Lecture 10

First Generation Currency Crises Models

Why fixed exchange rate regime collapse?

Model developed by Krugman (1979).

Basic structure based on the monetary model of exchange rate determination in which we add investors behavior and in which we consider explicitly and intertemporal context.

Underlying key assumption: it is a model without uncertainty (i.e. we have perfect foresight).

Message: traders speculate against fixed exchange rate in order to profit from an anticipated speculation. Their behavior is "justified" because of an inconsistency between internal and external objectives.

The outcome of this interaction is a balance of payment crises in which traders acquire a large portion of the central's bank foreign reserve as the bank attempts in vain to support its currency.

Speculative attacks in this framework are inevitable and represent an entirely rational market response to persistently confliction internal and external macroeconomic targets.

Money demand equation:

$$\frac{M_t^d}{P_t} = \alpha - \beta i_t$$

and money supply follows from Central Bank balance sheet:

$$M_t^s = FX_t + DC_t$$

Investors behavior is capture by uncovered interest parity condition:

$$\frac{e_{t+1}^e - e_t}{e_t} = i_t - i_t^*$$

Other assumptions:

a) we assume that purchasing power parity holds and we normalise the foreign price level to 1.

$$\frac{e_t P_t^*}{P_t} = 1 \text{ with } P_t^* = 1 \Rightarrow e_t = P_t$$

b) we assume that there is perfect foresight and we normalise the foreign interest rate to 0.

$$e_{t+1}^e = e_{t+1} \text{ with } i_t^* = 0 \Rightarrow \frac{e_{t+1} - e_t}{e_t} = i_t$$

c) there is a lower bound on the level of foreign reserves that the central bank owns.

$$FX_t \geq 0$$

Solution of the model:

Money market equilibrium:

$$M_t^d = M_t^s \Rightarrow \frac{FX_t + DC_t}{P_t} = \alpha - \beta i_t$$

$$\frac{FX_t + DC_t}{e_t} = \alpha - \beta \left(\frac{e_{t+1} - e_t}{e_t} \right)$$

Case I) Fixed Exchange Rate Regime:

$$e_t = \overline{e} \quad \forall t$$

$$\frac{FX_t + DC_t}{\overline{e}} = \alpha \tag{1}$$

The previous equation defines the conditions under which the fixed exchange rate is viable and determines the level of foreign reserves compatible with a given fixed exchange rate.

$$FX_t \geq \alpha \overline{e} - DC_t$$

note that here we are implicitly assuming that foreign reserves might change over time.

Case II) Floating Exchange Rate Regime

$$FX + DC_t = \alpha e_t - \beta \left(e_{t+1} - e_t \right) \qquad (2)$$

Note that here we are assuming that central bank does not intervene in the foreign exchange market and so foreign reserves are constant at the initial level.

The value of the current exchange rate depends on its value one period ahead. The shadow exchange rate is the exchange rate that would prevail in the market if there were no intervention in the foreign exchange market.

Equation (2) describes the path of the shadow exchange rate.

An unsustainable peg

Consider the situation in which the Central Bank expands the domestic component of money supply at a constant rate indefinitely:

$$DC_t = DC_{t-1} + \mu$$

where μ is the rate of growth of domestic credit. From (1) we have that, in order to defend the peg, the central bank will intervene in the foreign market by selling foreign reserves at the same rate of increase of the domestic credit component of the money supply. The monetary authority will eventually run out of foreign reserves and will be forced to abandon the peg.

This problem (e.g. of running out of reserves) becomes a crisis well before reserves smoothly go to zero.

Since we are in a framework in which everything is known in advance, traders in the foreign market will anticipate the abandonment of the peg and at a certain point will start selling the domestic currency so that reserves will be driven to zero abruptly. When do the speculators sell the currency?

Recall the definition of shadow exchange rate and recall what happens in the monetary model of exchange rate determination.

Since domestic credit is growing at a constant rate μ, and since the shadow exchange rate depends on the path of money supply, we have that the shadow exchange rate will depreciate also at the constant rate μ. The attack on the domestic currency will occur at time T at which the shadow exchange rate is equal to the fixed rate.

Any individual trader has the incentive to exchange domestic currency for foreign currency before reserves run out. Suppose the attack occurs at time $T_1 > T$ then the exchange rate would jump from the fixed value and it would depreciate discretely. Traders that hold the currency will incur in a capital loss and since they know everything in advance they will sell the currency before T_1.

Suppose now that the attack will occur at time $T_2 < T$ then the exchange rate will appreciate discretely but this cannot be an equilibrium since people do not want to sell a currency that will appreciate. The speculator would prefer to sell as much foreign currency as possible to the central bank and buy it back at the lower price that would prevail after the crisis.

Absence of discrete jump in the nominal exchange rate prevent speculative attacks at times like T_1 or T_2.

Money market is in equilibrium at time T even though the exchange rate doesn't jump: before the attack we had $e_{t+1} - e_t = 0$ and $i_t = i_t^*$. After the attack the nominal exchange rate is given by the shadow exchange rate and it depreciates at the rate μ, which implies that the domestic interest rate is higher than the foreign one in order to preserve the UIP condition.

This would imply a discrete fall in money demand. Given PPP, the price level will not jump and therefore we must have a fall in nominal money supply to re-establish equilibrium in the money market. This fall in money supply occurs through a discrete loss of reserves.

Things to note about this model of currency crisis:

1) The root cause of the crisis is poor government policy. The source of the upward trend in the shadow exchange rate is given by the increase in domestic

credit (the need for this might arise for example because of fiscal deficits to be financed by seignorage) $\Rightarrow$ solve fiscal problem and there is no crisis. Speculative target is provided by government's pursuit of inconsistent policies: persistent deficits together with an exchange rate peg.

2) The crisis, though sudden, is a deterministic event: the crisis is inevitable given the policies and the timing is in principle predictable

3) First generation currency crisis model seem to do no harm. In the model here there is no effect on output, but even a richer model will not generate a real economy slump in the aftermath of a first generation currency crisis model.

4) Note that what matters in determining the crisis are future policy stances that investors foresee, not the one observed in the past.

Is this a good model for describing ERM crisis in 1992?

There was no evidence of irresponsible policies in any of the country involved.

There was no obvious trend in long-run equilibrium exchange rate (shadow rate was not depreciating)

There was no mechanical link between capital flight and abandonment of the peg.

Importance of policy choice in deciding to quit the fixed exchange rate regime.

example: British official chose not to pay the price for defending the pound with higher interest rates, while French officials made the opposite decisions.

Second generation currency crisis model

Logic of the model: interactions between expectations, macroeconomic trade-offs and decisions.

This class of model is characterized by multipla equilibria and the interactions between market expectations and policy outcome can lead to a self-fulfilling crises (i.e. different outcomes, crisis or not crisis, can occur depending on agents' expectations).

Suppose a country has imperfectly committed itself to a currency peg at an uncomfortable level at which the government is forced to accept a lower level employment in the short-run than it would otherwise have wanted.

As long as the peg is credible this is the price the government is willing to pay maybe because there are political and/or long-run economic goals.

If the pegs is no longer credible, investors will demand higher interest rates in order to hold assets denominated in the country's currency. If the government defends the peg by providing those higher interest rates, it will worsen employment. So even a government that would be willing to pay the price of sustaining the peg in absence of speculative attack might be unwilling to stand up in such situation. Speculators who believe that other speculators are about to attack are themselves encouraged to do so. (self-fulfilling crises of confidence).

Difference with first generation models:

1) no irresponsible policy; (but still not full commitment to the peg)

2) no predictability of the crisis.

3) if the country leaves the peg, there is no negative impact on employment and output. Since the monetary policy constraint is removed and the result is

positive in terms of short-run macroeconomics benefits (think about Britain after 1992 and Brazil very recent experience).

Asian Crises:

- Importance of banking and financial sectors.

-Contagion.

-Crisis are followed by real economy slump.