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Financial Liberalisation, Credit Rationing and Slow Growth in Mexico: Testing the McKinnon-Shaw Hypothesis

Ignacio Perrotini Hernández *

Speculators may do no harm as bubbles on a steady stream of enterprise. But the position is serious when enterprise becomes the bubble on a whirlpool of speculation.

John Maynard Keynes (1936)

It is not by augmenting the capital of the country, but by rendering a greater part of that capital active and productive than would otherwise be so, that the most judicious operations of banking can increase the industry of the country.

Adam Smith (1776)

Abstract: The Mexican experience with financial liberalisation provides an interesting case of study for countries facing financial instability problems. The aim of this paper is twofold: first, to provide an overview of the macroeconomic effects of the lending boom associated with Mexico's transition from a financially repressed regime to financial liberalisation. And second, to empirically assess whether the McKinnon-Shaw hypothesis holds in this case. It is argued that financial liberalisation tends to generate financial fragility, credit rationing and long-run slow growth.

Key-words: Financial repression, financial liberalisation, growth, credit, crises.

JEL Classification Numbers: G100, G200, E440, D882

I Introduction

In the winter of 1994-95 Mexico had the misfortune of experiencing the so-called "twin crises" phenomenon, that is, a financial crisis and a currency crisis. Such financial collapse, due to its allegedly international

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repercussion, has been dubbed *The Tequila Effect*. According to a number of empirical studies, there seems to be a worldwide joint occurrence of both a financial crisis and a monetary crisis, the former being a sort of a leading indicator of the latter (Glick and Hutchison 2000; Kaminsky and Reinhart 1999). Thus, the Tequila crisis is just one example among many instances of the epidemic of financial failures that has plagued developing and developed countries alike in the 1990s. Incidentally, as Minsky (1982: 3) had already pointed out in reference to the Great Depression of 1929-33, in all of the current financial crashes "this implosion" happens to be a direct outcome of a "cumulative deflationary process" induced by restrictive monetary policies within an economic environment characterised by remarkably high levels of debt.

The literature on recent financial turmoil highlights several stylised facts. For instance, Kregel (2003) and Perrotini (2002) emphasise the role of debt-deflation processes and monetary authorities' success in defeating inflation through hard currency peg regimes as major causes of financial instability; Glick and Hutchison (2000) and Weller (1999) see the twin crises taking place mainly in financially liberalised economies, while Demirgüç-Kunt and Detragiache (1998) add that they occur in emerging financial markets with weak regulation and institutional settings. Calvo (1998), Calvo and Mendoza (2000) and Gourinchas *et al.* (1999) find that lending booms, a surge in portfolio capital inflows and sudden stops of capital flows anticipate most contemporary twin crises. Last but not least, there is the argument that, once financial fragility has taken over, the impact of credit constraints on investment forces macroeconomic fluctuations to take the form of severe output and employment losses (Gelos and Werner 1999; Perrotini 2003).

In this article we adopt a slightly different viewpoint. It is argued that, given the weakness of developing countries' financial structures and their structural macroeconomic imbalances, the fast dismantling of financial repression (FR) schemes that paves the way for financial liberalisation (FL), tends to generate financial fragility, credit rationing and long-run slow growth. Furthermore, as the economy reaches the stage of financial collapse the credit channel tightens. Nonetheless, the restoration of the flows of banking credit during the post-crisis period may not suffice for a less developed country to resume normal levels of economic activity¹. The rest of the paper is organized as follows: Section

¹ "(...) the weakening of credit is sufficient to bring about a collapse, its strengthening, though a necessary condition of recovery, is not a sufficient condition" (Keynes 1936: 158).

II briefly discusses the transition from FR to FL in Mexico. An empirical test of the FL hypothesis for the period 1981-2002 and its macroeconomic effects are dealt with in Section III. Section IV concludes.

2 From Financial Repression to Financial Liberalisation

2.1 Financial Repression

Financial repression is a result of explicit government policies. The best definition of FR is undoubtedly to be found in McKinnon (1993: 11): 'If governments tax or otherwise distort their domestic capital markets, the economy is said to be financially "repressed"'. FR prevails where "bank credit remains a financial appendage of certain enclaves" (McKinnon 1973: 68), in particular "enclaves" such as large public enterprises, government deficits, government agencies, large international corporations and highly-protected industries.

McKinnon (1973) and Shaw (1973), the two main architects of the FL hypothesis, argue that in less developed countries money and capital tend to be complements as they are the only two assets held in investors' portfolios. FR economies are usually liquidity-constrained, credit-constrained and asset-constrained economies. Under these circumstances, the domestic capital market will be fragmented with "highly adverse consequences for the quality and quantity of real capital accumulation" (McKinnon 1993: 11). In an economy with a fragmented financial market growth is expected to remain limited by internal finance and insufficient savings. The most salient features of FR are:

1. Self-financing of investment projects dominates the process of capital formation in developing economies where FR rules the market. Self-finance results from the fact that the supply of loanable funds through the formal banking sector shrinks due to the lack of incentives for saving. Hence enterprises will rely more on internal funds.

2. Interest rate ceilings on deposits and loans established by government intervention. Such ceilings reduce the rates of return on financial assets, thus diminishing aggregate financial saving and capital accumulation. With insufficient savings and artificially low interest rates the increase in demand for loans will bring about credit rationing. Therefore, some investment projects will not be voluntarily financed, which means that a financially repressed economy is bound to become credit rationed eventually. Moreover, as the credit market is highly

segmented, interest rates will vary from one investment project to another.

3. High reserve requirements. The banking sector is to keep a high percent of their demand deposits as non-interest-bearing reserves with the central bank. The central bank channels cheap credit to selected and specialized credit agencies in order to meet government-defined economic and political priorities. Hence such projects may not reflect economic agents' intertemporal preferences nor the true cost of capital. In Mexico, commercial banks were forced to hold a large proportion of their assets in the form of government liabilities. Indeed, the government used the banking system's resources to finance public deficits, since its access to international financial markets was limited during the early 1980s. Most selective credit quotas went to large government enterprises (94% in 1987 and only 6% was allocated to small and medium-sized firms²).

4. The excess demand for credit will be bridged by foreign debt which, when combined with fiscal deficits financed by compulsory credit lines, entails higher levels of inflation and exchange rate instability.

5. Inflows of foreign capital to bridge the gap between local saving and investment will not be allocated to the most productive projects as FR distorts both the exchange rate and the domestic capital markets.

6. As deposit and loan interest rates are set in nominal terms, a FR system is characterized by negative real rates of interest on loans and negative real rates of return on financial assets.

7. Monetary and price instability make it more difficult for financial deepening to take place (Shaw 1973).

What lessons are to be learned about FR "in the longer run?" According to McKinnon (1993: 13), 'countries that have sustained higher real rates of interest and more stable prices have generally had more robust real financial growth'.

2.2 Some Macroeconomic Stylized Facts

Mexico enjoyed very fast rates of economic growth—in the order of 6% on an annual average—during a fairly long period of time, namely

² Copelman (2000: 79) argues that "[t]he resources used by the government crowded out private sector financing in the banking sector. For example, in 1986, 72% of commercial bank credit flowed to the government".

1940-1981. Such bonanza was based on a twofold strategy: import substitution industrialization and FR. Nonetheless, as the economy proved vulnerable to asymmetric shocks (a shift from fixed to flexible exchange rate regimes in most developed countries, rising world interest rates and falling oil prices), the macroeconomic imbalances of the late 1970s-early 1980s led to unsustainable fiscal and current account deficits and, therein, to a sizable foreign debt. Previous fast economic growth came to a sudden halt. Mexico was forced to a sizable devaluation the peso (68%) and defaulted on its foreign debt in 1982 under the pressure of high inflation and diminished international reserves. The twin crises of the early 1980s, it has been emphatically argued, were nothing but the upshot of FR (Aspe 1993).

The Mexican economy, as many other Latin American countries, went through a long painstaking process of IMF-devised adjustment and stabilization, which resulted in flat rates of economic growth and rampant inflation, in other words, stagflation³. The economy became prone to slow growth, exchange rate and price instability and financial shocks ever since. For instance, in 1986 oil prices declined leading to a deterioration in Mexico's terms of trade by 28.6%; the peso was devalued again by 28.6% in real terms. To counter that, the Banco de Mexico introduced an exchange rate target mechanism to conduct monetary policy. However, it only fuelled inflation (159%) and was replaced in 1987 by a crawling peg regime.

After five years of monetarist policies to counter the alleged effects of FR, the economic panorama did not look any better: acute external sector crisis plus high inflation. Hence a comprehensive orthodox/heterodox stabilization package, the "Economic Solidarity Pact" (ESP), was set in motion in late 1987 (December 15th), with the main purposes of: (1) restraining wage growth, (2) conducting austere monetary and fiscal policies, (3) lowering the budget deficit, (4) controlling certain key prices of basic private and public services, and (5) most importantly, fixing the exchange rate against the U.S. dollar. The nominal exchange rate was set as an anchor for inflation, and remained so up until December 1994. The new strategy aimed at reducing inflation was complemented with other measures such as fast trade openness, financial liberalisation and an ambitious program of massive privatisation of public assets, with a view toward reducing the government's involvement in

³ Albeit no definitive evidence has been supplied so far, it has also been contended that stagflation in the 1980s was triggered by FR (Aspe 1993).

economic activity. The ESP managed to lower inflation from 159% in 1987 to 7% in 1994, most remarkably, without inducing a sharp recession. Nonetheless, the combination of free trade, disinflation, and a slow and lagging rate of crawl of the exchange rate led to a sharp appreciation of the peso: This turned out to lead to unmanageable current account deficit in the long run. Moreover, the current account deficits of those years were being financed by huge capital inflows, mainly short term flows⁴. The Mexican economy patiently moved from speculative finance to Ponzi finance (Minsky 1982) in the course from FR to FL. A run on the peso and, therefore, an exchange rate collapse was to take place⁵ when an unsustainable current account deficit of 8% of GDP and falling international reserves combined with Mexico's difficulties to refinance the stock of Tesobonos, i.e., the government's dollar denominated debt. It is no exaggeration to claim that a Ponzi finance structure generated by FL lies behind the twin crises known as *Tequila Effect*.

The ensuing recession resulted in a fall of real GDP of almost 7% in 1997. The *Tequila effect* was enhanced by the banking crisis of 1995. The banking failure triggered by the exchange rate crisis forced a bail out package that ended up costing about 18% of GDP⁶. Such rescue program proved pretty instrumental in returning Mexico to a path of strong *short-term* growth in 1996 (see table 1).

Table 1: Mexico - Growth Rates of GDP 1994-2002

Years	1994	1995	1996	1997	1998	1999	2000	2001	2002 I	2002 II	2002 III	2002 IV
GDP Growth, (%)	4.4	-6.2	5.1	6.8	4.8	3.7	6.6	0.87	-2.2	-0.1	0.5	0.9

Source: Banco de México and INEGI.

Thus, from 1996 to 1999 Mexico enjoyed fairly fast growth rates *vis-à-vis* those of the 1980s -though slower than those prior to the 1982 debt crisis-, fuelled by consumption and investment booms. The spurt of growth in investment and consumption (consumption growth averaged about 5% per year in 1989-1999) reflects a more elastic supply

⁴ Between 1990 and 1993, net capital inflows summed to US\$91 billion (Ros 1994).

⁵ On December 20, 1994 the government devalued the peso, and later on it was allowed to float.

⁶ A multilateral package of financial aid with resources coming from the U.S., the IMF, the BIS, private commercial banks, and the bank of Canada totalling US\$52 billion was set up.

of banking credit and an obvious increase in the volume of financial intermediation at least up until 1994. So, behind the aggregate demand boom there was a supportive lending boom. Such lending boom relaxed the remarkable credit constraint that prevailed during most of the 1980s. However, the very lending boom triggered by FL planted the seed for the upcoming financial fragility.

2.3 Financial Liberalisation

It can be said that in Mexico the heyday of FR was represented by the nationalisation of the banking system back in 1982. At the time, there were sixty private banks. With the exception of Banco Obrero (a bank owned by the CTM, the largest trade union) and Citibank, both small banks, the rest of the banking system was seized by the government.

Paradoxically enough, the very same government that had sponsored FR all along, set in motion the first measure toward FL: in the early 1980s the nonbank assets of various banks were sold to private hands, thus paving the way for the development of a parallel private financial system, which grew fairly rapidly during 1982-1988. In particular, the money market experienced the fastest growth rate: the share of nonbank financial institutions' assets in total assets of the financial system rose from 9.1% in 1982 to 32.1 % in 1988 (Welch and Gruben 1993; 1996). A further step toward FL was the continuous and substantial decline in the government's fiscal deficit⁷. According to McKinnon's order of economic liberalisation public finance equilibrium is a must for FL to succeed. The third and perhaps most important move toward FL in Mexico was the deregulation of both interest rates and credit supply. Starting in the fall of 1988, interest rate ceilings on all deposits and securities and "credit quotas" to high priority sectors were wiped out altogether. Likewise, by 1989 the selective credit mechanism was no longer in force, compulsory reserve requirements were removed, and new financial instruments were created⁸. Fourth, such financial reforms were further strengthened by the full privatisation of the banking system beginning in May 1990 and going through 1992. At the beginning, only

⁷ From 1982 to 1989 the public sector borrowing requirement fell from about 17% of GDP to 2.6% of GDP, and it was made a surplus of 1.5% of GDP in 1992.

⁸ Interest payments on checking accounts were allowed, the liquidity coefficient on bank liabilities first dropped to 30% and then disappeared for the sake of enhancing liquidity. Later on, a derivatives market for the peso was created.

Mexican nationals could buy the 18 banks⁹. Unfortunately, the twin crises of 1994 opened the doors for multinational banks. Fifth, a new legal framework allowed banks to unify their financial services into a universal banking structure. Sixth, the monetary policy of inflation targeting anchored on the nominal exchange rate, got rid of double-digit inflation (see table 2). Needless to say, price stability furthered the case for FL. Finally, a very important change in the international financial markets contributed to the easing of financial restrictions: as a result of the Brady Plan arranged for Mexico in 1988, international capital markets began opening up to Mexico once again in the late 1980s, thus providing the government with another source of funds to finance its now much smaller borrowing needs.

Table 2: Mexico - Main Economic Indicators 1989-1998 (Annual Growth Rates)

YEAR	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
Private Consumption	7.3	6.4	4.7	4.7	1.5	4.6	-9.5	2.2	6.4	6.4
Private Investment	5.8	13.1	11.0	10.8	-2.5	8.4	-31.2	26.7	23.4	16.9
Inflation	19.7	29.9	18.8	11.9	8.0	7.1	52.0	27.7	15.7	18.6

Source: Banco de México

Insofar as FR reduces “the real rate of growth and the real size of the financial system relative to nonfinancial magnitudes”, it deters optimal growth (Shaw 1973: 3-4). Seemingly, the obvious policy prescription would be FL, nearly “a truism” in today’s economics, according to McKinnon (1993). The gist of FL hinges upon capital account liberalisation and the elimination of all kinds of domestic financial regulations, such as interest rate and credit ceilings, selective credit quotas, “onerous” reserve requirements, and barriers to entry into the financial industry. By and large, the advantages of FL comprise an increased supply of loanable funds as flexible interest rates will generate incentives to save and domestic banks will be able to borrow internationally. Real financial savings (sf) is determined as follows:

$$sf_t = sf(y_t, r_t, i^*_t) \quad (1)$$

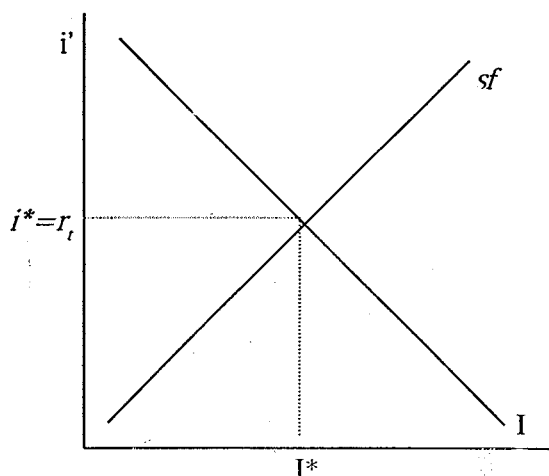
⁹ The banking sector had been previously consolidated from 58 to 18 banks, and the government injected large amounts of capital with a view to sell them at a profit.

where y_t is real income in period t , r_t is the real rate of return on capital in period t , and i^* is the equilibrium international real rate of interest in period t . Incidentally, as it did happen in the case of Mexico, international borrowing may be procyclical insofar as the ability for the banking system to borrow abroad and lend in the domestic market augments along with economic booms. Thus, higher real rates of interest are the key to higher saving and investment rates. While higher interest rates enhance investment efficiency, the average real rate of return on capital also rises as FL encourages high-yielding projects. Hence FL improves both the saving rate and the rate of aggregate economic growth. The optimal outcome of maximizing investment will be further achieved if monetary policies aim at reducing inflation. Investment (I) is determined as follows:

$$I_t = I(r_t, sf_t) \quad (2)$$

Under FL investment and growth are no longer constrained by saving. FL assures that money and capital become complement to one another. In equilibrium $i^* = r_t$ obtains (see graph 1). All in all, according to the McKinnon-Shaw hypothesis, if FL allocates liquidity to the most productive investment projects, the economy would follow a long-run growth pattern characterized by: (1) ever higher technology enticed by capital deepening ; (2) financial and exchange rate stability; (3) low inflation and high rates of employment; (4) a sizeable financial system with respect to the real sector; (5) optimal economic growth based on booming domestic saving, lending and investment and (6) a highly competitive financial market.

Graph 1: Effect of Financial Liberalisation on the Credit Market



3 Empirical Evidence: Testing the FL Hypothesis

Insofar as the interest rate that maximizes savers' income may not coincide with the one that clears the credit market, a highly competitive credit market may be shown to be one in which the equilibrium interest rate fails to avoid credit rationing (Stiglitz and Weiss 1981). Therefore, neither the lending boom would be sustainable in the long-period nor equilibrium investment would be attained. In such a case, the McKinnon-Shaw predictions would not hold.

In order to calibrate the FL hypothesis, we estimate the impact of the real interest rate on sf for the period 1981-2002. We want to see whether sf is elastic with respect to the interest rate (as postulated by the McKinnon-Shaw hypothesis, MSH) or whether there is an inelastic relationship between them (as postulated by the credit rationing hypothesis, CRH). The following equation is estimated using OLS (variables are defined as before¹⁰):

$$sf = \beta_0 i_t + \beta_1 y_t \quad (3)$$

which yielded the following results:

$$sft = 967680.20it + 0.01yt \quad (4)$$

$$R^2 = 0.19; DW = 0.48.$$

As expected by both theories (MSH and CRH), the flow of sf is shown to be positively affected by the interest rate, with an elasticity of 1.47 for the whole period under study. However, during 1981-1989 I (the period of FR), the average elasticity was 3.45, while under the period of FL it was only 0.23, quite inelastic. A further model for the flow of financial saving was also obtained using the error correction model (ECM). The estimated final equation includes two dummy variables, one to account for the change in savers' confidence on the liberalised financial system ($D = 1$ in 1994 I and zero otherwise) and another one ($D = 1$ for the period 1995-1996, when sf became negative, and zero otherwise) to remove the effect of the twin crises on saving. The results are:

$$\Delta SF_t = 462213.9 \Delta i_{t-2} - 0.29 \Delta SF_{t-2} - 0.34 \Delta SF_{t-3} - 0.16 \Delta SF_{t-4} - 0.53 ECM_{t-4} \quad (5)$$

(3.09) (-3.58) (-4.21) (-2.03) (-8.08)

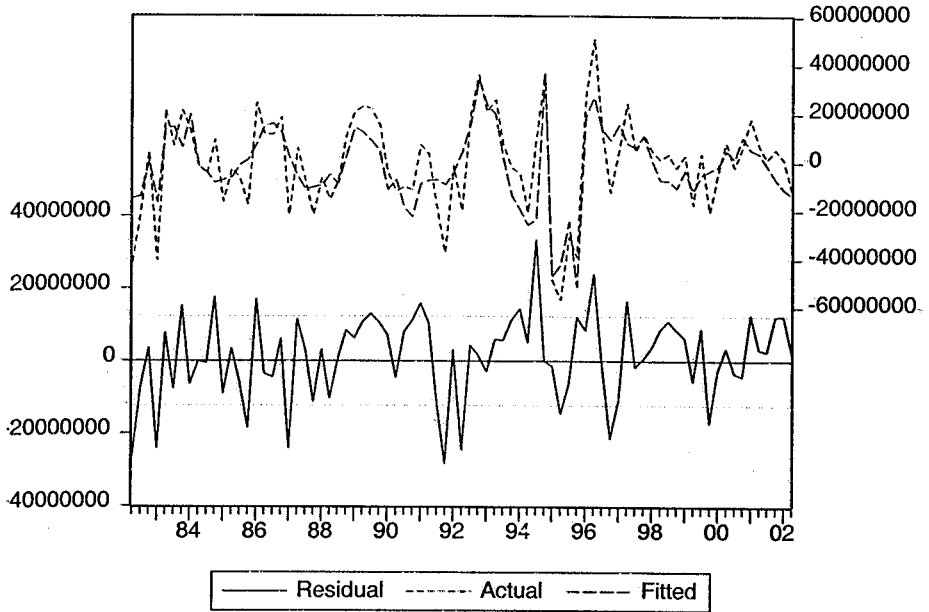
Equation (5) is satisfactory and it does not reject the hypothesis of normality (see graph 2 and appendix I). Numbers in parenthesis are t-statistic values:

¹⁰ Data and variable definitions may be obtained from the author upon request.

$$ECM1t = SFt - 967680.20it - 0.01yt$$

$$R^2 = 0.64; DW = 1.84$$

Graph no. 2. Flows of Financial Saving, Actual and Fitted, 1981 I-2022 II.



Next, we tried and measured the relationship between financial saving flows and the annual flow of credit in real terms (c_t)¹¹. The equation to be estimated is:

$$c_t = \alpha_0 sf_t \quad (6)$$

The result of OLS estimations is:

$$c_t = 0.0006sf_t \quad (7)$$

$$R^2 = 0.19; DW = 0.12$$

A final econometric model was estimated for the flow of real credit using the ECM with a corresponding $D = 1$ for 1995-1997 I and zero otherwise, to capture the contractive effect of the twin crises on commercial banks' credit. The results are shown below:

$$\Delta c_t = 0.0005\Delta sf_t + 0.0003\Delta sf_{t-4} + 0.16\Delta c_{t-1} - 0.52\Delta It_{t-4} - 0.13ECM2_{t-4} \quad (8)$$

(7.80) (3.46) (2.51) (-6.80) (-4.58)

¹¹ The flow of real credit is the annual change in the stock of the banking sector's credit to the non-financial private sector, adjusted for the GDP implicit deflator.

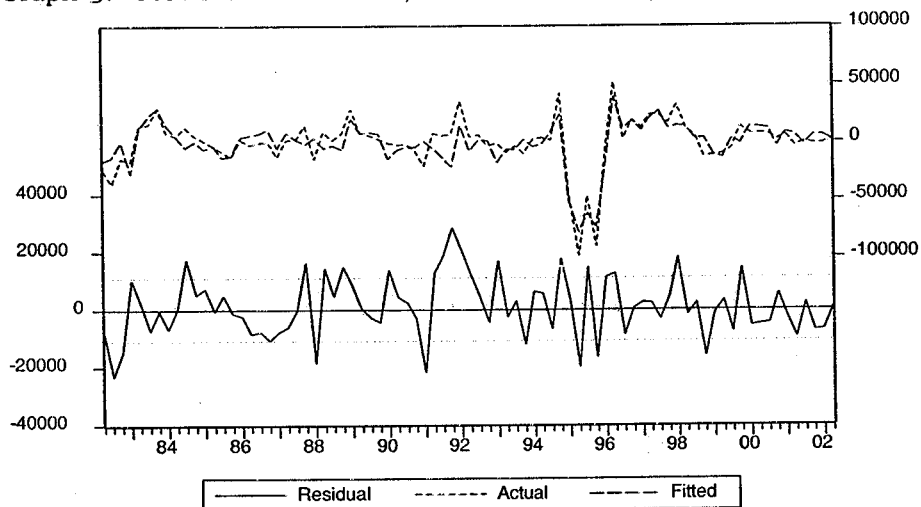
Again, numbers in parenthesis show t-statistics.

$$ECM2_t = c_t - 0.0006sf_t$$

$$R^2 = 0.77; DW = 1.83$$

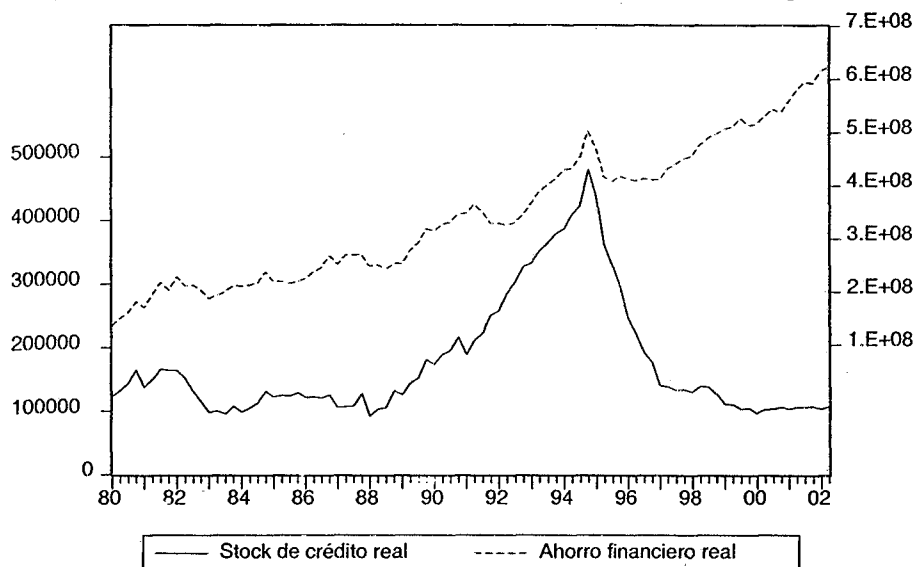
Equation (8) is statistically satisfactory and does not reject the hypothesis of normality (see graph no. 3 and appendix I).

Graph 3: Flows of Real Credit, Actual and Fitted, 1981:1 – 2002:2



Summarizing, first, the flow of credit is not linearly determined by the availability of loanable funds; the risk inherent to economic activity is also significant. Secondly, rising real interest rates does not seem to be a sensible solution to credit constraints: albeit there is a positive correlation between these two variables, it is important to emphasize that such relationship happens to be inelastic: the average annual growth rate of financial saving flows was 7.11% during 1980-1989, while it hardly changed during the period dubbed FL, i.e., 7.21%. Third, the empirical evidence does not seem to support the hypothesis that the real interest rate determines the real flows of credit (see graph no. 4).

Graph 4: Evolution of Real Credit and Real Financial Saving



Conclusion

1. McKinnon (1973) and Shaw (1973) maintain that low investment and slow growth in less developed economies arise from FR. The remedy to circumvent what in such authors represents a sort of development trap is FL in order to reflect the true cost of capital.

2. Financial saving may very well be positively affected by the rate of interest. However, as the empirical analysis has revealed, between the two there is an inelastic relationship. Therefore, FL does not necessarily guarantee that financial deregulation will unleash a credit boom. Moreover, even if a credit boom follows suit it does not imply that the investment and consumption booms will not end up in financial fragility.

3. One very important point is as follows. The stock of real credit grew 0.17% on an annual average during 1980-1989 I, while it declined -1.18% during the FL period. Throughout the latter there was a continuous appreciation of the exchange rate. While this added to the slow down of the real sector, it also induced investors to rely more heavily on foreign finance. In order to avoid devaluation, the Banco de México tightened money supply and raised interest rates, thus making it harder for domestic firms to repay loans and more probable for foreign investors to withdraw their funds.

4. As can be seen from graph number 4, FL unleashed a dramatic lending boom, which, in turn, fuelled both a domestic consumption and investment booms (see table number 2). As a consequence, interest rates rose and, despite inflation declined, capital inflows appreciated the currency, worsened the current account, and eventually generated the collapse of the banking sector and forced an abrupt transition from a fixed to a flexible exchange rate regime.

5. Finally, the upshot of Mexico's experience with FL has not only been financial fragility, but also a long period of credit rationing and slow growth (see table number 1).

Adam Smith recommends that commercial banks should channel the flow of savings to productive enterprises, and yet "*rendering a greater part of that capital active and productive*" is just what Mexico's banking sector has not been doing ever since the Tequila crisis!

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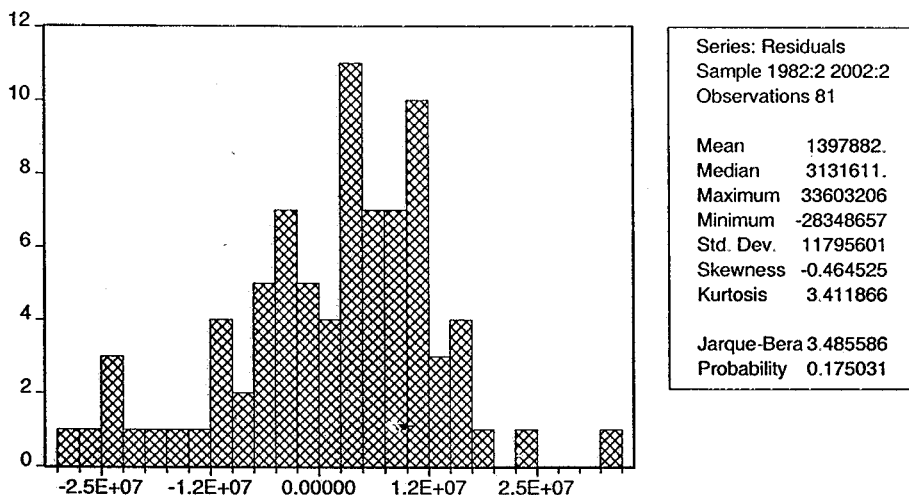
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Appendix i

Graph a1: Normality test for the flow of financial saving model (equation 5).



Heteroscedasticity test for the flow of financial saving model

ARCH Test:				
F-statistic	0.602423	Probability		0.662112
Obs*R-squared	2.493578	Probability		0.645786
Test Equation:				
Dependent Variable: RESID^2				
Method: Least Squares				
Date: 11/13/02 Time: 01:59				
Sample(adjusted): 1983:2 2002:2				
Included observations: 77 after adjusting endpoints				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	1.43E+14	4.02E+13	3.557559	0.0007
RESID^2(-1)	-0.143539	0.114627	-1.252228	0.2145
RESID^2(-2)	0.071300	0.115390	0.617907	0.5386
RESID^2(-3)	0.002149	0.115550	0.018600	0.9852
RESID^2(-4)	-0.029203	0.108951	-0.268035	0.7894
R-squared	0.032384	Mean dependent var		1.29E+14
Adjusted R-squared	-0.021372	S.D. dependent var		1.95E+14
S.E. of regression	1.97E+14	Akaike info criterion		68.72960
Sum squared resid	2.80E+30	Schwarz criterion		68.88180
Log likelihood	-2641.090	F-statistic		0.602423
Durbin-Watson stat	2.004743	Prob(F-statistic)		0.662112

Autocorrelation test for the flow of financial saving model

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	2.126036	Probability	0.086628
Obs*R-squared	7.747477	Probability	0.101279

Test Equation:

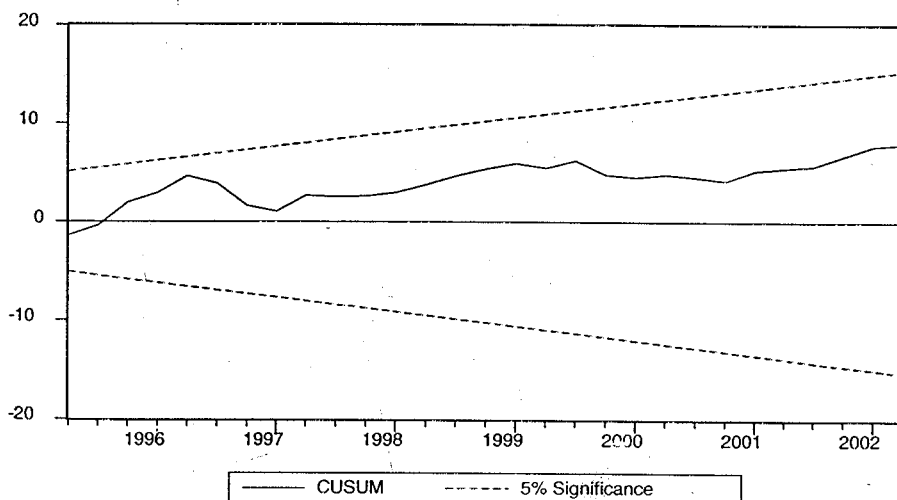
Dependent Variable: RESID

Method: Least Squares

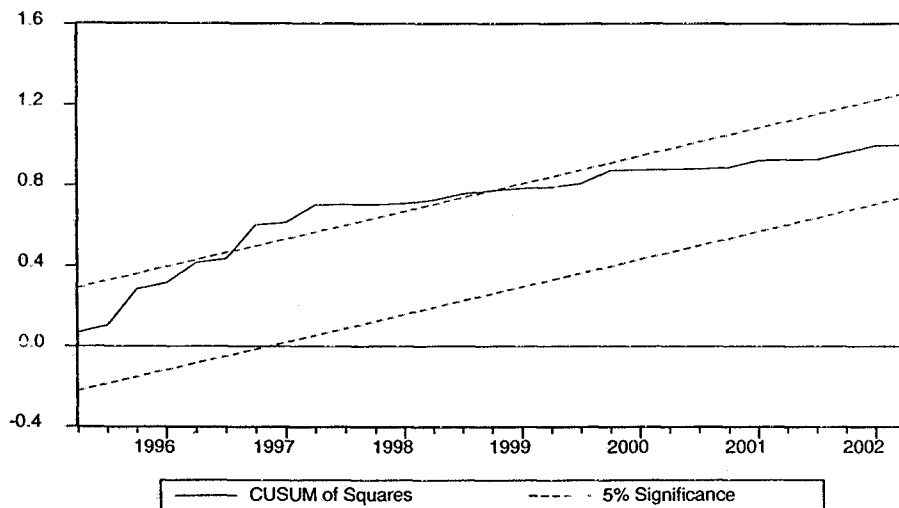
Date: 11/13/02 Time: 01:56

Variable	Coefficient	Std. Error	t-Statistic	Prob.
DU	960422.7	600157.3	0.160028	0.8733
DU1	-2082031.	13239515	-0.157259	0.8755
D(R(-2))	157405.4	162005.1	0.971608	0.3346
D(SF(-2))	-0.179960	0.118467	-1.519072	0.1332
D(SF(-3))	-0.049291	0.116336	-0.423691	0.6731
D(SF(-4))	0.199674	0.110379	1.808985	0.0747
UI(-4)	-0.049736	0.078630	-0.632533	0.5291
RESID(-1)	0.027180	0.121243	0.224177	0.8233
RESID(-2)	0.299828	0.169908	1.764651	0.0820
RESID(-3)	0.116262	0.175670	0.661821	0.5103
RESID(-4)	-0.418072	0.173834	-2.405005	0.0188
R-squared	0.095648	Mean dependent var		1397682.
Adjusted R-squared	-0.033545	S.D. dependent var		11795601
S.E. of regression	11991813	Akaike info criterion		35.56300
Sum squared resid	1.01E+16	Schwarz criterion		35.88817
Log likelihood	-1429.301	F-statistic		0.740348
Durbin-Watson stat	2.027569	Prob(F-statistic)		0.684236

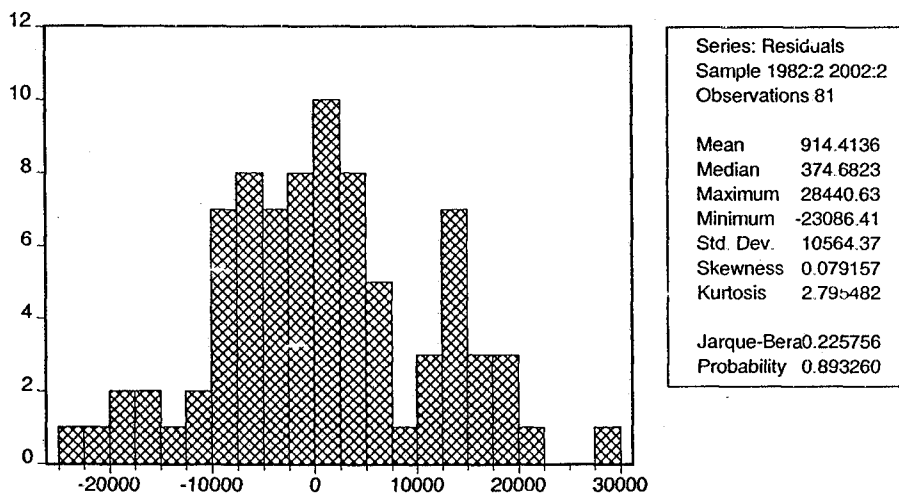
Graph a.2: Cusum test flow of real financial saving model



Graph a.3: Cusum test (squares) flow of real financial saving model



Graph a.4: normality test flow of real financial saving model (equation 8)



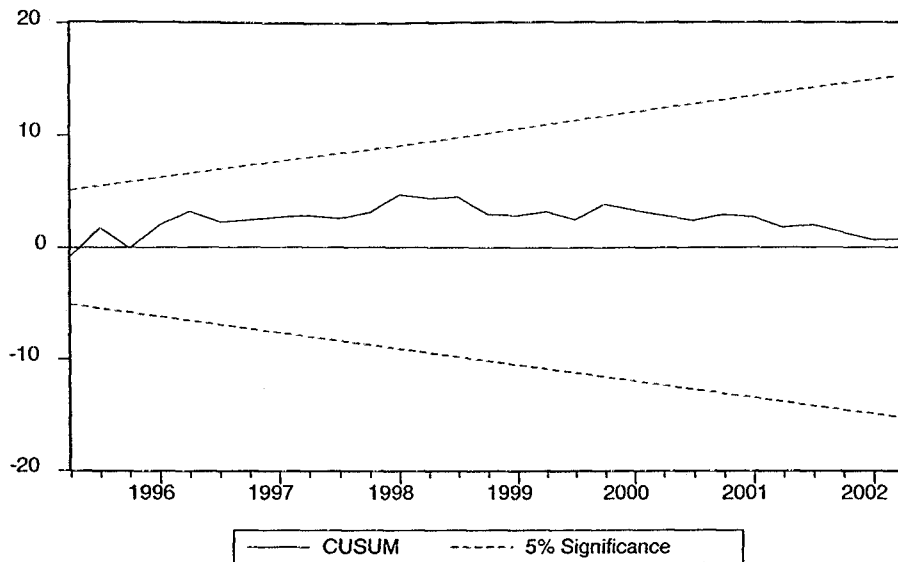
Heteroscedasticity test for the flow of real financial saving model

ARCH Test:				
F-statistic	2.112748	Probability		0.087986
Obs*R-squared	8.088481	Probability		0.088390
Test Equation:				
Dependent Variable: RESID^2				
Method: Least Squares				
Date: 11/13/02 Time: 02:11				
Sample(adjusted): 1983:2 2002:2				
Included observations: 77 after adjusting endpoints				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	61205194	24846675	2.463315	0.0162
RESID^2(-1)	0.284850	0.117990	2.414193	0.0183
RESID^2(-2)	0.059550	0.122514	0.486066	0.6284
RESID^2(-3)	0.049198	0.115856	0.424651	0.6724
RESID^2(-4)	0.010536	0.111439	0.094544	0.9249
R-squared	0.105045	Mean dependent var		1.05E+08
Adjusted R-squared	0.055326	S.D. dependent var		1.46E+08
S.E. of regression	1.42E+08	Akaike info criterion		40.44765
Sum squared resid	1.46E+18	Schwarz criterion		40.59984
Log likelihood	-1552.234	F-statistic		2.112748
Durbin-Watson stat	1.990003	Prob(F-statistic)		0.087986

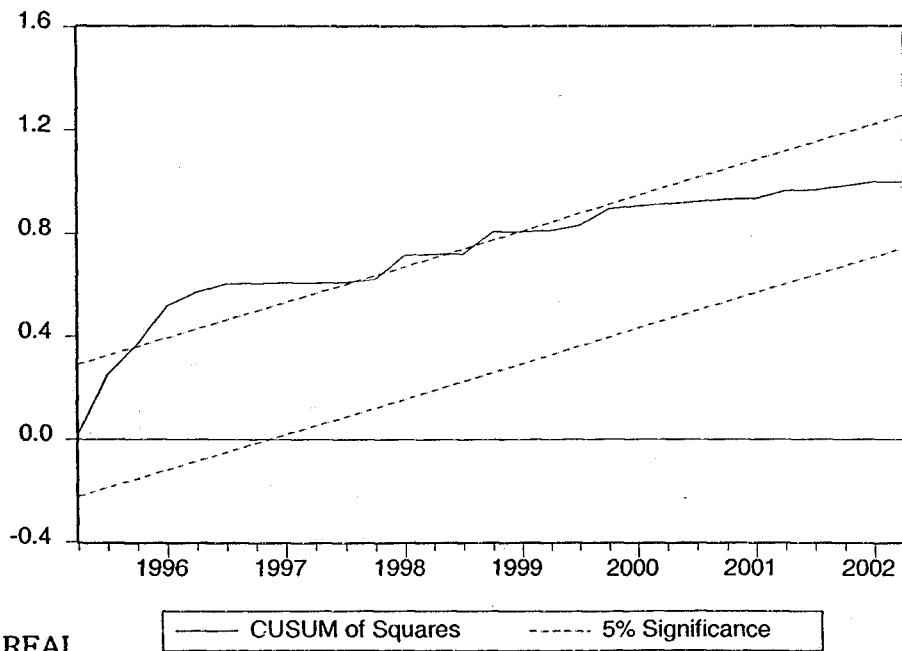
Autocorrelation test flow of real credit model

Breusch-Godfrey Serial Correlation LM Test:				
F-statistic	1.220511	Probability		0.309839
Obs*R-squared	4.636413	Probability		0.326677
Test Equation:				
Dependent Variable: RESID				
Method: Least Squares				
Date: 11/13/02 Time: 02:10				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
DU	4105.212	5835.039	0.703545	0.4840
D(SF)	3.19E-05	7.42E-05	0.429230	0.6691
D(SF(-4))	-5.31E-05	9.18E-05	-0.578508	0.5648
D(FCF(-1))	0.010592	0.086110	0.123001	0.9025
D(FCF(-4))	0.132347	0.111147	1.190741	0.2377
UI(-4)	0.014315	0.032393	0.441903	0.6599
RESID(-1)	0.054695	0.147529	0.370744	0.7119
RESID(-2)	0.122726	0.118048	1.039628	0.3020
RESID(-3)	0.015029	0.118785	0.126524	0.8997
RESID(-4)	-0.323241	0.181302	-1.782881	0.0789
R-squared	0.057240	Mean dependent var		914.4136
Adjusted R-squared	-0.062265	S.D. dependent var		10564.37
S.E. of regression	10888.30	Akaike info criterion		21.54391
OSum square: resid	8.42E+09	Schwarz criterion		21.83952
Log likelihood	-862.5283	F-statistic		0.478974
Durbin-Watson stat	1.893/33	Prob(F-statistic)		0.884094

Graph a.5: Cusum test real credit model



Graph a.6: cusum test (square) flow of real credit model



REAL