Lecture Nine
International Financial Crisis

Fan Xiaoyan

SOE, Fudan University

Outline

1. Overview of International Financial Crisis

2. Currency Crises: History and Policies
   - 2.1 Facts about Currency Crises
   - 2.2 How Pegs Work: The Mechanics of a Fixed Exchange Rate
   - 2.3 Generalization of Central Bank Balance

3. Banking Crises in History and Present
   - 3.1 Overview of Banking Crises
   - 3.2 Understanding the Crisis in 2008

4. Reading and Discussion

Reinhart and Rogoff(2009)

- If there is one common theme to the vast range of crises we consider in this book, it is that excessive debt accumulation, whether it be by the government, banks, corporations, or consumers, often poses greater systemic risks than it seems during a boom.

- Debt-fueled booms all too often provide false affirmation of a government's policies, a financial institution's ability to make outsized profits, or a country's standard of living. Most of these booms end badly.

- Of course, debt instruments are crucial to all economies, ancient and modern, but balancing the risk and opportunities of debt is always a challenge, a challenge policy makers, investors, and ordinary citizens must never forget.
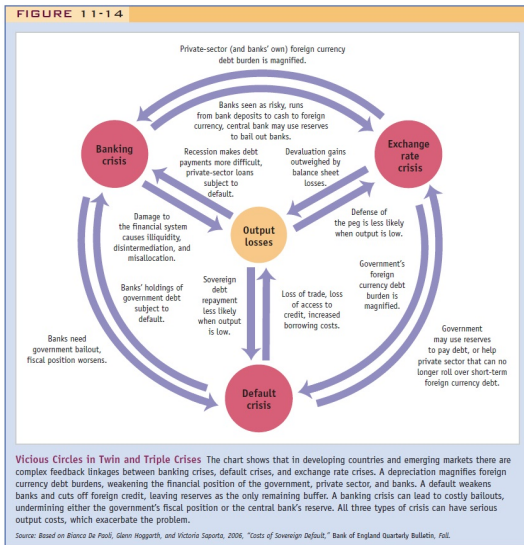
Three Types of International Financial Crisis

- **Exchange rate crisis**: When the break (of fixed exchange rate) occurs, there is often a large, sudden depreciation accompanied by high economic and political costs. Such a collapse is known as an exchange rate crisis.

- **Banking crisis**: In the private sector, if banks and other financial institutions face adverse shocks, they may become insolvent, causing them to close or declare bankruptcy: this is known as a banking crisis.

- **Default crisis**: In the public sector, if the government faces adverse shocks, it may default and be unable or unwilling to pay the principal or interest on its debts: this is known as a sovereign debt crisis or default crisis.

Financial Crises by Type
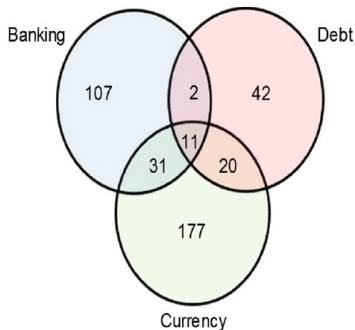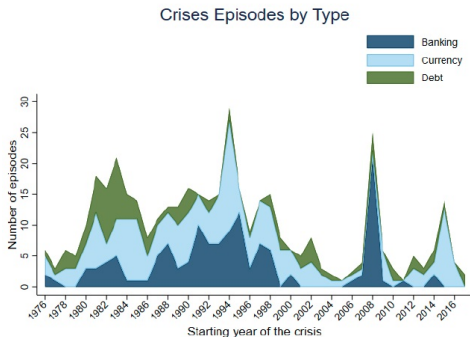
Source: Laeven and Valencia(2018), Figure 4.

Vicious Circles in Twin and Triple Crises

FIGURE 11-14

Vicious Circles in Twin and Triple Crises The chart shows that in developing countries and emerging markets there are complex feedback linkages between banking crises, default crises, and exchange rate crises. A depreciation magnifies foreign currency debt burdens, weakening the financial position of the government, private sector, and banks. A default weakens banks and cuts off foreign credit, leaving reserves as the only remaining buffer. A banking crisis can lead to costly bailouts, undermining either the government's fiscal position or the central bank's reserve. All three types of crisis can have serious output costs, which exacerbate the problem.

Source: Based on Bianco De Paoli, Glenn Hoggarth, and Victoria Saporta, 2006, "Costs of Sovereign Default," Bank of England Quarterly Bulletin, Fall.

Economic Costs of the Financial Crisis

Crisis Severity: Percent Decline in Per Capita GDP, Duration of Contraction and
Years to Full Recovery in 25 of the Worst Systemic Banking Crises, 1857-2018

	Year	Country	% change Peak to trough	Number of years Peak to trough	Number of years Peak to recovery	Severity index
1	1926	Chile	-46.6	3	16	62.6
2	1931	Spain	-34.6	9	26	60.6
3	1983	Peru	-32.0	11	25	57.0
4	1931	Uruguay	-36.1	3	17	53.1
5	1893	Australia	-28.0	8	20	48.0
6	1929	Mexico	-31.1	6	16	47.1
7	1921	Italy	-25.5	3	21	46.5
8	1890	Brazil	-21.7	4	21	42.7
9	2008	Greece	26.3	6	16	42.3
10	1890	Uruguay	-21.0	2	19	40.0
11	1981	Philippines	-18.8	3	21	39.8
12	1980/1985	Argentina	-21.8	11	18	39.8
13	1929	India	-8.2	9	31	39.2
14	1929/1933	US	-28.6	4	10	38.6
15	1994	Venezuela	-24.2	11	14	38.2
16	1939	Netherlands	-16.0	6	21	37.0
17	1931/1934	Argentina	-19.4	3	15	34.4
18	1931	Poland	-24.9	4	9	33.9
19	1929/1931	Austria	-23.4	4	10	33.4
20	1981	Mexico	-14.1	7	17	31.1
21	1920	UK	-18.7	3	11	29.7
22	2001	Argentina	-20.9	4	8	28.9
23	2008	Italy	-11.9	6	16	27.9
24	1980	Chile	-18.9	2	8	26.9
25	2002	Uruguay	-18.9	4	8	26.9

Banking, Currency, and Debt
Banking only
Currency only
Debt only

Source: Reinhart (2018), Reinhart and Rogoff (2009 and 2014).

"Pure" (ie, unaccompanied banking crises) do not figure as prominently among the most severe recession episodes.

Debt crises (usually at the time of or following the banking crisis) add to the depth and duration of the post-crisis output decline.

Besides a variety of crises, some of these episodes also encompassed wars.

22 of these 25 episodes are classified as GDP collapses by Barro and Ursua (2008) and another 3 (including Greece and Italy post-2008) are not in their sample.
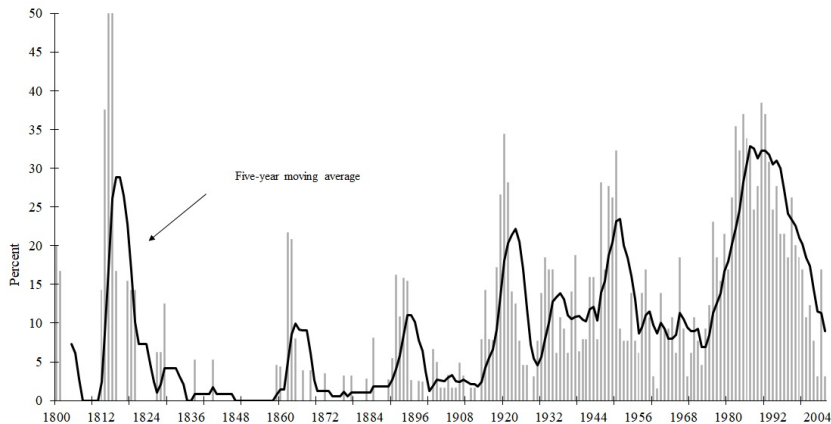
Source: Reinhart(2018), International Financial Crises, Lecture slides on *Nobel Symposium "Money and Banking"*.

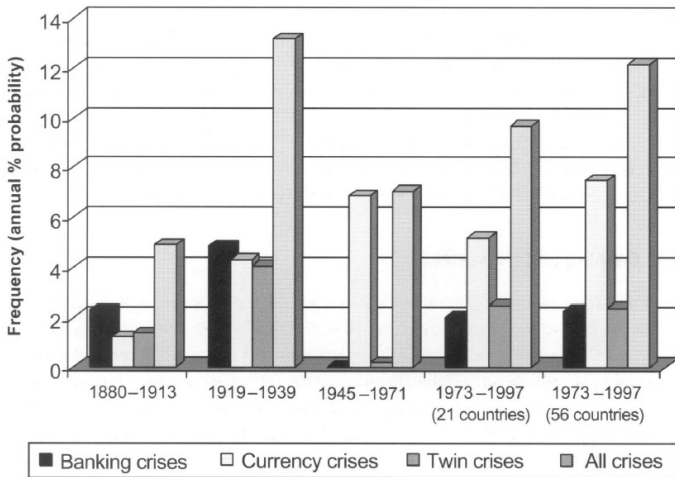# Turning Right after the Financial Crisis
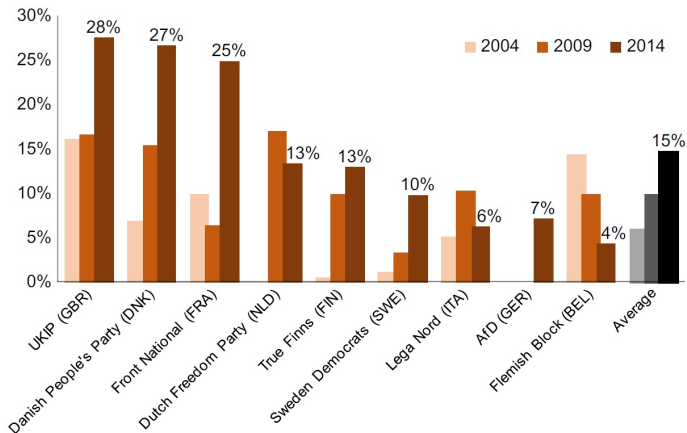
Source: Funke et al.(2016), Fig2. Far-right and right-wing populist votes in European elections.

Currency Crashes: 1800–2007

Source: Reinhart and Rogoff(2009), Figure 12.3. The share of countries with annual depreciation rates greater than 15 percent.

Currency and Banking Crisis: 1880–1997

Source: Bordo et al.(2001), Figure 1.
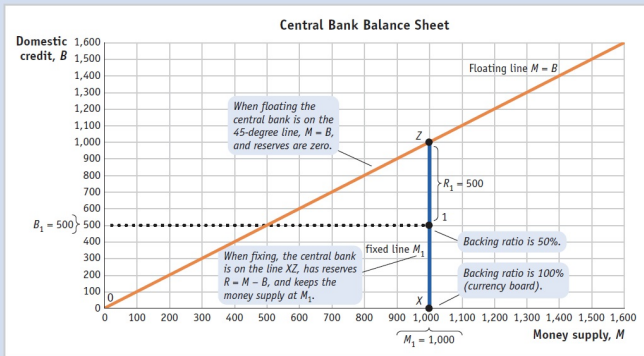
The Central Bank Balance Sheet and Support Ratio

$$M = R + B$$

SIMPLIFIED CENTRAL BANK BALANCE SHEET (MILLIONS OF PESOS)			
Assets		**Liabilities**	
Reserves R *Foreign assets (dollar reserves)*	500	**Money supply M** *Currency in circulation*	1,000
Domestic credit B *Domestic assets (peso bonds)*	500		

The ratio R/M is called the backing ratio, and it indicates the fraction of the money supply that is backed by reserves on the central bank balance sheet.

The Central Bank Balance Sheet Diagram

FIGURE 9-4

Central Bank Balance Sheet

When floating the central bank is on the 45-degree line, $M = B$, and reserves are zero.

Floating line $M = B$

$R_1 = 500$

$B_1 = 500$

Backing ratio is 50%.

fixed line M_1

When fixing, the central bank is on the line XZ, has reserves $R = M - B$, and keeps the money supply at M_1.

Backing ratio is 100% (currency board).

$M_1 = 1,000$

Domestic credit, B

Money supply, M

The Central Bank Balance Sheet Diagram On the 45-degree line, reserves are at zero, and the money supply M equals domestic credit B. Variations in the money supply along this line would cause the exchange rate to float. There is a unique level of the money supply M_1 (here assumed to be 1,000) that ensures the exchange rate is at its chosen fixed value. To fix the money supply at this level, the central bank must choose a mix of assets on its balance sheet that corresponds to points on line XZ, points at which domestic credit B is less than money supply M. At point Z, reserves would be at zero; at point X, reserves would be at 100% of the money supply. Any point in between on XZ is a feasible choice. At point 1, for example, domestic credit is $B_1 = 500$, reserves are $R_1 = 500$, and $B_1 + R_1 = M_1 = 1,000$.

Changes in the Level of Money Demand

When the domestic output Y declines or the interest rate i increases, the nominal money demand $M = L(i)Y$ will decrease. Given B unchanged, the fall of money demand equals the change of reserve assets $\Delta M = \Delta R$.
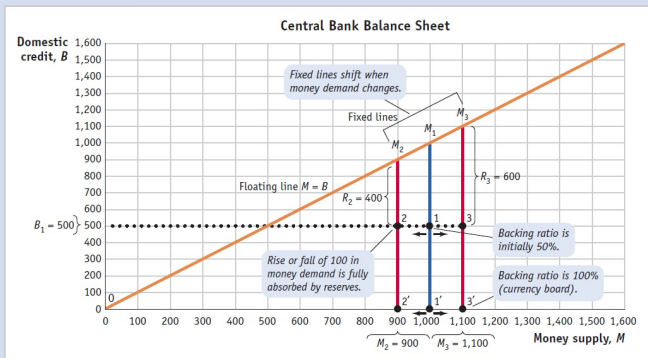
$$M \downarrow = R \downarrow + B$$

SIMPLIFIED CENTRAL BANK BALANCE SHEET AFTER MONEY DEMAND FALLS (MILLIONS OF PESOS)

Assets		Liabilities	
Reserves R	400	**Money supply M**	900
Foreign assets (dollar reserves)		*Currency in circulation*	
Domestic credit B	500		
Domestic assets (peso bonds)			

Illustration in the Central Bank Balance Sheet Diagram

FIGURE 9-5

Central Bank Balance Sheet

Domestic credit, B

Fixed lines shift when money demand changes.

Fixed lines

Floating line $M = B$

$B_1 = 500$

$R_2 = 400$

$R_3 = 600$

Backing ratio is initially 50%.

Rise or fall of 100 in money demand is fully absorbed by reserves.

Backing ratio is 100% (currency board).

$M_2 = 900$ $M_3 = 1,100$

Money supply, M

Shocks to Money Demand If money demand falls, interest rates tend to fall, leading to pressure for an exchange rate to depreciate. To prevent this, the central bank must intervene in the forex market and defend the peg by selling reserves and hence lowering the money supply to keep the interest rate fixed and ensure that money supply equals money demand. As shown here, the money supply declines from $M_1 = 1,000$ to $M_2 = 900$. If domestic credit is unchanged at $B_1 = 500$, the change in the central bank balance sheet is shown by a move from point 1 to point 2, and reserves absorb the money demand shock by falling from $R_1 = 500$ to $R_2 = 400$. An opposite positive shock is shown by the move from point 1 to point 3, where $M_3 = 1,100$ and $R_3 = 600$. In a currency board system, a country maintaining 100% reserves will be on the horizontal axis with zero domestic credit, $B = 0$. A currency board adjusts to money demand shocks by moving from point 1′ to points 2′ or 3′.

Extention of UIP and the Risk Premium of Interest Rate

$$i = i^* + \frac{\Delta E^e}{E} + \underbrace{\left[\begin{array}{c} \text{Exchange rate} \\ \text{risk premium} \end{array} \right]}_{\text{Currency premium}} + \underbrace{\left[\begin{array}{c} \text{Default} \\ \text{risk premium} \end{array} \right]}_{\text{Country premium}}$$

- The currency premium reflects the credibility of pegged exchange rate.

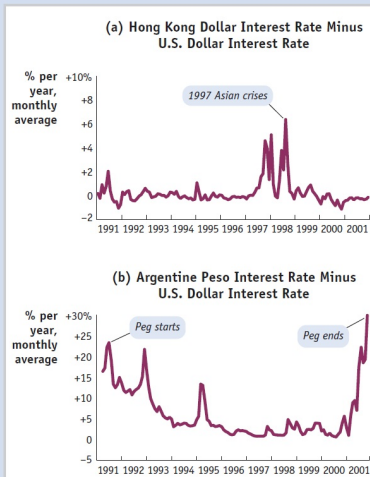- The country premium is compensation for perceived default risk (settlement or counterparty risk).

Risk Premium in Argentina
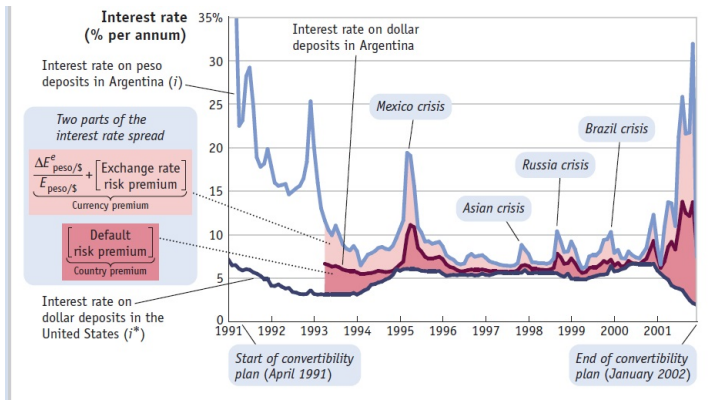
Interest Rate Spreads: Currency Premiums and Country Premiums When advanced countries peg, the interest rate spread is usually close to zero, and we can assume $i = i^*$. An example is Denmark's peg to the euro in panel (a), where the correlation between the krone and euro interest rates is 0.96. When emerging markets peg, interest rate spreads can be large and volatile, due to both currency and country premiums. An example is Argentina's peg to the U.S. dollar in panel (b), where the correlation between the peso interest rate and the U.S. interest rate is only 0.38.

Risk Premiums of Argentina and Hongkong

FIGURE 11-5

(a) Hong Kong Dollar Interest Rate Minus U.S. Dollar Interest Rate

1997 Asian crises

(b) Argentine Peso Interest Rate Minus U.S. Dollar Interest Rate

Peg starts   *Peg ends*

Peso Problems If exchange rates are fixed (and credible), then the interest rate on the home currency and the base currency should be the same. As seen here, however, the Hong Kong dollar and Argentina peso often had large currency premiums. Hong Kong's peg held, and carry trade profits were made. Argentina's peg broke, and losses were massive.

Source: Hong Kong Monetary Authority and econstats.com.

Changes in the Composition of Money Supply

$$M = R \downarrow + B \uparrow$$

SIMPLIFIED CENTRAL BANK BALANCE SHEET AFTER EXPANSION OF DOMESTIC CREDIT (MILLIONS OF PESOS)

Assets		Liabilities	
Reserves R	400	**Money supply M**	1,000
Foreign assets (dollar reserves)		*Money in circulation*	
Domestic credit B	600		
Domestic assets (peso bonds)			

Illustration in the Central Bank Balance Sheet Diagram

FIGURE 9-8

Central Bank Balance Sheet
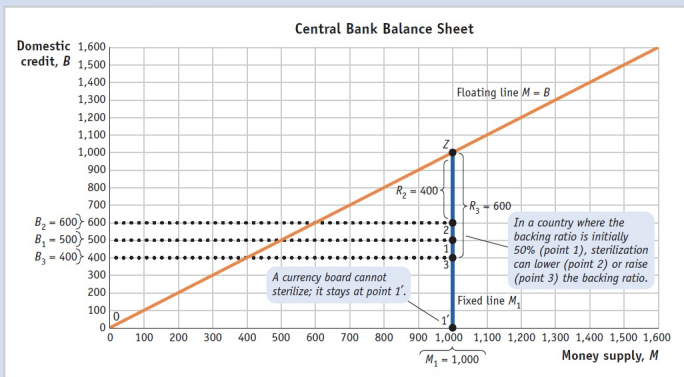
Sterilization If domestic credit rises, money supply rises, all else equal, interest rates tend to fall, putting pressure on the exchange rate to depreciate. To prevent this depreciation, keep the peg, and stay on the fixed line, the central bank must intervene and defend the peg by selling reserves to keep the money supply fixed. As shown here, the money supply is $M_1 = 1,000$. If domestic credit increases from $B_1 = 500$ to $B_2 = 600$, the central bank balance sheet moves from point 1 to point 2, and reserves fall from $R_1 = 500$ to $R_2 = 400$. An opposite shock is shown by the move from point 1 to point 3, where $B_3 = 400$ and $R_3 = 600$. If the country maintains 100% reserves, it has to stay at point 1': a currency board cannot engage in sterilization.
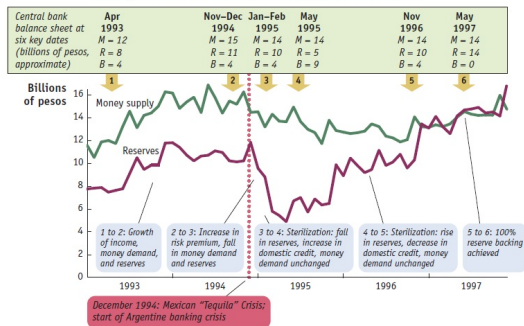
General Central Bank Balance

$$M + L = R + B$$

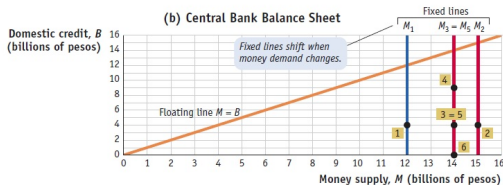$$M \downarrow, B \uparrow \not\Rightarrow R \downarrow, \quad R/M > 1$$

GENERAL CENTRAL BANK BALANCE (MILLIONS OF PESOS)			
Assets		**Liabilities**	
Foreign assets	950	**Foreign liabilities**	50
of which:		of which:	
Foreign reserves (all currencies)	950	Foreign currency debt issued by the	50
Gold	0	central bank	
Domestic assets	500	**Domestic liabilities**	400
of which:		of which:	
Domestic government bonds bought	300	Domestic currency debt issued by the	400
Loans to commercial banks	200	central bank	
		Money supply M	1,000
		of which:	
		Currency in circulation	900
		Reserve liabilities to commercial banks	100

Case 1: Agentina's Crisis in 1993–1997
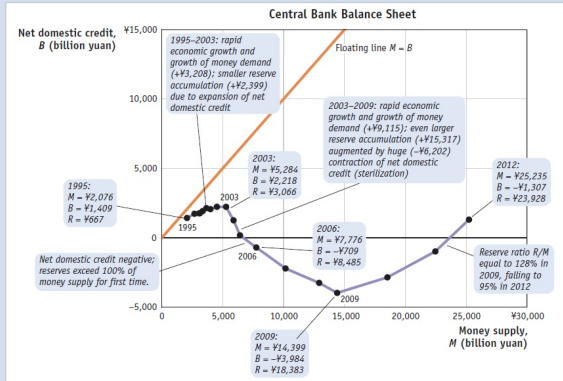

(a) Approximate Evolution of Money Supply and Reserves

Central bank balance sheet at six key dates (billions of pesos, approximate)	Apr 1993	Nov–Dec 1994	Jan–Feb 1995	May 1995	Nov 1996	May 1997
	M = 12	M = 15	M = 14	M = 14	M = 14	M = 14
	R = 8	R = 11	R = 10	R = 5	R = 10	R = 14
	B = 4	B = 4	B = 4	B = 9	B = 4	B = 0

1 to 2: Growth of income, money demand, and reserves

2 to 3: Increase in risk premium, fall in money demand and reserves

3 to 4: Sterilization: fall in reserves, increase in domestic credit, money demand unchanged

4 to 5: Sterilization: rise in reserves, decrease in domestic credit, money demand unchanged

5 to 6: 100% reserve backing achieved

December 1994: Mexican "Tequila" Crisis; start of Argentine banking crisis

(b) Central Bank Balance Sheet

Domestic credit, B (billions of pesos)

Fixed lines shift when money demand changes.

Floating line M = B

Money supply, M (billions of pesos)

Case 2: Sterilization in China

FIGURE 9-10

Central Bank Balance Sheet

Net domestic credit, B (billion yuan)

1995–2003: rapid economic growth and growth of money demand (+¥3,208); smaller reserve accumulation (+¥2,399) due to expansion of net domestic credit

Floating line M = B

2003–2009: rapid economic growth and growth of money demand (+¥9,115); even larger reserve accumulation (+¥15,317) augmented by huge (−¥6,202) contraction of net domestic credit (sterilization)

1995:
M = ¥2,076
B = ¥1,409
R = ¥667

2003:
M = ¥5,284
B = ¥2,218
R = ¥3,066

2012:
B = ¥25,235
B = −¥1,307
R = ¥23,928

Net domestic credit negative; reserves exceed 100% of money supply for first time.

2006:
M = ¥7,776
B = −¥709
R = ¥8,485

Reserve ratio R/M equal to 128% in 2009, falling to 95% in 2012

2009:
M = ¥14,399
B = −¥3,984
R = ¥18,383

Money supply, M (billion yuan)

Sterilization in China By issuing "sterilization bonds" central banks can borrow from domestic residents to buy more reserves. With sufficient borrowing of this kind, the central bank can end up with negative net domestic credit and reserves in excess of 100% of the money supply. The chart shows how this has happened in China in some recent years: from 1995 to 2003 net domestic credit in China was steady; reserve growth was almost entirely driven by money demand growth (movement to the right). From 2003 to 2009 sterilization (movement down) sent net domestic credit below zero; sterilization accounted for about 40% of the reserve growth in that period. In 2009–12, sterilization abated and the reserve ratio fell below 100% for the first time in seven years.
Source: IMF, International Financial Statistics.

Banking Crises in History
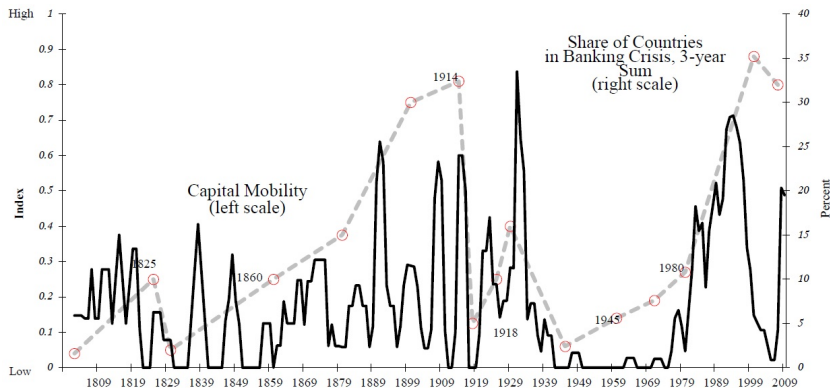
Source: Reinhart(2018), International Financial Crises, Lecture slides on *Nobel Symposium "Money and Banking"*.
Note: Reinhart and Rogoff(2008 and 2009); introspective index of capital mobility index of capital mobility based on Obstfeld and Taylor(2004) updated and backcast to 1800-1859. Reinhart, Reinhart, and Trebesch(2017) trace a very similar capital mobility index over 1815-2016 based on international bond issues and cross-border capital flows.

Frequency of Systemic Banking Crises, 1970–2017
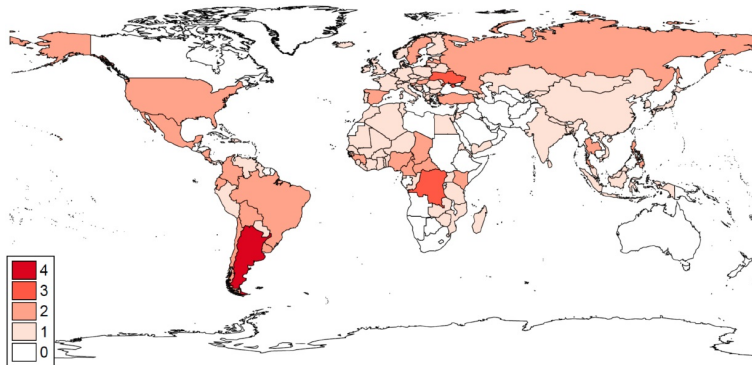
Source: Laeven and Valencia(2018).

Systemic Banking Crises by Income Level, 1970–2017
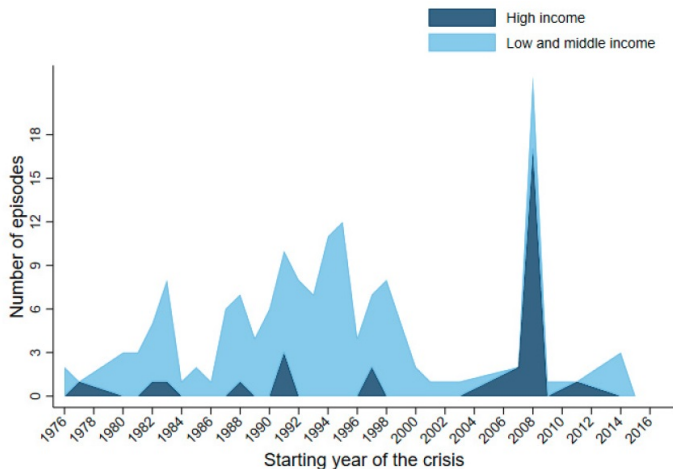
Source: Laeven and Valencia(2018).

Costly Banking Crises

TABLE 9-1

Costly Banking Crises The table shows the estimated costs of major banking crises since 1991 in both advanced and emerging economies. Various measures are shown: the loss of output relative to trend, the direct costs to the government of repairing the banking system, and the change in the level of public debt.

Country	Starting Year of the Crisis	Output Loss (% of GDP)*	Direct Fiscal Costs (% of GDP)**	Increase in Public Debt (% of GDP)***
Argentina	2001	71.0%	9.6%	81.9%
Brazil	1994	0.0	13.2	−33.8
China	1998	19.4	18.0	11.2
Denmark	2008	36.0	3.1	24.9
Finland	1991	69.6	12.8	43.6
France	2008	23.0	1.0	17.3
Germany	2008	11.0	1.8	17.8
Greece	2008	43.0	27.3	44.5
Iceland	2008	43.0	44.2	72.2
Indonesia	1997	69.0	56.8	67.6
Ireland	2008	106.0	40.7	72.8
Italy	2008	32.0	0.3	8.6
Japan	1997	45.0	14.0	41.7
Korea	1997	57.6	31.2	9.9
Luxembourg	2008	36.0	7.7	14.6

Costly Banking Crises (cont.)

Malaysia	1997	31.4	16.4	0.2
Mexico	1994	13.7	19.3	16.4
Netherlands	2008	23.0	12.7	26.8
Norway	1991	5.1	2.7	19.2
Portugal	2008	37.0	0.0	33.6
Russia	1998	—	0.1	−7.1
Russia	2008	0.0	2.3	6.4
Sweden	1991	32.9	3.6	36.2
Sweden	2008	25.0	0.7	11.1
Switzerland	2008	0.0	1.1	−0.2
Thailand	1997	109.3	43.8	42.1
Turkey	2000	37.0	32.0	15.3
United Kingdom	2007	25.0	8.8	24.4
United States	2007	31.0	4.5	23.6
Average		36.9	14.8	25.6

* Cumulative, actual relative to trend from crisis start year T until year T+3.
** Restructuring costs including bank recapitalizations but excluding liquidity provision.
*** From year before crisis starts T−1 to year T+3.

Source: Peter Hooper, Michael Spencer, Torsten Sløk, and Thomas Mayer, 2013, "Financial Crises: Past and Present," Global Economic Perspectives, 15 May (Deutsche Bank, Markets Research, Global Economics); based on Fabian Valencia and Luc Laeven, 2012, "Systemic Banking Crises Database: An Update," IMF Working Paper 12/163, International Monetary Fund.

Understanding Financial Crisis

- Summers(2000):

  Leo Tolstoy famously observed that "every happy family is the same. Every unhappy family is miserable in its own way." Every financial crisis is different and involves its own distinctive elements.

- Allen and Gale(2009):

  There is a significant empirical literature on financial crises. Much of this work is concerned with documenting regularities in the data. ...The theory is at a relatively early stage,... crises are complex phenomena in practice. One of the main themes of this book is that there is no one theory of crises that can explain all aspects of the phenomena of interest.

- Reinhart and Rogoff(2009):

  The literature on financial crises suggests markedly rising asset prices, slowing real economic activity, large current account deficits, and sustained debt buildups (whether public, private, or both) are important precursors to a financial crisis.

The Crisis in 2008

>10%
8-10%
6-8%
4-6%
2-4%
0-2%
−0-2%
−2-4%
−4-6%
−6-8%
−8-10%
<−10%

−6-8%
−8-10%
<−10%
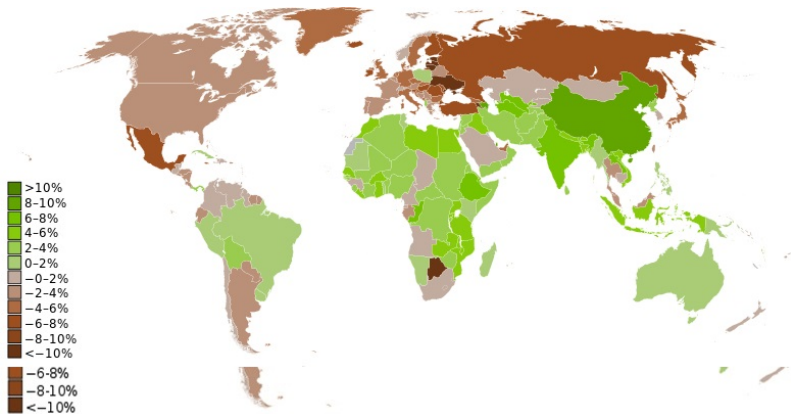
Note: GDP Real Growth Rates for 2009

Actors in the Crisis

- China: The savings glut and global imbalances

- FED: Low-interest rate and too-easy monetary policy

- Bankers: Over innovation and expansion of shadow banking

- Households and real estate brokers: The housing bubble and market failure

- SEC, Fannie Mae, and Freddie Mac ...: De-regulation, lack of supervision and government failure

- ......

# Too Much Export of China?
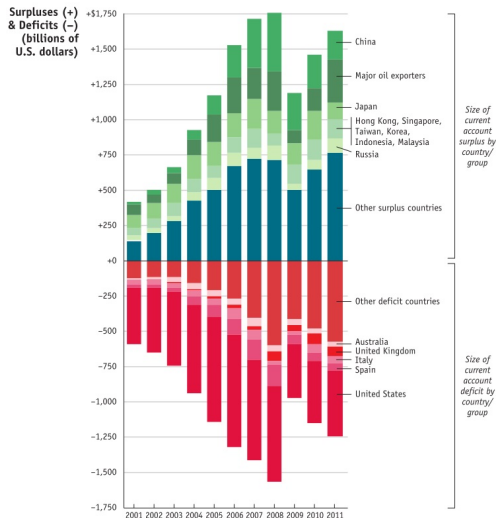
Too Much Money from FED?

According to Taylor(2007), during the period from 2002 to 2005, the short term interest rate path deviated significantly from what this two decade experience would suggest is appropriate.

This deviation may have been a cause of the boom and bust in housing starts and inflation in the last two years.
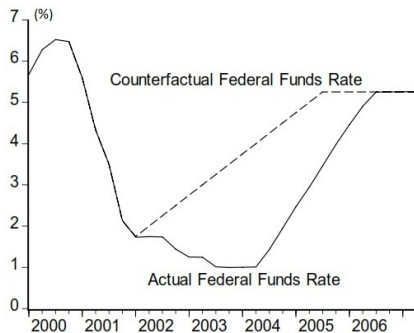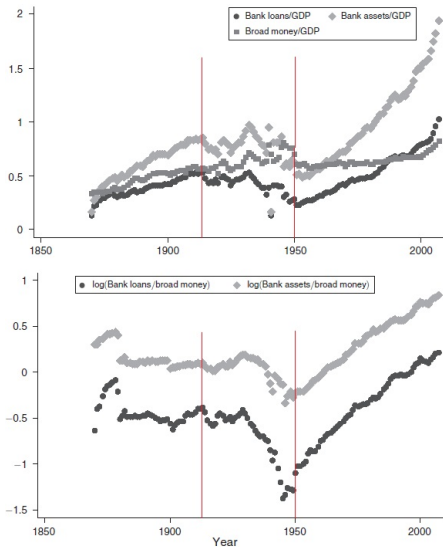
Too Much Innovation in Finance?

Bernanke(2010) argues that "monetary policy following the 2001 recession appears to have been reasonably appropriate... (but) it is difficult to ascribe the house price bubble either to monetary policy or to the broader macroeconomic environment."
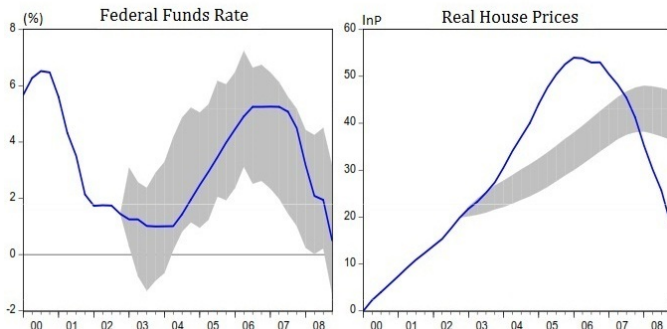
Schularick and Taylor(2012): Credit Booms Gone Wrong

- We study the behavior of money, credit, and macroeconomic indicators over the long run based on a new historical dataset for 14 countries over the years 1870-2008.

- Pre-WWI:

  $$B/Y, M/Y \uparrow, \quad B/M \rightarrow$$

- Post-WWII:

  $$B/Y, M/Y \uparrow\uparrow, \quad B/M \uparrow$$

Cumulative Effects after Financial Crises

Cumulative log level effect, after years 0–5 of crisis, versus noncrisis trend, for:	Pre-World War II	Pre-World War II, excluding 1930s	Post-World War II
Log broad money	−0.139***	−0.103***	−0.077*
	(0.027)	(0.029)	(0.040)
Log narrow money	−0.083**	−0.098***	0.009
	(0.037)	(0.036)	(0.053)
Log bank loans	−0.248***	−0.220***	−0.144***
	(0.044)	(0.047)	(0.055)
Log bank assets	−0.156***	−0.144***	−0.258***
	(0.035)	(0.038)	(0.050)
Log real GDP	−0.041**	−0.018	−0.079***
	(0.020)	(0.020)	(0.018)
Log real investment	−0.190**	−0.115	−0.257***
	(0.091)	(0.089)	(0.049)
Log price level	−0.089***	−0.055***	0.007
	(0.025)	(0.026)	(0.029)

Note: Standard errors in parentheses.
   ***Significant at the 1 percent level.
    **Significant at the 5 percent level.
     *Significant at the 10 percent level.

- Pre-WWII: $M \downarrow$, $M_0 \downarrow$, $B \downarrow$, $Y \downarrow$, $P \downarrow$
- Post-WWII: $M \downarrow$, $M_0 \rightarrow$, $B \downarrow$, $Y \downarrow$, $P \rightarrow$

Predictor and Policy of Financial Crises

Specification (Logit country effects)	Baseline plus 5 lags of nominal stock price change (20)	Baseline plus 5 lags of real stock price change (21)	Baseline plus Loans over GDP (22)	Baseline plus 5 lags of real stock prices plus loans/GDP (23)
L. Δ log (loans/P)	−2.491 (2.324)	−2.540 (2.312)	−0.755 (2.293)	−3.392 (2.470)
L2. Δ log (loans/P)	7.316** (2.910)	7.165** (2.915)	7.599*** (2.871)	7.848** (3.215)
L3. Δ log (loans/P)	3.405 (2.899)	3.185 (2.864)	0.720 (3.307)	3.297 (3.171)
L4. Δ log (loans/P)	−1.352 (1.521)	−1.684 (1.539)	0.0933 (1.497)	−1.747 (1.669)
L5. Δ log (loans/P)	1.678 (1.835)	1.771 (1.784)	2.326 (1.784)	2.460 (1.994)
L1. Δ log (stock prices)	−1.046** (0.464)	−0.865** (0.434)		−0.768* (0.455)
L2. Δ log (stock prices)	0.535 (0.644)	0.563 (0.673)		0.550 (0.666)
L3. Δ log (stock prices)	0.272 (0.651)	0.715 (0.692)		0.691 (0.690)
L4. Δ log (stock prices)	0.954 (0.822)	1.098 (0.811)		1.024 (0.814)
L5. Δ log (stock prices)	0.0844 (0.631)	0.467 (0.703)		0.438 (0.627)
Loans/GDP (log)			1.100* (0.624)	1.601** (0.703)

- Credit growth is a powerful predictor of financial crises, suggesting that such crises are "credit booms gone wrong".

- Policymakers ignore credit at their peril.

Reading and Discussion

Please read ONE of the following reports and discuss with your friends：

- BIS: Promoting global monetary and financial stability, *Annual Economic Report, June 2018*

- IMF: A Decade after the Global Financial Crisis: Are We Safer?, *Global Financial Stability Report, October 2018*

- PBC: *China Financial Stability Report 2018*.

- Philippon, T. and A. Salord 2017: Bail-ins and Bank Resolution in Europe: A Progress Report, *Geneva Reports on the World Economy Special Report 4*