputs at firesale prices, N/T falls drastically and recuperates sluggishly.

d) Are There Other Mechanisms Consistent with the Data?

We have presented a mechanism (based on the model of Section 6) in which causation goes from liberalization to financial fragility to growth: liberalization allows the undertaking of credit risk by financially constrained firms, most of which are in the N-sector. This eases borrowing constraints and increases GDP growth, but it also generates endogenous financial fragility. Thus, a liberalized economy will experience occasional self-fulfilling crises, during which real depreciations coincide with sharp falls in the credit-to-GDP and N-to-T output ratios, as constrained N-sector firms are hit especially hard.

³⁰ The graphs are the visual representations of the point estimates and standard errors from regressions in which the variable in the graph is the dependent variable, regressed on time dummies preceding and following a crisis. We estimate the following pooled regression:

$$y_{it} = a_i + \sum_{j=-3}^3 \beta_j \text{Dummy}_{\tau+j} + \varepsilon_{it},$$

where y is the respective variable of interest in the graph, $i = 1 \dots 35$ denotes the country, $t = 1980 \dots 1999$, and $\text{Dummy}_{\tau+j}$ equals 1 at time $\tau+j$ and zero otherwise, where τ is a crisis time. The panel data estimations account for differences in the mean, by allowing for fixed effects, as well as for differences in the variance, by using a GLS estimator, using the estimated cross section residual variances.

³¹ This asymmetric sectoral response parallels the N/T regressions of the previous subsection.

This mechanism implies that (i) credit growth and the credit-to-GDP are negatively skewed, i.e., they experience sharp falls during (occasional) crises; (ii) the N-to-T output ratio collapses during crises, and co-moves with credit in normal times; and (iii) the N-to-T output ratio responds positively to financial liberalization and negatively to trade liberalization. Our data analysis has shown that all these predictions are exhibited by MECs.

Would we observe this behaviour of credit and N/T if causation went in another direction or if financial constraints did not play a key role? Consider, for instance, an alternative view where higher GDP growth causes liberalization, an increase in capital inflows and in credit growth. In such a framework, higher GDP growth would lead to higher N/T following financial liberalization, to a greater incidence of crises, and to a protracted decline in N/T in the wake of crises. We are not aware of any argument in which the causation goes from GDP growth to liberalization and financial fragility that is also able to explain these patterns, and a negatively skewed credit growth path.³²

Liberalization may increase long-run growth by improving the quality of institutions. For instance, through a discipline effect that induces structural reforms that improve property rights and reduce taxation as in Tornell and Velasco (1992). This channel does not generate financial fragility, and it can work side by side with the mechanism we have identified here.³³

Finally, the asymmetry in financing opportunities between N- and T-sectors is key in our argument. In Section 4 we provide micro-data evidence from the Mexican economic census and stock market supporting this sectoral asymmetry. Tornell and Westermann (2003) provide evidence for this sectoral asymmetry for a set of MECs by looking at survey data from the World Bank.

4. The Effects of Liberalization in Mexico

Mexico is a prime example of a country that shifted from a highly interventionist to a liberalized economic regime. Given the far-reaching reforms, the signing of NAFTA, and the large capital inflows many observers expected stellar growth performance. In terms of per-capita GDP growth, Mexico's performance has been reasonable, but unremarkable. Even during the nineties Mexico only grew about 1% above the value predicted by its initial income and population growth, as one can see in Figure 5. This is less than other countries that have also implemented liberalization. Moreover, during the last two years exports and GDP have stopped growing. Why has Mexico's aggregate growth performance failed to meet expectations? Why has there been an export slowdown? Where can we see the effects of liberalization and NAFTA?

Some pundits have argued that Mexico could have grown faster had it not liberalized its financial markets so fast, and had it received more FDI and less risky bank flows. In this way, Mexico could have avoided the lending boom and the Tequila crisis. We do not agree. We have seen that across MECs liberalization leads to higher growth, as

³² Consider, for instance, the traditional dependent economy model where the N- and T-sectors use a common non-reproducible factor (e.g., labor or land) and where there are no credit market imperfections. There is no force in such an economy that leads to a greater incidence of crises following financial liberalization, that generates a negatively skewed credit growth distribution or that generates a protracted decline in N/T in the wake of crises.

³³ On this point see Kaminski and Schmukler (2002), Levine et.al. (2000), and Loayza and Ranciere (2002).

well as to financial fragility and occasional crises. Mexico is thus no exception in experiencing a boom and a bust. Something else must be at work. To find out we will compare Mexico's experience with the empirical norm we have presented in Sections 2 and 3.

We will argue that Mexico's less than stellar growth is not due to liberalization or the lending boom and crisis it engendered, and that, in all likelihood, GDP growth would have been lower without liberalization and NAFTA. In fact, in the wake of the crisis exports experienced extraordinary growth and GDP growth recovered quite fast. Instead, we will argue that Mexico's deeper and more protracted credit crunch, than that of the typical MEC, is an important factor behind Mexico's less than stellar performance and the recent slowdown in exports.³⁴

A key distinctive fact about Mexico is that in the wake of the Tequila crisis the fast resumption of GDP growth was accompanied by a protracted credit crunch. Real credit fell an astounding 62% between 1994 and 2002, as we can see in Figure 8. As a result, the credit-to-GDP ratio, which had increased from 11% in 1988 to 51% in 1994, fell back to 14% in 2002. This credit crunch hit the N-Sector particularly hard. As Figure 9 shows, real credit to the N-sector fell 72% between 1994 and 2002. The policy response to the banking problem and the sharp deterioration of contract enforceability are key factors contributing to the credit crunch.

We start by summarizing Mexico's reforms and by comparing several aspects of Mexico's performance to the international norm. We will then investigate the role of the evolution of the US economy and the role of internal factors in explaining the differences between Mexico's and typical MEC cycles. Finally, we will analyse the credit crunch and provide microeconomic evidence on the sectoral asymmetry in financing opportunities that we have emphasized throughout the paper.

a) Reforms

Mexico accessed GATT in 1985 and by 1987 had eliminated most of its trade barriers (except for agriculture). Mexico went from being a very closed economy to one of the most open in the world and it experienced a dramatic increase in exports. Between 1985 and 2000 non-oil exports jumped from \$12 billion to \$150 billion, and the share of trade in GDP went from 26% to 64%, as we can see in Figure 10.

Financial liberalization started in 1989. Although Mexico's capital account was not totally closed, financial markets and capital flows were heavily regulated. The rules that restricted the opening of bank accounts and the purchase of stocks by foreigners were relaxed. The rules that strictly restricted FDI were relaxed with new regulations.³⁵ Banks were privatized, and reserve requirements, interest rate ceilings, and directed lending were eliminated. Finally, the

³⁴ This view is consistent with Bergoening et.al. (2002), who find that most of the growth differential between Mexico and Chile over the period 1980-2000 is due to differences in TFP, not from differences in capital and labor inputs. They conclude that the crucial factor that drives the TFP differential is differences in banking systems and bankruptcy procedures.

³⁵ In 1989 a new "Reglamento" to the "Ley para Promover la Inversión Mexicana y Regular la Inversión Extranjera" was introduced. Then in 1993 a new FDI law was passed by congress: the "Ley de Inversión Extranjera." This law was subsequently revised in 1998.

limits on the amount of commercial paper and corporate bonds issued by firms, as well as the prohibition to issue indexed securities were lifted.³⁶

NAFTA was signed in 1993 and entered into effect on January 1, 1994. The treaty did not significantly reduce trade barriers from their already low levels. Its significance resides in the fact that it codified the new rules of the game and greatly reduced the uncertainty faced by investors. On the one hand, it solidified the reforms that were implemented and reduced the likelihood that the Mexican government would violate investors' property rights as it had done in the past. On the other hand, it made it very unlikely that US or Canada would suddenly impose trade barriers on some products. Furthermore, NAFTA established a supranational body to settle disputes.³⁷

A key shortcoming of the liberalization program is that it was not accompanied by badly needed judicial and labor reforms. In particular, Mexico had and still has severe contract enforceability problems that make it very difficult for a creditor to take over the assets of defaulting debtors. Such problems include long delays in the adjudication of commercial disputes (with a median time of over 30 months), very low salaries for judges (a median monthly salary of around \$1000US), biased judgments (lawyers in 14 states out of 32 view judges as deserving the low score of 1 on the impartiality scale), and poor enforcement of judicial decisions. It was not until year 2000 that new bankruptcy and guarantees laws were introduced.³⁸

b) The Mexican Experience in Perspective

We have seen that risky lending booms and (rare) crises are the norm across fast growing MECs. Thus, it cannot be the case that financial liberalization and crisis are the cause of Mexico's lack of stellar growth. Given the bumpiness it experienced, could Mexico have attained higher GDP growth? To address this issue we look again at GDP growth rates in Figure 5. Even during the liberalized period (1988-1999) Mexico's annual GDP grew less than 1% above the value predicted by its initial income and population growth. This is around 2% less than countries with similar bumpiness, as measured by the skewness of real credit growth. For instance, Chile, Korea and Thailand grew about 3%, 3% and 2%, above the predicted values. This indicates that, given its bumpiness, Mexico has been an underperformer during the nineties. Furthermore, during the period 2001:I-2003:II GDP growth has stagnated and non-oil exports have fallen 1% per year on average.³⁹

In order to explain the negative growth differential and the recent slowdown in export growth we compare Mexico's boom-bust cycle with the average cycle across the MEC sample. Both cycles are depicted in Figure 7. As we explained in Section 3, this figure depicts the deviation from the mean in tranquil times of several macroeconomic variables before, during and after twin currency and banking crises.

³⁶ For a detailed description see Babatz and Conesa (1997).

³⁷ Aspe (1993), Esquivel and Tornell (1998), Lustig (2001) and Perry et.al. (2003).

³⁸ Calomiris, Fisman and Love (2000).

³⁹ From 1980 to 1989 Mexican GDP grew on average 2% per year. Then it averaged 4% during the five boom years prior to the crisis (1990-1994), -6% during the crisis (1995) and 5% in the following five years (1996-2000). The last two years, however, have witnessed stagnation, with an average growth rate of 0%.

As we can see, GDP growth in Mexico behaved quite typically both before and during the crisis. Mexico experienced a recession that was more severe but also more short-lived than in the typical MEC during a crisis episode. The decline in GDP growth of about 8%, in comparison with the tranquil times mean, lies within the 5% confidence interval of the average MEC. During the recovery phase GDP growth in Mexico is greater than in the typical MEC. In the second and third year after the crisis Mexico grew 3-4% above tranquil times, which is outside the 5% confidence bands.

The behaviour of GDP growth masks the sharp sectoral asymmetry that we emphasize throughout this paper. As we can see in Figure 7 in the three years prior to the crisis the N-to-T output ratio increased cumulatively 8% despite a negative long-term trend towards T-production. This change lies within the 5% confidence interval of the average MEC. In the three years after the crisis, the N-to-T output ratio in Mexico declined cumulatively about five times as much as in the average MEC. This drop is significantly larger than in the average MEC. Furthermore, even by t+3 this ratio did not show any signs of reversion towards its mean in tranquil times. This long-lasting decline of the N-to-T output ratio can be seen in Figure 11, which depicts the evolution of N-production and T-production in Mexico from 1988 to 2001.

The abnormal behaviour of the N-to-T output ratio in Mexico is closely linked to that of bank credit. Relative to the international norm, the behavior of Mexican credit is typical during the boom, but is an outlier in the post-crisis period. As we can see in Figure 7, Mexico experienced an increase in the credit-to-GDP ratio in the three years prior to the crisis of about 23 percentage points. This value is above the MEC average, although it lies within the 5% confidence intervals of the typical MEC. However, in the wake of the Tequila crisis, Mexico's credit crunch was both more severe and more protracted than in the typical MEC. In the three years after the crisis, the credit-to-GDP ratio in Mexico fell from 35% above its mean in tranquil times to 5% below this mean. This drop is significantly larger than in the average MEC.

The credit crunch affected mainly the N-sector. As we can see in Figure 9, total bank credit to the N-sector fell in each year from 1995 and 2002. In contrast, the T-sector was not hard hit by the credit crunch. As we shall show below using micro-data of the economic census and the set of stock market listed firms, in the wake of the crisis T-sector firms in Mexico had significantly more access to international financial markets than N-firms.

Fast T-sector growth thus explains why GDP, which is an average of N and T output, did not fall as much as either N-output or credit, and why robust GDP growth resumed one year after the crisis. This remarkably fast T-sector growth is associated with the extraordinary export growth that can be observed in Figure 7. While it is remarkable that in the typical MEC export growth does not display any significant deviation from tranquil times in the wake of crisis, Mexico's exports increased over 20% above its tranquil time mean in 1995. This increase is certainly an outlier.

The investment-to-GDP ratio behaved typically during the boom-phase. During the crisis however, it fell significantly more than in the typical MEC, with a -15% deviation from tranquil times. During the recovery it was

also more pronounced, reaching 8% above tranquil time growth in the period $t+3$. Finally, consumption displays a similar cyclical pattern, although with a much smaller amplitude, than that of investment.

In sum, our findings indicate that the lack of stellar growth in Mexico during the nineties cannot be blamed on the liberalization, the boom or the crisis. In fact, the effects of liberalization and of NAFTA can be observed in the extraordinary growth of exports, which drove the fast and robust recovery of GDP growth in the years following the crisis. However, the dynamism of exports has faded: from 2001:I to 2003:II exports have fallen in absolute terms and GDP has stagnated. What role has the evolution of the US economy played? What role has the credit crunch played?

c) Export Growth

Since a large share of Mexican exports go to the US, a natural question is to what extent the evolution of the US economy explains their behaviour. In particular, we investigate the extent to which the extraordinary growth in exports in 1995-2000 and the slowdown in 2001-2003 can be accounted for by the evolution of US imports or US manufacturing.⁴⁰ As we shall see, the US can explain part but not all fluctuations in export growth. We will then discuss how the predictions of the model can help explain the residual export growth. The boom in exports will be explained by the firesales that occurred during the crisis, and the recent slowdown by the protracted credit crunch and the N-sector bottlenecks it generated.

Before we present the results, we would like to emphasize that the strict macroeconomic policies that were put in place in the wake of the crisis were necessary for the extraordinary growth in exports. These policies kept the fiscal balance under control and ensured that the real exchange rate did not become overvalued.

First, we investigate the link between the evolution of US imports and Mexican exports at a quarterly frequency over the period 1988:I-2003:II.⁴¹ We estimate a bivariate VAR that allows for two lags. Since both series have a unit root and their growth rates are stationary, we perform our analysis using growth rates.⁴² Figure 12 traces the response of Mexican exports to a one-standard deviation shock in US imports. We can see that there is a 3.5% of a standard deviation response in the first quarter, and 3%, 2.6%, and 2.2% in the following quarters. All these responses are significant at the 5% level.

While the impulse responses provide information on the effect of a standardized shock, they do not indicate the extent to which a given shock contributes to the total forecast error variance of Mexico's exports. To assess the relative importance of US imports shocks, we decompose the forecast error variance of Mexican exports into parts that are attributable to shocks emanating from the US and from Mexico. Figure 12 shows that US shocks account for approximately 40% of the total forecast error variance, while shocks from Mexico account for 60%. In other words,

⁴⁰ We choose US imports and manufacturing instead of a broader aggregate, such as US GDP because our objective is to determine an upper bound on the effect of the evolution of the US economy on Mexican exports.

⁴¹ An earlier starting date is not appropriate, as both countries did not trade much before 1987.

unexpected changes in Mexico's export growth are mainly generated by shocks to its own economy. Although statistically significant, US shocks play only a secondary role.

A similar pattern arises when we estimate the VAR using US Manufacturing. The long-run effects are of similar magnitude, as shocks to US Manufacturing account for around 40% of the unexpected exports' forecast error variance. However, compared with a shock to US imports, it takes longer for a shock in US manufacturing to fully translate into a reaction in Mexican exports.

In order to illustrate what periods account for the low relative importance of US shocks we plot in Figure 13 the average residuals from the VARs. The unusually high exports' residual growth in the crisis episode, and the negative outliers of recent years indicate that the performance of the US economy does not fully account for the skyrocketing 32% increase in Mexican exports during 1995, or the -1% fall in the last two years.

A simpler way to make the same point is to compare the growth rates of Mexican exports and US imports(manufacturing). Table 5 shows the average annual growth rates, while Figure 14 exhibits the demeaned growth differentials. We can see that the main deviations occurred during the crisis (1995), with an abnormally high growth residual of 14%, and from 2001:I to 2003:II, with a residual of -11%. In fact, during some quarters the residuals are more than two standard deviations away from the expected value of zero. In contrast, the average residuals were relatively small in 1990-1994 and 1996-2000 (1% and 0%, respectively). A similar pattern exists in the export growth residuals obtained by using US manufacturing.⁴³

Next, we explain how the fire-sales and the bottlenecks generated by the credit crunch help account for these large deviations. We then provide empirical evidence in support of these effects.

Fire-sales and the Bottleneck Effect

In the model economy, the real depreciation that accompanies a crisis hits severely the cash flow of N-sector firms with currency mismatch in the books. As a result, N-sector credit and investment fall. In contrast, access to international financial markets combined with the real depreciation allows T-sector firms to buy inputs at fire-sale prices. This leads to a fast growth of exports, T-output and GDP in the wake of crisis.

However, as we discuss in the section on the model, high GDP cannot be sustained over a long period if it is driven only by T-sector growth because T-production needs N-inputs. The real depreciation and the credit crunch depress N-sector investment, which eventually leads to bottlenecks: exporters will not have an abundant and cheap supply of N-inputs. Thus, ceteris paribus, at some point export growth starts falling as competitiveness erodes.

⁴² We cannot reject the null hypothesis of no cointegration according to finite sample critical values of Cheung and Lai (1993).

⁴³ These demeaned growth differentials have the same interpretation as the residuals of an OLS regression of Mexican export growth on US import growth. The slope coefficient in that regression is 0.83, significant at the 5%

To test whether these predictions of the model apply to Mexico, we look at the annual manufacturing survey of INEGI, which includes medium and large firms in the manufacturing sector, covers more than 80% of manufacturing value added and includes 206 5-digit sub-sectors. First we assess the importance of N-inputs in T-production and then we contrast the behavior over time of exports that are highly dependent on N-sector inputs and of exports that are least dependent on the N-sector.

According to this survey, N-inputs represent on average 12.4% of total variable costs in the manufacturing sector over the period 1994-1999. This share ranges from 5% in some food manufacturing subsectors to 28% in some chemical subsectors. Table 6 shows the shares of the main N-inputs used in the manufacturing sector. For example, the non-metallic minerals products subsector spends 9.5% in repairs and maintenance, 4.9% in rent, 2% in transports, 5.6% in electricity, etc.

Not only are N-inputs a significant fraction of T-production, but subsectors that are intensive in N-inputs display precisely the pattern we predict. Figure 15 shows the ratio of manufacturing exports of the sub-sectors that use N-inputs most intensively to those that use N-inputs least intensively (call it the *X-ratio*). We can see three things: (1) during the lending boom period, when the N-sector was booming and investing a lot, N-goods were expensive and the X-ratio fell; (2) after the crisis the situation reversed: in 1996-1998 N-inputs could be bought at fire-sale prices and the X-ratio increased; (3) Recently, lack of N-sector investment has generated a dramatic fall in the X-ratio.

In sum, the asymmetric behavior of different export sub-sectors supports the view that fire-sales contributed to the extraordinary export growth in the wake of the crisis, and that the bottleneck effect has contributed to the export slowdown over the last two years. We are not ruling out the possibility that other external factors, such as the exports from China, have also contributed to the recent export slowdown. However, it is unlikely that such external factors can generate the asymmetric export response we have documented.

d) How Did Financial Fragility Emerge?

In the early 1990s there was a dramatic increase in the resources available to domestic banks. In addition to the increase in capital inflows, the consolidated public sector balance swung from a deficit of 8% of GDP in 1987 to a surplus of 1% in 1993. Thus, the credit from the banking system to the public sector fell from 14% of GDP to 2%.

While bank liabilities were often denominated in foreign currency, the income streams that would service those liabilities were ultimately denominated in domestic currency. Sometimes the banks lent in pesos, and when they lent in dollars, a large share of bank credit went to households and N-sector firms, whose products were valued in pesos. In both cases the banks were undertaking insolvency risk through currency mismatch.⁴⁴ As is well known, currency mismatch was also present in the government books through the famous dollar-denominated Tesobonos.

level, and the R-squared is 0.3. This shows that 30% of the total variance in Mexican exports is explained by US imports. Recall that the VAR shows that 40% of the unexpected forecast error variance is explained by the US.

⁴⁴ The share of bank credit allocated to the N-sector reached 63% in 1994.

Agents both in the government and in the private sector understood they were taking on credit risk. However, as the model explains, taking on such risk was individually optimal because of the presence of systemic bailout guarantees and the rosy expectations generated by the prospect of NAFTA. These expectations could have been right, but unfortunately in 1994 several negative shocks to expectations befell the country. The first day of the year started with the news of the Chiapas revolt. Then March witnessed the assassination of the presidential candidate, Luis Donaldo Colosio. Although presidential elections took place in July without civil unrest and Ernesto Zedillo won with an ample majority, the full-blown crisis erupted at the end of 1994, a few weeks after he took office.

In terms of the model March 1994 marks the date of the crisis. It is the “tipping point” when there is a reversal of capital inflows. Instead of letting the exchange rate depreciate, authorities responded by letting reserves fall.⁴⁵ Central Bank reserves net of Tesobonos fell from \$27 billion in February to \$8 billion in April. They stood at negative \$14 billion at the end of 1994.

e) What Accounts for Mexico’s Credit Crunch?

As we mentioned earlier, Mexico’s credit crunch is an outlier relative to the typical MEC. Not only did credit experience a sharp fall during the crisis, after a small rebound it continued falling until 2001. Credit growth resumed in 2002. However, it turned negative in the first quarter of 2003. This path of credit is more puzzling if we note that the share of bank assets owned by foreigners increased from 6.4% in 1994 to 88% in 2001, and foreign banks are arguably well capitalized (see Figure 16).

There are two important factors that have contributed to the deepening credit crunch: the deterioration in contract enforceability and the policy response to the non-performing loans (NPLs) problem. We consider each in turn.

In the wake of the crisis borrowers stopped servicing their debts, and noncompliance went unpunished by authorities. As a result, a “cultura de no pago” developed: agents that could pay chose not to pay. Furthermore, this deterioration in law enforcement has also been observed in other areas such as an increase in fiscal evasion and in crime. Figure 17 shows that while contract enforceability improved up to 1994, it has deteriorated since 1995. In the terms of the model of Section 6, this pattern implies a decline in the coefficient of enforceability, which induces a fall in the credit multiplier and the investment of constrained firms.

Due to the currency mismatch all banks were de facto bankrupt in the wake of the crisis. However, regulatory discipline was not immediately established: only a small share of NPLs was officially recognized. The banks’ bailout took the form of exchanges of the officially recognized NPL’s for 10-year government bonds that paid interest but could not be traded.⁴⁶ This piecemeal rescue program that was meant to be temporary became an open-

⁴⁵ See for instance Lustig (2001) and Sachs, Tornell and Velasco (1996b).

⁴⁶ These exchanges are the so-called FOBAPROA and IPAB programs. For an analysis of the banking problem see La Porta et. al. (2002) and Krueger and Tornell (1999).

ended bailout mechanism.⁴⁷ Despite high GDP growth, the share of NPLs kept on going up: from 15% in 1995 to 21% in 1998 and gradually declined after that. During this period banks were not making new loans, but were making profits because they were receiving interest income on their FOBAPROA-bonds.

The increase of the cost of the rescue package is associated with the fact that banks were saddled with non-recognized de facto NPLs (i.e., evergreen accounts) and failed to increase their capital in order to make new loans (see Figure 18).⁴⁸ The quality of the portfolio deteriorated over time as moral hazard problems developed and the accrued interest of the evergreen accounts had to be capitalized.

Over time several measures have been taken to solve the banking problem. First, in year 2000 the bankruptcy and the guarantees laws were reformed in order to limit the ex-post judicial discretion in the disposition of loan collateral and in the resolution of insolvent firms. However, given certain implementation problems and the limited power given by the Mexican Constitution to creditors to exercise the collateral, it is not yet clear whether the reforms will lead in practice to better contract enforceability. Second, key loopholes in bank accounting have been eliminated. Third, a part of the debt overhang problem has been resolved (mainly the small debts) through the Punto Final program. There are still unresolved problems like judicial reform and the resolution of big debts.

f) Sectoral Asymmetries: What do Firm Level Data Say?

The existence of sectoral asymmetries in financing opportunities is a key element in our theoretical argument, as well as in our account of the Mexican experience. Here, we will show that in Mexico T-sector firms are on average larger than N-sector firms, and that they have better access to international financial markets. We will also show that T-firms were not as hard hit by the credit crunch as N-firms.

To establish these facts we analyze two Mexican micro-data sets: the firms listed in the Mexican stock market (i.e., the Bolsa Mexicana de Valores (BMV)) and the Economic Census. The BMV set contains only the firms that issue either bonds or equity (310 firms), while the census includes all firms in the economy (2,788,222 firms).

As we can see in Table 7, the BMV set contains only large firms, while the majority of firms in the economy are small and medium. Moreover, although the BMV set contains both N- and T-sector firms, it is more representative of the T-sector than the N-sector. The bias is greater for the N-sector than for the T-sector both in terms of the distribution of fixed assets (Figure 19) and in terms of sales (Table 8). For instance, the sales of large N-firms constitute only 12% of economy-wide sales (as recorded by the Census of 1999). In contrast, the corresponding share for large T-firms is 64%.⁴⁹

⁴⁷ Notice that this program is different from the systemic guarantees we consider in the model below. Under the latter, bailouts are not granted on an idiosyncratic basis, but only if a systemic meltdown takes place.

⁴⁸ Evergreen accounts are those where the bank lends the debtor the principal plus interest that the debtor was supposed to have repaid, and these transfers are accounted as “loans.”

⁴⁹ In both cases we excluded financial firms.

Since the BMV set is biased towards the T-sector and firms in this set are the only ones that issue bonds and equity internationally, it follows that the T-sector has better access to international financial markets than the N-sector. To the extent that Mexico is typical of other MECs, this fact gives an important warning. In contrast to HECs, in MECs stock market based data sets (such as Datastream or Worldscope) do not reflect economy-wide behavior. They are biased towards the T-sector.⁵⁰

To get an idea of the extent to which the crisis affected the access to external financing of BMV firms consider the ratio of issuance of long-term bonds and equity to the stock of bonds and equity. Table 9 shows that this ratio jumped from an average of 1.6% in the period 1990-1994 to 4.7% in 1996-1997.⁵¹ This jump indicates that BMV firms were not hard hit by the credit crunch.

Another indicator that points in the same direction is that there was no increase in bankruptcies among BMV firms. As we can see in Table 10, the share of firms that exited the BMV in 1995 and 1996 was 6% and 3%, respectively. The average share of exits over the entire sample period was 3.6% with a standard deviation of 3.5%. The increase in bankruptcies in 1995 was therefore not statistically significant.

The availability of external finance for the BMV firms contrasts with the protracted fall in the credit-to-GDP ratio over 1995-2001. The reason for this is that the BMV firms shifted away from domestic bank credit in the wake of crisis. This shift is reflected in the increase of the share of foreign denominated debt from an average of 35% in 1990-1994 to 45% during the credit crunch period (1996-2000), which can be observed in Table 11. Since the BMV set is biased towards the T-sector, this contrast in financing opportunities explains why T-production did not fall so much in the wake of the crisis, and why GDP recuperated so fast.

The economic census does not provide data on the financing of firms, so we will look at the behavior of investment. We group the observations into quintiles and compute the change in the investment rate between 1994 and 1999.⁵² We can see in Figure 20 that within each size class the investment rate fell more in the N-sector than in the T-sector. Furthermore, the largest quintile of T-firms is the only group that experienced an increase in the investment rate. Table 12 exhibits the average investment rate across all size classes. We can see that in 1994, before the crisis, both sectors had the same investment rate (7%). In contrast in 1999 the investment rate of the N-sector was one percentage point lower than that in the T-sector (3.7% vs. 4.6%).

To see whether the sectoral asymmetry we observe across the largest quintile of firms in Figure 20 is associated with an asymmetry in financing opportunities, we run a standard cash flow regression similar to the one in Fazzari (1988). We regress the invest rate on the change in sales, on cash flow, and on cash flow interacted with a dummy

⁵⁰ Tornell and Westermann (2003) find a similar sectoral asymmetry across MECs using survey data of the World Bank.

⁵¹ New equity issues are typically placed in New York through ADRs.

⁵² Due to confidentiality requirements, an observation is not a firm, but rather a group of firms. Each group contains firms that have similar size, that are in the same sub-sector and that are located in the same geographical area. See the appendix for details.

that equals one for non-export firms during the years 1995-1997(1998). Following Fazzari (1988), we interpret a positive effect of cash flow on investment as an indication of financing constraints.⁵³ We estimate the regression including fixed effects and using a GLS estimator. As we can see in Table 13, in the wake of the crisis large non-export firms were more sensitive to cash flow than large export firms. This effect is significant at the 5% in the period 1995-97, and at the 10% level in 1995-98.

5. Capital Flows

During the last two decades capital inflows to MECs have increased enormously, and so has the importance of private flows (see Figure 21). In the average MEC the share of private flows has increased from 60% in the mid 1980s to more than 90% by the end of the 1990s. In Mexico these shares are 40% and 80%, respectively.

Mexico ranges in the middle of other MECs in terms of capital inflows. Between 1980 and 1999 the net capital inflows to Mexico were on average equivalent to 3.3% of GDP (4.3% after liberalization). This is a remarkably high number, given that Mexico liberalized only in 1989 and experienced a crisis in 1994. During the same period the capital inflows-to-GDP ratio of Korea was 2% (3% after liberalization), that of Thailand was 3.9% (5.3% after liberalization) and that of Chile 7.2%.

FDI is considered the good form of capital inflows, while bank flows are considered bad as they are foreign loans to domestic banks.⁵⁴ They are risky because of the currency mismatch. In Mexico, the share of bank flows peaked in 1994 at about 25% of cumulative capital inflows since 1980.⁵⁵ This share has been declining ever since (see Figure 22). In contrast, the share of FDI in cumulative capital inflows has increased gradually from 35% in 1980 to 57% in 2002, with an increasing speed after the Tequila crisis. The impressive increase in FDI in the wake of the crisis can be considered one tangible effect of NAFTA.

Several observers have noted that one reason why financial liberalization has led to financial fragility is that an important share of capital inflows takes the form of bank flows. Many have argued that the greater the share of inflows in the form of FDI and the lower the share of bank credit, the lower financial fragility. To evaluate this argument we must keep in mind a key fact overlooked by the literature.

Stylized Fact 5. *The lion's share of FDI is directed mostly to the T-sector or to financial institutions.*

This is illustrated in Figure 23. Because the non-financial N-sector receives a small share of FDI, bank flows are still the main source of external finance for most N-sector firms. Since this group of firms is financially constrained, a reduction in risky bank flows and credit, may mean that N-sector investment and growth will fall. As there are productive linkages throughout the economy, the unconstrained T-sector will also be negatively affected. Hence, it

⁵³ The change in sales controls for investment opportunities.

⁵⁴ Here we do not analyse the determinants of FDI. See Ashoka, et.al. (2003) for the role of information in driving FDI.

⁵⁵ This share can be viewed as a lower bound of the inflows to the banking sector, as some banks also received FDI and portfolio flows.

is possible that the net effect of banning risky bank flows is to reduce long-run GDP growth. Here, again, we see that a reduction in financial fragility and bumpiness can lead to a fall in growth.

6. The Model

Here, we formalize the intuitive argument of Section 3 and show that it is indeed part of an internally consistent story. The equilibrium will establish a causal link from financial liberalization to financial fragility, and from the latter to credit and GDP growth. Also, it will impose restrictions on the sample of countries over which the mechanism is operative, and on the behavior of credit and the N-to-T output ratio. The model is based on Schneider and Tornell (2003), and Ranciere, Tornell and Westermann (2003).⁵⁶

We consider a simple dynamic general equilibrium model of an economy with two sectors: a tradables (T) sector that produces the consumption good, and a nontradables (N) sector that produces an intermediate good which is used as an input in the production of both goods.⁵⁷ As we shall see, the fact that the N-sector demands its own goods is key for financial fragility to arise in equilibrium. The assumption that T-production uses N-inputs is key to generate the bottleneck effect and to link financial fragility to higher GDP growth.⁵⁸

We will denote the relative price of N-goods (i.e., the inverse of the real exchange rate) by $p_t = p_t^N / p_t^T$.⁵⁹ T-goods are produced using a nontradable input (d_t) according to $y_t = a_t d_t^\alpha$, with $\alpha \in (0, 1)$. In any equilibrium it follows that T-output and the T-sector demand for N-goods are, respectively:

$$y_t = a_t d_t^\alpha, \quad d(p_t) = \left(\frac{\alpha a_t}{p_t} \right)^{\frac{1}{1-\alpha}} \quad (4)$$

N-goods are produced using N-goods as inputs (I_t) according to

$$q_{t+1} = \theta I_t \quad (5)$$

The investable funds of an N-firm consist of the debt it issues (B_t) plus its cash flow (w_t). The firm's budget constraint, in terms of T-goods, is thus

$$p_t I_t = w_t + B_t \quad (6)$$

In order to allow for the possibility of financial fragility we assume that there are two one-period debt instruments. N-debt (b_t^n), that promises to repay in N-goods: $p_{t+1}(1 + \rho_t^n)b_t^n$; and T-debt (b_t) that promises to repay in T-goods: $(1 + \rho_t)b_t$. We can interpret T(N)-debt as foreign(domestic) currency denominated debt. As we shall see, the price may take two values in equilibrium. Since firms produce N-goods, N-debt is

⁵⁶The model combines elements of the financial accelerator framework (Bernanke, et. al. (2000)) with elements of third-generation BoP crises models. See for instance, Aghion, et.al. (2000), Burnside, et.al. (2000), Caballero and Krishnamurthy (1999), Calvo (1998), Chang and Velasco (1998), Corsetti, et.al. (1999), Mckinnon and Pill (1998), and Tirole (2002).

⁵⁷The assumption that N-goods are demanded by the N-sector is necessary to get financial fragility in equilibrium. The assumption that T-production uses N-inputs will allow us to formalize the bottleneck effect and to link financial fragility to higher GDP growth.

⁵⁸Since the economy is small and open, the destination of T-goods is not important for our argument.

⁵⁹Betts and Kehoe (2001) find that in a set of 52 countries over the period 1980-2000 real exchange rate variations reflect mainly changes in the relative price of N and T goods, not movements in the international relative prices of T-goods. Among some developed countries the latter channel is more important (Engel (1999)).

a perfect hedge, while T-debt may be risky.

In modeling the N-sector we will make two assumptions to capture key features of MECs discussed in Section 3. First, N-sector financing is subject to contract enforceability problems. Second, there are systemic bailout guarantees that cover lenders against systemic meltdowns.⁶⁰ We follow Schneider and Tornell (2003) and model the contract enforceability problem by assuming that firms are run by dynasties of two-period lived managers that cannot commit to repay debt: if at time t the young manager incurs a non-pecuniary cost $h[w_t + B_t]$, then at $t + 1$ she will be able to divert all the returns provided the firm is solvent.⁶¹ Lenders only finance plans that do not lead to diversion. Thus, when deciding whether to lend they take into account that the goal of every manager is to maximize next period's expected profits net of diversion costs.

The firm is solvent next period if revenues $q_{t+1}p_{t+1}$ are no lower than the promised debt repayment L_{t+1} plus the young manager's wage $(1 - \beta)p_{t+1}q_{t+1}$. In this case the old manager distributes the remaining profits, $\pi_{t+1} = \beta q_{t+1}p_{t+1} - L_{t+1}$, as a dividend to herself. To capture the costs of financial meltdowns we assume that under insolvency a large share $1 - \mu_w$ of revenues are dissipated, the young manager gets a small amount of seed money $\mu_w p_{t+1} q_{t+1}$, with $\mu_w < 1 - \beta$, and the old manager gets zero. Lenders get L_{t+1} if a bailout is granted and zero otherwise. Since guarantees are systemic, bailouts are paid out if and only if many borrowers go bust. For concreteness, we assume that there is a bailout agency that repays lenders 100% of what they were promised (L_t) if a majority of borrowers goes bust.⁶²

To close the description of the economy we note that the real exchange rate is determined by the N-goods market clearing condition

$$d_t(p_t) + I_t(p_t) = q_t(I_{t-1}) \quad (7)$$

Since there are no exogenous shocks, the only source of risk is endogenous real exchange rate variability. As we shall see, there are equilibria where (7) holds at two values of p_t : \bar{p}_{t+1} if firms are solvent or \underline{p}_{t+1} if they are insolvent.⁶³

Trade and financial liberalization will mean a reduction in impediments to trade goods and assets, rather than a shift away from autarky. In a financially non-liberalized economy there are regulations that preclude agents from taking on credit risk that might lead to insolvency. Since the only source of risk is real exchange rate variability, this is equivalent to allowing agents to issue only N-debt. Financial liberalization eliminates these regulations, so agents can issue both types of debt. As we shall see, liberalization will lead to currency

⁶⁰Recall the distinction between unconditional and systemic guarantees we made earlier. If all debt were covered by unconditional bailout guarantees, then the enforceability problem would become irrelevant and borrowing constraints would not arise in equilibrium.

⁶¹We can think of N-firms as banks that lend to the N-sector. This captures the fact that in MECs banks are heavily exposed to the N-sector. The banking system is the channel through which capital inflows reach the N-sector and also is the weak link during crises.

⁶²Here we do not analyse how the cost of the subsidy implicit in the guarantees is paid for. This cost could be financed by domestic taxation if we assumed that T-goods were produced using a fixed factor. In this case the cost of the subsidy would be paid for by taxing this fixed factor. This is done by Ranciere, et.al. (2003).

⁶³There are multiple self-fulfilling equilibria as in Cole and Kehoe (2000) and Obstfeld (1986).

mismatch and lending booms that end in busts. The effects of trade liberalization are not the focus of the model. Since these reforms typically increase T-sector efficiency, they can be represented by an increase in the productivity parameter a_t in (4). To isolate the effects of financial liberalization we will set a_t to one.⁶⁴

Financing and Investment Decisions. Consider first a non-liberalized economy. Since lenders are risk neutral and the opportunity cost of capital is $1 + r$, the interest rate that they require satisfies $[1 + \rho_t^n]E_t(p_{t+1}) = 1 + r$. Furthermore, to avoid diversion by the firm, lenders impose a borrowing constraint: $(1 + r)b_t^n \leq h(w_t + b_t^n)$. If investment yields a return which is higher than the opportunity cost of capital, the firm will borrow up to an amount that makes the credit constraint binding. Thus, budget constraint (6) implies that credit and investment are:

$$b_t^n = [m^s - 1]w_t \quad I_t = m^s \frac{w_t}{p_t}, \quad \text{where } m^s = \frac{1}{1 - h\delta}, \quad \delta \equiv \frac{1}{1 + r}. \quad (8)$$

Notice that a necessary condition for borrowing constraints to arise is $h < 1 + r$. If h , the index of contract enforceability, were greater than the cost of capital, it would always be cheaper to repay debt rather than to divert. Thus, lenders will not impose a ceiling on the amount they are willing to lend and agents will not be financially constrained. This is why in the empirical part we differentiate high- h from low- h countries.

Consider now a liberalized economy. Firms can now choose between N- and T-debt. If there is enough real exchange rate variability, T-debt is risky and it might lead to insolvency: $\pi(\underline{p}_{t+1}) = \beta \underline{p}_{t+1} q_{t+1} - (1 + \rho_t) b_t < 0$. A firm might choose T-debt and risk insolvency because risky T-debt is cheaper than safe N-debt. To see why suppose for a moment that tomorrow's real exchange rate can take on two values. With probability u it takes an appreciated value (\bar{p}_{t+1}) that leaves every firm solvent, while with probability $1 - u$ it takes a depreciated value (\underline{p}_{t+1}) that makes all N-sector firms go bust and generates a crisis. Since lenders constrain credit to ensure that borrowers will repay in the no-crisis state, it follows that in the no-crisis state debt is repaid in full and there is no bailout. Meanwhile, in the crisis state there is bankruptcy and each lender receives a bailout equal to what he was promised. Thus, the interest rate on T-debt is $1 + \rho_t = 1 + r$, while that on N-debt is $1 + \rho_t^n = \frac{1+r}{u\bar{p}_{t+1} + (1-u)\underline{p}_{t+1}}$. It follows that choosing T-debt over N-debt reduces the cost of capital from $1 + r$ to $[1 + r]u$. Lower expected debt repayments, in turn, ease the borrowing constraint as lenders will lend up to an amount that equates $u[1 + r]b_t$ to $h[w_t + b_t]$. Therefore, credit and investment are:

$$b_t = [m^r - 1]w_t \quad I_t = m^r \frac{w_t}{p_t}, \quad m^r = \frac{1}{1 - u^{-1}h\delta} \quad (9)$$

By comparing (9) with (8) we can see that:

⁶⁴Clearly, in the real world financial liberalization opens the possibility for agents to take on credit risk in many other ways than by just allowing them to choose a risky debt instrument. Here, we capture this in a parsimonious way that allows us to obtain closed-form solutions, which in turn allows us to make clear why in an economy with credit market imperfections financial liberalization leads to higher growth only if it leads to fragility.

Result 1. *In the presence of systemic bailout guarantees, risky currency mismatch allows agents to reduce the expected value of debt repayments, which eases borrowing constraints and increases the investment multiplier: $m^r > m^s$.*

This increase in leverage is possible because systemic guarantees mean that in a crisis lenders expect to be bailed out. The fact that T-debt is cheaper than N-debt does not imply that agents will always be willing to issue T-debt. This is because with probability $1 - u$ T-debt will result in bankruptcy for a borrower. One can show that it is individually optimal to choose T-debt if crises are rare events and there is enough real exchange rate variability:

$$\frac{\beta\theta\bar{p}_{t+1}}{p_t} \geq \frac{1}{\delta} > h > \frac{\beta\theta\underline{p}_{t+1}}{p_t} \quad (10)$$

This condition ensures that in the good state returns are high enough to make the production of N-goods profitable, and that in the bad state there is a critical mass of insolvencies so that lenders will be bailed out.⁶⁵ Next, we investigate when it is that currency mismatch generates price sequences that satisfy (10).

Equilibria. In the two economies we have considered investment is given by $I_t = m_t \frac{w_t}{p_t}$ and cash flow equals the representative manager's wage: $w_t = (1 - \beta_t)p_t q_t$, where β_t equals β under solvency and μ_w under insolvency. Thus, the market clearing condition (7) implies that in any equilibrium

$$I_t = \phi_t q_t, \quad \phi_t = [1 - \beta_t]m_t, \quad (11)$$

where the investment multiplier m_t can take the value m^s or m^r . Combining (11) with (4) and (5) we have that in a symmetric equilibrium N-output, prices and T-output evolve according to

$$q_t = \theta\phi_{t-1}q_{t-1} \quad (12a)$$

$$p_t = \alpha [q_t(1 - \phi_t)]^{\alpha-1} \quad (12b)$$

$$y_t = [q_t(1 - \phi_t)]^\alpha = \frac{1 - \phi_t}{\alpha} p_t q_t \quad (12c)$$

In a non-liberalized economy the share of N-output that the N-sector commands for investment purposes is $\phi^s = \frac{1-\beta}{1-h\delta}$ during every period. Thus, there exists an equilibrium in such an economy if and only if: (i) the degree of contract enforceability satisfies $h < \bar{h} = \beta\delta^{-1}$, so that ϕ_t is less than one; and (ii) N-sector's productivity satisfies $\theta > \underline{\theta} = [\delta\beta(\phi^s)^{\alpha-1}]^{-1/\alpha}$, so that the production of N-goods has a positive net present value $\frac{\beta\theta p_{t+1}}{p_t} \geq \delta^{-1}$.

In a liberalized economy there are two equilibria. The safe one we have just characterized, where agents choose not to issue T-debt. There is also a risky equilibrium that is composed of lucky paths which are

⁶⁵For a derivation of this result see Schneider and Tornell (2003).

punctuated by crises. Along a lucky path of this equilibrium all debt is denominated in T-goods and lenders will be bailed out in the next period if a majority of firms goes bust. Since the debt burden is not indexed to p_t , there are two market clearing prices. At the high price firms are solvent and their cash flow is $[1 - \beta]\bar{p}_t q_t$. Thus, $\phi_t = (1 - \beta)m^r$. However, at the low price N-firms are insolvent and their cash flow is only $\mu_w \underline{p}_t q_t$. Moreover, it can be shown that when $p_t = \underline{p}_t$, leverage is too low for fragility to arise and the real exchange rate to take on two values at $t + 1$. Thus, at the time of the crisis agents find optimal to issue N-debt and the investment share is $\phi_t = \mu_w m^s$.

Resumption of risk taking takes place in the period after the crisis. Therefore, the path of N-sector investment is

$$I_t = \phi_t q_t, \quad \phi_t = \begin{cases} \phi^l = \frac{1-\beta}{1-u^{-1}h\delta} & \text{if } p_t = \bar{p}_{t+1} \\ \phi^c = \frac{\mu_w}{1-h\delta} & \text{if } p_t = \underline{p}_{t+1} \end{cases} \quad (13)$$

The sequence $\{q_t, p_t, y_t\}$ is then determined by using (13) to replace ϕ_t in (12a)-(12c). One can show that if crises are rare events there are thresholds for the degree of contract enforceability and for N-sector's productivity, such that if $h \in (\underline{h}, \bar{h})$ and $\theta \in (\underline{\theta}, \bar{\theta})$ returns satisfy (10), and thus a risky equilibrium exists. Notice that $h < \bar{h}$ and $\theta > \underline{\theta}$ ensure that when crises are rare events, investment is profitable. Meanwhile, $\theta < \bar{\theta}$ and $h > \underline{h}$ ensure that firms with T-debt go bust in the bad state, and that the fall in cash flow is translated into a large fall in credit and N-investment, so that the fall in prices is validated. This establishes the second result.

Result 2. *Financial liberalization increases investment in the financially constrained sector, but only if it makes the economy financially fragile and agents find it profitable to take on credit risk. This occurs only if the degree of contract enforceability satisfies $h \in (\underline{h}, \bar{h})$.*

Notice that no exogenous shocks are necessary for crises, a shift in expectations is sufficient. A crisis can occur whenever firms expect that others will not undertake credit risk, so that there is a reversion to the safe equilibrium. The key to having multiple market clearing prices is that part of the N-sector's demand comes from the N-sector itself. Thus, when the price falls below a cutoff level and N-firms go bust, the investment share of the N-sector falls (from ϕ^l to ϕ^c). This, in turn, reduces the demand for N-goods, validating the fall in the price.

We emphasize that the interaction of contract enforceability problems and systemic guarantees creates the fragility required for self-fulfilling crises. If there were no guarantees, agents would not be willing to take on credit risk to claim the implicit subsidy, and currency mismatch would not arise. Costly enforceability of contracts would still imply that the N-sector can grow only gradually and balance sheet effects would play a role during the lending boom. However, there would be no endogenous force that makes a boom end in a crisis. Alternatively, if there were only guarantees but no enforceability problems, then neither borrowing constraints nor balance sheet effects would arise. Thus, N-sector investment would not depend on its cash

flow.

GDP Growth and Financial Fragility. We are now ready to rationalize the link between growth and fragility. Since N-goods are intermediate inputs, while T-goods are final consumption goods, gross domestic product equals the value of N-sector investment plus T-output: $gdp_t = p_t I_t + y_t$. It then follows from (11)-(12c) that

$$gdp_t = y_t + p_t \phi_t q_t = q_t^\alpha Z(\phi_t) = y_t \frac{Z(\phi_t)}{[1 - \phi_t]}, \quad Z(\phi_t) = \frac{1 - [1 - \alpha]\phi_t}{[1 - \phi_t]^{1-\alpha}} \quad (14)$$

As we can see, the key determinants of the evolution of GDP are the technological coefficient in T-production (a_t) and the share of N-output invested by the N-sector (ϕ_t). In order to isolate the effects of financial liberalization, we have set a_t to one.

In a non-liberalized economy the investment share ϕ_t is constant and equal to ϕ^s . Thus, GDP and T-output grow at a common rate

$$1 + \gamma^{NL} := \frac{gdp_t}{gdp_{t-1}} = \frac{y_t}{y_{t-1}} = (\theta \phi^s)^\alpha \quad (15)$$

Absent technological progress in the T-sector, N-sector growth is the force driving growth in both sectors. As the N-sector expands, N-goods become more abundant and cheaper allowing the T-sector to expand production. This expansion is possible if and only if N-sector productivity (θ) and the N-investment share (ϕ^s) are high enough, so that credit and N-output can grow over time: $\frac{B_t}{B_{t-1}} = \frac{q_t}{q_{t-1}} = \theta \phi^s > 1$.⁶⁶

A liberalized economy goes through a succession of lucky paths punctuated by crisis episodes. An economy is on a lucky path at time t if there was no crisis either at $t-1$ or at t . Since along a lucky path the investment share equals ϕ^l , (14) implies that the common growth rate of GDP and T-output is $1 + \gamma^l = (\theta \phi^l)^\alpha$. A comparison of γ^l and (15) reveals that as long as a crisis does not occur, growth in a liberalized economy is greater than in a non-liberalized one. In the presence of systemic guarantees, credit risk allows financially constrained N-firms to borrow and invest more than in a non-liberalized economy ($\phi^l > \phi^s$). Since there are sectorial linkages ($\alpha > 0$), this increase in the N-sector's investment share benefits both the T- and the N-sectors.

Because self-fulfilling crises occur with probability $1 - u$, and during a crisis the investment share falls from ϕ^l to $\phi^c < \phi^s$, the fact that $\gamma^l > \gamma^{NL}$ does not imply that financial liberalization leads to higher mean GDP growth. The reduction in the investment share comes about through two channels: (i) N-sector firms go bust and their cash flow collapses (captured by $\frac{\mu_m}{1-\beta}$); and (ii) leverage falls because firms cannot take

⁶⁶The mechanism by which higher growth in the N-sector induces higher growth in the T-sector is the decline in the relative price of N-goods that takes place in a growing economy $\frac{p_{t+1}}{p_t} = [\theta \phi^s]^{\alpha-1}$. If there were technological progress in the T-sector, there would be a Balassa-Samuelson effect and the real exchange rate would appreciate over time.

on credit risk (indexed by $\frac{1-h\delta}{1-h\delta u-1}$). It follows from (14) that in a crisis episode that lasts two periods, the mean crisis growth rate is $1 + \gamma^{cr} = \theta^\alpha \left(\phi^l \phi^c \right)^{\frac{\alpha}{2}}$. As we can see variations in GDP growth generated by real exchange rate changes at τ and $\tau + 1$ cancel out. Thus, the average loss in GDP growth stems only from the fall in the N-sector's average investment share.

A liberalized economy experiences several crises over time. Therefore, to see whether financial liberalization will increase long-run growth, we compute the limit distribution of GDP's growth rate. Using the expressions for γ^l and γ^{cr} , it follows that over the long run the mean compounded growth rate of GDP in a liberalized economy is¹

$$E(1 + \gamma^{LE}) = (1 + \gamma^l)^\omega (1 + \gamma^{cr})^{1-\omega} = \theta^\alpha (\phi^l)^{\alpha\omega} (\phi^l \phi^c)^{\alpha \frac{1-\omega}{2}}, \quad \text{where } \omega = \frac{u}{2-u} \quad (16)$$

Notice that ω is the proportion of time that the economy is on a lucky path over the long-run. A comparison of long run GDP growth rates in (15) and (16) reveals that:

Result 3. *Average long-run GDP growth is greater in a liberalized economy than in a non-liberalized one provided contract enforceability problems are severe, but not too severe ($h \in (h^*, h^{**})$), and financial distress during crises is not too large ($\mu_w > \underline{\mu}_w$).*

The relationship between financial liberalization and growth is not straightforward because an increase in the probability of crisis ($1 - u$) has ambiguous effects on long-run growth. On the one hand, a greater $1 - u$ increases investment and growth along the lucky path by increasing the subsidy implicit in the guarantee and allowing N-sector firms to be more leveraged. On the other hand, a greater $1 - u$ makes crises more frequent. The degree of contract enforceability h plays a key role. If we increase $1 - u$, the growth enhancing effect of more investment dominates the growth reducing effect of more frequent crises when h is large enough. This is because a large h increases firms' leverage and allows them to reap the benefits of risk-taking. However, h cannot be arbitrarily large to ensure the existence of an equilibrium. If h were very large, borrowing constraints would not arise (by (9)), or there would not be market clearing, as $\phi^l > 1$ (by (13)).⁶⁸

The central role played by the requirement that “ h must be low, but not too low” underlies the importance of the country sample over which the empirical link between liberalization, and growth exists. The above result implies that among the set of countries where contract enforceability problems are severe, but not too severe, financial liberalization may lead to higher growth even if we control for trade liberalization. This prediction establishes a causal link from liberalization to GDP growth in the regressions of Section 2.

¹For the computation of the limit distribution see Ranciere, et.al. (2003).

⁶⁸Higher long-run growth comes at the cost of a higher incidence of crises. A natural question is, thus, whether higher growth is associated with higher social welfare. Ranciere et.al. (2003) show that if T-sector agents have access to complete capital markets, so that they can hedge real exchange rate risk, then welfare in a risky equilibrium is greater than in a safe equilibrium provided enforceability problems are severe enough.

Credit Growth. Here we show that economies that have followed growth-enhancing risky credit paths are identified by a negatively skewed distribution of credit growth. Since in the model N-firms use only N-inputs, the appropriate measure of real credit is $\tilde{b}_t = (b_t + b_t^n)/p_t$. It follows from (8) and (9) that in a risky and a safe economy real credit is given, respectively, by

$$\tilde{b}_t^{LE} = \begin{cases} [\phi^l - (1 - \beta)]q_t & \text{if } \pi(p_t) \geq 0 \\ [\phi^c - \mu_w]q_t & \text{if } \pi(p_t) < 0 \end{cases} \quad \tilde{b}_t^{NL} = [\phi^s - (1 - \beta)]q_t \quad (17)$$

In a safe non-liberalized economy credit follows a smooth path, while in a risky liberalized economy it follows a bumpy path. Using (12a), we have that in the latter the compounded growth rate of credit is $\zeta^l = \log(\theta\phi^l)$ along a lucky path, $\zeta^c = \log(\theta\phi^l u \frac{\mu_w}{1-\beta} \frac{1-h\delta u^{-1}}{1-h\delta})$ during a crisis and $\zeta^p = \log(\theta\phi^l \frac{1}{u})$ in the post-crisis period.

When skewness is negative, the good outcomes in the distribution lie closer to the mean than the bad outcomes. We find this credit pattern in the risky equilibrium because N-firms face endogenous borrowing constraints, so N-sector credit is constrained by cash flow. Along the lucky path –in which no crises occur– cash flow accumulates gradually, and credit can grow only gradually. In contrast, when a crisis erupts there are widespread bankruptcies and cash flow collapses. Thus, credit growth falls sharply ($\zeta^c < \zeta^l$). In the wake of a crisis credit growth rebounds before returning to its lucky level ($\zeta^p > \zeta^l$). As long as crises are rare events, the credit growth rates during the post-crisis period and the lucky path are very close ($\zeta^p - \zeta^l = \log(u^{-1})$). Since falls and rebounds occur with the same frequency, the distribution of credit growth is characterized by negative outliers in a long enough sample. That is

Result 4. *In a risky liberalized economy the limit distribution of credit growth has negative skewness. Meanwhile, in a non-liberalized economy credit growth has a smooth path with zero skewness.*

To link this result to our empirical findings recall that a risky equilibrium exists only if enforceability problems are severe but not too severe, conditions which we find in MECs. Thus, the first implication of this result is that financial liberalization may lead to bumpiness of credit growth across MECs. Since negative skewness of credit growth implies the adoption of credit risk, which eases financial constraints and leads to an increase in mean GDP growth (per result 3), the second implication is that negative skewness is an appropriate RHS variable in the growth regressions we estimate.

Notice that if enforceability problems were either not severe or too severe, there would be no endogenous force that would make credit growth negatively skewed to begin with. Thus, the link between negative skewness and growth would not exist. This is why skewness is statistically significant in all growth regressions, even if we do not condition on the sample of countries.

In the model, credit growth exhibits more variance in the liberalized economy. Empirically, however, variance is not a good means of identifying economies that have followed growth-enhancing risky credit

paths that lead to infrequent crises. High variance may also reflect high frequency shocks, which might be exogenous or might be self-inflicted by, for instance, bad economic policy. To generate high variance in both the safe and the risky equilibria, one could include in the model high frequency exogenous shocks that do not lead to crises. Such shocks would increase the variance of credit growth in both economies, but would not increase mean GDP growth. The two equilibria would still be distinguished by negative skewness of credit growth, because only the risky equilibrium would be crisis-prone.

The N-to-T Output Ratio. We have captured the sectorial asymmetry in financing opportunities prevalent in MECs by assuming that T-production is not affected by financial constraints, while the N-sector faces contract enforceability problems. This sectorial asymmetry generates two predictions about the behavior of the N-to-T output ratio (N/T) that help us identify the mechanism that links liberalization, fragility and growth in MECs.

Since the N-sector is more financially constrained than the T-sector, the first prediction is that along any equilibrium path N/T is positively correlated with domestic credit. To derive the second prediction note that it follows from (12a)-(12c) that in a symmetric equilibrium N/T is given by

$$\frac{N_t}{T_t} \equiv \frac{p_t q_t}{y_t} = \frac{p_t q_t}{\frac{1-\phi_t}{\alpha} p_t q_t} = \frac{\alpha}{1-\phi_t} \quad (18)$$

Investment equations (8) and (9) imply that when there is a shift from a non-liberalized to a liberalized economy the N-to-T output ratio increases from $\frac{\alpha}{1-\phi^s}$ to $\frac{\alpha}{1-\phi^l}$. This reflects the fact that financial liberalization eases financial constraints and allows the N-sector to command a greater share of N-inputs.⁶⁹

If a crisis occurs at some date, say τ , there is a *fire-sale*: there is a steep real exchange rate depreciation, and since there is currency mismatch, all N-firms default. As a result, the investment share falls from ϕ^l to ϕ^c . The price of N-goods must fall to allow the T-sector to absorb a greater share of N-output, which is predetermined by $\tau - 1$ investment. As we can see in (18) N/T falls from $\frac{\alpha}{1-\phi^l}$ to $\frac{\alpha}{1-\phi^c}$. Thus,

Result 5. *Across MECs, the N-to-T output ratio: (i) responds positively to financial liberalization and negatively to crises; and (ii) is positively correlated with credit growth.*

Both of these implications of sectorial asymmetries are consistent with our empirical findings in Section 3. Furthermore, sectorial asymmetries are key to explaining several features of the boom-bust cycles experienced by many MECs, as well as Mexico's less than stellar growth and recent export slowdown.

⁶⁹We have set a_t to a constant. However, one can verify that an increase in a_t following trade liberalization reduces N/T .

7. Lessons

While several observers have claimed that financial liberalization is not good for growth because of the crises associated with it, this is the wrong lesson to draw. Our empirical analysis shows that, across countries with active financial markets, financial liberalization leads to higher average long-run growth even though it also leads to occasional crises. This gain in growth is over and above the gain derived from trade liberalization.

A second, closely related, lesson is that the growth-enhancing financial deepening that follows liberalization is not a smooth process. It takes place through boom-bust cycles. Occasional crises are the price that has to be paid to attain higher growth in the presence of severe contract enforceability problems. The first best is to implement judicial reform and improve contract enforceability. In the absence of such reforms, liberalization permits financially constrained firms to attain greater leverage and invest more at the cost of undertaking credit risk. Credit risk creates an environment with high growth and financial fragility.

Third, to analyse the effects of liberalization it is not sufficient to look at aggregate data. Sectoral asymmetries play a key role: while many tradables(T-) sector firms have access to international capital markets, most nontradables(N-) sector firms are financially constrained and bank-dependent. Trade liberalization and agreements such as NAFTA promote higher productivity growth in the T-sector, but are not of much direct help to the N-sector. Financial liberalization leads to an increase in international bank flows, which allows financially constrained firms to borrow more. Since many of these firms are in the N-sector, a currency mismatch in balance sheets develops, making the economy prone to self-fulfilling crises. In short, financial liberalization generates crises in countries with contract enforcement problems because financial liberalization is associated with international lending to the N-sector.

We agree with the general view that FDI is the safest form of capital inflows. The fourth lesson, however, is that FDI does not obviate the need for (risky) international bank flows. A robust regularity is that FDI goes mostly to T-sector firms or financial institutions. As a result, bank flows are practically the only source of external finance for most N-sector firms. Curtailing such risky flows would reduce N-sector investment and generate *bottlenecks* that would limit long-run growth. Bank flows are hardly to be recommended, but for most firms it might be that or nothing. Clearly, allowing risky capital flows does not mean that anything goes. Appropriate prudential regulation must be in place.

Fifth, it is possible for GDP growth to recover rapidly from a crisis. Sustainable growth, however, is not assured without ‘fixing’ the banking problem. Recovery in aggregate activity is typically not uniform across the economy. The tradables sector grows strongly, while the non-tradables sector recuperates only sluggishly. This asymmetric response is intimately linked with a severe credit crunch that hits the N-sector particularly hard, and that goes hand in hand with a steady increase in the share of non-performing loans. The Mexican experience shows that NPLs are unlikely to disappear on their own, even if GDP growth resumes quickly. This raises the question of whether a policy under which all NPLs are recognized at once and the fiscal costs are all paid up-front is preferable to a piecemeal policy.

A sixth, and somewhat conjectural lesson that can be drawn from the Mexican experience has to do with the long-run sustainability of unbalanced export-led growth. With data up to June 2003 it can be cogently (but not conclusively) argued that if there is a lack of N-sector investment over a long period, a bottleneck effect will eventually set in and lead to an export slowdown, as that observed in Mexico since the year 2000.

A seventh lesson is that crises are part of the growth process in financially liberalized countries with contract enforcement problems. At the “tipping point” beyond which it is unlikely that capital outflows will reverse, authorities should focus on what to do after the crisis instead of attempting to forestall the crisis. Delaying an inevitable crisis will tend to make the effects of the full-blown crisis far worse.

Finally, one can draw two lessons for empirical implementation: (i) stock market micro data sets are not representative of the economy as a whole and overemphasize the T-sector. This is demonstrated by Mexican census firm-level data; (ii) variance is not a good instrument with which to identify financial fragility. Fragility is associated with infrequent, but severe, crises and therefore with both high variance and negative skewness. High variance, however, may reflect high frequency shocks, which may be exogenous or self-inflicted by, for instance, bad economic policy. Negative skewness tests specifically for infrequent busts.

Appendix

Here, we describe how we construct our liberalization indexes and the N-to-T output ratio, and we describe the data sets we have used.

a) Liberalization Indexes

Our *de facto* trade and financial liberalization indexes signal the year when a given country has liberalized. We construct the indexes by looking for trend-breaks in trade and financial flows. We identify trend-breaks by applying the CUSUM test of Brown et. al. (1975) to the time trend of the data. This method tests for parameter stability based on the cumulative sum of the recursive residuals.⁷⁰

A MEC is trade liberalized (TL) at year t if: (i) its trade-to-GDP ratio has a trend break at or before t ; or (ii) the country's trade-to-GDP ratio has been larger than 30% at or before t . The 30% criterion identifies countries where trade was liberalized at the beginning of our sample (1980) or where the increase in trade flows did not take place from one year to the next, but took place over a few years.⁷¹

To determine the date of financial liberalization we consider net cumulative capital inflows (KI).⁷² A country is financially liberalized (FL) at year t if: (i) KI has a trend break at or before t and there is at least one year with a KI-

⁷⁰ All HECs have been trade and financially liberalized through our sample period.

⁷¹ We compute the trade-to-GDP ratio as the ratio of exports plus imports over GDP. We use the World Development Indicators (WDI) of the World Bank.

⁷² We compute cumulative net capital inflows of non-residents since 1980. Capital inflows include FDI, portfolio flows and bank flows. The data series are from the IFS: lines 78BUDZF, 78BGDZF and 78BEDZ. For some

to-GDP ratio greater than 5% at or before t , or (ii) its KI-to-GDP ratio is greater than 10% at or before t , or the country is associated with the EU. The 5% and 10% thresholds reduce the possibility of false liberalization and false non-liberalization signals, respectively. Table C2 exhibits the liberalization dates.

In order to determine the trend breaks, we regress each KI series on a constant and a time trend. The CUSUM test is based on the cumulative sum of residuals of this regression. Figure 24 plots this cumulative sum together with the 5% critical values for Mexico's KI series. The test signals parameter instability of the time trend if the cumulative

sum exits the area between the two critical lines. The test is based on the statistic: $W_t = \sum_{r=k+1}^t w_r / s$, for

$t = k + 1, \dots, T$, where w_r is the recursive residual and s is the standard error of the regression fitted to all T-sample points. If the coefficient on the time trend remains constant from period to period, $E(W_t) = 0$. But if it changes, W_t will tend to diverge from the zero mean value line. The significance of any departure from the zero line is assessed by reference to a pair of 5% significance lines. The distance between them increases with t . The 5% significance lines are found by connecting the points $k \pm 0.948(T - k)^{1/2}$ and $T \pm 3 * 0.948(T - k)^{1/2}$. A crossing of the critical lines by W_t signals coefficient instability.⁷³

When the cumulative sum of residuals starts to deviate from zero, it may take a few years until this deviation is statistically significant. In order to account for the delay problem, we choose the year where the cumulative sum of residuals deviates from zero, provided that it eventually crosses the 5% significance level. In the case of Mexico parameter instability begins in the fourth quarter of 1989, and it becomes statistically significant after the fourth quarter of 1991.

Three comments are in order. First, our TL and FL indexes do not allow for policy reversals: once a country liberalizes it never becomes close thereafter. This means that our indexes do not capture some policy reversals that might have occurred in latter part of the 1990s. Since our sample period is 1980-1999, we consider that our approach

countries not all three series are available for all years. In this case, we use the inflows to the banking system only, which is available for all country-years.

⁷³ The underlying assumption is that the time series is trend stationary before the structural break. This is confirmed for the case if Mexico by the following unit root tests.

Augmented Dickey-Fuller test statistic:	t-Statistic	Prob.
1982:1-1989:4	-4.43	0.007
1982:1-1995:4	-2.33	0.409

The unit root tests are estimated with a constant, a time trend, and a number of lags (2) determined by the SIC criterion. Before liberalization the series is trend stationary. Including the post liberalization period, it has a unit root and is difference stationary.

is the correct one to analyse the effects of liberalization on long-run growth and financial fragility.⁷⁴ Second, in comparing different indexes it is convenient to distinguish *liberalization* from *openness* indexes. The former identify *dates* of financial liberalization, while the latter measure the amount of capital flows that a country receives over a certain time period. For instance, Bekaert et.al. (2001), and Kaminski and Schmukler (2002) consider *liberalization* indexes as we do, while Kraay (1998), Lane and Milesi-Ferretti (2002), and Edison et. al (2002) consider *openness* indexes. Finally, the country-years identified as financially liberalized by our index, as well as the other liberalization indexes, do not coincide with “good times,” as they include both boom and bust country-years. Therefore, they are not subject to the criticism that liberalized country-years coincide with good times. The liberalization dates are reported in Table 13.

b) The N-to-T output ratio

We construct the N-to-T output ratio by proxying N-sector and T-sector production with data for construction, manufacturing and services. In the main body of the paper we use the sectoral exports-to-GDP ratio as the criterion to select the N and T sectors. Construction is never classified as a T-sector. Meanwhile, the classification of services and manufacturing varies from country to country. Since the price of N-goods tracks international prices less closely than that of T-goods, we construct an alternative index where we classify as N(T) the sector in which the sectoral real exchange rate varies the most(the least). Table 13 reports both indexes. The correlation between them is 0.745. Table 14 shows that the regression results reported in Table 4 are robust to the choice of index.

c) Mexican Manufacturing Sector Data Set

The data used to test for the presence of “bottlenecks” comes from the Annual Industrial Survey (Encuesta Industrial Anual) of the National Institute of Statistics, Geography and Informatics (INEGI). In 1999 the sample contained 5,934 firms, it covered more than 80% of manufacturing value added, 34.9% of employment and 83.6% of sales in the manufacturing sector. The unit of observation is the manufacturing establishment. However, for confidentiality reasons we received the information at a 5-digit aggregation level. To compute the share of N-inputs we consider as N expenses: maintenance and repair services, outsourcing services, rents and leasing, transport, publicity and electricity. The other expenses used to calculate total variable costs include: labor costs, materials, technology transfers, commissions for sales, combustibles and other expenses.

d) Mexican Stock Market (BMV) Data Set

The data set is derived from the information contained in the financial statements of firms listed in the BMV. It is an unbalanced panel of 310 firms, excluding financial firms, of which only 64 are present for the whole sample period. We have yearly observations from 1990 to 2000. All the variables are measured at the end of the year and are deflated by the December CPI. The variables used in the text are constructed as follows: Issuance.- Total value of equity plus long term bonds issued domestically and internationally. Long-term bonds are those with maturities of one year or longer. Issuances are normalized with the sum of long-term liabilities plus the stock outstanding.

⁷⁴ If after liberalization a country suffers a sharp reversal in capital flows (like in a financial crisis), it might exhibit a second breakpoint. In our sample, however, this possibility is not present: the trend breaks due to crises are never large enough to show up in significant CUSUM test statistics.

Entries/Listed Firms.- Number of new firms or firms issuing IPOs over total number of listed firms. Exits/Listed Firms.- Number of firms de-listing over total number of listed firms; Foreign Liabilities/Total liabilities.- Liabilities denominated in foreign currency, over total liabilities. Capital stock.- Fixed assets, including real estate, machinery and equipment. Investment.- Change in fixed assets from year t-1 to t. Cash flow.- Total sales minus operation expenses. Change in sales.- The change in total sales from year t-1 to t.

e) Mexican Economic Census

The census covers the whole Mexican economy and is available at five-year intervals. The information at the establishment level is confidential. Thus, each observation corresponds to a group of establishment with a similar number of employees, same economic activity (six digit classification), and same geographical region (municipality).⁷⁵ The number of establishment is omitted for some observations. In such cases, an average of the number of establishments by group is used in order to weight each. There are 286,866 observations in 1994 and 400,120 in 1999.

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⁷⁵ Within each six digit class and each municipality establishments were grouped according to the following stratification: a) 0-2 employees, b) 3-5, c) 6-10, d) 11-15, e) 16-20, f) 21 – 30, g) 31 – 50, h) 51 – 100, i) 101 – 250, j) 251 – 500, k) 501 – 1000, l) 1001 or more.

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Table 1: Liberalization and Growth

Dependent variable: Real per capita GDP growth

	(1) Cross section	(2) Panel (non- overlap.)	(3) Panel (overlap.)	(4) Panel (overlap.)	(5) Panel (overlap.)	(6) Panel (overlap.) MECs +HECs
Fin. Liberalization	2.163** (0.551)	1.316** (0.535)	1.806** (0.161)		1.983** (0.164)	2.112** (0.132)
Trade Liberalization				1.232** (0.195)	0.757** (0.197)	0.723** (0.137)
# of observations	32	56	270	280	260	420

Note: The table shows the results from the regression:

$\Delta y_{it} = \lambda y_{i,1980} + \gamma X_{it} + \phi_1 TL_{it} + \phi_2 FL_{it} + \varepsilon_{jt}$, where Δy_{it} is the average growth rate of per-capita GDP; $y_{i,ini}$ is the initial level of per-capita GDP; X_{it} is a vector of control variables that includes initial human capital, the average population growth rate, and life expectancy; $TL(FL)$ is one in a country/year following trade(financial) liberalization, and zero otherwise. Column (1) shows the results for a standard cross section regression, estimated by OLS for the sample period 1980 to 1999. Column (2) shows the results for a non-overlapping panel regression with two periods, one from 1980-1989 and one from 1990 to 1999. Column (3) reports the results from an overlapping panel regression. For each country and each variable, we construct 10-year averages starting with the period 1980-1989 and rolling it forward to the period 1990-1999. The panel regressions are estimated using a GLS estimator. The standard errors are heteroscedasticity-adjusted according to Newey and West (1987). Standard errors are reported in parentheses; * indicates significance at the 10 percent level and ** indicates significance at the 5 percent level. (The estimates for the control variables are not included)

Table 2: Moments of Credit Growth Before and After Financial Liberalization:

MECs

	Liberalized country-years	Non-liberalized country-years
Mean	0.080	0.038
Std. Dev.	0.155	0.170
Skewness	-1.096	0.164

HECs

	Liberalized country-years	Non-liberalized country-years
Mean	0.025	NA
Std. Dev.	0.045	NA
Skewness	0.497	NA

Note: The table partitions the sample in two country-year groups: liberalized and not liberalized. The table compares the moments of credit growth across these two groups. Before the computations of the Std. Dev. and Skewness, the means were removed from the series. Also data mistakes in NZL, GBR and BEL are corrected for.

Table 3: Liberalization, Bumpiness and Growth

Dependent variable: Real per capita GDP growth

	(1) MECs	(2) All	(3) MECs	(4) All
Credit_mean	0.170** (0.012)	0.154** (0.009)	0.055** (0.009)	0.111** (0.007)
Credit_Variance	-0.029** (0.007)	-0.030** (0.003)	-0.039** (0.004)	-0.027** (0.002)
-(Credit_Skewness)	0.174** (0.069)	0.266** (0.021)	-0.195** (0.061)	0.143** (0.018)
Fin. Liberalization			1.512** (0.129)	1.704** (0.128)
Trade Liberalization			0.418** (0.145)	0.685** (0.138)
# of observations	269	424	239	394

Note: The table shows the results from the regression:

$$\Delta y_{it} = \lambda y_{i,1980} + \gamma X_{it} + \beta_1 \mu_{\Delta B,it} + \beta_2 \sigma_{\Delta B,it} + \beta_3 S_{\Delta B,it} + \phi_1 TL_{it} + \phi_2 FL_{it} + \varepsilon_{j,t}$$

The panel regression is estimated using a GLS estimator. The standard errors are heteroscedasticity-adjusted according to Newey and West (1987). The specification also includes initial per capita income, secondary schooling, population growth, and life expectancy. Standard errors are reported in parentheses; * indicates significance at the 10 percent level and ** indicates significance at the 5 percent level.

Table 4: Sectoral Asymmetries

Dependent variable: N-to-T output ratio

Variable	REG 1	REG 2	REG 3
Fin Lib	1.155** (0.139)	1.002** (0.146)	0.998** (0.140)
Trade lib	-0.787** (0.188)	-0.595** (0.195)	-0.808** (0.201)
Credit		0.465** (0.202)	0.446** (0.190)
1/p			2.811** (1.338)
Crisis	-0.224* (0.142)	-0.207* (0.124)	-0.285** (0.120)
Crisis (+1)	-2.435** (0.142)	-2.137** (0.182)	-2.240** (0.176)
Crisis (+2)	0.192* (0.126)	0.429** (0.153)	0.364** (0.146)
Crisis (+3)	-0.794** (0.126)	-0.659** (0.128)	-0.696** (0.121)
Crisis (+4)	-0.501** (0.191)	-0.259 (0.201)	-0.360* (0.192)
Crisis (+5)	0.878** (0.181)	0.844** (0.161)	0.925** (0.153)
# of observations	443	426	360

Note: The table shows the results from the regression:

$$\Delta N/T_{it} = c + \beta_1 TL_{it} + \beta_2 FL_{it} + \beta_3 credit_{it} + \beta_4 1/p_{it} + \sum_{j=0}^5 \delta_j crisis_{i,t+j} + \varepsilon_{it}$$

The N-to-T output ratio in the regressions above is calculated using export shares. The panel regression is estimated using a GLS estimator. Standard errors are reported in parentheses; * indicates significance at the 10 percent level and ** indicates significance at the 5 percent level.

Table 5: Mexico and the US

(Average Growth Rates)

	1990-94	1995	1996-2000	2001-03
Export growth in Mexico	15%	32%	17%	-1%
Manufacturing growth in the US	2	5	5	-2
Import growth in the US	7	11	10	2

Note: The figures in the table are averages of quarter-to-quarter growth rates.

Table 6: N-inputs in T-production

High N-Intensive Sectors	Total	Outsourcing	Repairs and Maintenance	Freights and Transport	Electricity	Rentals and Leases	Others
Textiles and apparel	23.0%	16.5%	2.4%	1.7%	0.8%	1.2%	0.5%
Paper and printing	24.8%	11.5%	3.5%	1.1%	3.1%	3.3%	2.3%
Basic inorganic chemical products, perfumes & cosmetics and plastic & rubber	27.7%	1.1%	6.8%	1.0%	8.2%	8.2%	2.4%
Non metallic mineral products	23.4%	0.3%	9.5%	2.0%	5.6%	4.9%	1.0%
Discs & magnetophonic tapes	22.6%	4.8%	8.8%	1.0%	1.2%	4.0%	2.7%
Total Manufacturing	12.4%	2.1%	3.4%	2.2%	1.7%	1.3%	1.7%

Note: The table shows the share of expenditure on N inputs in total variable cost in some manufacturing sectors over total expenses. Total variable cost include N-expenditures plus: material inputs, technology transfers, commissions for sales, combustibles, labor costs and other expenses. Investment or expenditures in fixed assets are excluded. The figures correspond to the average share during the 1994-1999 period.

Source: Annual Industrial Surveys, INEGI

Table 7: The stock market is not representative of the economy (I)

(number of firms in each size category in 1999)

	Economic Census		BMV	
	N	T	N	T
Small	2,371,468	329,242	0	0
Medium	65,630	12,054	0	0
Large	4,239	5,589	105	194

Note: Size is defined in terms of fixed assets in thousand of 1994 USD. Categories are: small < \$148, medium < \$2,370 & large > \$2,371. Tradeables sectors include: primary sectors and manufacturing. Nontradeables sectors include: construction, trade, telecom, transportation, hotels and restaurants, real estate and other services. Excluded sectors: financial services, electricity, gas and water. For those firms entering between 2000 and 2002 or exiting between 1991 and 1999 we took the year closest to 1999 for which data on total assets was available for the firms.

This table was not updated with the new n and t criteria.:

Table 8: The stock market is not representative of the economy (II)

(Distribution of Sales in the Economic Census)

	N	T
Small	0.56	0.10
Medium	0.32	0.26
Large	0.12	0.64

Note: Sizes are defined as in Table 7.

Table 9: Issuance of Long Term Bonds and Equity

Year	Issuance/(Long term liabilities and equity)		
	Total	Long Term Debt	Equity
1991	0.9%	0.5%	0.4%
1992	2.0%	1.7%	0.2%
1993	2.2%	2.0%	0.2%
1994	1.3%	1.1%	0.1%
1995	0.5%	0.5%	-
1996	3.8%	3.8%	-
1997	5.8%	5.0%	0.7%
1998	3.0%	3.0%	-
1999	1.4%	1.1%	0.3%
2000	3.2%	3.1%	0.0%
2001	2.0%	2.0%	-

Note: Total gross issuance of long term corporate bonds (maturity of 1 year or higher) and equity over the stock of outstanding long term liabilities plus the stock of equity. Average of all non-financial firms that were listed in the BMV throughout the period 1990-2000 and for which there was balance sheet data available.

Table 10: Entry and Exit from the BMV

	Entries/Listed Firms	Exits/Listed Firms
1990	3.6%	0.0%
1991	16.4%	1.7%
1992	7.5%	12.0%
1993	10.2%	3.9%
1994	11.1%	6.7%
1995	2.1%	6.4%
1996	8.1%	3.0%
1997	11.2%	3.5%
1998	1.9%	5.8%
1999	0.7%	1.4%
2000	2.7%	2.1%
2001	0.7%	3.4%
2002	2.2%	0.0%

Notes: Entries are defined as the number of new firms listed in the BMV. Exits are defined as the firms that left the stock market or that were suspended in a given year, and were still suspended in 2003. The number of listed companies includes public firms plus some private firms that had issued corporate bonds.

Table 11: Shift Away from Domestic Credit

year	Foreign Liabilities / Total Liabilities		
	T	N	All
1990	31.6%	34.0%	23.8%
1991	32.9%	36.5%	23.7%
1992	32.7%	36.0%	25.0%
1993	36.0%	39.3%	29.3%
1994	43.9%	50.5%	30.6%
1995	46.4%	53.5%	34.2%
1996	44.8%	52.7%	32.6%
1997	47.4%	54.8%	37.2%
1998	48.4%	56.6%	37.8%
1999	44.9%	52.1%	36.4%
2000	45.4%	51.8%	37.0%
2001	44.4%	52.1%	35.6%
2002	40.6%	46.7%	33.1%

Notes: Average of outstanding foreign currency liabilities over total liabilities.

Table 12: Sectoral Asymmetries in Investment

(Investment Rates)

	1994	1999
	Average	
N	7.1%	3.7%
T	6.9%	4.6%
N/T	1.03	0.81

Note: The investment rate is computed as the ratio of investment/Capital_(t-1).

Source: Own calculations with data from the Mexican Economic Census

Table 13: Cash Flow RegressionsDependent variable: Investment / Capital_{t-1}

	(1)	(2)
Cash Flow _t / K _{t-1}	0.04*** (0.01)	0.02** (0.01)
d(Sales) _t / K _{t-1}	0.05*** (0.00)	0.05*** (0.00)
Cash Flow _t / K _{t-1} * D _{Crisis} * D _{Non-exporters}	0.15*** (0.05)	0.05* (0.03)
Observations	1430	1592
Number of firms	328	338
R ²	0.195	0.194

Note: D_{Crisis}=1 for the years 1995-7 in regression (1) and for the years 1995-8 in regression (2). D_{Non-exporters}=1, if the firm does not export. The regressions are estimated with fixed effects by generalized least squares. They include year dummies, but they are not reported. Standard errors are given in parentheses. * denotes significance at the 10% level; ** at the 5% level; *** at the 1% level.

Table 14: Indexes

Country	Indicator of Financial Liberalization	Indicator of Trade Liberalization	N / T Index Based on Export Shares	N / T Index Based on Real Exchange Rates
ARG	1991	1986	C / M	C / M
BEL	Always	Always	C / M	C / M
BGD	Never	Never	S / M	S / M
BRA	1992	1988	S / M	S / M
CHL	Always	Always	C / M	C / M
COL	1991	1992	S / M	S / M
EGY	Always	1991	S / M	S / M
ESP	Always	1984	S / M	S / M
GRC	Always	1986	S / M	S / M
HUN	1994	1994	S / M	S / M
IDN	1989	1987	S / M	S / M
IND	Never	1994	S / M	S / M
IRL	Always	Always	NA	NA
ISR	1990	1986	NA	NA
JOR	1989	Always	S / M	S / M
KOR	1989	Always	C / M	C / M
LKA	Never	1989	S / M	S / M
MAR	Never	1986	S / M	S / M
MEX	1989	1988	C / M	C / M
MYS	Always	Always	C / M	C / M
PAK	Never	never	S / M	S / M
PER	1992	1987	M / S	S / M
PHL	1989	1986	C / M	C / M
POL	Never	1993	NA	S / M
PRT	1986	1986	C / M	C / M
SOU	1994	Never	S / M	S / M
THA	1988	1986	C / M	C / M
TUN	Never	Always	M / S	S / M
TUR	Always	1994	C / S	C / M
VEN	Never	Always	S / M	S / M
ZWE	Never	Never	S / M	S / M

Notes: In the first two columns, “always” means that a country has been open at least since 1980, and “never” means that it was closed until 1999. In the 3rd and 4th column, C=construction, M=manufacturing, S=services. For Indonesia, our sample does not cover the period before 1993. We therefore set 1989 as the liberalization date, which fits to the dates of Schmuckler and Kaminsky (2002) and Bekaert et al (2001).

Source: Own calculations

Table 15: Sectoral Asymmetries II

Dependent variable: N/T index based on the sectoral real exchange rate

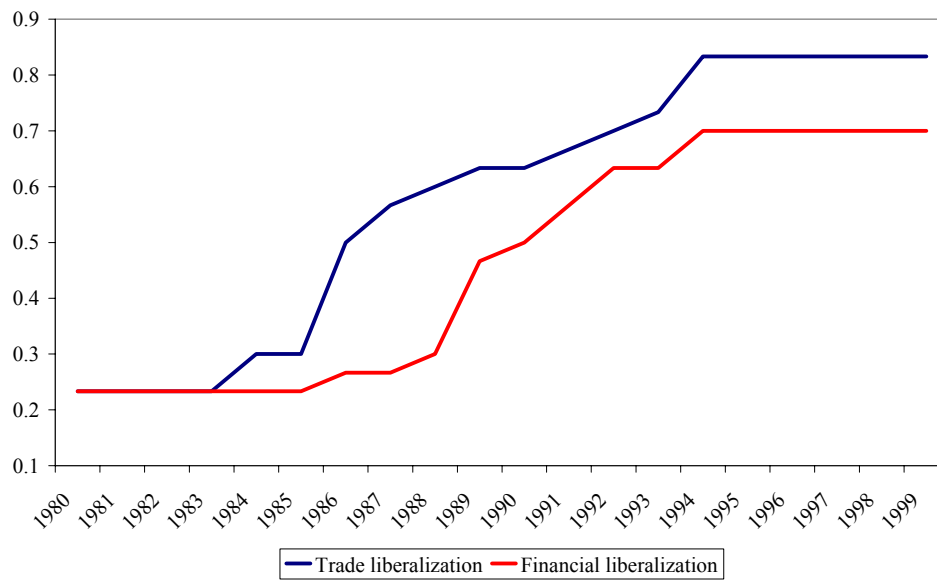
Variable	REG 1	REG 2	REG 3
Fin Lib	1.136** (0.140)	1.099** (0.146)	1.032** (0.206)
Trade lib	-0.552** (0.189)	-0.576** (0.195)	-0.612** (0.274)
Credit		0.462** (0.202)	0.490* (0.286)
1/p			2.234** (0.570)
Crisis	-0.021* (0.014)	-0.020* (0.012)	0.001 (0.018)
Crisis (+1)	-2.445** (0.143)	-2.146** (0.181)	-1.609** (0.287)
Crisis (+2)	0.205* (0.127)	0.437** (0.153)	0.836** (0.238)
Crisis (+3)	-0.786** (0.127)	-0.655** (0.128)	-0.659** (0.184)
Crisis (+4)	-0.479** (0.192)	-0.246 (0.201)	0.111** (0.299)
Crisis (+5)	0.863** (0.182)	0.834** (0.161)	1.264** (0.254)
# of observations	443	426	371

Note: The table shows the results from the regression:

$$\Delta N/T_{it} = c + \beta_1 TL_{it} + \beta_2 FL_{it} + \beta_3 credit_{it} + \beta_4 1/p_{it} + \sum_{j=0}^5 \delta_j crisis_{i,t+j} + \varepsilon_{it}$$

The N/T index in the regressions above is based on the variance of the sectoral real exchange rate. The panel regression is estimated using a GLS estimator. Standard errors are reported in parentheses; * indicates significance at the 10 percent level and ** indicates significance at the 5 percent level.

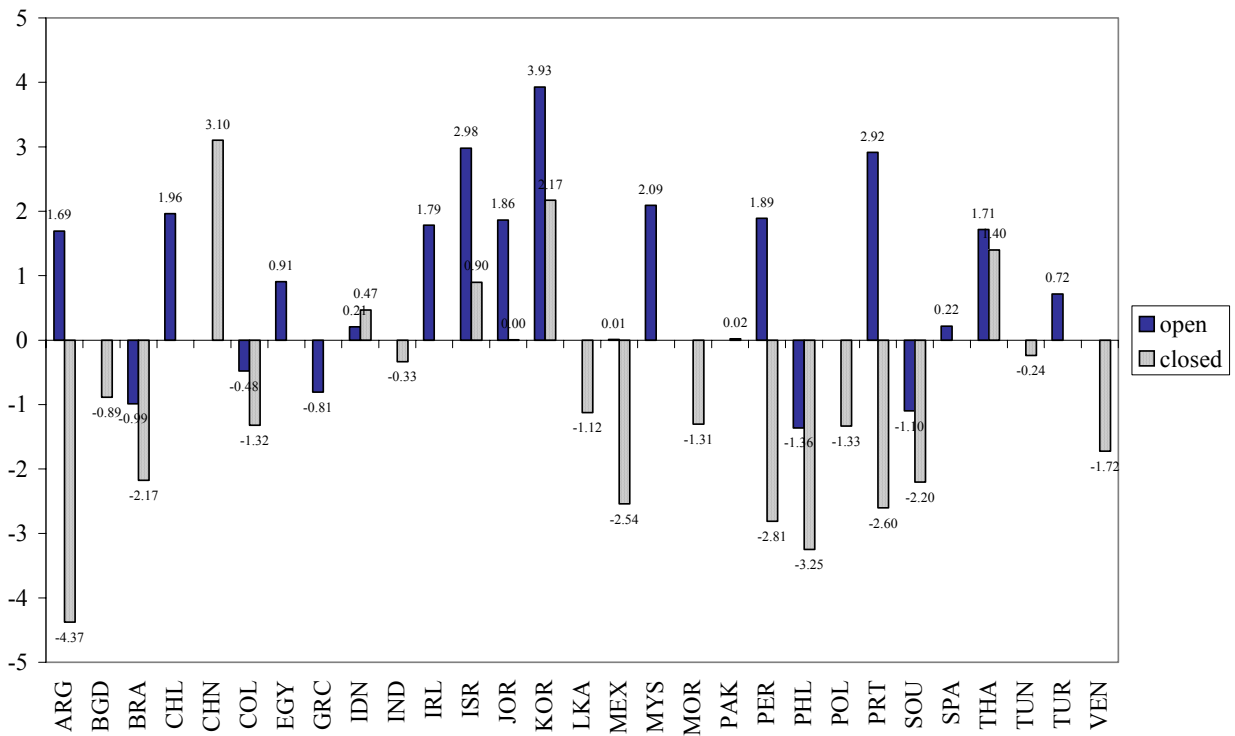
Figure 1: Share of Countries that Liberalized Trade and Financial Flows



Note: The figure shows the share of countries that have liberalized relative to the total number of MECs in our sample.

Source: own calculations.

Figure 2: Liberalization and Growth

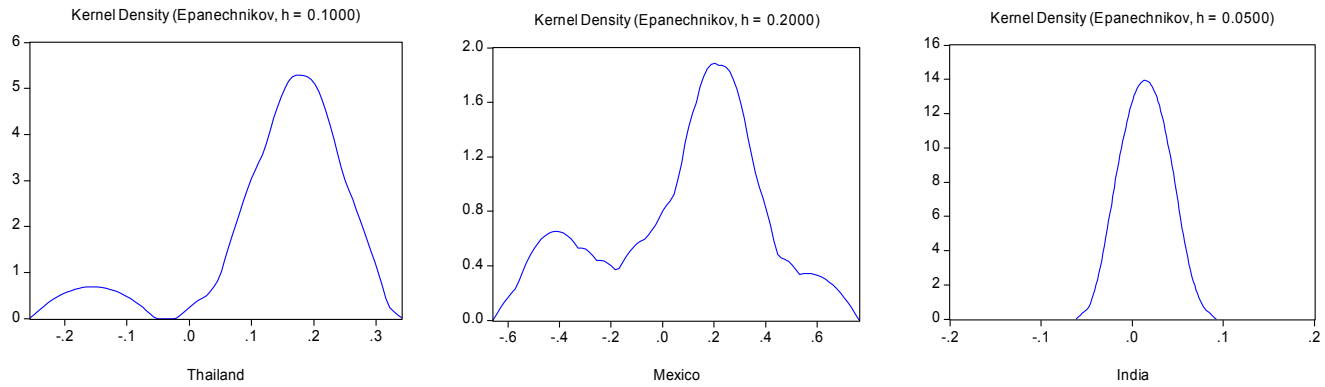


Note: The country episodes are constructed using windows of different length for each country. Country episodes that are shorter than 5 years are excluded. Averaging over these periods, we estimate a simple growth regression by OLS in which real per capita growth is the dependent variable and that only include the respective initial income and population growth. The figure plots the residuals from this regression.

Source: Population growth for Portugal: IMF, IFS. All other series: WDI, World Bank.

Figure 3: Credit Growth Distributions

a) Kernel Densities:



b) Descriptive Statistics:

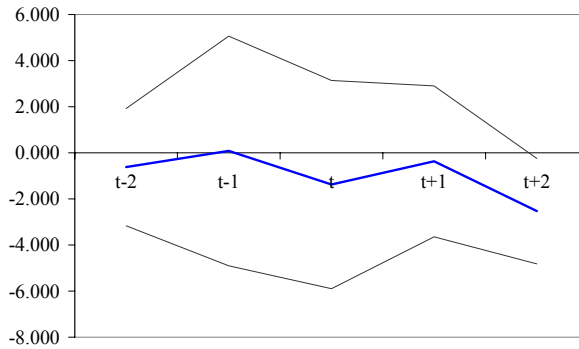
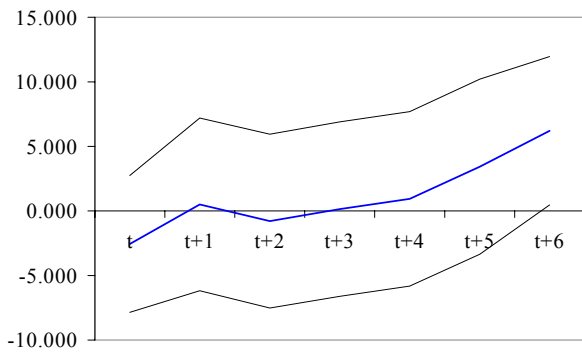
	Thailand	Mexico	India
Mean	0.143	0.091	0.014
Std.	0.110	0.303	0.014
Skewness	-1.945	-0.537	0.157

Note: The sample period is 1988- 1999.

Figure 4: Financial Liberalization, Lending Booms and Bumpiness

a) Credit/GDP

b) Skewness

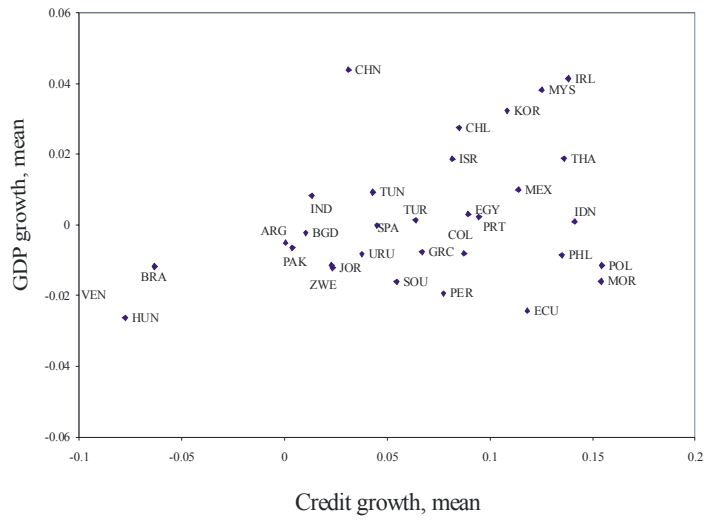


Note: In panel b) skewness refers to the skewness of real credit growth in the following 10 years. The event windows were constructed from panel regressions of the respective variable on dummy variables that take of value of 1 in the period where a country liberalized and zero otherwise. The panel regressions are estimated with fixed effects, using a GLS estimator.

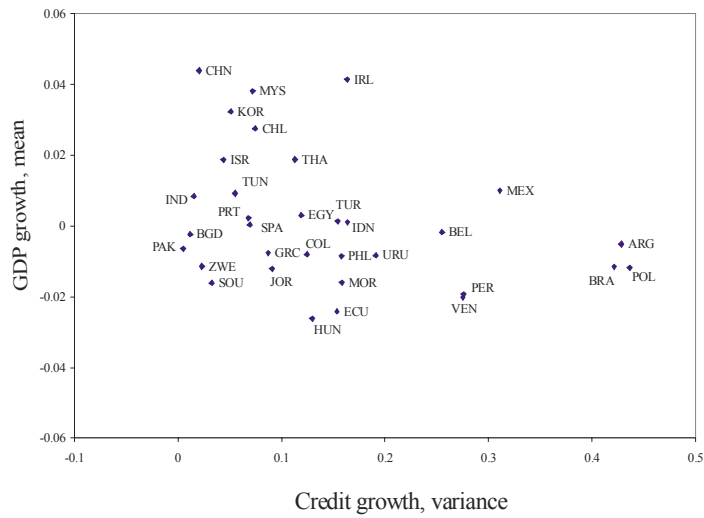
Source: Own calculations.

Figure 5: Moments of Credit and GDP Growth

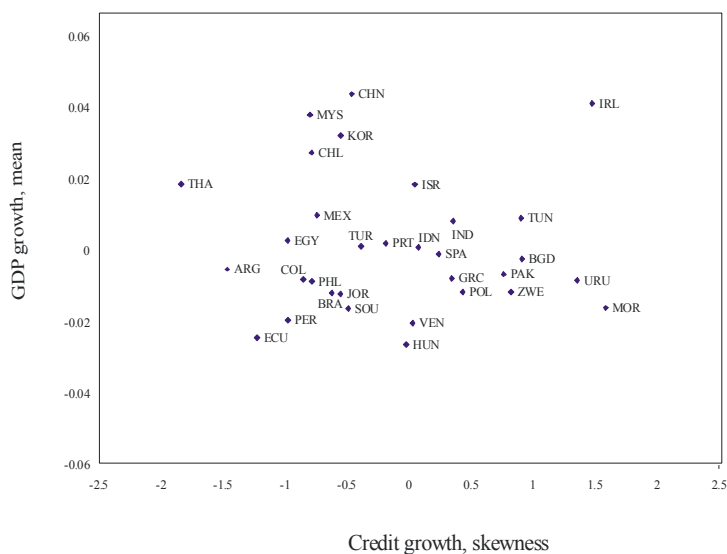
a) Growth and Mean



b) Growth and Variance

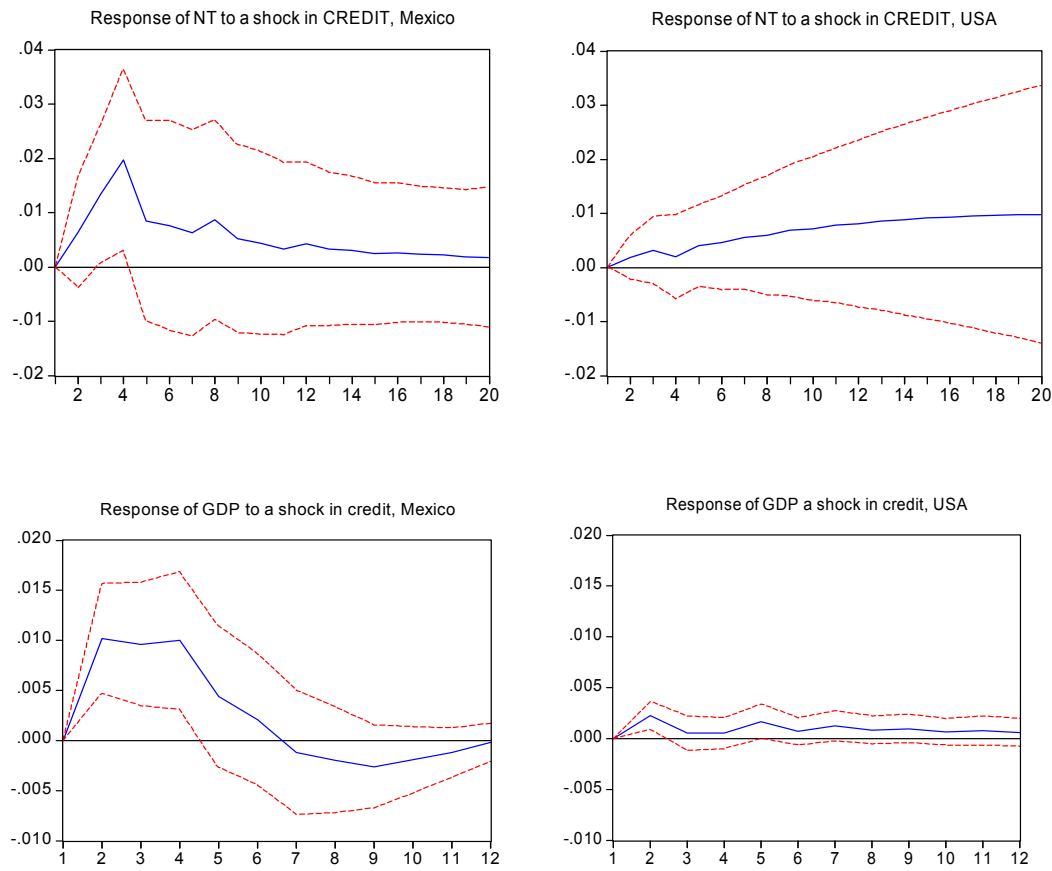


c) Growth and Skewness



Note: The graphs plot the moments of real credit growth during the period 1988-1999 against the residuals of a growth regression that controls for initial per capita GDP and population growth.

Figure 6: Responses to a Credit Shock in Mexico and the USA

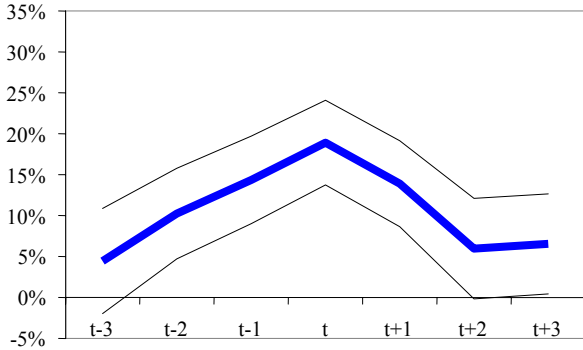


Note: The heavy lines trace the response of Mexico and the USA to a one-standard deviation shock in credit. Calculations are based on two-variable VARs, including credit and either N/T or GDP. Each VAR is estimated from quarterly data in growth rates over the sample period from 1980:1 to 1999:4, allowing for 4 lags, a time trend and dummy variables for liberalization and the crisis. Finite sample critical values are generated by 1000 Monte Carlo replications.

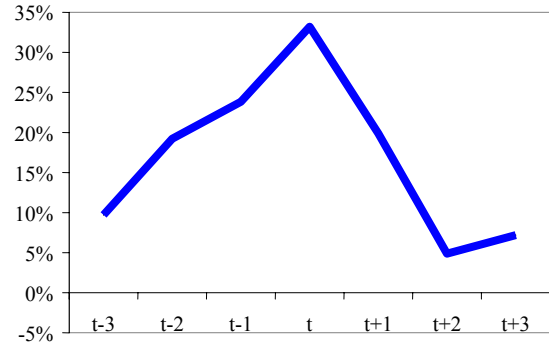
Figure 7: The Boom-Bust Cycle

Average MEC

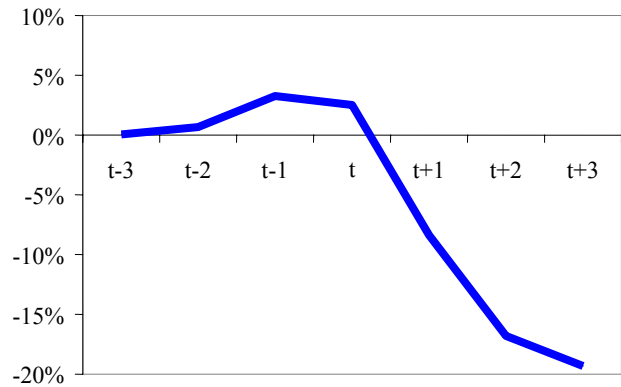
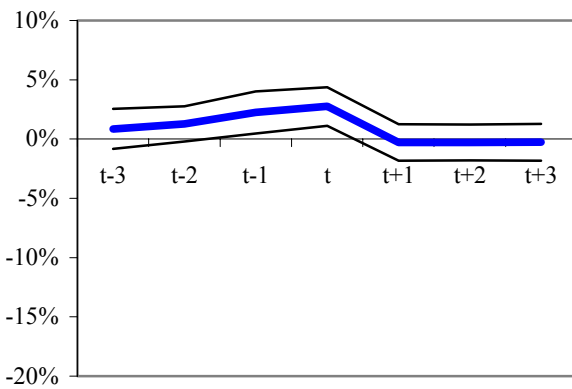
Credit/GDP



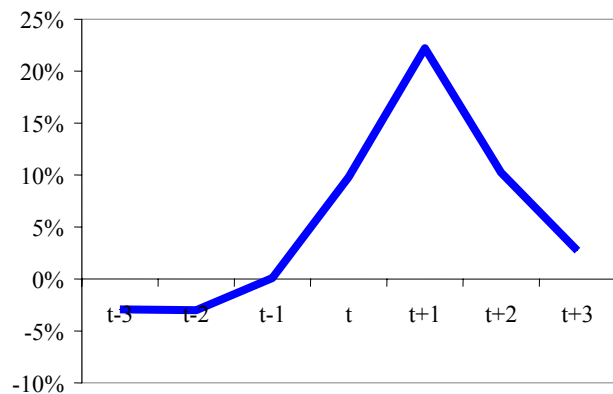
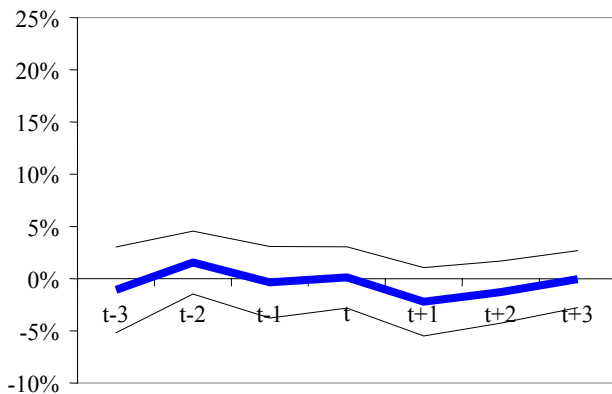
Mexico



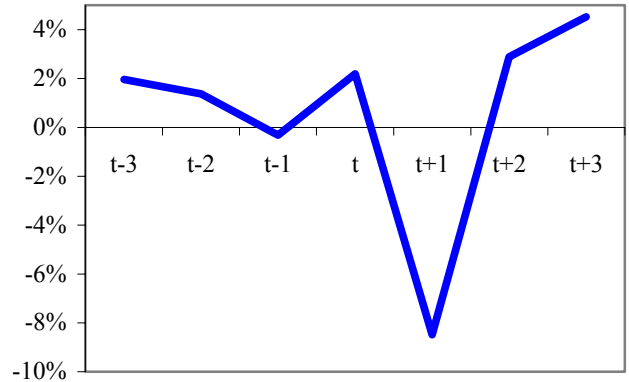
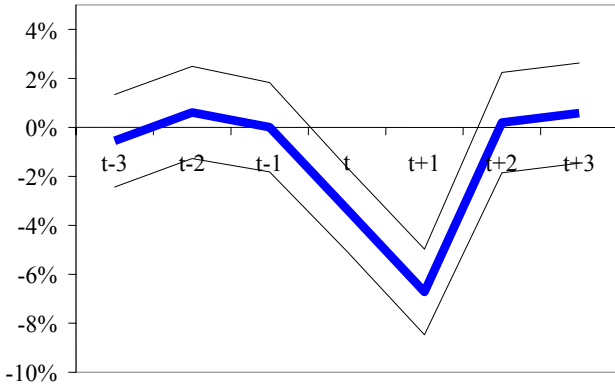
N-to-T Output Ratio



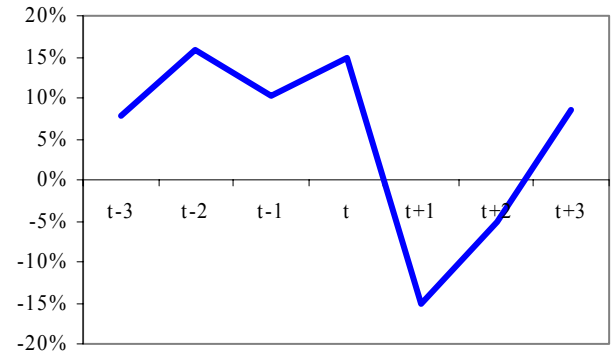
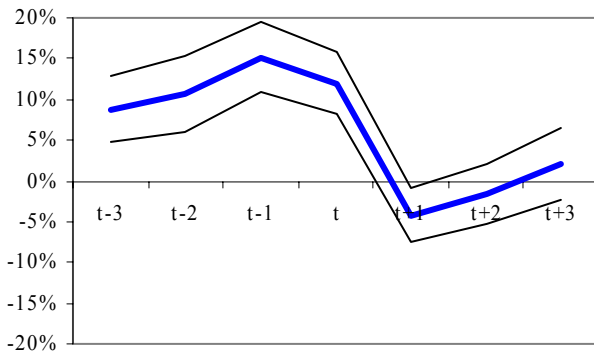
Exports Growth



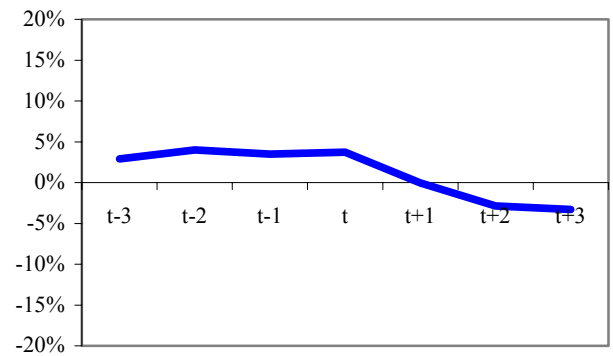
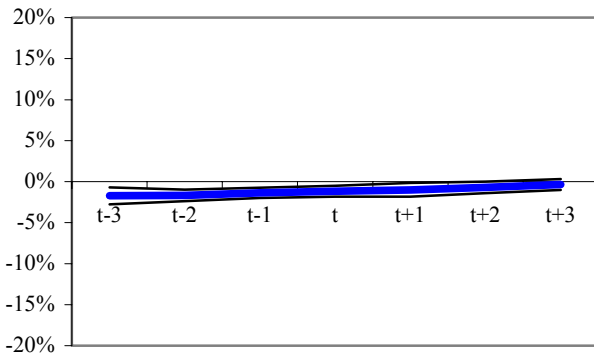
GDP per Capita Growth



Investment



Consumption



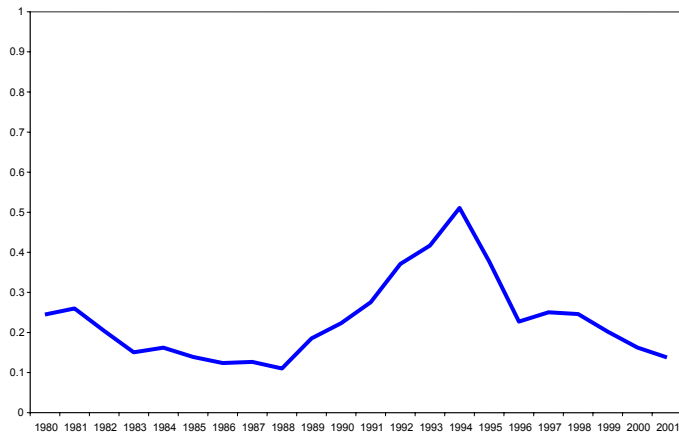
Note: Event windows were constructed from panel regressions of the respective variable in each graph on dummy variables that take of value of 1 in the period where a joint banking and currency crisis occurred and zero otherwise. The panel regressions are estimated with fixed effects, using a GLS estimator. The N/T and GDP series where computed as mid-year changes. The graphs are the visual representations of the point estimates and standard errors from the following pooled regression:

$$y_{it} = a_i + \sum_{j=-3}^3 \beta_j Dummy_{\tau+j} + \varepsilon_{it}$$

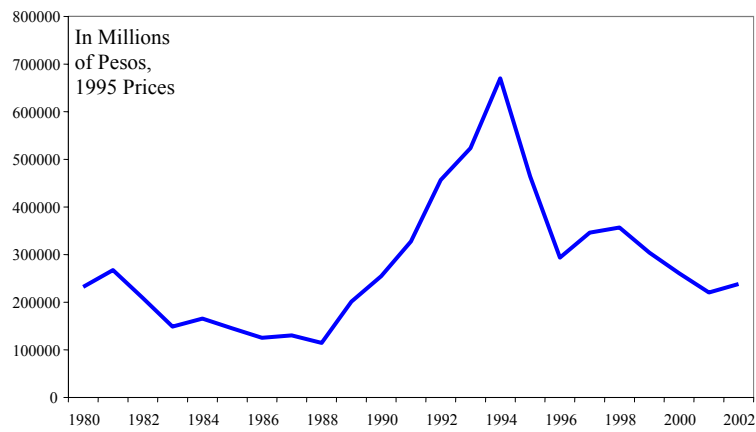
where y is the respective variable of interest in the graph, $i = 1 \dots 35$ denotes the country, $t = 1980 \dots 1999$, and $Dummy_{\tau+j}$ equals 1 at time $\tau+j$ and zero otherwise, where τ is a crisis time.

Figure 8: Credit in Mexico

a) Credit/GDP

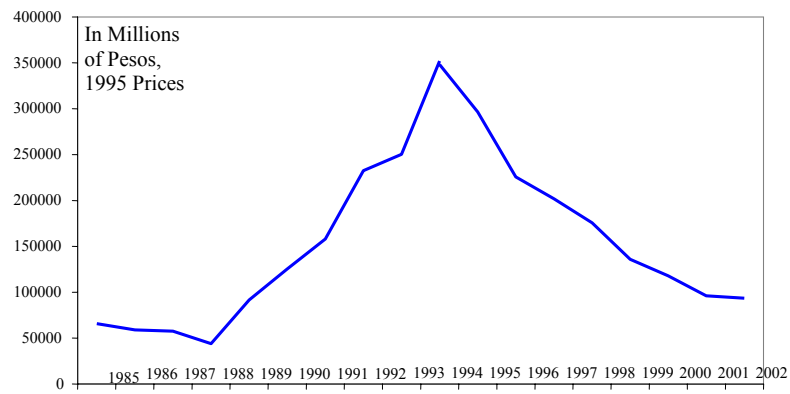


b) Real Credit



Source: Banco de Mexico.

Figure 9: Credit to the N sector

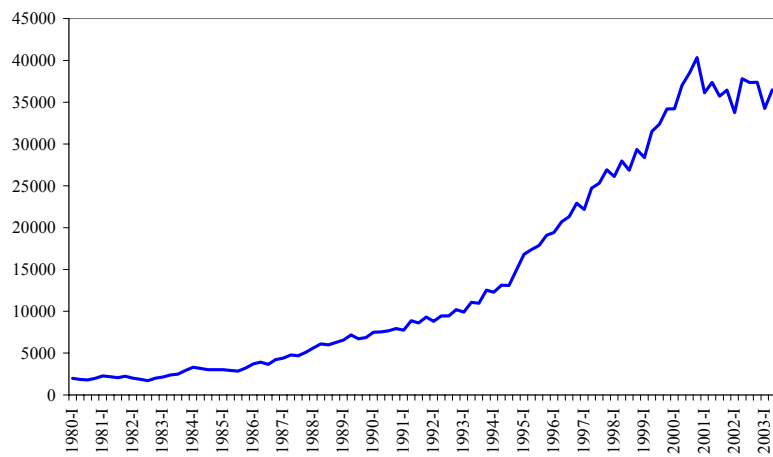


Note: Starting in 1995, the graph shows performing loans to the N-sector

Source: Bank of Mexico and IMF, IFS.

Figure 10: International Trade

a) Non-oil Exports



b) Exports+Imports/GDP

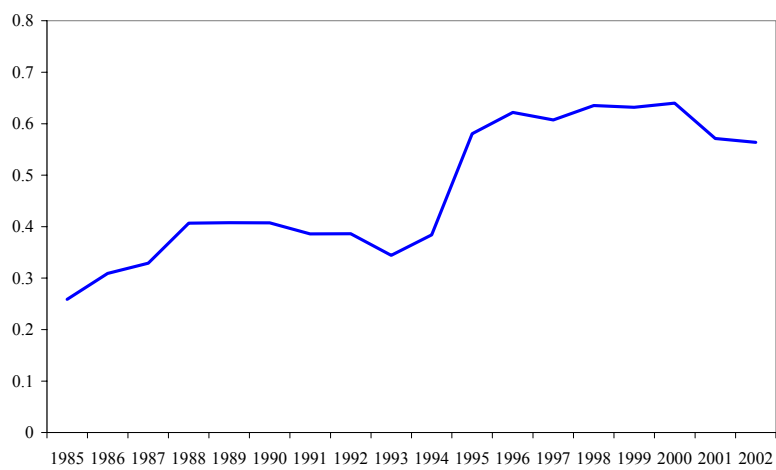
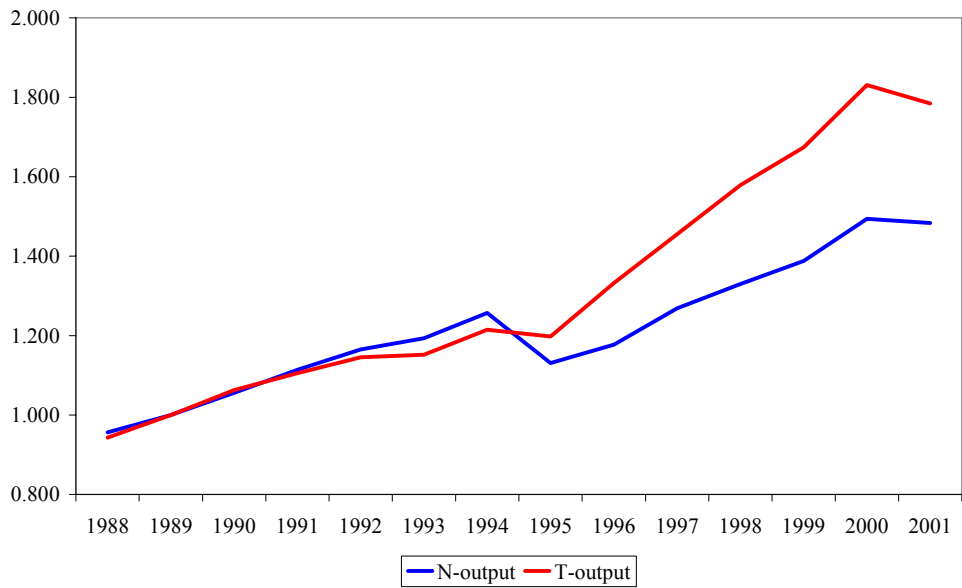
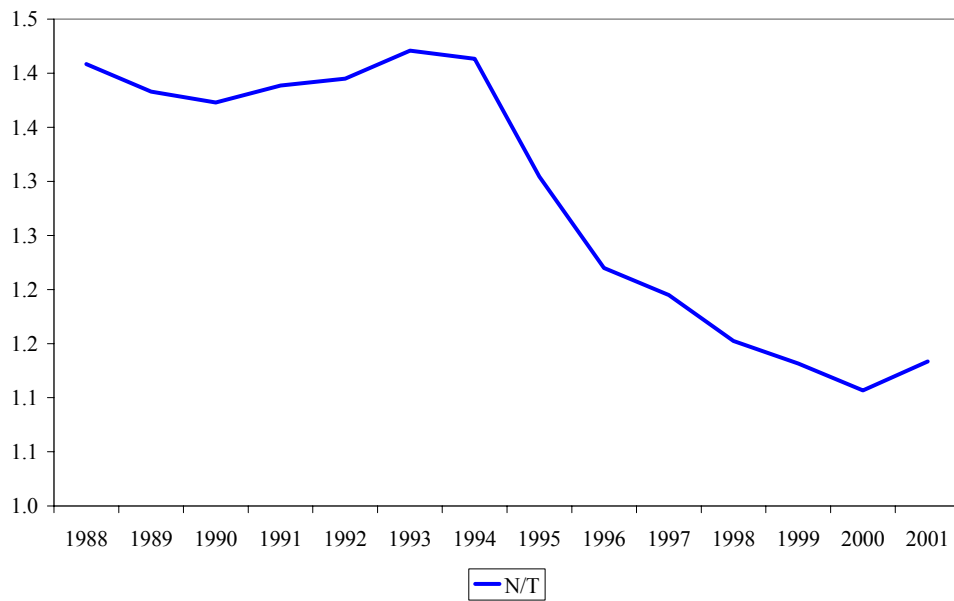


Figure 11: Non-tradables and Tradables Production

a) levels



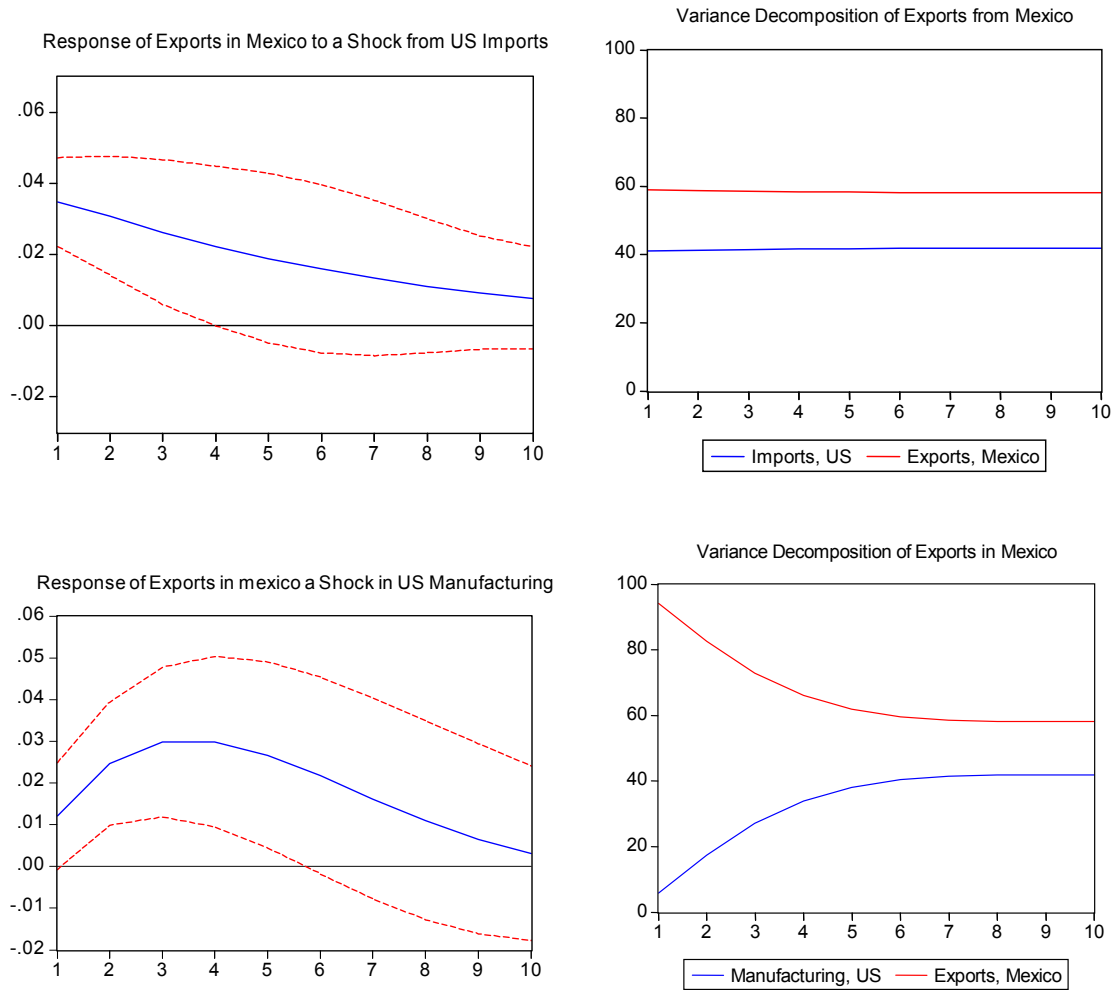
b) Ratio



Note: The T-sector includes Manufacturing, Mining and Agriculture. The N-sector includes Construction, Commerce, Restaurants and Hotels, Transporting, Storage and Communications and Communal Services.

Source: INEGI

Figure 12: The Effects of the US Economy on Mexican Exports (VARs)



Note: In the two figures on the left, the heavy lines trace the response of Mexican exports to a one-standard deviation shock in US imports and US manufacturing, respectively. Calculations are based on two-variable VARs, including Mexican exports and either US imports or US manufacturing. Each VAR is estimated from quarterly data in growth rates over the sample period from 1987:1 to 1999:4, allowing for 2 lags in the estimation. The two figures on the left, trace the share of the forecast error variance that is attributable to the respective variables.

Figure 13: Unexplained Export Growth (I)

(Average Residuals from the VARs)

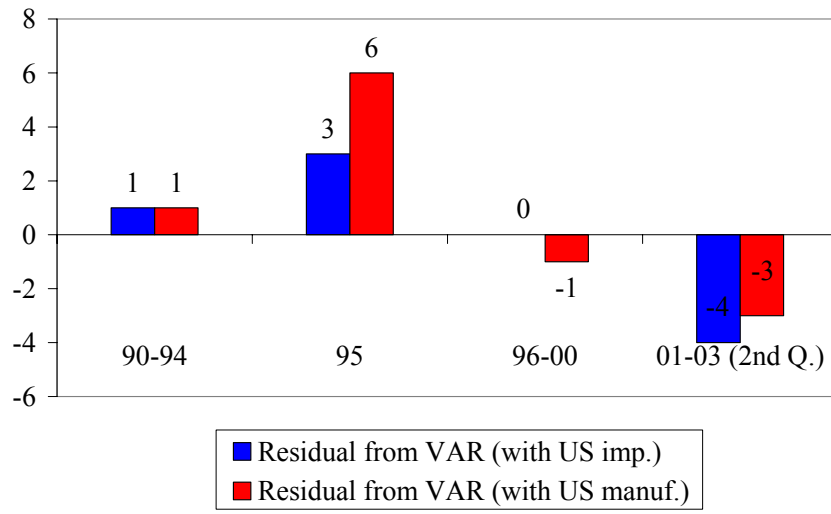
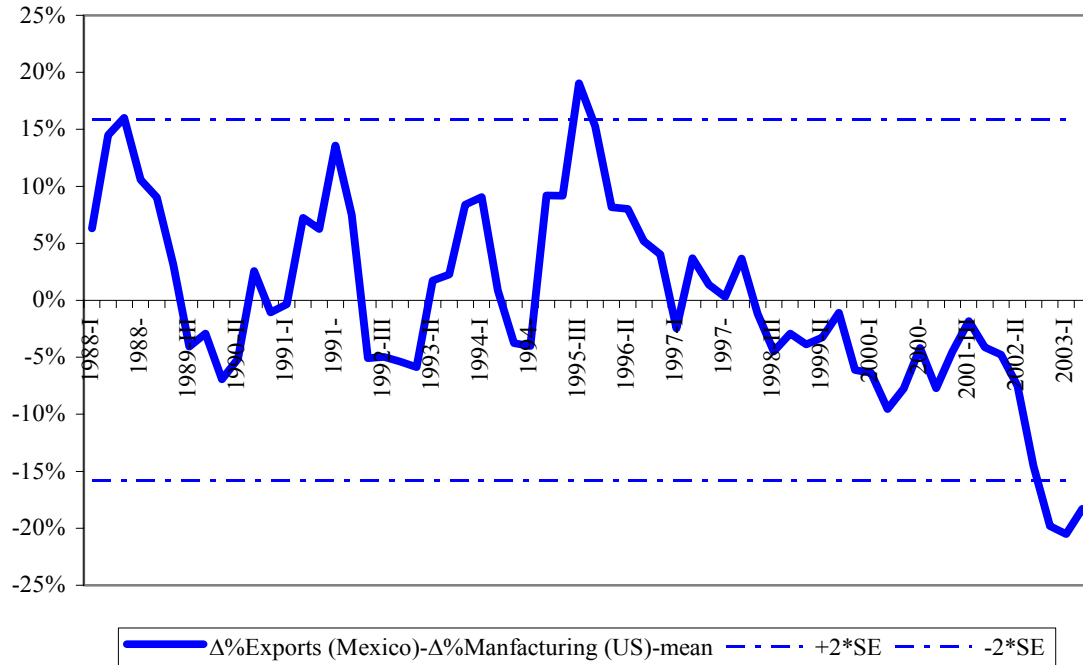


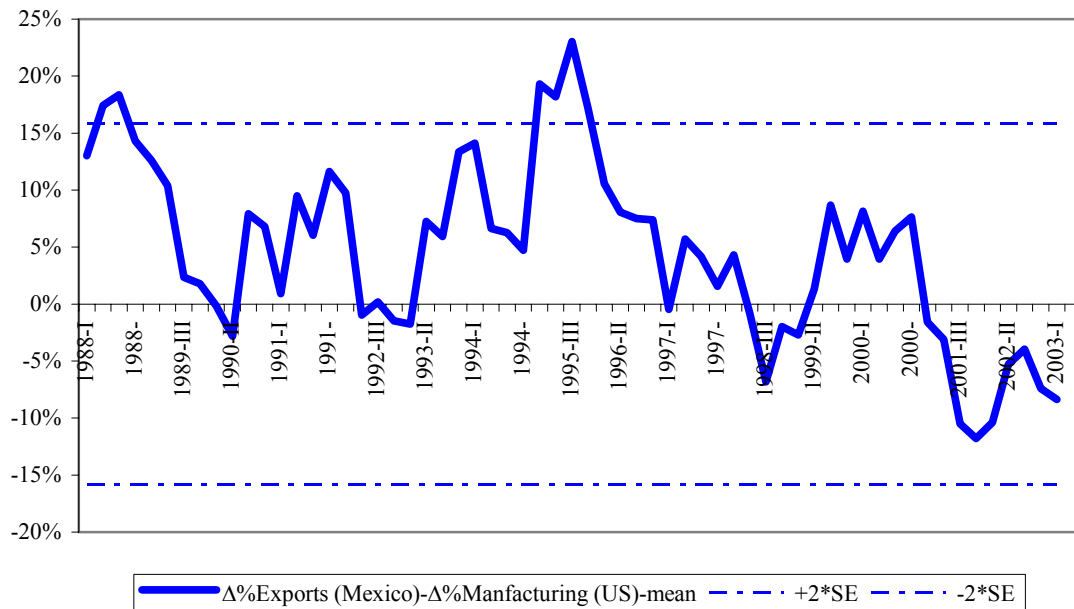
Figure 14: Unexplained Export Growth (II)

(Demeaned Growth Differentials)

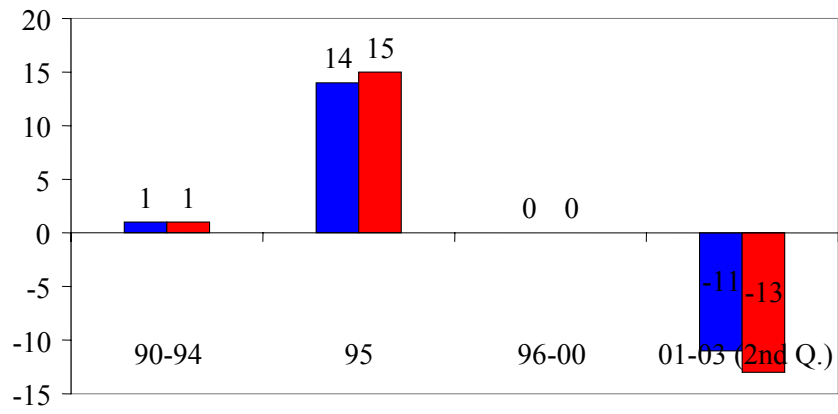
(a) Mexican Exports vs. US Imports



(b) Mexican Exports vs. US Manufacturing



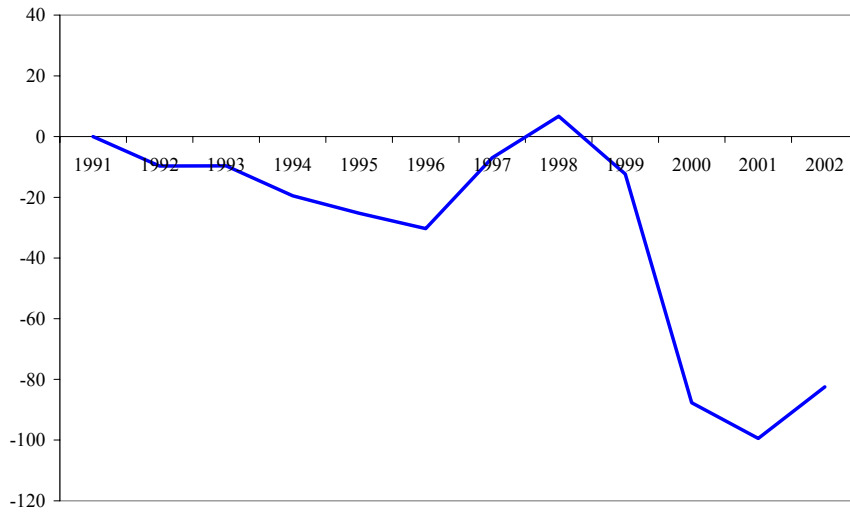
(c) Average Demeaned Differences



■ Demeaned growth diff. (with US imp.)
■ Demeaned growth diff. (with US manuf.)

Figure 15: The Bottleneck effect

(Ratio of highly N-intensive to low N-intensive exporters)

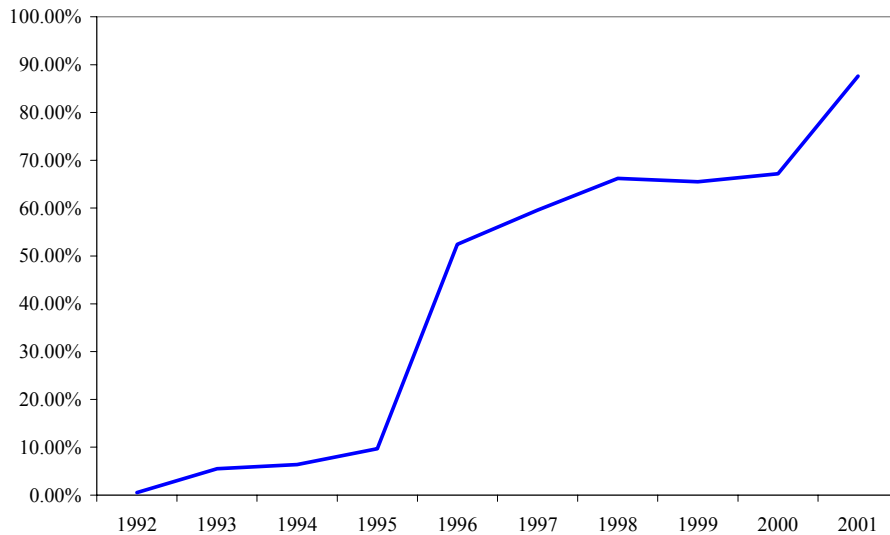


Note: The figure plots the ratio of exports of subsectors with the highest 20% and the lowest 20% of N-costs in total costs.

Source: INEGI

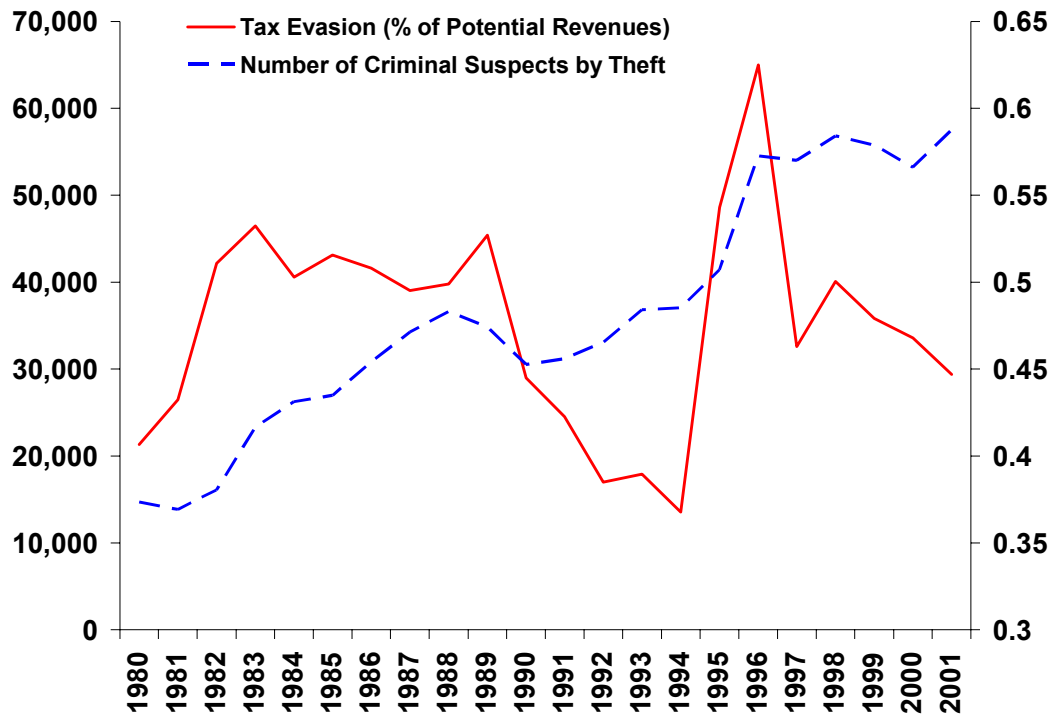
Figure 16: Foreign Participation in the Mexican Banking System

(Share in Total Assets)



Source: Bank Failure Management, prepared by SHCP for the APEC, 2001.

Figure 17: Law Enforcement

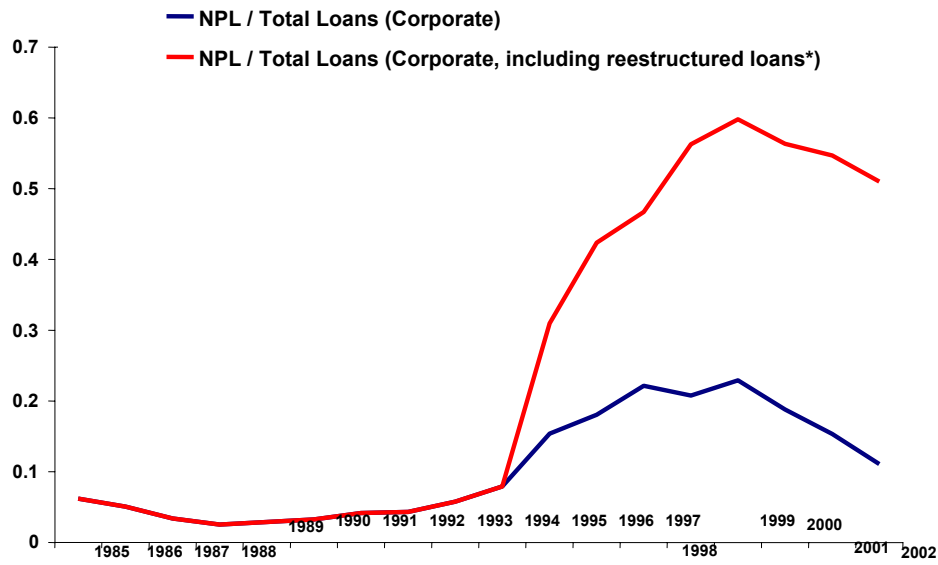


Notes: Number of criminal suspects by theft comes from SIMBAD, INEGI.

Tax evasion is constructed using value added revenues. Potential revenue is equal to the sectorial GDP times the share going to domestic consumption and its respective tax rate.

We also applied different tax rates at border cities.

Figure 18: Share of NPLs in Total Loans



* Restructured loans include the programs of UDIS, IPAB-FOBAPROA, restructured portfolio affecting the flow participation scheme and Special CETES .

*The IPAB-FOBAPROA non-performing loans were obtained by applying the ratio of non-performing loans to total IPAB-FOBAPROA portfolio to IPAB-FOBAPROA's Titles.

Figure 19: The stock market is not representative of the economy

(Kernel Densities, Epanechnikov, $h=90,000$)

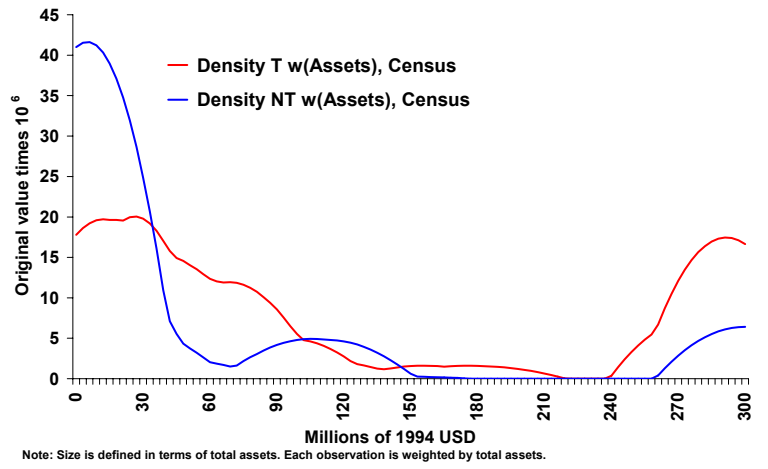
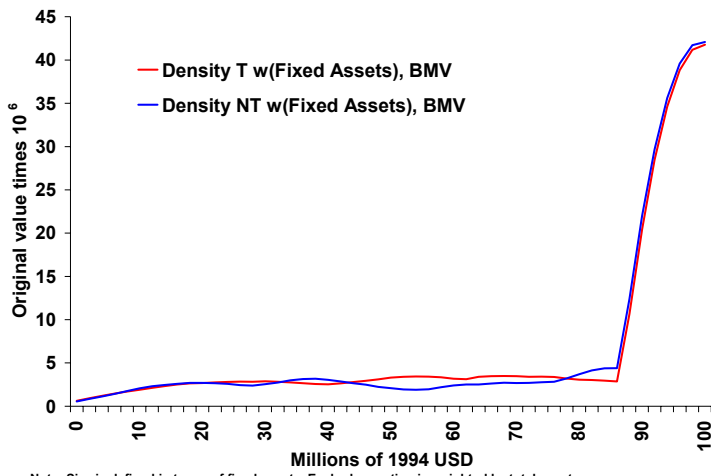
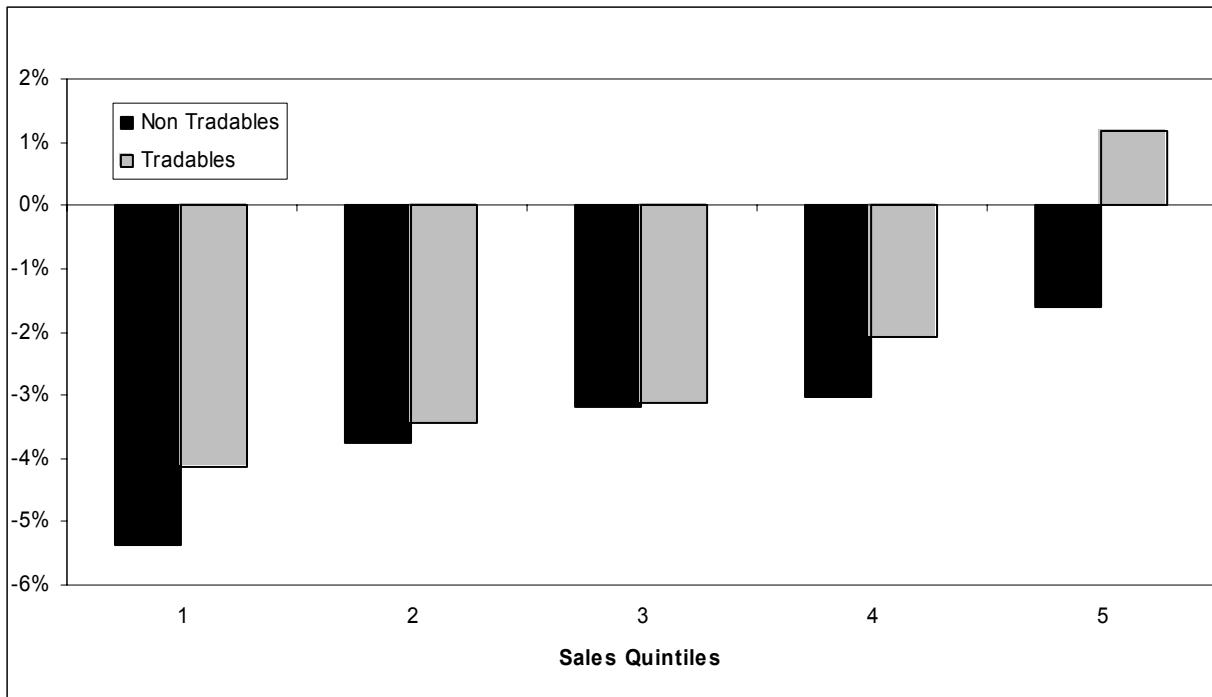


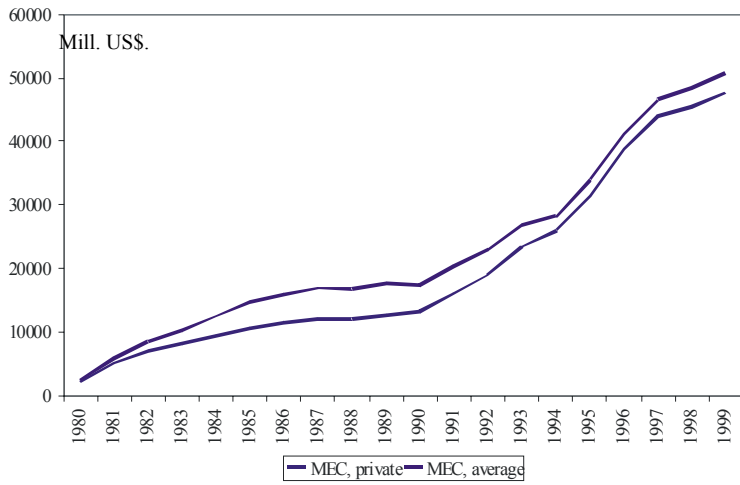
Figure 20: Change in the Investment Rate Between 1994 and 1999



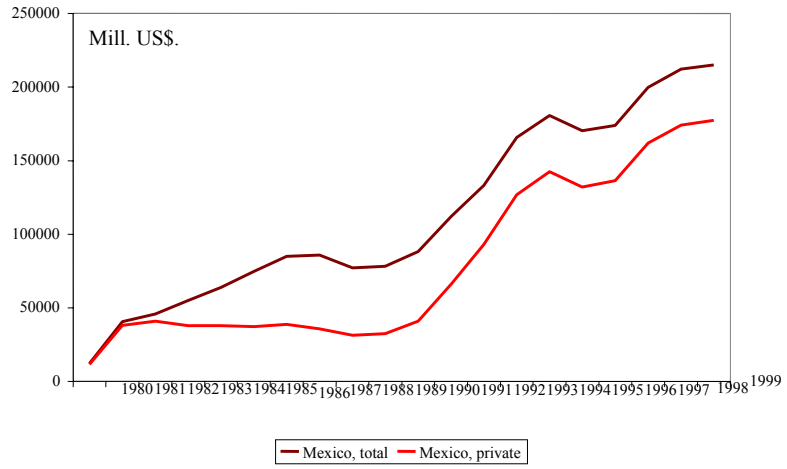
Notes: The investment rate is measured as net investment in fixed asset over the total level of fixed assets. Sales are the total revenues derived from own activity. The value displayed is the average investment rate in 1999 minus its value in 1994.

Figure 21: Capital Inflows

a) MECs



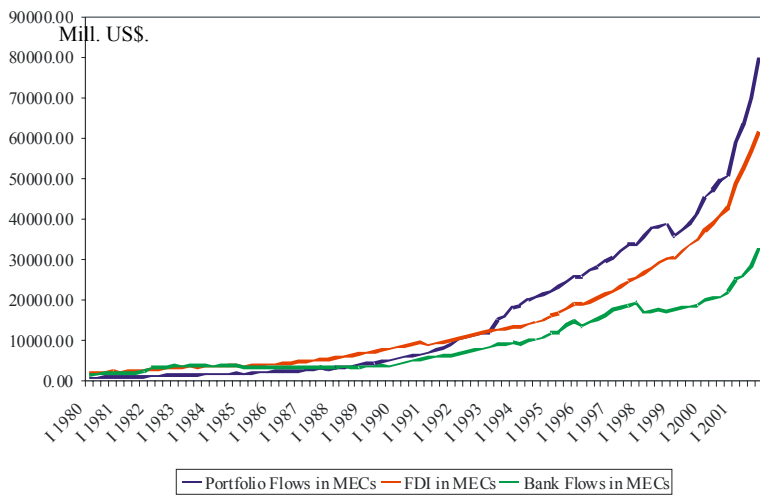
b) Mexico



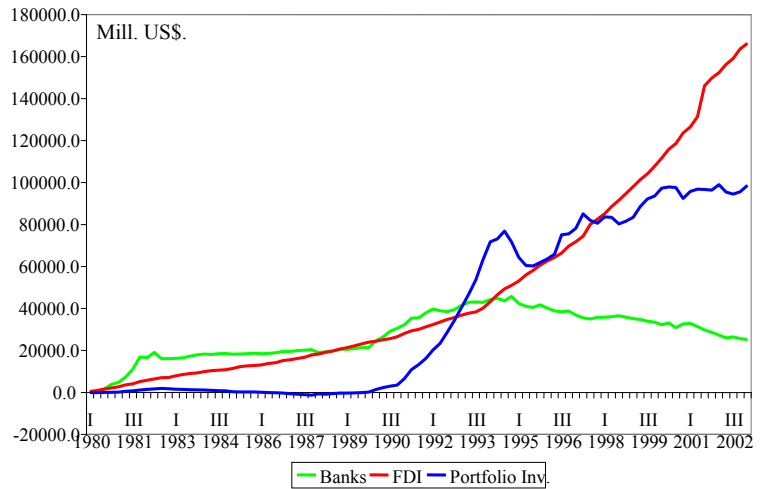
Note: The figures show the total accumulated financial inflows in Mill. US\$.
Source: International Financial Statistics, IMF.

Figure 22: Components of Private Capital Inflows

a) MECs



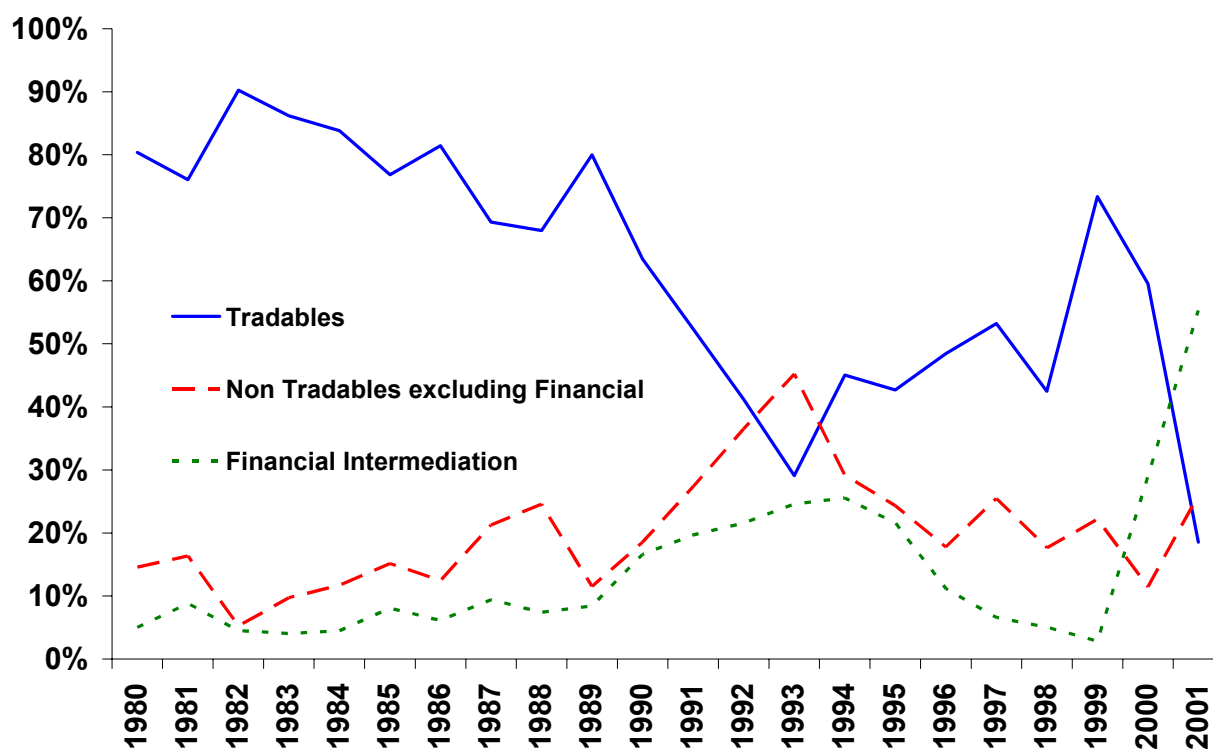
b) Mexico



Source: IFS, IMF and Bank of Mexico
Note: Banks include commercial and development banks

Figure 23: FDI by Sector

a) FDI Into Mexico



Note: 1993 there was a major FDI inflow due to the investment in telecoms. Note that FDI into small and medium firms in 1993 was also only 6.5%.

b) FDI Originating in the USA in 1998

	N	T	F
All countries	0.260	0.275	0.465
HECs	0.260	0.232	0.508
MECs	0.265	0.416	0.319
Mexico	0.154	0.592	0.255

Source: Bureau of Economic Analysis

Figure 24. The Capital Inflows Trend Break in Mexico

