International Financial Crises

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Outline

1. What Happened in Mexico in 1994-95? Why models like that of Krugman (1979) cannot account for the lead-up to the crisis or for its aftermath.

2. Self-Fulfilling Debt Crises. How we can build a dynamic stochastic general equilibrium model that can have a crisis like that in Mexico as an equilibrium outcome and how we can calibrate it. What we learn and what questions still remain unanswered.

4. What Lessons Can We Draw from the Crisis in Argentina? Challenges in using economic theory to understand crises like that in Argentina. The political economy of commitment. Is there a role for institutions like the International Monetary Fund?
1. What Happened in Mexico in 1994-95?

- What are the key features of simple models of financial crises?
  Krugman (1979) and Obstfeld (1996)
- What were the crucial events in Mexico in 1994 and 1995?
- Why do we need more than the simple models?


Krugman’s (1979) Model of Balance of Payments Crises

Key features of crisis:

- lack of fiscal discipline / monetization of deficit
- run on reserves by domestic agents
- perfect anticipation by financial markets
Model

small open economy, continuous time

one good, price $P = eP^* = e$

constant fiscal deficit, $G - T$

government monetizes deficit $\dot{M} = P(G - T)$

initial stock of reserves, $R(0) = R_0$

demand for money $M/P = L(\dot{P}/P)$ where $L'(\dot{P}/P) < 0$
Two possibilities

1. Government fixes exchange rate, $e=1$, and sells reserves:

$$\dot{P}/P = 0$$
$$M/P = L(0)$$
$$\dot{R} = -(G-T).$$

2. Government lets exchange rate float:

$$\dot{M} = P(G-T)$$
$$M/P = L(\dot{P}/P)$$

in stationary equilibrium, where $\dot{M}/M = \dot{P}/P = \pi$,

$$\pi L(\pi) = G-T$$
The government maintains the fixed exchange rate until it runs out of reserves. When the government is forced to float, the demand for money drops from $L(0)$ to $L(\pi)$.

Dynamics:
Obstfeld’s (1996) Model
of Self-Fulfilling Currency Crises

Key feature:

• government’s incentives to float depend on private agent’s expectations

There is a time consistency problem of the sort studied by Kydland and Prescott (1977) and Barro and Gordon (1983).
Model

government minimizes loss function

\[ \left[ a(e^*_t - e_t) + b(e^E_t - e_t) \right]^2 + \delta C \]

\[ a(e^*_t - e_t)^2 \] is the cost of deviating from the optimal exchange rate.

\[ b(e^E_t - e_t)^2 \] is the cost of having private agents make decisions based on incorrect expectations.

\[ \delta C \] is the cost of breaking the commitment to maintain a fixed exchange rate \( e_t = \bar{e} \). (\( \delta = 1 \) if devaluation, \( \delta = 0 \) otherwise.)
Suppose that $e^E_t = e^*_t$. Then the government devalues, setting $e_t = e^*_t$, if

$$(a+b)^2(e^*_t - \bar{e})^2 > C.$$ 

Suppose that $e^E_t = \bar{e}$. Then the government devalues, setting $e_t = (ae^*_t + b\bar{e})/(a+b)$ if

$$a^2(e^*_t - \bar{e})^2 > C.$$ 

If

$$(a+b)^2(e^*_t - \bar{e})^2 > C \geq a^2(e^*_t - \bar{e})^2,$$

there are two equilibria, one of which is a self-fulfilling crisis.
Events in Mexico in 1994

1994 was an election year. The government wanted honest elections, but it also wanted the ruling *Partido Revolucionario Institucional* to win.

There was enormous political uncertainty following the assassination of the PRI candidate in March.

Every time there was bad political news, more investors moved their investments out of Mexico.

The government gambled with its monetary policy and debt policy that the political situation would stabilize and that capital inflows would resume. A similar gamble had been successful in 1993. **This time the government lost the gamble.**
PESOS per DOLLAR EXCHANGE RATE*
JANUARY 1993 - JANUARY 1994

* New York market. Average rate on last day of the week.
Source: Tradeline International
MEXICAN INTERNATIONAL RESERVES*
JANUARY 1993 - JANUARY 1994

Billions of U.S. Dollars

* Monthly data.
Source: IMF; International Financial Statistics
INTEREST RATES*
MEXICAN - U.S. GOVERNMENT BONDS

MEXICAN 91 DAY CETES

U.S. 90 DAY T-BILLS

* Weekly data
Source: Bloomberg Financial Market
MEXICAN INTERNATIONAL RESERVES*
DECEMBER 1993 - DECEMBER 1994

Billions of U.S. Dollars

* Daily data.
FOREIGN INVESTMENT IN MEXICO

DIRECT PLUS PORTFOLIO INVESTMENT

DIRECT INVESTMENT

INTERNATIONAL RESERVES
VS.
MONEY SUPPLY
(BILLIONS OF NEW PESOS)

MONEY SUPPLY

RESERVES

MONETARY BASE

D J F M A M J J A S O N D
1993 1994
INTEREST RATES
MEXICAN - U.S. GOVERNMENT BONDS
DECEMBER 1993 - DECEMBER 1994

Source: Bloomberg Financial Market
2. Self-Fulfilling Debt Crises

- Can we build a dynamic stochastic general equilibrium model that can have a crisis like that in Mexico as an equilibrium outcome?
- Can a calibrated model have a crisis when the government has as low a level of debt as did Mexico in 1995?
- What questions remain unanswered? Problems with maturity of debt, role of reserves, and role of private banks


3. What Happened in Argentina in 2001-02?

- What were the crucial events that occurred in 2000-02?
- What role did the Convertibility Plan and its abandonment play?
- Can we separate the economics of the crisis from the politics?


T. J. Kehoe (2002), “What Can We Learn From the Current Crisis in Argentina?” University of Minnesota.

The economy of Argentina finds itself submerged in a great depression that, even if though began four years ago, deepened after mid 2001 with average quarterly falls of deseasonalized GDP with respect to the previous quarter of 5 percent for the last two quarters of 2001 and the first of 2002. This violent deepening of the recession occurred just at the moment that economic agents, almost universally, became convinced of the impossibility of sustaining the Convertibility Plan.

Dirección Nacional de Coordinación de Políticas Macroeconómicas, Secretaría de Política Económica (2002)
What Happened in Argentina in 2001-2002?

The Brazilian devaluation did not lead to problems for the Argentinian current account — both exports and the trade surplus in fact grew.

March 16 2001: President De la Rúa rejected the plan presented by the Minister of the Economy, Ricardo López Murphy, to reduce the fiscal deficit.

After López Murphy’s resignation, De la Rúa appointed Domingo Cavallo, the architect of the Convertibility Plan during the first Menem administration, as Minister of the Economy.
Cavallo presented a new economic plan in the lower house of Argentina’s congress. On 28 March, the congress refused to allow Cavallo to cut government salary and pension costs, and the government sold debt to cover the deficit.

Cavallo’s alternative: La Ley de Déficit Cero (Zero Deficit Act): Quasi Monies

In December 2001, the government defaulted on its debt and, in January 2002, it abandoned the Convertibility Plan.
LETRA DE TESORERIA PARA CANCELACION DE OBLIGACIONES
(PATACON)

PROVINCIA DE BUENOS AIRES
AL PORTADOR
LEY N° 12 727

A 08814498
UN PESO
DARDO ROCHA

VALOR NOMINAL

LEY N° 12 727

ARTÍCULO 1°: "Declárase un estado de emergencia administrativa, económica y financiera al Estado Provincial..."

ARTÍCULO 2°: "Apruébase la emisión de Letras de Tesorería para Cancelación de Obligaciones, las que se denominarán "Patacon". Los títulos serán emitidos bajo las modalidades de los Artículos 742, 744 y 745 del Código de Comercio."

ARTÍCULO 3°: "Las Letras de Tesorería para Cancelación de Obligaciones pagarán el cierto siete por ciento (7%) de su valor nominal el 25 de julio de 2022... Las Letras de Tesorería serán nominadas en pesos..."

ARTÍCULO 11°: "El pago efectuado al acreedor mediante Patacones o Bonos de Cancelación de Obligaciones, importará la extinción irrevocable de los créditos por los que se efectúa la entrega."
Money Market Interest Rates

percent per year

pesos deposits

dollar deposits

year

1991 1993 1995 1997 1999 2001 2003
4. What Lessons Can We Draw from the Crisis in Argentina?

- Do economic theory and the data provide clues to where the severity of the crisis comes from?
- What does it mean to “commit” to a monetary policy?
- What features would a good model of the crisis in Argentina have?


T. J. Kehoe (2002), “What Can We Learn From the Current Crisis in Argentina?” University of Minnesota.


Growth accounting

Production function:

\[ Y_t = A_t K_t^\alpha L_t^{1-\alpha} \]

Capital accumulation:

\[ K_t = (1-\delta)K_t + I_t. \]

\[ \alpha = 0.30, \ \delta = 0.05. \]
Decomposition of changes in output

\[
\log \left( \frac{Y_t}{N_t} \right) = \log A_t + \alpha \log \left( \frac{K_t}{N_t} \right) + (1 - \alpha) \log \left( \frac{L_t}{N_t} \right)
\]

\[
\log \left( \frac{Y_t}{N_t} \right) = \frac{1}{1 - \alpha} \log A_t + \frac{\alpha}{1 - \alpha} \log \left( \frac{K_t}{Y_t} \right) + \log \left( \frac{L_t}{N_t} \right)
\]

\[
\left[ \log \left( \frac{Y_{t+s}}{N_{t+s}} \right) - \log \left( \frac{Y_t}{N_t} \right) \right] / s = \frac{1}{1 - \alpha} \left[ \log A_{t+s} - \log A_t \right] / s
\]

\[
+ \frac{\alpha}{1 - \alpha} \left[ \log \left( \frac{K_{t+s}}{Y_{t+s}} \right) - \log \left( \frac{K_t}{Y_t} \right) \right] / s
\]

\[
+ \left[ \log \left( \frac{L_{t+s}}{N_{t+s}} \right) - \log \left( \frac{L_t}{N_t} \right) \right] / s.
\]
Real GDP Per Working Age Person and Total Factor Productivity

GDP

TFP

index (1970=100)

year

Applied dynamic general equilibrium model

The representative consumer maximizes

\[ \sum_{t=1980}^{\infty} \beta^t \left[ \gamma \log C_t + (1-\gamma) \log (\tilde{h}N_t - L_t) \right] \]

subject to

\[ C_t + K_{t+1} - K_t = w_t L_t + (r_t - \delta) K_t. \]

Feasibility:

\[ C_t + K_{t+1} - (1-\delta) K_t = A_t K_t^\alpha L_t^{1-\alpha}. \]
Calibration

First order conditions:

\[ \frac{1}{C_{t-1}} = \frac{\beta}{C_t} (1 + r_t - \delta) \]

\[ \frac{1 - \gamma}{\bar{h}N_t - L_t} = \frac{\gamma w_t}{C_t} \]

Estimate \( \beta = 0.96, \gamma = 0.30 \) 1960-1970 data.
Model with Adjustment Costs

\[ C_t + X_t = A_t K_t^\alpha L_t^{1-\alpha} \]

\[ K_{t+1} = (1-\delta)K_t + \phi(X_t / K_t)K_t \]

where

\[ \phi(X / K) = \left[ \delta^{1-\eta} (X / K)^\eta + (\eta-1)\delta \right] / \eta. \]

For \(0 < \eta \leq 1\), \(\phi'(X / K) > 0\), \(\phi''(X / K) \leq 0\), \(\phi(\delta) = \delta\), \(\phi'(\delta) = 1\).

The model without adjustment costs is the special case \(\eta = 1\).

In numerical experiments \(\eta = 0.8\).

Should we model rigidity in the labor market (instead)?
Real GDP per Working Age Person

Base Case Model

Model with Adjustment Costs
Hours Worked per Working Age Person

Base Case Model

Model with Adjustment Costs
Capital-Output Ratio

Base Case Model

Model with Adjustment Costs

Data

Model
Sargent-Wallace Model of Unpleasant Monetarist Arithmetic

Imagine that fiscal policy dominates monetary policy. The fiscal authority sets its budgets, announcing all current and future deficits and surpluses and thus determining the amount of revenue that must be raised through bond sales and seignorage. Under this … coordination scheme, the monetary authority faces the constraints imposed by the demand for government bonds, for it must try to finance with seignorage any discrepancy between the revenue demanded by the fiscal authority and the amount of bonds that can be sold to the public.

Monetary and fiscal policy are not independent instruments!
Da Rocha-Giménez-Lores Model of Devaluation and Default in Argentina

Expectations of devaluation can lead domestic consumers to invest in assets abroad rather than in domestic capital. This gives the government an incentive to devalue.

Devaluation can increase the value of government debt denominated in dollars relative to domestic GDP and the government’s ability to repay the debt, pushing the economy into the crisis zone.

What drives the results in this model is that the nominal devaluation expected by domestic consumers turns out to be a real devaluation that pushes the economy into the crisis zone.
Lessons for monetary policy

Increasing the costs of abandoning a policy can reduce the set of conditions under which a crisis can occur. If these increased costs do not rule out a crisis completely, however, they can backfire in making the economy far worse off if things do go wrong.

Rogoff’s (1985) (and, more recently, Woodford’s 2002) proposal to reduce the dynamic consistency problem in monetary policy making is to employ a “conservative” central banker, one whose social welfare function puts far more weight on price stability than does the general population’s. This is what the De La Rúa administration tried to do in bringing in Domingo Cavallo as Economics Minister in early 2001.
Dynamic consistency problems are pervasive because commitment is not easy. Lack of political consensus both within the federal government and between the federal and the provincial governments in Argentina made it impossible to resolve fiscal imbalances. In this environment, “unpleasant monetarist” arithmetic doomed the Convertibility Plan to failure. Measures that the administration had put in place to make the Convertibility Plan more credible are imposing severe costs on the economy now that the plan has failed.
A final note

They say that every dark cloud has a silver lining, but it is hard to have much optimism about the Argentinian economy. Nevertheless, the pervasiveness of time consistency problems may soon produce one favorable for Argentina: Up until recently, both the Bush administration and the International Monetary Fund in the person of its new Managing Deputy Director Anne Krueger claimed to be committed to a policy of “no more bailouts” for countries like Mexico and Korea that run into financial crises of their own making. Early last month, however, the IMF, with the backing of the U. S. government, announced large loan packages for Brazil and Argentina. Negotiations for another package for Argentina are currently underway.