Abstract

This paper deals with how the exchange-rate regime of Argentina and Mexico shaped macroeconomic performance over the period 1994-2001. The purpose of the analysis is to draw lessons for Latin American and other countries on whether and how the choice of the exchange-rate regime can help sustained growth. As it is impossible to isolate the growth effect of the exchange-rate regime in a comparative country study, the paper emphasises those macro variables that have been identified in the theoretical and empirical literature as important channels through which the choice of the regime affects economic performance: a) investment, b) trade openness, c) capital flows and d) fiscal or institutional rigidities. These channel checks confirm 1997/1998 as the “breakeven” year since Mexico’s managed floating currency regime has yielded higher pay off relative to Argentina’s currency board, faced to successive external shocks.

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Hard Peg versus Soft Float.
A Tale of Two Latin-American Countries

“Argentina is far from resembling Mexico”,
Domingo Cavallo – Argentina’s former Finance Minister -, March 1995,

1) Introduction

Mr. Cavallo has a point: While Mexico in early 1995 was in deep trouble, ending yet another failed Latin American episode of exchange-rate based stabilisation by moving to a managed float of her currency, Argentina was not doing too badly even in the face of the Tequila crisis. Seven years on, Mexico has been awarded investment-grade sovereign rating by all leading rating agencies, while Argentina is in deep disarray and selective default.

This paper deals with how the exchange-rate regime of two main Latin American economies, namely Argentina and Mexico, shaped macroeconomic performance over the period 1994-2001. The purpose of the analysis is to draw lessons for Latin American and other countries on whether and how the choice of the exchange-rate regime can help sustained growth. As it is impossible to isolate the growth effect of the exchange-rate regime in a comparative country study, the paper will emphasise those macro variables that have been identified in the theoretical and empirical literature as important channels through which the choice of the regime affects economic performance.

The paper is organised as follows. The first section will provide an overview on the current debate on exchange-rate regimes, referring in particular to the channels between exchange-rate regimes and economic performance. Section two will shortly describe the two (three, were Mexico’s pre-crisis regime considered) monetary and exchange-rate regimes so far implemented in both countries. In section three, we move on to analyse the empirical evidence about the transmission channels, focusing on real variables performance, capital market issues (sovereign ratings, bond spreads and financial flows), the external sector role and fiscal discipline. There we’ll address the question of what factors account for building the road to credibility, hence to sustained output growth and macroeconomic stability. Finally we carry out an econometric exercise whereby we give a rationale to explain the widening gap in sovereign risk and the different dynamics of public debt sustainability.

In a nutshell, we argue that 1997/1998 can be considered as the “breakeven” year when Mexico’s managed floating currency regime has started to yield a higher pay off relative to Argentina’s currency board in face of successive external shocks -notably the Russian default and Brazil’s currency devaluation. Furthermore, our analysis suggest that a more opened-up and integrated economy, alongside a dynamic non-traditional export sector, FDI allocated mainly to tradable good sectors and strengthened public finances, can altogether make the difference in building the road to solvency. The complementary econometric exercise underscores, in turn, how these elements may have triggered more
credibility paving the way for a virtuous circle of lower sovereign spreads and higher sustained growth.

2) Exchange Rate Regimes and Economic Performance

For a while, a consensus-like doctrine prescribing either a full float or a hard peg ("dollarisation" or monetary unions) as the optimal exchange-rate policy had emerged influencing much of the new literature about currency regimes. This consensus was largely driven by Mundell’s ‘impossible trinity’ theorem in view of increasing world financial integration and full capital account liberalisation in most emerging countries (EM in what follows).

On the one hand, the hard peg advocates have argued that because of a) the lack of credibility, b) liabilities dollarisation (Calvo, 2000, Haussman and Powell, 1999) c) the ‘original sin’ problem of non-existing long-term local-currency finance inducing currency and maturity mismatches (Haussman, 2000) d) excessive de-facto interest rate and reserves volatility – e.g. fear of floating (Calvo and Reinhart, 2000), or e) the need for capital market financing instead of relative price-adjustment (Dornbusch, 2001), currency/monetary policy is no longer an effective policy instrument for EM. They also rule out intermediate options due to their non-verifiability (Frankel, Schmukler and Serven, 2000), the lack of reputation (Guidotti and Powell, 2000) and/or the general ineffectiveness of capital controls. Thus, importing credibility and a hands-off exchange rate approach seemed to be, from this standpoint, the most suitable move for EM so as to cope with their global exposure and vulnerability to “sudden stops” of capital flows. Some hard peg advocates seem still in denial mood about the impact of the currency board on Argentina’s misfortunes even in 2002.

On the other hand, those who support the flexible-oriented corner (Larrain and Velasco, 2001, Schmidt-Hebbel, 2000) point to nominal wage and price rigidities, to the prevalence of real shocks in EM and to the moral hazards implicit in pegs to make the case for exchange-rate flexibility. They attempt to prove their case by citing the main shortcomings of the hard pegs experiences as: wider and more volatile sovereign spreads driven by comparatively growing default risk; heightened output volatility; wage and price stickiness; insufficient fiscal discipline and the non-compliance with Optimum Currency Areas criteria (OCA) to irrevocably peg the exchange rate. Furthermore, reviving intermediate options and building-credibility approaches have also been brought back to the arena (e.g. Williamson, 2000; Bénassy-Quéré and Coeuré, 2000; Braga de Maced, Cohen and Reisen, 2001) to highlight the fact that different transition paths can be adopted in emerging economies, without necessarily contradicting the basic tenets of the impossible trinity theorem.

Compared to this more general perennial debate about the superiority of exchange rate regimes in defined circumstances, theory and evidence on the channels through which the regimes impact growth performance is relatively sparse. This may be due to the fact that the policy relevance of mainstream economics has been hampered by its rational expectations framework, where perfect-foresight models suggest that exchange
rate regimes should not affect the long-run equilibrium value of real variables, including the long-run allocation of resources. Let us therefore direct our attention to proxy variables relevant to this comparative study, for which a link between the exchange rate regime and economic growth has been evident in theory and practice.

First, the strong correlation between investment and growth, resulting from the interaction of capital accumulation and technical progress, is well established (e.g. Schmidt-Hebbel, Serven and Solimano, 1996). Further, the debt-cycle hypothesis warns that capital-importing countries are bound to run into costly crises unless inflows consistently augment investment rather than being diverted into consumption (Ffrench-Davis and Reisen, 1998). What is the evidence then for exchange-rate regimes to impact on investment versus consumption?

Exchange rate pegs have often been accompanied by a boom in bank lending, which in turn has fuelled a boom in consumption spending (Sachs, Tornell and Velasco, 1996). Initially, pegs tend to lower inflation which in turn produces a rise in real-money balances, both as a result of central bank intervention to peg the currency and of higher money demand. A currency board reinforces the result as domestic money supply is pegged to the initial rise in foreign exchange reserves. The unsterilised intervention on the foreign exchange market is fully intermediated into the banking system, giving rise to a twin bank credit and spending boom. Under flexible exchange rates, by contrast, disinflation results from a lower money supply. Intermediate exchange rate regimes are characterised by sterilised intervention which aims at reducing the domestic credit component in response to higher foreign exchange reserves. In the context of capital inflows, disinflation and ill-supervised banking systems, therefore, pegs will tilt the allocation of resources more to consumption than either floating or intermediate regimes.

Second, the endogenous-growth literature has established a positive link between openness to international trade and economic growth, as open economies benefit from their greater ability to absorb technological advances, take advantage of larger markets and boost efficiency as a result of higher competition (Barro and Sala-i-Martin, 1995). Which kind of exchange rate regime is more likely to foster international trade orientation, will probably largely depend to which extent flexible rates can avoid excessive volatility and pegs large misalignments of the real effective exchange rate. Rose (2000) finds evidence that currency unions have a positive effect on trade while exchange rate volatility exerts a negative influence; this result implies, however, that unlike in Argentina the bulk of trade is the union, resp. anchor currency as otherwise effective exchange rates can be destabilised by third-currency fluctuations. Pegged rates, by contrast, may be more akin to persistent misalignments and hence more supportive to export growth. Nilsson and Nilsson (2000), using a gravity model for more than 100 countries, find that more flexible regimes favour export growth, and by implication, output growth.

Third, although the link between international trade and growth has received more attention in the literature, openness to capital flows can also promote growth – under certain conditions. Arteta, Eichengreen and Wyplosz (2001), in what is perhaps the most careful study on the link between opening and growth up to now, find fragile evidence of
a positive association between capital-account liberalisation and growth. The effects vary with time, with how liberalisation is measured and with country-specific prerequisites. Their results cover round 60 countries and the period 1973-92. The authors produce evidence that the positive growth effects of liberalisation are stronger in countries with higher standard indicators of the rule of law (law and order index of the *International Country Risk Guide*), in countries which have opened up more generally before the capital account was freed (as measured by the *Sachs-Warner index*), and where macroeconomic imbalances (measured by the *black market foreign exchange premium*) were eliminated beforehand. At least the last condition is linked to the choice of the exchange rate regime (see paragraph above). Note that the structure of inflows which the opening process entails will determine its growth impact as equity inflows have been shown to exert a strong independent impact on growth in developing countries during the 1990s (Reisen and Soto, 2001). Bonds, by contrast, did not produce any significant impact on growth in the OECD Development Centre study, and foreign bank lending — both short and long term — was found to be negatively associated with tomorrow’s per capita income growth in the recipient country, unless local banks were sufficiently capitalised. As reviewed in Reisen (1998), pegs in developing countries have repeatedly induced hot money inflows in view of structural interest rate differentials that were exploited by carry traders and local banks. The exchange rate peg provides the incentive to allocate those inflows disregarding currency and maturity risks, as these are implicitly transferred to the central bank. Flexible exchange rates are thus more likely than pegs to produce inflows that entail growth benefits.

Fourth, the degree of a country’s fiscal, institutional, price and wage *rigidity* as well as her specific *shock exposure* will importantly determine the impact of the exchange rate regime on long-run economic performance (Freytag, 2002). In the presence of rigidities (not every economy displays Hong Kong’s flexibility), more flexible exchange rate arrangements may foster growth as real shocks can be absorbed more easily, as monetary policy retains a degree of autonomy for an anti-cyclical stance, and as costly breakdowns of the exchange-rate regime in adverse conditions are less likely than under pegs. The expected smoother adjustment to shocks should allow for higher productivity growth as the economy is operating closer to productive capacity and displays less output volatility. Note that raw-material producing OECD countries subject to heavy terms-of-trade volatility have generally opted for flexible exchange rates.

But it has been argued that developing countries with shallow financial markets will see lower growth under flexible rates as their financial system is ill-prepared to withstand exchange-rate shocks and the private sector lacks hedging instruments. Aizenman and Hausmann (2000) provide a model where greater exchange-rate stability translates into lower interest-rate volatility and lower risk premia, thereby increasing output. They suggest that the gains from hard pegs may be greater for emerging-market economies than for OECD countries.

The empirical evidence on the independent growth impact of exchange-rate regimes in developing countries is inconclusive so far, with a certain bias in favour of flexible regimes. Adopting a three-way classification based on de-facto regimes with data extracted from the IMF World Economic Outlook over 1960-1990, Ghosh et al (1996)
have found that although pegged regimes have had higher investment, floating ones have experienced faster productivity growth when measured by per capita GDP growth and controlling for inflation differentials. Part of the higher productivity growth under floating rates is reflected in faster growth of external trade and a better allocation of resources, given some relative price (e.g. real wages) rigidity observed in fixers. One manifestation of the rigidities corroborated by Ghosh et al (1996) is the higher volatility of GDP growth and employment, a result recently confirmed by Ffrench-Davis and Larrain (2001). A last but not least interesting result they present refers to the output growth gains those countries switching from a peg to a more flexible arrangement had. They calculate an average increase in GDP growth of 0.3 percentage points one year after the switch and more than 1 percentage point three years after the switch took place.

Challenging conventional IMF classifications based on de-jure regimes Levy-Yeyati and Sturzenegger (2000) regroup exchange-rate policies by using a K-cluster methodology that distinguishes high from low volatility environments. This new classification groups the countries according to the actual behaviour of three main variables, namely: a) exchange rate volatility, b) volatility of exchange rate changes and c) volatility of reserves, measured as the absolute average changes of foreign-currency reserves over monetary base (to assess the monetary impact of the intervention in currency markets). Using IMF statistics -but over 1974-1999 so that Breton Wood’s period bias is excluded- they run econometric regressions coming up with: a) pegs significantly and negatively related with per capita output growth in non-industrial countries, b) de-jure pegs that devalue exhibit faster growth than its counterparts that defend the regime, c) output volatility declines monotonically with the degree of regime flexibility and d) real interest rates appear to be lower under fixed exchange rates than under floats, even for those countries with intermediate regimes who are said to be fixers.

Based on the regime classification provided by Yeyati and Sturzenegger, the Bank of Canada has recently released a study which investigates the effect of the exchange-rate regime on mid-term growth (five year averages) for a sample of 25 emerging markets over the 1973-1998 period (Bailliu, Lafrance and Perrault, 2001). The study finds evidence that more flexible exchange rate arrangements are associated with higher growth, provided these countries are open to international capital flows and have well-developed financial markets.


3-1. Argentina’s Currency Board (R.I.P)

Currency boards, once designed as a monetary arrangement for British colonies and then disused as countries gained political independence, have been back in fashion (until?) recently. Currency boards now exist in Bosnia, Bulgaria, Estonia, Hong Kong, and Lithuania, but also existed in Argentina until very recently (January 2002). They consist of exchange rates which are strictly fixed, not just by policy but by law. Domestic money can only be issued when it is fully backed by foreign exchange, removing monetary policy discretion from the government and the central bank.
Argentina provided one of the most-debated cases of a currency board regime. In April 1991, after a long history of macroeconomic mismanagement and two episodes of hyperinflation, the currency board started to operate, with the peso pegged to the US dollar at one. The regime was based on the Convertibility Law passed in March 1991 by Congress, which granted the dollar legal tender status, and was subsequently supported by comprehensive deregulation of the economy and the full liberalisation of the current and capital accounts of the balance of payments.

Argentina’s regime featured some notable design elements that represent a deviation from a strict currency board. These elements were introduced to accommodate the loss of a lender of last resort which a currency board entails and which exposes the country to financial crises with insufficient provision of liquidity; this in turn requires strong and liquid domestic banks. First, the currency board was integrated into the central bank, there were no designated currency board accounts. Second, 33% of the money-base cover could be provided in the form of dollar short-term Argentinean public debt, rather than through international reserves. Third, the Argentine system was characterised by demanding capital requirements and a series of liquidity provisions. Banks were obliged to hold 21% of all deposits in liquid international reserves at the Central Bank or at Deutsche Bank New York. The Central Bank had also a contingent line of credit with a dozen international banks covering 10% of deposits in the banking system.

3-2. Mexico: From Peg to Inflation-Targeting

After the collapse of its pegged but adjustable exchange rate regime, late 1994, Mexico has been floating quite freely since then. Nevertheless, at different stages there has appeared for different reasons the need for the authorities to intervene in the forex market. In all of these cases, the rule that has always been followed consists of the complete transparency of the intervention, whose goal is not to defend a particular level of the exchange rate (Carstens and Werner, 1999). The rule has included a two-fold approach in which a put-option mechanism was used to accumulate reserves and a contingent sale was generally used when the Central Bank wanted to minimise a sudden depreciation. Additionally, Banco de Mexico sterilises through open-market interventions in order not to affect the primary money supply. Futures currency markets have also been created in order to reduce exchange rate volatility.

While Mexico adopted a managed floating, it was converging gradually towards inflation targeting to anchor inflation expectations. Just after the crisis, there was a brief experience with monetary targeting, but as inflation came down and there was significant evidence of instability in the demand for money, the Central Bank started adopting annual inflation targets (since 1997-98 according to some prestigious officials). The main elements of the current framework include (a) a medium term goal of reducing inflation towards international levels in 2003, (b) annual inflation targets, (c) monetary policy actions based on an assessment of inflationary pressures, and (d) a transparent system based on the publication of a quarterly inflation report. A basic difference of the Mexican approach, compared to other “targeters”, concerns the policy instrument. While most inflation targeters use a short-term interest rate target (i.e. Brazil), the Mexican Central Bank uses a reserve operating procedure, known as the “corto”. This system
induces significant short term volatility in nominal interest rates, a feature desired by authorities in order to have a more stable exchange rate and, hence, a more stable inflationary environment.

4) Channel Checks: The Evidence

The current section aims at exploring the transmission channels of the exchange-rate regime to economic performance. We ultimately intend to explain how Mexico’s float has built credibility through a sound and less volatile economic performance whereas Argentina’s currency board has failed to deliver the long-term benefits it was supposed to produce. Unlike Argentina, Mexico’s more flexible exchange-rate arrangement has allowed a smooth response in face of external shocks. To make our case, we’ll stress the real economy performance, the way these economies opened up and managed adverse competitiveness shocks and the perils of fiscal indiscipline leading to insolvency. To make the point clearer we will also introduce some vulnerability indicators to see how these countries have or not lessened their degree of exposure vis a vis external shocks.

4-1. Real GDP growth and Investment

At first sight, average real output-growth figures would not show a striking disparity spanning 1994-2000: 2.36% and 3.69% in Argentina and Mexico, respectively. However, the after “Tequila” period (1996 on) yields a Mexican growth rate twice as the Argentine rate (5.21% against 2.65%). First, this highlights the dissimilar output response in the wake of consecutive external shocks since 1997. The second observation concerns the heightened output volatility in Argentina compared to Mexico over the same period, turning from a peak of 8.1% to –3.4% low in a year-on year basis (chart 1).

Chart 1: Annual Real GDP growth rate

[Chart showing annual real GDP growth rate with notable events like Russian Default and Brazil's Devaluation marked on the timeline]

- 5.84% GDP growth Mex in 1994
- 5.14% GDP growth Mex in 1995
- 6.78% GDP growth Mex in 1996
- 4.31% GDP growth Mex in 1997
- 3.64% GDP growth Mex in 1998
- 6.92% GDP growth Mex in 1999
- -3.40% GDP growth Mex in 2000
- 6.22% GDP growth Arg in 1994
- 6.22% GDP growth Arg in 1995
- 2.85% GDP growth Arg in 1996
- 3.85% GDP growth Arg in 1997
- 8.11% GDP growth Arg in 1998
- -3.40% GDP growth Arg in 1999
- 0.52% GDP growth Arg in 2000

Russian Default + Brazil’s Devaluation
The higher real output volatility is the counterpart of fairly important relative price/wage rigidities not allowing to smooth real external shocks. These rigidities seemed to have prevailed in the Argentine economy in spite of efforts to push forward labour market deregulation and fostering product market competition within a context where the price-setting process has been linked to some distortions or oligopoly power in public utilities and other basic goods supply (Artus, 2000). On the other hand, higher volatility has implied less productive and slack resources more often as for the Argentine case. Chart 2 offers some evidence on that matter displaying the degree of utilised industrial capacity as a proxy of the potential/effective output gap.

Chart 2: Degree of industrial capacity utilisation in Argentina

source: FIEL
Mexico’s relative outperformance can be explained by a) a more dynamic gross domestic investment (GDI) less dependent on foreign savings, b) an increasing participation of fast growing exports in GDP (table 1).

<table>
<thead>
<tr>
<th>Year</th>
<th>Argentina GDI growth</th>
<th>Argentina Export growth</th>
<th>Argentina Exp%GDP</th>
<th>Mexico GDI growth</th>
<th>Mexico Export growth</th>
<th>Mexico Exp%GDP</th>
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</thead>
<tbody>
<tr>
<td>1994</td>
<td>13.67%</td>
<td>15.11%</td>
<td>6.96%</td>
<td>8.39%</td>
<td>17.80%</td>
<td>17.2%</td>
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<tr>
<td>1995</td>
<td>-13.08%</td>
<td>22.56%</td>
<td>7.57%</td>
<td>-29.00%</td>
<td>30.19%</td>
<td>23.9%</td>
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<tr>
<td>1996</td>
<td>8.88%</td>
<td>7.76%</td>
<td>9.55%</td>
<td>-16.39%</td>
<td>18.23%</td>
<td>26.8%</td>
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<tr>
<td>1997</td>
<td>17.66%</td>
<td>11.98%</td>
<td>9.75%</td>
<td>21.04%</td>
<td>10.72%</td>
<td>27.8%</td>
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<tr>
<td>1998</td>
<td>6.54%</td>
<td>9.87%</td>
<td>10.10%</td>
<td>10.28%</td>
<td>12.10%</td>
<td>29.7%</td>
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<tr>
<td>1999</td>
<td>-12.77%</td>
<td>-1.37%</td>
<td>10.68%</td>
<td>7.69%</td>
<td>12.42%</td>
<td>32.2%</td>
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<tr>
<td>2000</td>
<td>-8.56%</td>
<td>2.00%</td>
<td>10.91%</td>
<td>9.99%</td>
<td>15.96%</td>
<td>34.9%</td>
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Sources: INEGI (Mexico) and Finance Ministry (Argentina)

The paradox of the Argentine tale lies in the need to continue boosting exports to lessen the dependence on external savings to finance GDI while this dependence has increased indeed on average terms over the last years and GDI has plummeted to its lowest since 1993 (17% of GDP). To make matters worse, access to global capital markets has shrunk for emerging economies. Chart 2 and 3 depicts the percentage of the GDI that is financed by either national or foreign savings (current account deficits) in both countries –vertical axis- as well as the percentage of each one in GDP –inside the bars. The figures bring in a crude polarity: decreasing GDI over GDP (back to 1995 slump levels) with increasing reliance on foreign savings on one pole; on the other, rising share of GDI jointly with lower and stabilised foreign savings participation. The good (or bad?) news is that the Mexican real exchange rate is roughly at the same pre-crisis level (see next section), blamed for triggering the capital account crisis late 1994. We’ll come back to this making the case for tightened fiscal policy and local saving promotion attitude.
4-2) On the external sector role

Undoubtedly, the process of trade and financial liberalisation undertaken by Mexico (mid 80s, GATT membership) and Argentina (late 80s), together with the structural reforms programs carried out so far has brought about increasing trade and foreign investment flows. The broadening of internal and sub-regional markets dimension has been a common feature of that process at least in their first stages. Such a trade/investments boom was prompted either by preferential agreements (NAFTA, MERCOSUR), vigorous economic growth from natural partners, consumption booms triggered by lower inflation and exchange rate appreciation or confident foreign investors seeking to diversify portfolios in their quest of juicy returns. Nevertheless, as we anticipated when presenting the exports performance, the relative quantity, quality and breakdown of those flows have not been always similar.

A first distinctive feature was the extent of the opening up of both economies (chart 4). In other words, how fast trade flows grew with respect to current GDP marks off an important difference in the degree of integration. Mexico’s trade has been multiplied by at least 4 over the nineties and imports have grown at a fairly similar pace as exports.

While Mexico has bumped up its trade average, both in absolute terms to 330 US$ billions and 60% of GDP in relative ones (2000), Argentina has seldom broken the 50 US$ billion ceiling, or 17.6% of GDP the same year (from near 26 billions and 12.2% in 1991, respectively). On the export side, the outcome is very clear-cut. Argentina has merely reached an 11% share of GDP, rendering foreign markets a modest contributor to overall growth, whereas more than a third of the real demand for Mexican goods and
services is explained by a fairly dynamic export sector. It is worth to say that, though compared to a lower benchmark, Argentine real exports had outgrown GDP until 1998 but had never caught up to the Mexican growth pace, as seen from table 1 above.

Chart 4 indeed reflects an exponential growth of Mexican trade flows. Although the 1995 jump can be partly explained by the peso devaluation, in that it reduces the denominator proportionally, the subsequent real appreciation along with ever-increasing trade flows cast some doubt on the role of the exchange rate as the main trigger for this “big push”. Other than exchange rate responsive or permanent terms-of-trade effects driven, reaping NAFTA benefits and travelling in a first-class wagon pulled by a US engine growing at a yearly 3% have been the main factors accounting for that outperformance. This was not without becoming extremely US-dependent on the export side (near 90%), what raises the fears of the downside in case the slight ongoing American recession deepens. All in all, Mexico was already US-dependent at the beginning of the nineties when it exported around 80% of its total foreign sales.

A last but not least pillar of the impressive Mexican trade performance is the change of the specialisation pattern. Oil based exports either manufactured (the major part) or at the extraction level (including gas and derivatives) has dropped to 10% compared to a 68% in 1985. This is not due to a negative permanent shock to the terms of trade (as we’ll see below) but to a policy change towards modifying the export mix, to make it less dependent from raw materials or energetic resources prices fluctuations (chart 5).

Chart 5: Classified Mexican Exports
A second relevant aspect deals with price-competitiveness factors bearing on external equilibrium and domestic resources reallocation. In what follows, we overview the real exchange rate (RER)\(^1\), terms of trade and unit labour cost paths to get a comparative perspective of the weight these variables could have had in both economies.

In spite of the overshooting of the nominal exchange rate in the aftermath of the currency crisis, Mexican RER has gradually converged to an even more appreciated level than 1994 (pre-crisis) (chart 6). Equilibrium appreciation? Many qualitative and quantitative reasons underpin a differentiation between 1994 and 2000 RER values:

![Chart 6: RER (US deflator) and Terms of Trade Index](chart)

1) A now managed-floating regime –along with an inflation-targeting rule - that allows some flexibility faced to external shocks, against a non-credible peg which collapsed amid a currency/banking crisis;

\(^1\) The RER is almost equivalent to the effective rate (REER) because the major trade partner is the US, what is not the case for Argentina. In this regard, we’ll examine the real exchange rate with Brazil, main Argentina’s trade partner.
2) As we mentioned above, a lessened foreign savings dependency has stabilised current account deficits, turning capital flow reversals less damaging for the real economy. Moreover, the current account is more solidly financed now than it was in 1994 (see section 4.3).


4) Higher share of tradable manufacturing products alongside important sectoral productivity gains reflected in turn in lower unit labour cost could explain the real appreciation (chart 7). Hence, a positive productivity gap between tradable and non-tradable goods together with the outperformance respect to US indexes may give a rationale for that.

It is worthwhile to note that the real exchange rate appreciation has coincided with growing industrial productivity in Argentina. Notwithstanding, the shrinking size of industry in terms of total GDP (16% in 2000) as well as the modest contribution of industrial exports (in % of GDP) lead to conclude that higher productivity has been insufficient to offset the real appreciation. Moreover, terms of trade fluctuations –roughly similar to those of Mexico- have not been cushioned by some exchange-rate flexibility and only served to exacerbate external disequilibrium.

The Argentina-Brazil’s bilateral RER overvaluation’s merits some additional comments. First of all, the overvaluation becomes moderate if the benchmark year is 1991, the year when MERCOSUR was set up. By contrast, since the customs union stage started out in 1995, the RER has appreciated nearly 40%, mainly due to the January 1999 Brazilian devaluation (table 2). However, empirical findings so far suggest that it is rather
the activity level elasticity what mostly determines the dynamics of Argentine exports to Brazil (Heymann and Navajas, 1998; Grandes, 1998).

Table 2: AR/BR Real Exchange Rate, 1991 average = 1

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<tbody>
<tr>
<td>RER AR/BR</td>
<td>0.96</td>
<td>0.71</td>
<td>0.72</td>
<td>1.00</td>
<td>1.39</td>
<td>1.51</td>
<td>1.50</td>
<td>1.44</td>
<td>0.99</td>
<td>1.05</td>
<td>0.91</td>
</tr>
</tbody>
</table>

Still, maintaining an already costly currency board regime, which does not allow accommodating for external shocks, points to fiscal policy as the only policy instrument left to cope with that. The paradox comes in that during “bonanza times” fiscal misbehaviour and public debt run-up appeared to be the rule. Since 1998 –up to the currency board collapse cum default- Argentina had entered a vicious circle of high interest rates-recession cum lower tax collections and spending cuts, deflationary debt build-up and higher interest rates. Contractive fiscal policy had done nothing but fuel the vicious circle. We’ll come back to that in sections 4-4 and 5.

4-3. From the Premier League to the “Series D”

The statement from Mr. Cavallo, who was striving at that time to differentiate Argentina from Mexico in an attempt to fend off fears of a capital flight/bank run -which finally occurred-, would nowadays be paradoxically taken as a matter of fact. Argentina lags well behind Mexico in terms of economic performance and the access to global capital market has not been the exception. Despite having to challenge a more risk-averse investor appetite, in a global arena where private capital flows to emerging countries have sharply fallen off and industrialised countries are sliding into a recession, both countries have kept on raising new fresh funding or simply rolling over the debt, with fairly dissimilar outcomes, however.

The end of the story is pretty much known. While Argentina has defaulted on its external obligations, seeing collapse its currency board-, Mexico is enjoying the benefits of the investment grade status supported by NAFTA preferential agreements and OECD membership since 1993/4. A preliminary conclusion one may draw from the story is that after the Russian default markets have been screening more thoroughly the array of the emerging markets spectrum. Witness the differential sovereign spread measured by the JP Morgan EMBI + index since 1998 onward (chart 8). Even in the aftermath of the Mexican currency crisis starting late 1994, the relative spread had not surpassed a value of 2. In other words, Mexico has been able to trade and issue debt instruments yielding up to 400 bps over comparable US Treasury bonds in 2000 whereas Argentina has barely done it for less than 700 bps (not to speak of 2001, when sovereign spreads were soaring, reaching levels far above 2000 bps, on the brink of the expected outright default).

\[2\] The EMBI AR + and EMBI MEX + figures for December 1994 had been 962 and 582 basis points respectively (taking a composite index which averages Brady bonds out)
Another major issue related to credibility loss vis à vis the global capital market deals with the role of the rating agencies in assessing sovereign borrower creditworthiness. Although credit ratings downgrades/upgrades seem to lag behind and validate market perceptions and of course do not move as rapidly as spreads do, they reflect the same pattern that the last support. Actually, the empirical evidence so far has revealed that they tend to move procyclically, particularly on the downside. Still, announcements over possible upgrades/downgrades appear to have some bearing on bond spreads (see Kaminsky and Schmukler, 2001, Mora, 2001 or Reisen and von Maltzan, 1999). Moreover, as most institutional investors’ placements are constrained by prudential regulation standards, a downgrade towards the speculative notch can modify the demand for a determined sovereign asset class segmenting markets even further.

Rating actions are chiefly based on the sovereign’s ability and willingness to pay. That depends in turn on the extent to which solvency and liquidity problems are incorporated into the markets or agencies assessments about the prospects of the sovereign borrower performance. Therefore, part of the input into sovereign risk perceptions or ratings relies on indicators which mainly deal with external payments and debt, fiscal stance or monetary and liquidity issues (see e.g. Moody’s 2001). Even though they are necessarily backward looking, the delay to produce and release the information or the forecast errors (not uncommon in volatile, unpredictable markets) turns them relevant for current assessments.
Accordingly, the exchange-rate policy matters because it has much to do with the way the economies accommodate a shock or cope with financial turmoil, so as to put themselves back on the solvency track. From this standpoint we argue that the managed floating regime seemed to start paying off in Mexico since the aftermath of the East Asian crisis/onset of the Russian default period. By contrast, the inability of the Argentine currency board and the inappropriate policies pursued thus far to resume economic growth or smooth external shocks out, have cast additional doubt on its sustainability pushing default and currency risk up to ever-seen magnitudes.

Chart 9 displays the two main rating agencies (S&P and Moody’s) actions throughout the period under analysis. We transform both notch scales into a numerical equivalent assigning a number not only to a notch level but also to a given outlook within a notch (e.g. BB positive=16, BB stable=15, BB negative=14, see annex). From the picture below we see once again how the diverging process start off since the Russian default.

Back to 1999, the story prompts a promising policy agenda set out by the now outgoing Argentine administration (De la Rua’s) where the goal of reaching the

![Image of Chart 9: Sovereign Ratings Mexico and Argentina]
investment grade was pointed out as a state priority. The misfortunes from adverse external shocks, some domestic mismanagement and untimely recessionary policies applied by the government have turned things round. Aiming to play in the Premier League, Argentina now watches how Mexico gained confidence and recently entered into the investment grade club, while she can hardly find a way out knocking other than the “D” default door. Without effect were the efforts of the successive Finance Ministers and their senior staff to persuade the agencies not to keep on downgrading the country.

Furthermore, the volatility and composition of capital inflows have been the mirror image of the relative sovereign spreads and ratings. Three major facts stand out:

First, a remarkable negative correlation between portfolio investment flows (specially bond items) and sovereign risk, -0.54 and -0.31 in the Argentine and Mexican cases respectively. As we observe from charts 10 and 11 this correlation as well as inflows volatility have weakened or even turned positive for Mexico, what’s clearly not the case as for the Argentine evidence. An important caveat is in order. This correlation might not necessarily involve causality because there can be some endogeneity between both variables. Expectations of higher future yields can make capital flee if that is associated with upward default risk, in a more risk-averse environment. On the other side, expected capital flow reversals can bring about excess offer in the bond markets pushing prices down and spreads up (as yields to maturity go up). All the former does not inevitably hold if e.g. markets are segmented or default risk is insignificant.

Second, the gross capital inflows breakdown has been changing over the period under study (table 3). From these figures it turns out clear-cut that Mexico has increasingly got finance through FDI flows, bringing portfolio (equity plus bonds) flows down. By contrast, Argentina has continued depending heavily on short-term flows (or official aid flows when those were absent) to finance its current account deficits. Figures for 1999 and 2000 are tricky because they involve state-owned shares sell-off, specially a huge one concerning YPF (oil company). This higher FDI share reinforces the investment-growth link other than fuelling the perverse debt-cycle (as Argentina’s currency board or Mexico’s peg before 1995). It is also worthwhile noting, from a stocks perspective, Argentine multiplied by more than 6 the absolute value of its outstanding bonds and notes according to the BIS whereas Mexico has less than tripled her debt stocks (table two).

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3 Mexico’s upgrade to Baa2 by Moody’s came in February 2002 –first investment grade notch Baa3 two years before- while S&P just gave the equivalent to Baa3 during the same month. In the meantime, Argentina was declared in a selective default by S&P and rated only one notch above the default category according to Moody’s.

4 A well-known debt manager of the former administration used to say “they give us a 4 while we deserve an 8 (over 10)”. 

Chart 10: Net Bond Flows and Sovereign Risk in Mexico

Chart 11: Net Bond Flows and Sovereign Spreads in Argentina
Table 3: Gross Capital inflows shares and stocks

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</thead>
<tbody>
<tr>
<td>Gross capital inflows</td>
<td>17018</td>
<td>17495</td>
<td>20967</td>
<td>29088</td>
<td>23315</td>
<td>20993</td>
<td>12465</td>
</tr>
<tr>
<td>FDI</td>
<td>21.4%</td>
<td>32.1%</td>
<td>33.1%</td>
<td>31.5%</td>
<td>31.3%</td>
<td>114.2%</td>
<td>93.6%</td>
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<tr>
<td>Equity</td>
<td>18.3%</td>
<td>6.2%</td>
<td>4.7%</td>
<td>4.8%</td>
<td>-0.9%</td>
<td>-51.3%</td>
<td>-25.9%</td>
</tr>
<tr>
<td>Bonds</td>
<td>39.5%</td>
<td>20.8%</td>
<td>53.0%</td>
<td>35.3%</td>
<td>46.8%</td>
<td>28.5%</td>
<td>15.2%</td>
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<tr>
<td>Other investment</td>
<td>14.3%</td>
<td>22.3%</td>
<td>7.1%</td>
<td>15.2%</td>
<td>20.2%</td>
<td>3.1%</td>
<td>9.9%</td>
</tr>
<tr>
<td>Bank loans</td>
<td>6.4%</td>
<td>18.6%</td>
<td>2.1%</td>
<td>13.2%</td>
<td>2.7%</td>
<td>5.4%</td>
<td>7.2%</td>
</tr>
<tr>
<td>Bond Stocks</td>
<td>11800</td>
<td>17600</td>
<td>28300</td>
<td>40300</td>
<td>52300</td>
<td>60800</td>
<td>68700</td>
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<td>12535</td>
<td>18107</td>
<td>22026</td>
<td>14787</td>
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<td>FDI</td>
<td>51.1%</td>
<td>-304.3%</td>
<td>73.6%</td>
<td>102.4%</td>
<td>62.5%</td>
<td>54.1%</td>
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<td>Equity</td>
<td>19.0%</td>
<td>-16.6%</td>
<td>22.5%</td>
<td>25.6%</td>
<td>-3.7%</td>
<td>17.1%</td>
<td>3.0%</td>
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<tr>
<td>Bonds</td>
<td>19.1%</td>
<td>326.9%</td>
<td>85.1%</td>
<td>14.5%</td>
<td>0.5%</td>
<td>32.7%</td>
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<td>Other investment</td>
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<td>-18.6%</td>
<td>40.2%</td>
<td>6.6%</td>
<td>33.1%</td>
</tr>
<tr>
<td>Bank loans</td>
<td>13.0%</td>
<td>169.2%</td>
<td>-23.8%</td>
<td>-23.9%</td>
<td>-18.6%</td>
<td>0.5%</td>
<td>-10.5%</td>
</tr>
<tr>
<td>Bond Stocks</td>
<td>26000</td>
<td>28500</td>
<td>41100</td>
<td>49600</td>
<td>52600</td>
<td>61200</td>
<td>64100</td>
</tr>
</tbody>
</table>

Source: IFS and BIS capital inflows expressed in million dollars; negative turnovers means debt repayment or equity sales.

Third, and regarding FDI flows, Mexico has been the major recipient (except for 1999), but the evolution in relative terms looks not that different (chart 12). The crucial point nevertheless is how FDI-financed current account deficits have been, as mentioned before. This ratio (FDI/CC) reports a value of 2.09 in Mexico and 0.91 in Argentina, both on 1994-2000 averages. Argentina’s ratio would be even lower if we didn’t include the YPF shares sell-off, mid 1999. Finally, Mexican FDI flows have been more tradable-production oriented. While Mexican manufacturing sector (comprising “Maquiladoras”)

![Chart 12: FDI flows](image-url)
accounted for 60.5% of total receipts over 1994-1998, Argentina’s industrial sector explains 34% of total FDI throughout the same period (ECLAC, various).

4-4. Some vulnerability indicators: public sector deficits and external debt

Public Sector performance has certainly shaped a crucial part of ratings decisions, spreads behaviour and macroeconomic balances. We have already mentioned how national savings/investments, capital inflows and competitiveness have been affected by public deficits. However, we have not explored how the need to finance these deficits and the outstanding debt has framed different risk perceptions in turn shaping each solvency profile. An economy can become insolvent if the discounted flow of expected net revenues is lower than the outstanding debt.

The link between a peg and fiscal discipline is intuitive: pegging the exchange rate may reduce the revenue from money creation (inflation tax), so in some circumstances a decision to peg may require a fiscal adjustment to ensure sustainability. Indeed, if money creation can be substituted by public debt issues assuming capital markets finance is available, governments could therefore smooth their spending so as to loosen the need for adjustment. However, when capital markets finance shrinks and real output comes down to make up for other rigidities faced to a shock, fiscal “indiscipline” can path the way to insolvency.

In section 5 we deal with the public debt sustainability problem in a theoretical-empirical way. As an introduction, though, let us see three standard indicators to get a preliminary view about the incidence of public sector savings and indebtedness on the intertemporal solvency “equation” (Table 4). These indicators, among others, entered as inputs into the rating decisions and contribute to form expectations on the repayment capacity.

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Total EDGDP</th>
<th>Public EDGDP</th>
<th>ED XGS</th>
<th>FDGDP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Argentina</td>
<td>33% 43% 51%</td>
<td>24% 26% 30%</td>
<td>4.44 4.06 4.72</td>
<td>0.36% -2.84% -3.10%</td>
</tr>
<tr>
<td>Mexico</td>
<td>32% 35% 26%</td>
<td>20% 22% 14%</td>
<td>1.90 1.15 0.83</td>
<td>0.51% -0.22% -1.23%</td>
</tr>
</tbody>
</table>

- Fiscal deficit to GDP (FDGDP): this solvency indicator shows the public sector gap or dissavings in terms of GDP. When governments cannot resort to print money or other inflationary-biased finance sources, it gives a raw idea of credit demand (bond offer) to bridge that intertemporal gap. Argentina has worsened its fiscal balances, from a near budgetary equilibrium in 1994 to ~3.1% in 1999 while Mexico has converged to lower and stabilised deficits (though still banking bailout costs matter).

- External debt as % of GDP (EDGDP): this is one of the most widely used indicators to predict likely debt-repayment troubles. A stable ratio means that the economy is sufficiently growing in order to meet its obligations (debt servicing), or that primary
surplus cancels out with interest payments. Argentina and Mexico display extremely opposite paths, either in terms of the total or the public component. The problem does not lie on the indicator level but on its dynamics.

- External debt over exports goods and services: a crucial indicator comparing the external liabilities size to the export capacity, reveals the magnitude of the external constraint in terms of the country’s ability to transfer foreign exchange abroad. Argentina has a ratio, three or four times Mexico’s one, indicating a higher vulnerability.

5- The economics of the vicious circles. When public sector loses its grip.

The last part of this paper is devoted to uncover the factors underlying the debt dynamics story. In this setting, we will focus on the “destructive” power of paying high sovereign risk premia, as we saw in section four, hand in hand with inconsistent fiscal behaviour in the context of a given exchange-rate regime. Accordingly, the econometric exercise undertaken will provide a rationale to the Argentine vicious circle described above. For the sake of our purpose we will contrast the former with the Mexican experience.

We will proceed as follows. Firstly, we will present a brief theoretical framework. Secondly, we will provide details about the econometric methodology. Lastly, we will discuss the results and policy implications.

5-1. Government budget constraint and debt dynamics

From the government budget constraint it comes up the following identity:

\[ R^* B^* e + R B = (T-G) + (T^*-G^*) e + dM/P + dB + dB^* e \]  

(1)

Where:
- \( R \) and \( R^* \) are the domestic (peso) and foreign-currency nominal interest rates respectively;
- \( B \) and \( B^* \) represent the outstanding external public debt (e.g. bonds held by non-residents) issued in local and foreign currency, respectively;
- \( T \) and \( T^* \) are tax revenues on tradable and non-tradable goods and services, respectively;
- \( G \) and \( G^* \) compute the non-interest public spending in the tradable and non-tradable goods;
- \( M/P \) are the real cash balances held by the households and firms;
- \( e \) is the nominal exchange rate;
- And \( dX \) means the change in \( X \) between period \( t \) and \( t-1 \).

In other words (1) sketches how the government finances the interest payments bill on the outstanding debt to regularly meet its obligations, converted into local

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5 Considering domestic resident holdings (bonds and short-term notes), the Argentine public debt over GDP amounts to 44% (December 2000).
currency amounts. That means a three-folded financing source: generating primary surplus, raising seigniorage (inflationary tax) or rolling over the debt by issuing new bonds. A stationary state would mean dB=dB*=0, hence if seigniorage revenues are negligible—as the case of Argentina proves, its inflation rate near zero-, the bulk of the interest bill would be cancelled out by the primary budgetary surplus.

However, when the last case does not apply, dB>0 dB*>0. Rearranging terms in (1) and expressing the variables in terms of GDP, a dynamic equation results straightforward (see Buiter, 1985 or Reisen, 1989):

\[ D_t = D_{t-1} \left( \left(1-f\right) R + f \left(R^* + e\right) - \lambda \right) - \left( (T-G) + (T^*-G^*) e \right) - \left( \pi + \lambda \right) \ m \]  

(2)

Being D the External Public Debt to GDP ratio; f the share of the foreign currency-denominated public debt over the total; λ the GDP growth rate between T-1 and T, m the Money Base to GDP and π the inflation rate.

As it was argued above, in a zero or even negative inflation regime like the Argentine one, the last term (right hand side) of (2) becomes irrelevant\(^6\). Furthermore, almost 95 of the external public debt stock are other than peso-denominated (Grande, 2001), what turns f near one. Rearranging terms, the dynamics of the Debt to GDP ratio turns out:

\[ D_t = D_{t-1} \left( R^* + e - \lambda \right) - \left( (T-G) + (T^*-G^*) e \right) \]  

(3)

As long as the output growth or an increasing primary surplus—as a GDP percentage—do not make up for interest payments or contingent devaluation effects, which may bring about an additional rise in D\(_t\), the public debt will be growing at a higher rate than the GDP. This could signal a solvency problem the larger the more likely the chance of being rationed (binding the rollover), the riskier the country (ratings below the investment grade) and the more fiscal-procyclical a country is.

A key factor of (3) is the interest rate component R\(^*\), say the yield on foreign currency-denominated government bonds or simply foreign borrowing cost. R\(^*\) can be further decomposed into a risk-free rate (US Treasury bills of the same maturity) plus a sovereign risk premia. The last component has played a significant role in capital account-liberalised emerging economies concerning the nature and volatility of the business cycles (see Avila, 1998; Rodriguez, 1999; Berg and Borensztein, 2000; Arora and Cerisola, 2000; Nogues and Grande, 2001, among others). Assuming that devaluation expectations could be captured by the risk premia (φ) and setting e=1, we get:

\[ D_t = D_{t-1} \left( USTB_t + \phi - \lambda \right) - \left( (T-G) + (T^*-G^*) \right) \]  

(4)

\(^6\) After the first years of the Convertibility Plan, where a fast remonetization took place, the Money Base to GDP ratio has remained quite stable. Consequently not only does the term π m vanishes but also λ m is relatively constant from six years onward.
5-2. Econometric Set-up

Although the former equations are identities, it would be perfectly reasonable to uncover what the ex-ante relationships might be and proceed to verify if the data shows any consistency.

Going all this way, it is quite simple to demonstrate how the relevant variables may be related to each other. Firstly, lower output growth causes lower expected primary surplus that in turn makes the risk premia go up. But a higher risk premia induces a drop in expected output growth (diminishing investment and consumption plans) what triggers lower expected tax levy (signalling weaknesses) increasing even more the sovereign spreads, and so on and so forth. In consequence, the interest bill gets unbalanced and $D_t/D_{t-1}$ starts moving up, leading to a worse solvency-scenario that can bring about successive risk premia upward adjustments to make up for this, etc. The USTB rate can be considered the only true exogenous variable.

Hence, there should exist a long-run equilibrium whereby a stable $D_t$ would be linked to given “equilibrium” values of $USTB_t$, $\phi$, $\lambda$ and the Primary Surplus (or its excess over the interest outlay). Likewise, if a shock to one of these variables results in a deviation from the long-run trend, the equilibrium path should be restored in a time depending on the convergence speed. Nevertheless, it may well fail in going the way back to the equilibrium driving $D_t$ to an unsustainable path.

Data from table 4 had already left clear the existence of an upward (downward) trend of the total and public external debt to GDP ratio in Argentina (Mexico) during the second half of the last decade. Does this imply an intertemporal disequilibrium pattern? Is there a divergent or unstable public debt path mainly driven by the country risk premia? How does it compare to the Mexican case? In order to account for the Argentine/Mexican debt dynamics, we propose an econometric exercise based on Vector Error Correction Models (henceforth VECM). This methodology allows testing if a long-run relationship as the one pointed out exists and provides estimates of the short-run dynamics when a shock to one of the endogenous variables occurs\(^7\).

In order to perform the VECM specification and estimation, several steps were followed (see annex 2-A/2-B), according to Enders (1995). Summing up, the VECM specification went as follows:

$$\Delta \log (X)_t = B_1 EC_{t-1} + A_j \Delta \log (X_{t-j}) + Z_t + e_t$$

\(^7\) In Grandes (2001) a VAR approach was devised to prove the endogeneity of country risk, the GDP growth rate and fiscal deficits, but no cointegration relationships were supposed. Unlike the present work, the goal was not to estimate the public debt dynamics itself but to give a rationale for the limits to a solvency-improving policy derived from dollarisation. In this regard, the model can be seen as an extension to those paper findings. Other differences dealing with data come up: there seasonally adjusted and monthly converted GDP instead of the EMISA and 3-month accumulated fiscal deficit instead of figures over a one year base were used.
Where \( j \) is the optimum lags number for endogenous variables \( \mathbf{X} \) namely: \( \text{dpgdpm}_h \) (external public debt to GDP ratio), \( \text{embi}_h \) (sovereign spreads), \( \text{fiscly}_h \) (one year accumulated fiscal deficit, \( \text{emisa}_\text{ar} \) or \( \text{iaglobsa}_\text{mex} \) the industrial and global production indexes, respectively, with \( h=\text{AR, MEX} \), \( i=1…3 \) the number of cointegrating vectors found by means of the Johansen test; 
\( \mathbf{B}_i \) is the adjustment speed coefficient matrix respect to the deviation to each of the three long-run relationships or cointegrating vectors \( \mathbf{EC}_{i,t-1} \); 
\( \mathbf{A}_j \) represents the parameter matrix corresponding to the lagged endogenous variables; 
\( \mathbf{Z}_t \) are the control variables mentioned above (US rates and dummies for Russian default and Asian crisis episodes); 
And \( \mathbf{e}_t \) are random shocks or structural forecast error terms (reduced form).

As the reader will recall, the fundamental purpose of this kind of models is to assess the variables dynamics once a shock to one of the endogenous takes place and spreads over the remaining variables in the subsequent periods. On the other side, the individual significance turns out fairly irrelevant (Enders, 1995)\(^8\). The VECM analysis focus on the response of those variables to a deviation from its stable long-run trend, which in turn makes all the system move toward the new “equilibrium” path after the adjustment took place. The extent of the shock impact is measured by the impulse response functions.

For the sake of the purpose, it is particularly interesting to assess how the External Public Debt to GDP ratio evolves given a positive shock to the sovereign risk premia (increase in \( \text{EMBI}_\text{AR}, \text{EMBI}_\text{MEX} \)) or to the one-year accumulated fiscal deficit (\( \text{FISC1Y}_\text{AR}, \text{FISC1Y}_\text{MEX} \) less negative). These shocks can be understood as a lack of credibility or policy inconsistencies within the framework of a given currency regime. Additionally it seems appealing to look at how the risk premia reacts to a self-induced shock and an augmenting budgetary deficit. We have assumed thus far the existence of an “autonomous” excessively high country risk premia, supported by the weaker solvency performance of the Argentine economy (opposite to Mexico). That spread would be triggering an unstable time path of growing public debt, unsustainable deficits and low output growth\(^9\).

Chart 13 below displays the impulse response functions of both \( \text{DPGDPM}_\text{AR} \) and \( \text{EMBI}_\text{AR} \) (\( \text{DPGDPM}_\text{MEX} \) and \( \text{EMBI}_\text{MEX} \)) in log terms, over a 36-months horizon ahead, when innovations to \( \text{EMBI}_\text{AR} \) and \( \text{FISC1Y}_\text{AR} \) (\( \text{EMBI}_\text{MEX}, \text{FISC1Y}_\text{MEX} \)) are allowed. To compute the impulse response functions it is necessary to identify canonical shocks from the structural ones (\( \mathbf{e}_t \) above). The Choleski decomposition is one of the most standard ways of doing so. For this to be achieved, it is necessary to assume that some variables do not have a contemporaneous effect on other, in the econometric jargon “an ordering” is required. Ranging from the most to the less exogenous variable, the suggested ordering was, respectively:

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\(^8\) The VECM output is available for the interested reader upon request. 
\(^9\) It is also fair to remark that much of current public deficits have to do with the tax authority mismanagement in levying due taxes, past pension fund reform which unbalanced the net present value cashflows of the “pay-as-you-go system”, and other related reasons.
Indeed, as long as the structural error correlations were not large (as a rule of the thumb it is proposed ±0.20), there would not be any reason to expect fairly dissimilar patterns in the impulse response functions. This is in fact corroborated in the appendix 2-C (tables A3). Changing the ordering of EMISA_AR respect to FISC1Y and EMBI_AR (the same holds for Mexico), to which is more correlated, has not lead to different results from those obtained in chart 1310.

Chart 13: Impulse Response Functions

Either the public debt ratio or the sovereign spreads show a clear-cut upward slope in the Argentine case, except for the second during the first five months. That could be due to the different sign of the speed adjustment coefficients in the DPGDP_AR

10 These results are available upon request. In the Mexican case, the ordering was irrelevant except for the relation between DPGDP_MEX and IAGLOBSA_MEX, yielding a –0.55 coefficient. In spite of this, the impulse functions did not substantially change.
equation. Intuitively, that FISC\textsubscript{1Y}_AR diminishes is partly because, ceteris paribus, the primary surplus is increasingly offsetting the interest payments. In consequence, the public debt ratio starts falling, but not for long. As the risk premia goes up output growth slows down and higher future deficits are to be expected, what makes the debt ratio go the other way round. In other words, output fall means a lower tax collection (hinging on the degree of activity-level based taxing) but also higher risk premia if solvency is compromised. This, in turn, puts further upward pressure to the public debt ratio, so the vicious circle gets under way.

On the other hand, the Mexican functions display an asymmetric behaviour, featured by lower and less volatile responses together with faster and convergent paths. It is worth noting a) the permanent reduction in the public debt to GDP ratio due to a decreasing fiscal deficit (higher primary surplus), b) the non-explosive sovereign risk-public debt link (the variables time paths reach a steady state sooner and at lower levels). Unlike the Argentine debt dynamics, Mexico’s case supports the rationale that another circle –a virtuous one- is possible: sustainable growth, decreasing and stabilised fiscal deficits, lower risk premia and diminishing public debt ratios.

This takes the analysis back to the literature of debt servicing and the default probability (e.g. Eaton, Gersovitz and Stiglitz, 1986; Calvo, 1988; Cohen and Sachs 1985). Indeed a high-risk premia, high default probability equilibrium might have fit the Argentine economy. The lack of credibility and intertemporal inconsistent policies within the framework of a hard currency peg may have been at the root of the problem. A very interesting question deals with the chance that a flexible regime can do a better job, bringing the economy back to a sustainable path. Mexico’s outcome hints it has coped with that in order to bring deficits down setting the economy in a more sustainable path.

**Conclusions:**

Argentina’s dismal performance from the late 1990s has ended in tears and abolishment of its currency board system introduced in 1991, while Mexico has gradually moved restored credibility and now is awarded investment grade by all major rating agencies. While this comparative country study can not provide a rigorous test about the independent role of the exchange-rate regimes that have let to such divergent fortunes, it has nevertheless confirmed the channels emphasised in the sparse literature that links the choice of the currency regime to growth performance.

The paper has highlighted four criteria that will help guiding the choice of the appropriate currency regime in emerging-market countries:
- How does the regime impact on the mix of capital inflows? Does it encourage flows that carry positive growth externalities or does it encourage flows that raise a country’s vulnerability to financial crisis?
- How does the regime impact on the incentive to invest and save rather than to consume? Does it foster productivity growth by keeping output volatility in check?
- How does the regime impact on the tradables sector and add to its integration into world trade, namely by providing sustainable and competitive exchange-rate levels and by avoiding misalignments from the fundamental equilibrium rate?
- How does the regime cope with a country’s given rigidities, namely in the fiscal area, and to what extent can such rigidities safely be assumed to display a sufficient degree of endogeneity to the regime choice?

During the last two decades, failed attempts with hard pegs have been discontinued in favour of more flexible exchange-rate arrangements, witness Chile in the early 1980s, Mexico in the mid 1990s, Brazil in the late 1990s and now Argentina. We hope that Argentina will be able to emulate those fairly successful regime switches and does start to grow again.

**Bibliography:**


Data sources

Ratings histories were extracted from Moody’s Investors Service www.moodys.com and Standard and Poor’s www.standardandpoors.com. The EMBI + indexes come from JP Morgan, UST bill rates from Yahoo-Finance quotes and the FED Funds Rate as well as the nominal/real exchanges rates, portfolio and FDI flows from IMF Financial Statistics.

Other Country Data:

- **Argentina**: external debt stocks (total and non-financial public sector – Central Government), external debt services, fiscal deficit, current account, exports and imports of goods and services, EMISA (Seasonally Adjusted Industrial Manufactures Index), Current and Real GDP (base year 1993) and Terms of Trade index, from the Ministry of Economy.
- **Mexico**: the external debt stock (total and public), external debt services, and public sector balance (including privatisation revenues, not so relevant for the period under study\(^{11}\)) from Secretaria de Hacienda (budget planning office). The current account, exports and imports of goods and services, terms of trade, Current and Real GDP (base year 1993) and IAGLOBAL (Global Activity Index) from INEGI (Instituto Nacional de Estadistica, Geografia e Informatica).

Annex 1

<table>
<thead>
<tr>
<th>Numeric Scale (includes outlook changes)</th>
</tr>
</thead>
<tbody>
<tr>
<td>BBB pos = 25</td>
</tr>
<tr>
<td>BBB stable = 24</td>
</tr>
<tr>
<td>BBB neg = 23</td>
</tr>
<tr>
<td>BBB- pos = 22</td>
</tr>
<tr>
<td>BBB- stable = 21</td>
</tr>
</tbody>
</table>

\(^{11}\) The series excluding privatization revenues were not fully available but till mid 1999 (IFS).
A) Preliminary steps to specify the VECM

Firstly, the endogenous and exogenous variable set was defined, for the span January 1995-December 2000. The endogenous entailed monthly data of the seasonally adjusted Production Index (EMISA_AR) as a proxy of GDP (IAGLOBSA_MEX), the JP Morgan’s EMBI + Brady Bonds Spreads (EMBI_AR, EMBI_MEX), the one-year accumulated fiscal deficit without privatisation revenues (FISC1Y_AR, FISC1Y_MEX) as the difference between the primary surplus and the interest payments, and the External Public Debt to GDP ratio (DPGDP_AR, DPGDP_MEX) converted from quarterly figures. On the other hand, the Federal Reserve Funds Rate (FEDFRATE) was included as exogenous as well as two dummies to control for the Asian and Russian crisis. All but the dummies were expressed in logarithm values.

Secondly, since the series are not stationary it was necessary to test whether they were integrated of the same order or not, and then to perform the cointegration test (Johansen version) to detect the number of cointegrating vectors, in case the former
holds. Briefly, for each variable the Augmented Dickey Fuller (adjusted-sample) test was run testing the null hypothesis of non-stationarity and concluding that all variables were integrated of order one (I(1)) (table A1).

### Table A1: ADF Test

<table>
<thead>
<tr>
<th>Variable</th>
<th>Optimal lags</th>
<th>$H_0: \gamma = 0; \tau$ value</th>
<th>Critical Value 5%</th>
</tr>
</thead>
<tbody>
<tr>
<td>EMISA_AR</td>
<td>1</td>
<td>-1.36</td>
<td>-2.91</td>
</tr>
<tr>
<td>IAGLOBSA_MEX</td>
<td>3</td>
<td>-2.22</td>
<td>-3.46</td>
</tr>
<tr>
<td>EMBI_MEX</td>
<td>1</td>
<td>-2.36</td>
<td>-2.91</td>
</tr>
<tr>
<td>EMBI_AR</td>
<td>1</td>
<td>-2.55</td>
<td>-2.91</td>
</tr>
<tr>
<td>DPGDP_MEX</td>
<td>12</td>
<td>-1.37</td>
<td>-2.89</td>
</tr>
<tr>
<td>DPGDP_AR</td>
<td>12</td>
<td>-0.15</td>
<td>-2.91</td>
</tr>
<tr>
<td>FISC1Y_MEX</td>
<td>3</td>
<td>-1.15</td>
<td>-2.91</td>
</tr>
<tr>
<td>FISC1Y_AR</td>
<td>3</td>
<td>-1.47</td>
<td>-2.91</td>
</tr>
</tbody>
</table>

Before carrying out the cointegration test, the number of lags to be included in the model was specified. For that reason, the Akaike Information Criteria (AIC) was employed though the Sims’ Likelihood Ratio test was also done. According to AIC the optimal lag was six months. Unlike the AIC, the Sim’s LR test indicated the restrictions set were non-binding starting from 3 lags. However, this test tends to conduct to misleading conclusions when relatively small samples are considered. Allowing for possible serial correlation in each of the equations to be estimated, 6 lags (3 for Mexico) were preferred even if the last turned out to be less parsimonious.

Finally, the Johansen trace statistic identified the existence of 3 cointegrating vectors (2 for Mexico), assuming no linear trend in data (see appendix B).

**B) Cointegration and VECM estimation**

**Johansen Test:**

Given a group of non-stationary series –like the ones presented above, it may be interesting to determine whether the series are cointegrated, and if they are, to identify the cointegrating (long-run equilibrium) relationships. One of the possible methods to test for these relationships was developed by Johansen (1991, 1995). Johansen’s method consists on testing the restrictions imposed by cointegration on the unrestricted VAR involving the series.

Consider a VAR of order $p$:

$$y_t = A_1 y_{t-1} + \ldots + A_p y_{t-p} + B x_t + \varepsilon_t$$
Where $\mathbf{y}_t$ is a $k$-vector of non-stationary endogenous I(1) variables, $\mathbf{x}_t$ is a $d$-vector of deterministic variables, and $\mathbf{e}_t$ is a vector of innovations. We can rewrite the VAR as:

$$\Delta \mathbf{y}_t = \Pi \mathbf{y}_{t-1} + A_j \sum_{i=1}^{p-1} \Gamma_i \Delta \mathbf{y}_{t-i} + \mathbf{B} \mathbf{x}_t + \mathbf{e}_t$$

Where

$$\Pi = \sum_{i=1}^{p} A_i \cdot I_1 \quad \text{and} \quad \Gamma_1 = - \sum_{j=p+1}^{p} A_j$$

Granger’s representation theorem asserts that if the coefficient matrix $\Pi$ has reduced rank $r < k$, then there exist $kr$ matrices $\alpha$ and $\beta$ each with rank $r$ such that $\Pi = \alpha \beta$ and $\beta' \mathbf{y}_t$ is stationary. $R$ is the number of cointegrating relations (the cointegrating rank according to this method) and each column of $\beta$ is the cointegrating vector. The elements of $\alpha$ are known as the adjustment parameters in the vector error correction model, in response to a deviation from the equilibrium. Johansen’s method is to estimate the $\Pi$ matrix in an unrestricted form, then test whether the restrictions implied by the reduced rank of $\Pi$ can be rejected or not.

How many cointegrating vectors would there be? If there are $k$ endogenous variables, each of which has one unit root, there can be from zero to $k-1$ linearly independent, cointegrating relations. If there are no cointegrating relations, standard time series analysis such as the (unrestricted) VAR may be applied to the first-differences of the data. Since there are $k$ separate integrated elements driving the series, levels of the series do not appear in the VAR in this case.

Conversely, if there is one cointegrating equation in the system, then a single linear combination of the levels of the endogenous series $\beta' \mathbf{y}_{t-1}$ should be added to each equation in the VAR. When multiplied by a coefficient for an equation, the resulting term $\alpha \beta' \mathbf{y}_{t-1}$ is referred to as an error correction term. If there are additional cointegrating equations, each will contribute an additional error correction term involving a different linear combination of the levels of the series.

If there are exactly $k$ cointegrating relations, none of the series has a unit root, and the VAR may be specified in terms of the levels of all of the series. Note that in some cases, the individual unit root tests will show that some of the series are integrated, but the Johansen tests show that the cointegrating rank is $k$. This contradiction may be the result of specification errors.

Once the optimal lag number is defined (Sims tests, Information criteria), and a choice on different deterministic trends paths for the data is made (here it was assumed

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The cointegrating vector is not identified unless we impose some arbitrary normalization. The program used (Eviews) adopts the normalization so that the $r$ cointegrating relations are solved for the first $r$ variables in the $\mathbf{y}_t$ vector as a function of the remaining $k-r$ variables.
no deterministic trend), it is necessary to compute the eigenvalues \( \lambda_i \) of the \( \Pi \) matrix. In this way, the number of distinct cointegrating vectors can be obtained by checking the significance of those characteristic roots. Moreover, the number of \( \lambda_i \) statistically different from zero will be exactly the number of cointegrating vectors.

Then, two tests can be performed, one based on a trace-statistic or another based on a “maximum” statistic. For this exercise only the first one was carried out, but the second can be easily computed leading to similar conclusions (there is however some scope for discrepancy, see Enders 1995).

The trace statistic test the null hypothesis that the number of distinct cointegrating vectors is less than or equal to \( r \) against a general alternative. The test is of the Log Likelihood Ratio type under the following statistic:

\[
\lambda_{\text{trace}}(r) = -T \sum_{i=r+1}^{m} \ln (1- \lambda_i)
\]

Table A2 below displays the results concluding, at a 5%, that there are at most 3 cointegrating vectors.

### Table A2: Johansen Trace Test

**A2-1: Argentina**

Sample: 1995:06 2000:12  
Test assumption: No deterministic trend in the data  
Series: LOG(DPGDP_AR) LOG(EMISA_AR) LOG(EMBI_AR) FISC1Y_AR  
Lags interval: 1 to 6

<table>
<thead>
<tr>
<th>Eigenvalue ( \lambda_i )</th>
<th>Likelihood Ratio</th>
<th>5 Percent Critical Value</th>
<th>1 Percent Critical Value</th>
<th>Hypothesised No. of CE(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.552439</td>
<td>88.68018</td>
<td>53.12</td>
<td>60.16</td>
<td>None **</td>
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<tr>
<td>0.245923</td>
<td>38.03181</td>
<td>34.91</td>
<td>41.07</td>
<td>At most 1 *</td>
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<tr>
<td>0.202501</td>
<td>20.24938</td>
<td>19.96</td>
<td>24.60</td>
<td>At most 2 *</td>
</tr>
<tr>
<td>0.090759</td>
<td>5.994108</td>
<td>9.24</td>
<td>12.97</td>
<td>At most 3</td>
</tr>
</tbody>
</table>

*(**) denotes rejection of the hypothesis at 5%(1%) significance level  
L.R. test indicates 3 cointegrating equation(s) at 5% significance level

**A2-2: MEXICO**

Included observations: 62  
Test assumption: No deterministic trend in the data  
Series: LOG(DPGDP_MEX) LOG(EMBI_MEX) FISC1YCPRI>MEX  
LOG(IAGLOBSA_MEX)  
Lags interval: 1 to 3

<table>
<thead>
<tr>
<th>Eigenvalue ( \lambda_i )</th>
<th>Likelihood Ratio</th>
<th>5 Percent Critical Value</th>
<th>1 Percent Critical Value</th>
<th>Hypothesised No. of CE(s)</th>
</tr>
</thead>
<tbody>
<tr>
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<td>0.271208</td>
<td>36.88867</td>
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<td>41.07</td>
<td>At most 1 *</td>
</tr>
<tr>
<td>0.187309</td>
<td>17.27389</td>
<td>19.96</td>
<td>24.60</td>
<td>At most 2</td>
</tr>
</tbody>
</table>
0.068730  4.414792  9.24  12.97  At most 3

*(**) denotes rejection of the hypothesis at 5%(1%) significance level
L.R. test indicates 2 cointegrating equation(s) at 5% significance level

C) VECM estimates:

Table A3: Structural Errors Correlation

<table>
<thead>
<tr>
<th></th>
<th>A3-1 Argentina</th>
<th></th>
<th>A3-2 Mexico</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>LOG(DPGDP_AR) 1</td>
<td>LOG(DPGDP_MEX) 1</td>
<td>LOG(DPGDP_MEX) 1</td>
</tr>
<tr>
<td>LOG(EMISA_AR)</td>
<td>0.164</td>
<td>LOG(EMISA_MEX)</td>
<td>LOG(EMISA_MEX) 0.027</td>
</tr>
<tr>
<td>LOG(EMBI_AR)</td>
<td>-0.052</td>
<td>LOG(EMBI_MEX)</td>
<td>LOG(EMBI_MEX) -0.035</td>
</tr>
<tr>
<td>FISC1Y_AR</td>
<td>-0.134</td>
<td>LOG(IAGLOBSA_ME)</td>
<td>LOG(IAGLOBSA_MEX) -0.558</td>
</tr>
</tbody>
</table>

A3-1 Argentina

<table>
<thead>
<tr>
<th></th>
<th>LOG(DPGDP_AR) 1</th>
<th>LOG(EMISA_AR)</th>
<th>LOG(EMBI_AR) -0.052</th>
<th>FISC1Y_AR -0.134</th>
</tr>
</thead>
<tbody>
<tr>
<td>LOG(EMISA_AR)</td>
<td>0.164</td>
<td>1</td>
<td>-0.353</td>
<td>-0.401</td>
</tr>
<tr>
<td>LOG(EMBI_AR)</td>
<td>-0.052</td>
<td>-0.353</td>
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<td>0.182</td>
</tr>
<tr>
<td>FISC1Y_AR</td>
<td>-0.134</td>
<td>-0.401</td>
<td>0.182</td>
<td>1</td>
</tr>
</tbody>
</table>

A3-2 Mexico

<table>
<thead>
<tr>
<th></th>
<th>LOG(DPGDP_MEX) 1</th>
<th>LOG(EMBI_MEX) -0.035</th>
<th>FISC1Y_MEX -0.0123</th>
<th>LOG(IAGLOBSA_MEX) -0.0065</th>
</tr>
</thead>
<tbody>
<tr>
<td>LOG(EMBI_MEX)</td>
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<td>1</td>
<td>-0.0123</td>
<td>-0.009</td>
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<tr>
<td>FISC1Y_MEX</td>
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<td>-0.0123</td>
<td>1</td>
<td>-0.0065</td>
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<tr>
<td>LOG(IAGLOBSA_MEX)</td>
<td>-0.558</td>
<td>-0.009</td>
<td>-0.006</td>
<td>1</td>
</tr>
</tbody>
</table>