Petty Crime and Cruel Punishment: Lessons from the Mexican Debacle

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Before December 1994, Mexico was hailed as the prime example of success of market-oriented reforms. It was widely believed that, despite the year's serious political shocks, the country was poised for ascending to a sustainable high-growth, low-inflation equilibrium. There was debate over the bloated current-account deficit and overvalued real exchange rate, and the need for some correction prior to the "ascension," but the strength of the country's fundamentals was rarely questioned.[1] The devaluation itself was welcomed by many as a necessary adjustment. For instance, Stanley Fischer argued that "the exchange rate adjustments . . . will help reinforce the economic recovery that has been evident since early 1994 and secure the viability of Mexico's external position" (International Monetary Fund, 1994). Thus, the severe crisis that followed and its global spillover were met with shock and disbelief.

After two severe speculative attacks in March and November, Mexico attempted a devaluation of 15 percent on December 20. The markets' response was dramatic. A final attack pushed foreign reserves well below the Bank of Mexico's "tolerable minimum" of U.S. $10 billion, and in the subsequent days stock markets in Mexico, South America, and other "emerging" regions of the world plummeted. For Mexico the consequences were catastrophic. The government could not refinance its dollar-denominated, short-term bonds ("Tesobonos") at any reasonable interest rate, while the private sector lost access to global capital markets. The country was forced to float the exchange rate. Interest rates rose sharply, and the subsequent liquidity squeeze resulted in Mexico's worst recession in modern times, putting the already weak banking system at the brink of collapse.

The sudden and violent financial crash helped to correct the imbalances highlighted by most analysts: the trade deficit running at about U.S. $1.5 billion per month by the end of 1994 turned into a surplus in less than two months, and the real exchange rate fell back to its end-of-1990 level. However, this failed to trigger an early recovery in 1995, and after stabilizing around M$6.40 per U.S. dollar for several months, in November the exchange rate fell sharply to about M$7.7 per U.S. dollar. Thus, this evidence casts serious doubts on the relevance of conventional explanations, which rely on current-account deficits and real currency appreciation (e.g., Rudiger Dornbusch and Alejandro Werner, 1994). Moreover, it is surprising that capital markets in countries seemingly unrelated to Mexico and without any of its vulnerability symptoms were also hit by the Mexican crash.

Our research suggests that the heavy punishment capital markets inflicted on Mexico is characteristic of a new kind of crises in the global-markets era. Punishment appears to be especially harsh on countries committed to fixed exchange rates. Rather than a crisis due to conventional current-account sustainability or real overvaluation (i.e., "flow") problems, Mexico's crash was primarily a capital-account crisis of "stocks," to some extent similar to the balance-of-payments crises studied by Paul Krugman (1979). The Mexican crisis, however, differs in that it was not caused by

[1] The current-account deficit at the end of 1994 stood at 8 percent of GDP. The real exchange rate had appreciated by more than 55 percent since the beginning of the December 1987 stabilization plan.
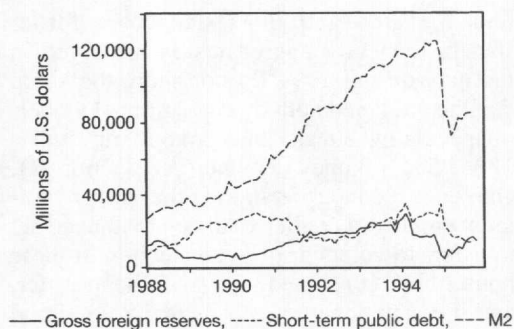
FIGURE 1. MEXICO: MONEY AND DEBT IMBALANCES

monetization of a fiscal deficit. To the contrary, for the first time in the postwar period the peso collapsed without the pressure of clearly expansionary policies. Instead, the peso became extremely vulnerable because of (a) large imbalances between money balances, short-term debt, and gross reserves caused in part by the effects of global markets on the financial system, and (b) the tendency of global investors in the complex world economy, in which information is costly to acquire, to neglect fundamentals and display herding behavior. We believe that these two elements are necessary to explain key features of the crisis. A theory of "fundamentals" explains the increased vulnerability reflected in the money and debt imbalances, while a theory of herd behavior justifies the massive capital flows triggered by the devaluation. The "stock" problems we highlight here have thus revealed their potential to be as dangerous as conventional "flow" problems—hence the interest in studying them and in designing mechanisms to anticipate and correct them.

I. Vulnerability Warnings and the Peso Collapse

The vulnerability of the peso was exhibited in two key imbalances relative to the stock of international reserves (see Fig. 1), which were clearly noticeable before the collapse. First, there was a *monetary-aggregates* imbalance: real money balances (in dollars or in CPI units) largely exceeded gross foreign reserves, making the peso vulnerable to negative and persistent money demand shocks. If such shocks occurred, a given pre-crisis rate of net

domestic credit expansion would be rendered inconsistent with the fixed exchange rate, even under unchanged fiscal policy. This imbalance gradually built up during 1988–1993, as Mexico experienced a surge in foreign capital inflows and booming private expenditures (which suggests a positive link between real balances and aggregate demand, as postulated in cash-in-advance models). The monetary aggregates imbalance was further fueled by far-reaching financial reform that *inter alia* eliminated reserve requirements, credit controls, and restrictions to global capital flows. This was accompanied by a worsening of banks' balance sheets, which in turn severely limited the central bank's ability to rein in the growth of monetary aggregates.

Second, there was a *debt* imbalance: private holdings of short-term public debt, measured in dollars, grew much larger than foreign reserves, and a large portion was converted to Tesobonos. The stock of debt was 5.5 times larger than the stock of reserves just before the collapse. We claim that this large imbalance resulted from the policy response in early 1994 to shocks that threatened to cause a sharp and sudden deceleration in the rapid growth of demand for liquid, peso-denominated assets experienced in previous years (e.g., the rise in U.S. interest rates, the slowdown in GDP growth in 1993, and the perception of a major political crisis).

The run on reserves in the aftermath of the Luis Donaldo Colosio assassination (March 23, 1994) reflected a run on government bonds by both the private sector and commercial banks, revealing a widening differential between interbank interest rates and those paid on government bonds. Faced with increased banking fragility, the central bank (a) expanded domestic credit to "sterilize" the effect of the fall in reserves on the monetary base, and (b) slowed down the decline in public-debt holdings by offering Tesobonos in exchange for short- and long-term peso-denominated bonds (Cetes, Bondes, and even the CPI-indexed Ajustabonos). This second policy converted most public debt to Tesobonos, with a large fraction taken by foreign investors. Thus, vulnerability to runs on government bonds worsened considerably as average bond maturity shortened, bonds were

dollarized, and bond-holders without transactional or liquidity needs became major holders.

International reserves fell sharply in April and then stabilized. However, short-term debt was already nearly 40-percent larger than gross reserves, reversing the situation of 1992–1993 and signaling the growing fragility of the currency peg. By November, before the second attack on reserves, the debt imbalance showed private debt holdings (mostly Tesobonos) 2.2 times larger than reserves. Pedro Aspe (1995) argues that the authorities responded to this second attack by repeating sterilized intervention, aiming to avoid large adjustments to interest rates or the exchange rate because of political uncertainty one week before the end of the Salinas term. Aspe's account of the policy debate shows no indication that the authorities worried about their ability to roll-over existing Tesobonos or place additional debt. Eventually, however, the government found it increasingly difficult to place Tesobonos, and the collapse arrived in December, when markets refused to roll-over Tesobonos falling due and the attempt at the managed devaluation failed with a final bonds-led attack on reserves.

To understand why the imbalances described above foretold the collapse of the Mexican peso we consider an extension of the Krugman (1979) model presented in Calvo (1995). The extension does not rely on obvious fiscal-policy laxity. A particular example consistent with the Mexican experience is one in which surging capital inflows, combined with radical financial liberalization, induce a lending boom in a setup prone to financial fragility. Fragility results from the perverse incentives given to credit markets by the currency peg and an explicit or implicit commitment by the central bank to act as lender of last resort. In an extreme case, with short-term bonds financing long-term loans, one can show under fairly general conditions that the size of the speculative attack increases with the size of the expected banking-system bailout, and that the attack occurs earlier than in a standard Krugman model.

Still, models like this only begin to explore the complex interaction among the global capital market, financial asset demand, and vulnerability of currency pegs in developing economies. Several important questions remain unanswered. In Mexico's case, for instance, monetary aggregates as measured in the data during 1994 do not show the sharp decline predicted both by conventional models of speculative attacks and econometric studies of Mexico's money demand (see Section II). One possible interpretation is that the government employed credit expansion to finance net transfers to voters prior to an election. If these households consumed most of the transfer, and if consumer-goods firms maintained real balances in proportion to their capacity utilization, one could explain the downward inflexibility of real monetary aggregates in the early stages of a balance-of-payments crisis. The danger is that, as the policy is reversed and the inertia of the original weakening of money demand takes over, the fall in money demand and, hence, the loss of reserves at the moment the peg is abandoned are magnified.

II. Econometric Evidence: Money Growth and the Transmission Mechanism

Our econometric analysis of money-demand models for M2 in Mexico (see Calvo and Mendoza, 1996) provides unambiguous evidence that (a) the global capital market influences the growth of M2, (b) M2 and expenditures are closely related, and (c) real M2 should have declined sharply in 1994. Using error-correction specifications of real M2 money demand, we identify large and significant effects of world capital markets on Mexico's M2, represented by a negative effect of the interest rate on 3-month U.S. Treasury bills (T-bills) and a positive effect of inflows of foreign reserves. We also show that private consumption and investment expenditures provide additional information for explaining money demand not included in the traditional scale variable represented by GDP.

This money-demand analysis predicts a large decline in the stock of real M2 for 1994 (equivalent to about U.S. $12.6 billion) on account of the rising T-bill rate, and the slowdown of GDP and aggregate demand a year before (see Fig. 2). Contrary to this prediction, actual real M2 continued to grow in 1994. The policy response described in Section I implied such a large structural change that if the
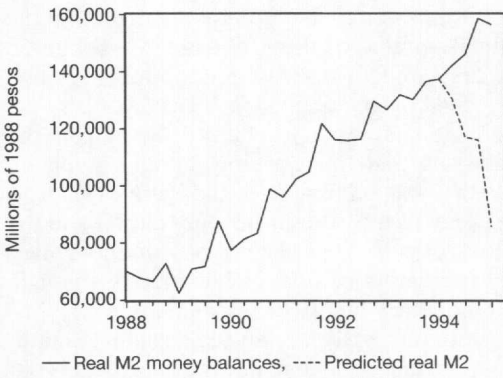
FIGURE 2. MEXICO: ACTUAL AND PREDICTED
REAL M2 MONEY BALANCES

M2 equations are reestimated adding only the second quarter of 1994, the coefficients on the T-bill rate, foreign reserves, and expenditures become statistically insignificant.

In Calvo and Mendoza (1996), we also examine comovements of cyclical components of real M2, private expenditures, GDP, the 28-day Cete rate, and the real exchange rate based on different detrending methods. We find further evidence of a positive link between M2 and private expenditures. Multivariate causality tests show, in addition, that M2 causes GDP and expenditures, and not vice versa (in line with a cash-in-advance model in which money carried over from the past is used in current transactions) and that the Cete rate (the main instrument of monetary policy) Granger-causes M2, GDP, and expenditures without feedback.

Further analysis based on a parsimonious VAR system provides additional evidence in favor of our view and illustrates the key role of the Cete rate as a policy instrument for the duration of the currency peg. In sharp contrast with similar studies for industrial countries, particularly the United States (see Christopher A. Sims, 1992), the Cete rate is clearly identified as the policy instrument, with the expected effects on real and nominal variables. Impulse-response analysis shows that upward adjustments in the Cete rate were very effective in lowering real money balances, bringing down inflation, and slowing the growth of GDP and private expenditures. Finally, impulse-response functions also show large effects, consistent with the intuition developed above, resulting from sudden inflows of foreign capital (e.g., innovations to real M2 or expenditures).

III. "Optimal" Herding Behavior in the Global Marketplace

Several important events in the aftermath of Mexico's currency collapse showed how sensitive world markets are to the arrival of news that may not be directly related to the fundamentals driving asset returns in a particular country and, hence, suggest that global investors may be susceptible to exhibiting "herding" behavior. First, in the days after the currency collapse, Mexico was unable to attract holders to roll-over maturing Tesobonos despite offerings at high interest rates, and the stock market fell sharply as foreign and domestic investors chose to reduce their exposure. Guillermo Ortiz (1995) noted that "after the devaluation, financial markets for Mexico virtually disappeared, and there was a true stampede, in which all Mexican public and private debt instruments where literally thrown out." Second, since the collapse, Mexican markets have remained extremely vulnerable to wild rumors originating at home or abroad, as vividly illustrated by the sharp fall in the peso on November 3, 1995, on unfounded rumors of a military coup and the resignation of the finance minister. A Reuters cable quoted a trader as saying "the day has been one of total anguish, we dropped as low as 7.72 pesos per dollar but now the rumors have been denied, the market breathes again." Third, in the days after the Mexican crash, emerging markets worldwide also fell as the "Tequila effect" propagated, and global investors reacted to the news on Mexico by suddenly changing their views on the merits of investments in all emerging markets. (Sara Calvo and Carmen M. Reinhart [1995] provide statistical evidence of strong contagion effects.)

This kind of "herding" by the global investor does not necessarily reflect any irrational behavior and does not require sophisticated theories to be justified. To the contrary, in Calvo (1995) and Calvo and Mendoza (1996) herding is a feature of the simplest of portfolio-choice models, the mean-

variance model. In this model, investors balance optimally the trade-off between diversification and costly information-gathering as opportunities to diversify rise. As a result, (a) portfolio allocations to a single country become highly responsive to very small changes in perceived expected returns, and (b) the benefits of gathering country-specific information to firm up beliefs with regard to those returns diminish. Thus, diversification encourages ignorance, and in this environment even frivolous rumors may trigger massive capital flows that are seemingly inconsistent with a country's "fundamentals."

However, high sensitivity to rumors does not fully explain the persistence of the Mexican recession. By the same logic of this model, the recession could have been avoided, or quickly reversed, by a slight fall in stock prices or rise in Tesobonos' interest rates.

The last model in Calvo (1995) provides the missing link. The model assumes that fiscal adjustment is socially costly. Thus, if the initial run against Tesobonos forces the government to undertake very tough fiscal adjustment, a new "bad" equilibrium could appear. Notice that, according to this interpretation, the initial run has to prompt tighter and socially costly fiscal policy. If, in contrast to Mexican experience, investors had been willing to refinance maturing Tesobonos (at possibly slightly higher interest rates), then no official reaction may have been called for. The run would likely have been reflected in lower stock prices, but lacking the disruptive policy response, the price decline would have been no larger than a "technical adjustment."

IV. Conclusion: Lessons for Avoiding Cruel Punishment

This paper argues that the harsh punishment that world capital markets dealt Mexico (and emerging markets in general) following the country's attempt at a modest devaluation reflects the substantial risks embodied in the volatile capital flows characteristic of the global world economy. Despite conventional-wisdom arguments favoring the devaluation as the best "medicine" for a large current-account deficit and an overvalued real exchange rate, and despite the devaluation's effectiveness at addressing these problems, the attempt at correcting the misalignment of the exchange rate triggered a deep and protracted economic crisis and caused continued weakness in Mexico's currency and stock markets. It follows from the analysis that the warning signals given by traditional vulnerability indicators (such as the size of the current-account deficit and the stock of reserves) need to be complemented by indicators of financial vulnerability such as monetary and debt imbalances.

Still, this analysis also suggests that volatility is an inescapable feature of the global economy that comes along with its advantages for risk-diversification, transfers of technology, and enhanced efficiency in resource allocation. Balancing the pros and cons is difficult, but domestic policy and international institutions can play a key role in moderating the risks. Domestic policy could ameliorate the impact of capital-market volatility by, for example, lengthening the maturity of public debt and helping to strengthen the banking system through, for instance, higher liquidity requirements and mandatory capital/deposit ratios. International institutions, on the other hand, could take the role of lender of last resort, which, given sufficient commitment and resources, can reduce the risk of sudden stampedes in capital markets. Also, publicly available "surveillance" studies, with an emphasis on financial vulnerability, can provide information as a public good and lessen the risk of herding behavior triggered by rumors (see Calvo and Morris Goldstein, 1995).

The phenomena studied here also pose challenges for international economics. It is important that we advance our understanding of the channels of transmission by which global integration affects real and financial variables, and that we learn more about how economic policies interfere with these channels. We hope to make progress in these areas in future work.

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