

FINANCIAL CRISES

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Introduction

Types of crisis:

- (1) Stock market crashes
- (2) Banking crises
- (3) Currency crises

Although they are often referred to separately they are intertwined on many occasions

Why do they matter?

- Wealth transfers
- Inefficient use of resources
- Spill over to real economy

These effects have often been large

Up until 1933 major crises occurred with differing frequency in different parts of the world. The study of financial crises was a part of mainstream economics.

From 1933 until 1974 there were no widespread crises. There were examples of currency crises in particular countries such as the U.K. There were no serious banking crises or stock market crashes. The study of crises became a subject for economic historians.

The failure of the Herstatt Bank in 1974 and the disruption it caused brought attention to the issue of crises again. Subsequent currency crises in the 1970's and then banking crises in the 1980's and 1990's have focused attention on the topic again.

We will consider each type of crisis in turn

[For an historical discussion of the effect of crises on financial systems see Chapter 2 of

Allen, F. and D. Gale (2000a), *Comparing Financial Systems*, MIT Press.]

1. Stock Market Crashes

What causes dramatic falls in stock market prices?

- Efficient markets theory argues that it is *new information* about cash flows or discount rates
- Another possible cause which is often put forward in the press and in historical discussions is that this can occur after a *bubble* where asset prices rise above their fundamentals

The interesting question is can bubbles exist?

Many apparent examples of bubbles in asset markets seem to suggest they can occur, e.g.

South Sea Bubble

Wall Street Crash of 1929

Norway/Finland/Sweden

Japan

What are the theories of bubbles?

There are many papers based on perfect markets that suggest bubbles cannot occur in finite horizon models because of *backward induction* (e.g. Tirole (1982))

In infinite horizon models backward induction does not work and bubbles can exist, e.g. fiat money. However, the very sharp rises and crashes of typical historical bubbles are difficult to explain in this framework.

Bubbles can be explained with finite (or infinite horizon) models by *agency* problems.

If investors can borrow money and the lenders are unable to observe how it is invested there is a *risk shifting problem*:

- Borrowers get the upside from taking risks while lenders bear the downside
- In an asset pricing context this leads to prices rising above their fundamentals
- With institutional investors such as pension fund managers there is a similar agency problem

[Allen, F. and D. Gale (1999), “Bubbles, Crises and Policy,” *Oxford Review of Economic Policy* 15, 9-18.

_____, (2000b), “Bubbles and Crises,” *Economic Journal*, 110, 236-255.]

2. Banking Crises

- Banks issue *liquid liabilities* in the form of deposit contracts but invest mainly in *illiquid assets*. Historically, this mismatch has resulted in frequent banking panics.
- One of the main roles of central banks has been to try to eliminate panics.

Different histories of panics in Europe and the US:

- Europe: Panics eliminated by central banks in the last half of the nineteenth century
- US: Panics endemic in the last half of the nineteenth century

French banker in 1907:

The US is a “great financial nuisance”.

Federal Reserve Bank founded in 1914 but panics not eliminated until 1933.

What can trigger banking crises?

- (i) “Sunspots,” e.g. Diamond and Dybvig (1983)
- (ii) Aggregate risk/business cycle
- (iii) Market crashes
- (iv) Contagion
- (v) Liquidity needs

Empirical evidence

Gorton (1988): Evidence supports the hypothesis that US banking panics in the late nineteenth and early twentieth century are related to the business cycle.

He found that panics were systematic events: whenever the leading economic indicator represented by the liabilities of failed businesses reached a certain threshold, a panic ensued

We will focus first on business cycle risk as the trigger

Banking in a closed economy with business cycle risk

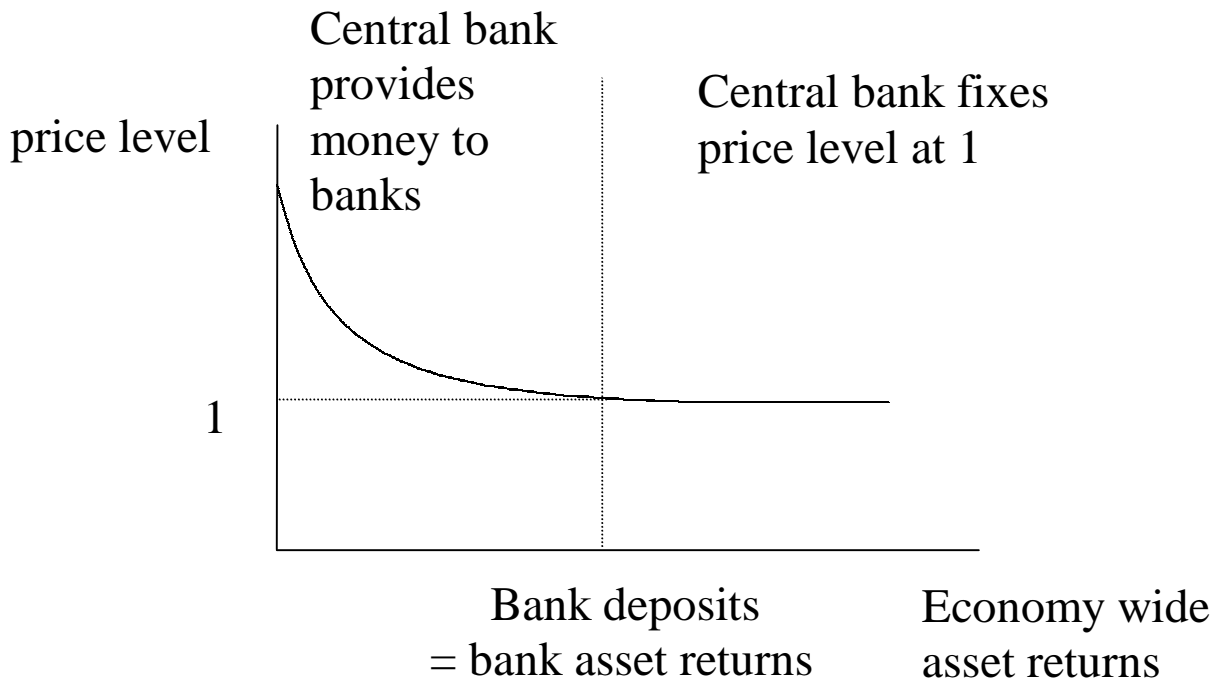
Deposit contracts that promise a fixed amount result in banking crises when leading economic indicators suggest the economy is going into a recession so the returns to banking assets will be low in the future.

- Depositors who want to consume in the future withdraw their money as well as the depositors who want to consume now. Everybody trying to simultaneously withdraw leads to a crisis.
- The crisis leads to banks being simultaneously forced to liquidate long-term assets at low prices because in these situations liquidity is in short supply and as a result there is “*cash in the market*” pricing. In other words liquidation is costly.

Suppose banks use *nominal* deposit contracts. If there is a central bank that provides money to banks when leading economic indicators suggest economy-wide asset returns will be low then forced liquidation and the associated meltdown in asset markets doesn't occur. Banking crises are eliminated and an efficient allocation of resources can be implemented.

- When returns next period look as though they will be low the amount of money relative to goods that is provided is relatively high so money prices are high

- Optimal risk sharing between people with different liquidity needs is achieved through variations in the price level



For asset returns below the critical level

$$\text{Price level} = \frac{\text{Nominal claims on banks}}{\text{Banks' asset returns}}$$

Similar theories can be developed when market crashes, contagion or excess liquidity needs are the crisis trigger

[Allen, F. and D. Gale (1998), “Optimal Financial Crises,” *Journal of Finance* 53, 1245-1284.

___ (2000c), “Financial Contagion,” *Journal of Political Economy* 108, 1-33.]

3. Currency Crises

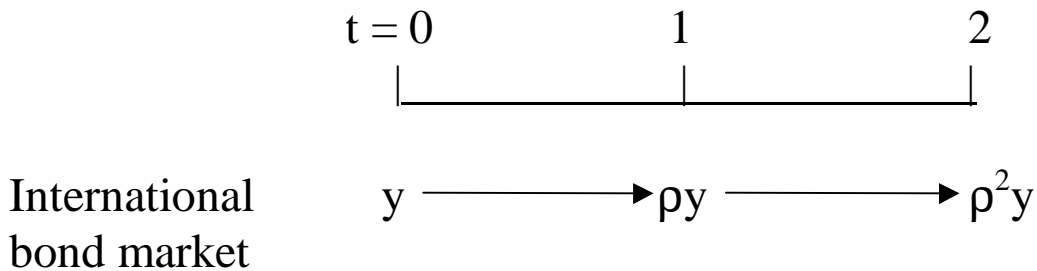
- Kaminsky and Reinhart (1999) have investigated the relationship between currency crises and banking crises which they term “twin crises”
 - In the 1970’s when financial systems were highly regulated currency crises were not accompanied by banking crises
 - After the financial liberalizations that occurred in the 1980’s currency crises and banking crises have become intertwined
 - The common cause of both crises is usually weak economic fundamentals - crises when fundamentals are sound are rare
- Much of the literature on currency crises (e.g., Krugman (1979)) is designed to explain the episodes in the 1970’s
- Despite the empirical inter-relationship between currency and banking crises since the 1980’s the two literatures have mostly developed separately
- An important exception is the work by Chang and Velasco (1998a,b) who develop a model of currency and banking crises based on Diamond and Dybvig (1983). Banking and currency crises are modeled as “sunspot phenomena.”

- The empirical evidence of Kaminsky and Reinhart (1999) is that the twin crises are related to weak economic fundamentals
- In addition, as discussed above empirical evidence supports the hypothesis that US banking panics in the late nineteenth and early twentieth century are related to the business cycle
- The model of banking crises developed for closed economies is extended to include an international capital market so that currency crises can be considered
- In the closed economy people bore the risk of variations in asset returns through variations in the price level
- In an open economy risk can be shared with the international capital market
- We consider the case where the country is small so risk is diversifiable from the standpoint of international investors

Banking in an open economy

Three dates $t = 0, 1, 2$ with single consumption good at each date

Banks can invest in two assets:



Country is small so bond market is *risk neutral*

Risky asset: $x \longrightarrow \rho h(x)$

r is a random variable and $h(x)$ is a decreasing returns to scale production function ($h' > 0$; $h'' < 0$)

Leading economic indicator:

Observed at date 1:
perfect signal of r
(usually non-contractible)

Optimal risk sharing

As a benchmark suppose that it is possible for banks to write a contract contingent on r with the risk neutral international capital market

- Full insurance is provided so depositors bear no risk and receive the expected returns from the bank's portfolio
- Production efficiency: $E[r]h'(x) = \rho^2$

In practice such fully state contingent contracts are not possible. We consider what happens when there is an international debt market. Two cases are considered

- Debt is denominated in *domestic currency*
- Debt is denominated in *foreign currency*

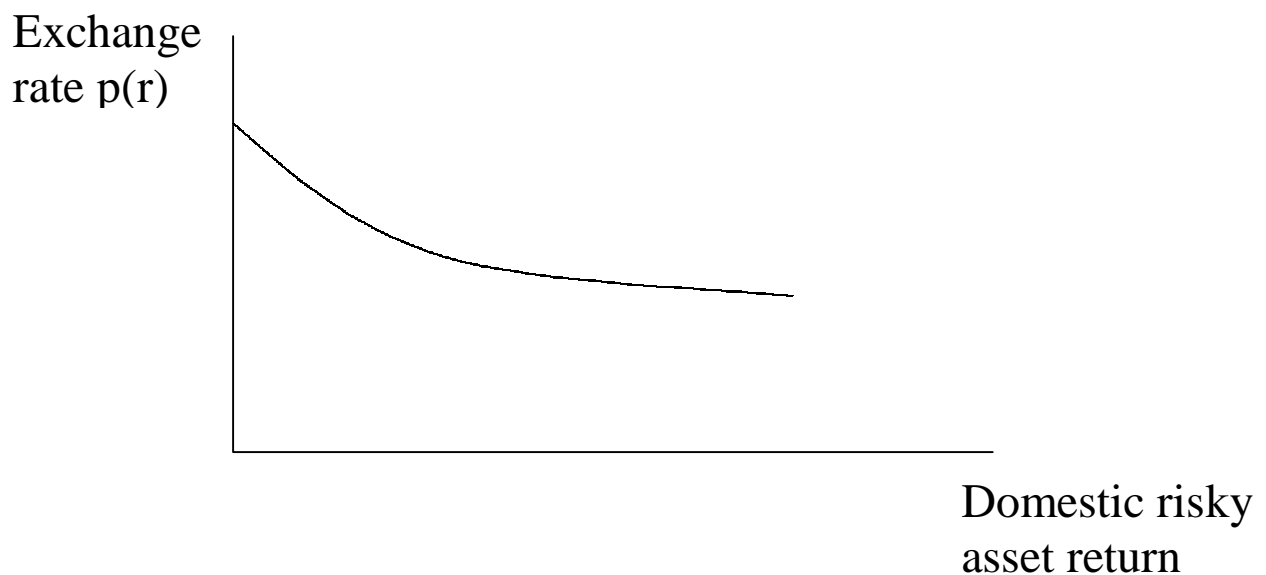
Domestic Currency Debt

With no central bank there is a problem of *financial crises* and inefficient liquidation of the risky asset as before

A central bank can prevent crises if contracts are nominal and money is provided to banks when r is low

We assume that the central bank is doing this and the price level, which can now be interpreted as the exchange rate, varies similarly to before

$$\begin{aligned} \text{Exchange rate} = p(r) &= \frac{\text{Nominal claims on banks}}{\text{Banks' asset returns}} \\ &= \frac{\text{Deposits} + \text{Bonds issued to foreigners}}{\text{Domestic risky asset returns} + \text{Foreign bond returns}} \end{aligned}$$



Suppose initially there is no borrowing in the international bond market so $\bar{B} = 0$

Can a bank do better by using the international bond market?

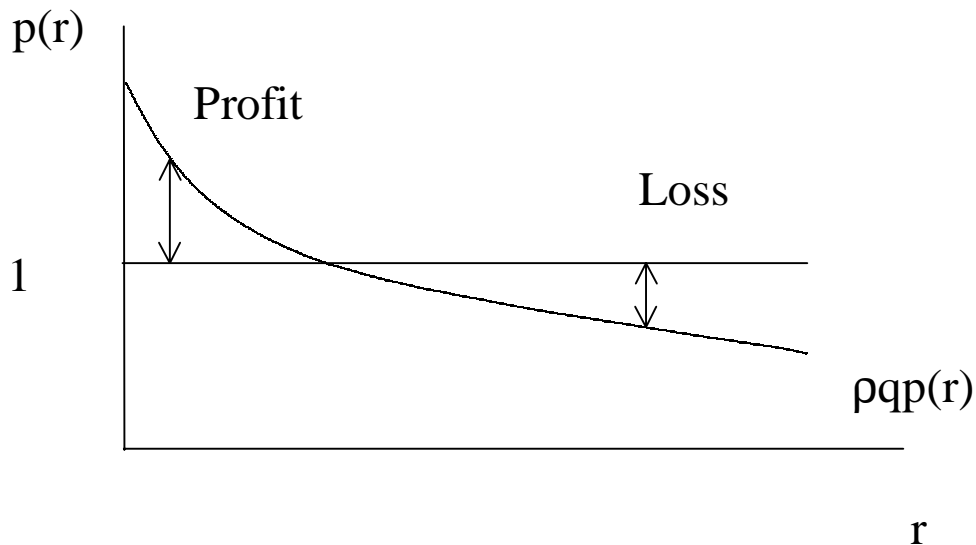
Strategy:

Issue domestic currency bond: $0 \xrightarrow{+q} 1$

Invest in foreign currency assets: $-q \xrightarrow{\rho q p(r)}$

Net payoff in domestic currency: $\rho q p(r) - 1$

Since the bond is **fairly priced** to reflect exchange rate risk the expected payoff to this strategy is zero.



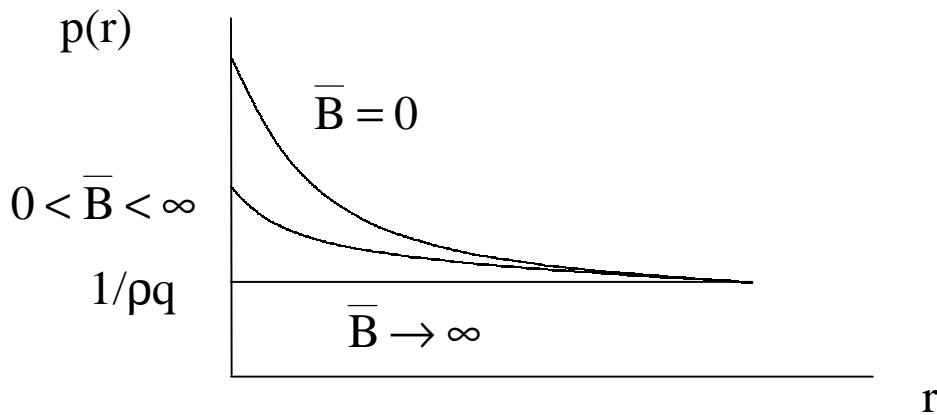
The strategy effectively transfers resources from high return states to low return states which allows depositors' welfare to be raised so the bank can attract more customers

Competition among banks means they wish to adopt this strategy and international borrowing \bar{B} increases

What happens to the exchange rate the central bank is setting to avoid financial crises?

$$p(r) = \frac{\text{Deposits} + \text{Bonds issued to foreigners}}{\text{Domestic risky asset returns} + \text{Foreign bond returns}}$$

$$\rightarrow \frac{1}{\rho q}$$



Result: In the limit all risk is eliminated and the allocation is optimal.

The form of the equilibrium is consistent with the observation that foreign exchange transactions and international financial flows are so large. In this model large financial positions are necessary to achieve optimal risk sharing.

Foreign Currency Debt

- The problem with the risk sharing mechanism described in the previous section is that foreign debt is in domestic currency. This creates a temptation for governments to inflate and expropriate the foreign lenders.
- For developed countries with sophisticated political institutions this will not be a problem
- For emerging economies this possibility may be quite likely in which case an “inflation premium” will be charged. This may make borrowing in domestic currency expensive.
- The inflation premium can be avoided by denominating the international debt in foreign currency rather than domestic currency
- However, if the foreign debt is denominated in foreign currency the benefits that a central bank and international bond market can bring are reduced.
 - The central bank may no longer be able to prevent financial crises and costly liquidation
 - It may not be possible to share risk with the international bond market

Depending on the parameters of the model it can be optimal to have:

- No central bank so all contracts are in foreign currency (i.e., “dollarization”) if liquidation costs are low
- A central bank with domestic currency deposits and foreign currency debt if liquidation costs are high

Policy Implications

- Krugman (1998) and Fischer (1999) have argued the IMF should act as an international lender of last resort by analogy with the widespread acceptance of the need for domestic lenders of last resort.
- Friedman (1998), Schultz (1998) and Schwartz (1998) have argued that the IMF distorts markets when it intervenes.

Our model provides a framework for thinking about these issues. In some situations it seems that an international organization has little role to play. In others, however, it may be able to prevent the costly liquidation and contagion associated with financial crises and improve the allocation of resources.

Case 1: Flexible Exchange rates and Foreign Debt in Domestic Currency

This was the case discussed initially and is the one applicable to the advanced industrial economies. The efficient allocation can be implemented. Here no intervention by an international organization such as the IMF is needed.

Case 2: Foreign Borrowing Denominated in Foreign Currency

Many governments particularly in emerging economies are unable to borrow in domestic currency because of inflation concerns and must instead borrow in dollars as discussed above. In this case a whole range of possible arrangements exists. Banking crises with inefficient liquidation can occur. There may also be severe problems of *contagion* in this kind of situation. The IMF can have an important role to play in such circumstances.

[Allen, F. and D. Gale (2000d), “Optimal Currency Crises,” *Carnegie-Rochester Series on Public Policy*, forthcoming]