

Currency Crises and Banking Panics

Costas Arkolakis

Teaching fellow: Federico Esposito

Economics 407, Yale

March 2014

Outline

- Currency Crises
- Currency and the Money Market
- A Model of Currency Crises
- Banking Panics

Currency Crises

A **Currency Crisis** (or Balance-of-payment crisis) is a sudden devaluation of a currency which often ends in a speculative attack in the foreign exchange market. In such a situation the government is typically unable or unwilling to meet its financial obligations.

- These difficulties for the government may manifest in a variety of ways: i.e., failure to honor the domestic and/or foreign public debt, suspension of currency convertibility, etc.

Currency Crises

Oftentimes, a balance-of-payment crisis arises when government pegs the nominal exchange rate and at the same time, it runs a fiscal deficit.

- Recall from previous lectures that under a fixed exchange rate regime, the government must finance any fiscal deficit by running down its stock of interest bearing assets (or accumulating debt).
- Obviously, such a situation cannot go indefinitely.
- A balance of payments or currency crises starts after that.

Currency Crises: Ways Out

There are three (unpleasant) ways out of such a crises:

- ① Reduce government fiscal spending or increase taxes: reduce deficit.

Currency Crises: Ways Out

There are three (unpleasant) ways out of such a crises:

- ① Reduce government fiscal spending or increase taxes: reduce deficit.
- ② Default on past debt and as a result, reduce interest payments.

Currency Crises: Ways Out

There are three (unpleasant) ways out of such a crises:

- ① Reduce government fiscal spending or increase taxes: reduce deficit.
- ② Default on past debt and as a result, reduce interest payments.
- ③ Abort the exchange rate peg and monetize the fiscal deficit.

Currency Crises: Ways Out

There are three (unpleasant) ways out of such a crises:

- ① Reduce government fiscal spending or increase taxes: reduce deficit.
- ② Default on past debt and as a result, reduce interest payments.
- ③ Abort the exchange rate peg and monetize the fiscal deficit.

Examples of abandoning the currency peg

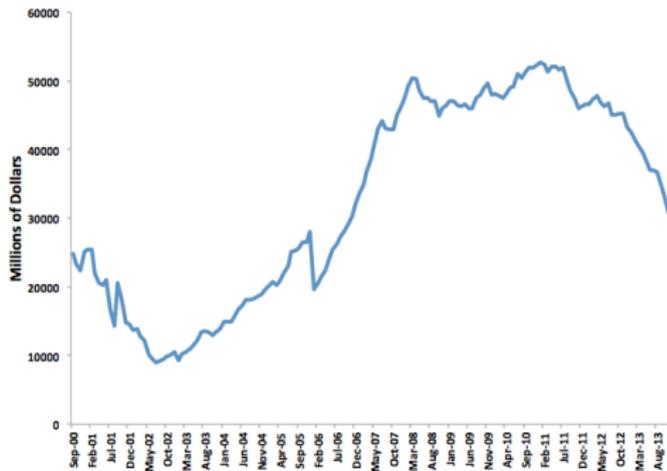
- Currency pegs implemented in Argentina, Chile & Uruguay in the late '70s, also known as tablitas, ended with large devaluations in the early '80s.
- More recently, Brazil's Real plan 1994 & Argentina peso-dollar parity 2002.
- In Argentinian case, that came with a default on dollar denominated debt.

Currency Crises: Symptoms

Extreme pressure on domestic currency, leading to capital controls and the emergence of a black market for foreign currency.

- Typically the last days before the collapse of fixed exchange rate, the central bank loses vast amounts of reserves.
 - Run by the public in anticipation of the impending devaluation.

Figure: Foreign Reserves of Argentina (source: IMF)



Currency Crises: Symptoms

Bank runs on bank accounts in foreign currency.

Figure: Depositors protest the freezing of their dollar-denominated accounts (source Wikipedia)



Case Study: Black Wednesday

- 1987: UK follows a semi-official policy that pegs the UK pound preventing the currency from fluctuating more than 6%.

Case Study: Black Wednesday

- 1987: UK follows a semi-official policy that pegs the UK pound preventing the currency from fluctuating more than 6%.
- 1990, Oct: Officially joins the European Exchange Rate Mechanism (ERM) committing to this policy.

Case Study: Black Wednesday

- 1987: UK follows a semi-official policy that pegs the UK pound preventing the currency from fluctuating more than 6%.
- 1990, Oct: Officially joins the European Exchange Rate Mechanism (ERM) committing to this policy.
- 1992: UK pound comes under extreme pressure due to high German interest rates and other turmoil in ERM. Prime Minister Major increased interest rates and spend billions of pounds worth of foreign currency to support the pound.

Case Study: Black Wednesday

- 1987: UK follows a semi-official policy that pegs the UK pound preventing the currency from fluctuating more than 6%.
- 1990, Oct: Officially joins the European Exchange Rate Mechanism (ERM) committing to this policy.
- 1992: UK pound comes under extreme pressure due to high German interest rates and other turmoil in ERM. Prime Minister Major increased interest rates and spend billions of pounds worth of foreign currency to support the pound.
- 1992: Investors kept selling pounds for foreign currency; on 16 Sept, UK decided to abandon the ERM.

Case Study: Black Wednesday

- 1987: UK follows a semi-official policy that pegs the UK pound preventing the currency from fluctuating more than 6%.
- 1990, Oct: Officially joins the European Exchange Rate Mechanism (ERM) committing to this policy.
- 1992: UK pound comes under extreme pressure due to high German interest rates and other turmoil in ERM. Prime Minister Major increased interest rates and spend billions of pounds worth of foreign currency to support the pound.
- 1992: Investors kept selling pounds for foreign currency; on 16 Sept, UK decided to abandon the ERM.
- George Soros short sold \$10B worth of pounds with a profit of \$1B during that crisis (source: Wikipedia)

Currency Crises: Timing

Typical timing to the crisis:

- A country pegs its currency exchange rate.

Currency Crises: Timing

Typical timing to the crisis:

- A country pegs its currency exchange rate.
- The government needs to intervene in the foreign exchange market to support the currency. Foreign reserves slowly deplete.

Currency Crises: Timing

Typical timing to the crisis:

- A country pegs its currency exchange rate.
- The government needs to intervene in the foreign exchange market to support the currency. Foreign reserves slowly deplete.
- A sudden speculative attack depletes the foreign reserves and forces government to abandon the currency float.

Currency Crises: Timing

Typical timing to the crisis:

- A country pegs its currency exchange rate.
- The government needs to intervene in the foreign exchange market to support the currency. Foreign reserves slowly deplete.
- A sudden speculative attack depletes the foreign reserves and forces government to abandon the currency float.

⇒ We will study a model of currency crises with these features
(Krugman, 1979, Journal of Money Credit and Banking)

- We will use the model of nominal exchange rate determination which we have already studied.

Currency and the Money Market

Currency and the Money Market

To refresh our memory, we first consider what happens when the exchange rate is free to fluctuate.

- We consider a specific monetary policy in which the central bank (CB) expands money supply at a constant rate: $M_t = (1 + \mu) M_{t-1}$.
- Set foreign price $P_t^* = 1 \implies P_t = P_t^* E_t = E_t$.

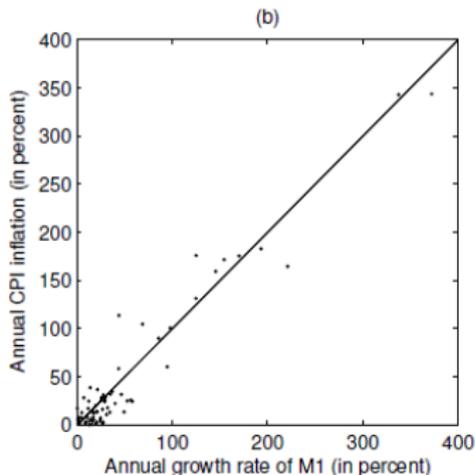
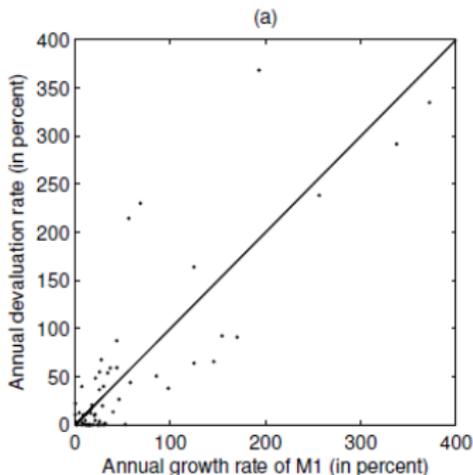
PPP

PPP holds:

$$\frac{P_{t+1}}{P_t} = 1 + \mu$$

Assume (we will eventually prove):

$$\frac{E_{t+1}}{E_t} = 1 + \mu$$



Uncovered Interest Parity

Using the uncovered interest rate parity condition, we solve for the domestic interest rate:

$$1 + i_t = (1 + r^*) \frac{E_{t+1}}{E_t} = (1 + r^*) (1 + \mu)$$

where $i_t > r^*$ if $\mu > 0$.

Uncovered Interest Parity

Using the uncovered interest rate parity condition, we solve for the domestic interest rate:

$$1 + i_t = (1 + r^*) \frac{E_{t+1}}{E_t} = (1 + r^*) (1 + \mu)$$

where $i_t > r^*$ if $\mu > 0$.

Denote this dependence $i_t = i_t(\mu)$. Money market equilibrium yields

$$\frac{M_t}{P_t} = \frac{M_t}{E_t} = L(\bar{C}, i(\mu))$$

Notice that RHS is constant. Take differences

$$M_{t+1}/M_t = E_{t+1}/E_t = 1 + \mu$$

proving our conjecture.

Government Budget Constraint

Recall government budget constraint:

$$\begin{aligned} B_t^g - B_{t-1}^g &= \underbrace{\frac{M_t - M_{t-1}}{E_t}}_{\text{seignorage revenue}} - \underbrace{[G_t - T_t - r^* B_{t-1}^g]}_{\text{real secondary deficit}} \\ &= \frac{M_t - M_{t-1}}{E_t} - DEF_t \end{aligned}$$

Government Budget Constraint

Recall government budget constraint:

$$\begin{aligned} B_t^g - B_{t-1}^g &= \underbrace{\frac{M_t - M_{t-1}}{E_t}}_{\text{seignorage revenue}} - \underbrace{[G_t - T_t - r^* B_{t-1}^g]}_{\text{real secondary deficit}} \\ &= \frac{M_t - M_{t-1}}{E_t} - DEF_t \end{aligned}$$

Can the government cover the deficit using seignorage revenue? Using money market equilibrium:

$$\begin{aligned} \frac{M_t}{E_t} &= L(\bar{C}, i(\mu)) \Rightarrow \\ \frac{M_t}{E_t} - \frac{M_{t-1}}{E_t} &= L(\bar{C}, i(\mu)) \left[1 - \frac{1}{1 + \mu} \right] \Rightarrow \\ \frac{M_t - M_{t-1}}{E_t} &= L(\bar{C}, i(\mu)) \frac{\mu}{1 + \mu} > 0 \end{aligned}$$

A Model of Currency Crises

A Model of Currency Crises

We use a model to solve for endogenous variables:

- nominal exchange rates,
 - price level,
 - real balances,
 - domestic interest rate.
-
- Assume that initially the government has to maintain a peg.
Three phases:
 - ① Currency Peg
 - ② Currency Crisis
 - ③ Currency Floats

Phase 1, Currency Peg

From period 1 to period $T - 2$: exchange rate is pegged.

Exchange rate fixed, $E_t = E$, & let foreign price fixed $P_t^* = 1$.

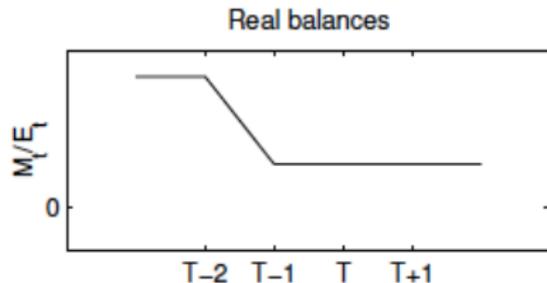
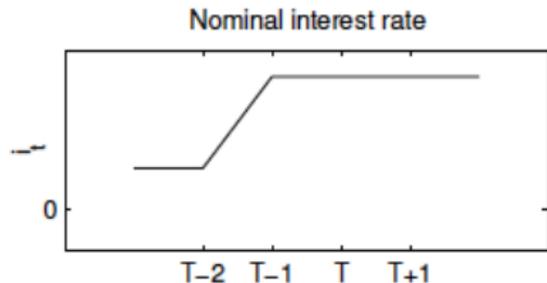
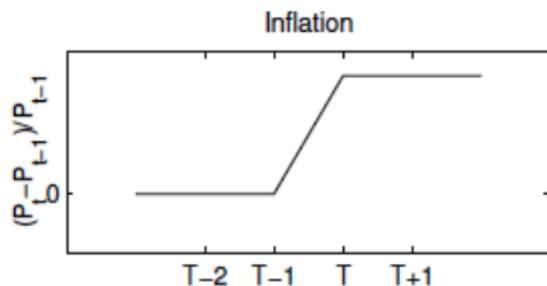
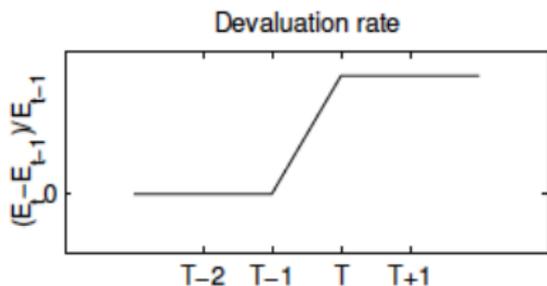
- By PPP: $P_t = E_t P_t^* \Rightarrow P_t = E \times 1$
- Interest rate fixed: $1 + i_t = (1 + r^*) \frac{E_{t+1}}{E_t} = 1 + r^*$
- Government cannot monetize deficit, and thus money supply stays fixed $\frac{M_t}{E_t} = L(\bar{C}, r^*) \Rightarrow M_t = E \times L(\bar{C}, r^*)$
- By government budget: $B_t^g - B_{t-1}^g = -DEF_t$

Phase 2, Currency Crisis

Period $t = T - 1$: peg has not collapsed yet, $P_{T-1} = E_{T-1} = E$.
Exchange rate is expected to float next period.

- Expected depreciation: $E_T/E_{T-1} = 1 + \mu$ (we will not prove that).
- By PPP: $P_{T-1} = E_{T-1}P_{T-1}^* \implies P_{T-1} = E \times 1$
- Interest rate changes: $1 + i_{T-1} = (1 + r^*) \frac{E_T}{E_{T-1}} > (1 + r^*)$
- Money market: $M_{T-1}/E = L(\bar{C}, i(\mu)) < L(\bar{C}, r^*) = M_{T-2}/E$
 - Money supply decreases, people use the domestic money to buy foreign currency.
 - Reserves drop sharply since foreign currency is relatively 'cheap'.

Phase 2, Currency Crisis



Phase 3, Currency Floats

Period $t = T$ onwards: country runs out of reserves $B_{T-1}^g = 0$.
Let us assume that it cannot borrow ($B_{T-1}^g \geq 0$).

Exchange rate floats:

- Government can monetize debt; it expands money supply at a rate μ .
- By PPP: $P_t = E_t P_t^* s \Rightarrow P_t = E_t \times 1$
- Interest rate fixed: $1 + i_t = (1 + r^*) (1 + \mu)$
- By government budget: $B_t^g - B_{t-1}^g = -DEF_t$

Banking Panics

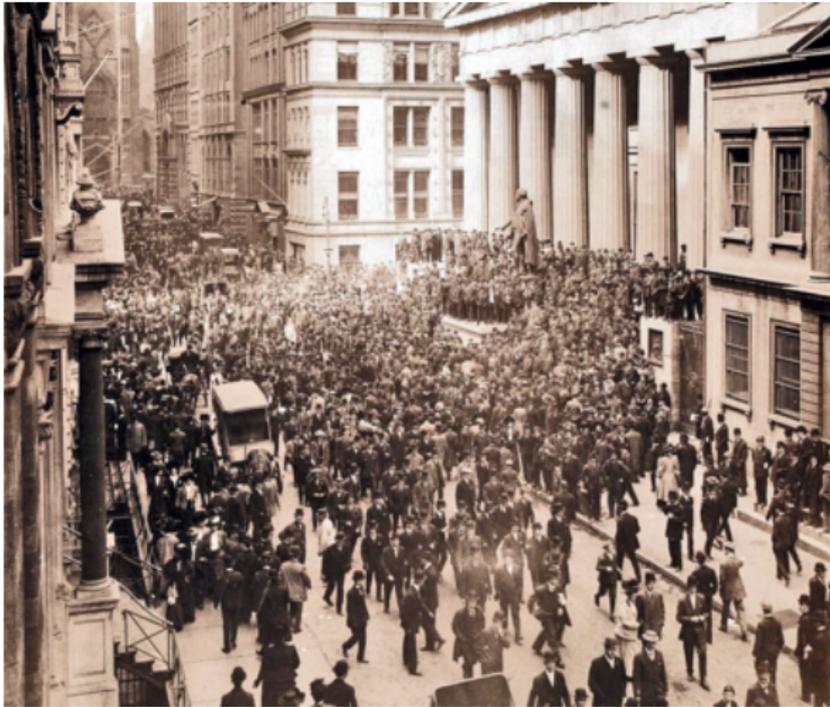
Banking Panics

Banking Panics happen when the public, fearful that their banks will not be able to convert their deposits into currency, attempts en masse to withdraw their deposits.

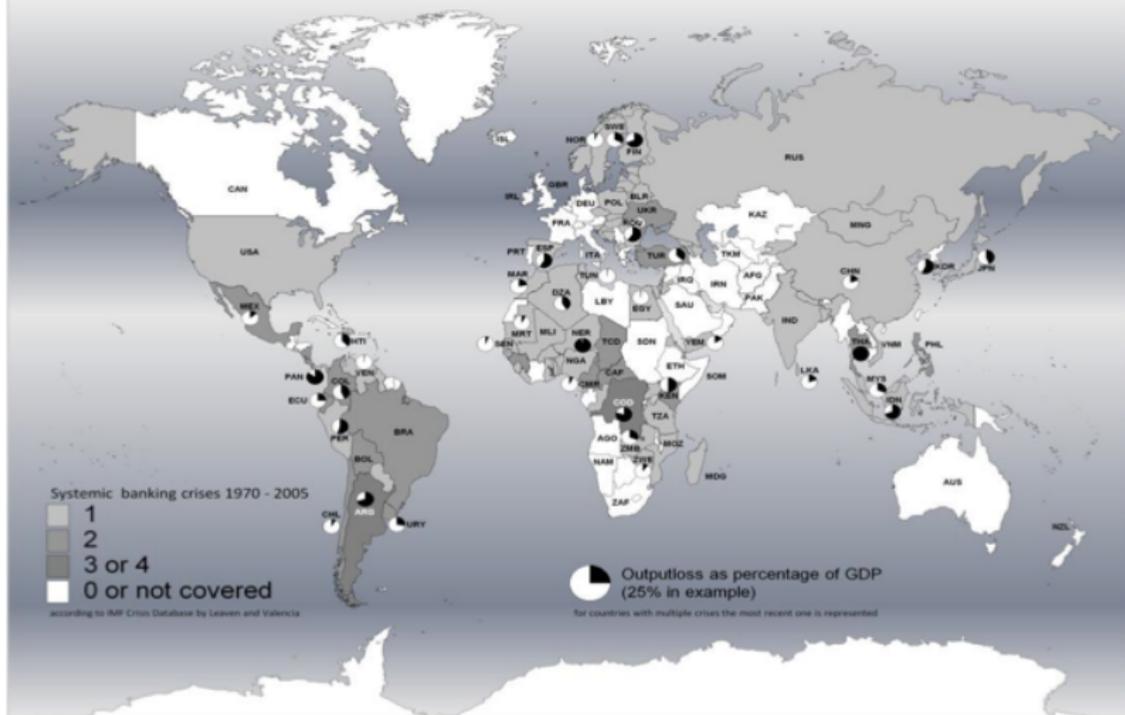
Historically, dozens of banking panics starting from the 18th century.

- Most famous ones: Panic of 1907, Great Depression, most recent one in Cyprus 2013.

Banking Panic of 1907



Systemic banking crises before the World Financial Crisis



Banking Panics: Theories

Self-fulfilling expectations (because of the imposed first-come-first served rule for withdrawing the deposits) could lead to a bank run

- If depositors believe that many other depositors will run to the bank to withdraw their money, they will run to be the first.
- Such a run could be triggered by some change in fundamentals or even by false information.

Banking Panics: Theories

Self-fulfilling expectations (because of the imposed first-come-first served rule for withdrawing the deposits) could lead to a bank run

- If depositors believe that many other depositors will run to the bank to withdraw their money, they will run to be the first.
- Such a run could be triggered by some change in fundamentals or even by false information.

Information asymmetry does not allow depositors to accurately assess a bank's risk.

- Unexpected failure of a corporation or a major recession may lead depositors to inaccurately assess bank's liabilities, because bank assets are non-traded.
- They may withdraw money from the bank and cause a panic.

Testing the Theories

Gorton (Oxford Economic Papers '88) tests the second hypothesis (about information asymmetry) in the data and finds some evidence:

- He uses an indicator variable predicting a recession.
- He finds that when the indicator reaches a certain level (very likely to be a recession) a banking panic occurs.

The Spread of Banking Panics

In a globally linked financial system, banks are also interconnected through their balance sheets.

- Banks hold assets from other banks; the default of one bank, even overseas, could lead to a widespread banking panic.
- Recent example, the subprime mortgage crisis in the US, that spread throughout the US, Europe (UK, Ireland, Spain), and the rest of the world by affecting the balance sheets of banks.

The Recent Banking Crisis

- Banks were holding many assets based on loans of lower quality (lower probability of repayment)
- That was not a problem as long as house prices were increasing because loans not serviced could be paid by selling the house (by home buyer or bank)
- When the house prices collapsed many loans could not be serviced
- This led to sharp devaluation of banks assets and a sudden disruption of banking credit

Lender of Last Resort

The policy of the central bank of a country providing liquidity to distressed banks (or even pledging to do so) has led to a severe reduction in the incidences of banking panics.

But if banking regulation/screening is loose crisis might happen through other channels as we just discussed