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# **Lecture 17: Subprime Crisis**

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**1 April 2012**

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# Outline

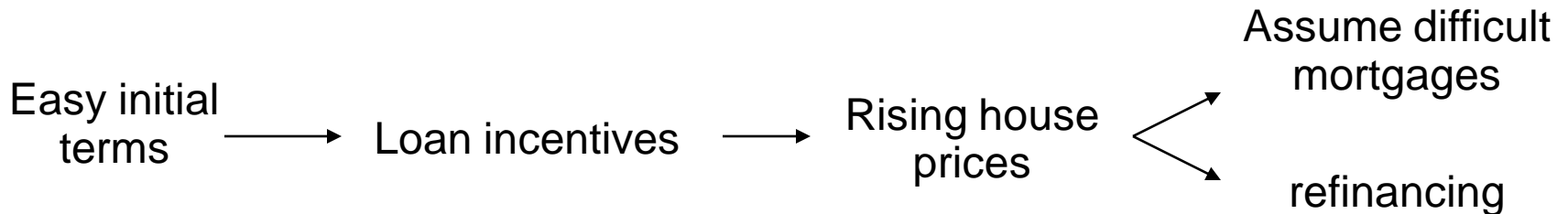
- **Overview of subprime**
- **Background**
- **Causes and Parties involved**
- **The Impact**
- **Actions taken**

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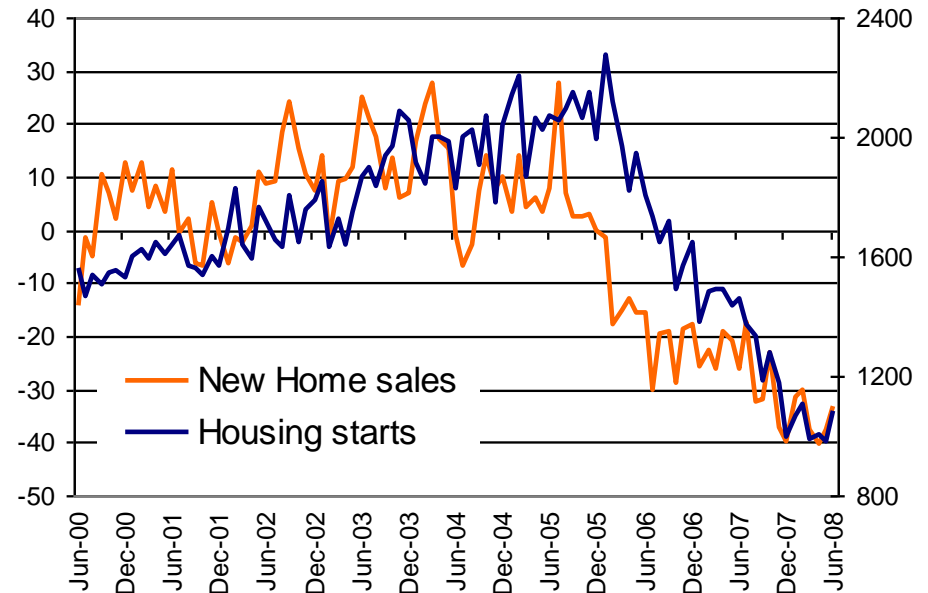
# Overview

- The **subprime mortgage crisis** is characterized by contracted liquidity in the global credit markets and banking system. An undervaluation of real risk in the subprime market cascaded, rippled and ultimately adversely affected the world economy.
- The crisis began with the bursting of the US housing bubble and high default rates on subprime and adjustable rate mortgages (ARM).

## Pre-crisis



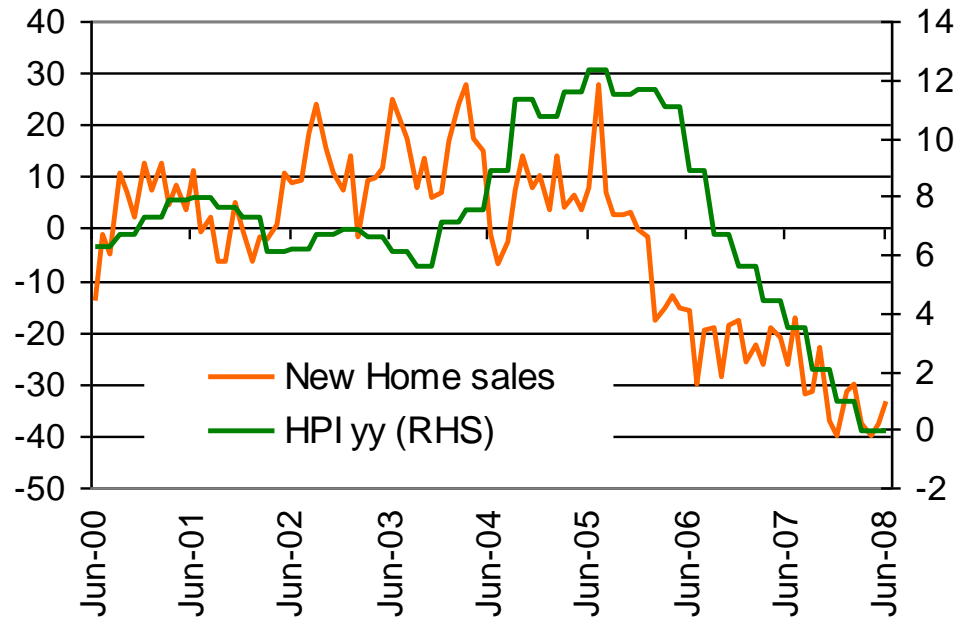
- The US housing market continued to expand since 2000.
- From the beginning of 2006, the US housing market started to slow down as evident in a decline in new home sales.



## Pre-crisis

Rising house prices → speculation → House price bubbles

- Rising house prices induced speculation and house price bubbles
- Once housing prices started to drop, refinancing became more difficult.

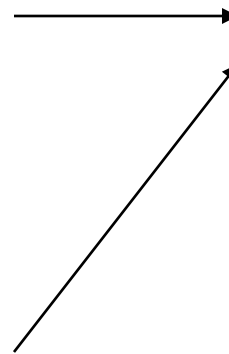


## The beginning of the crisis

Bubbles burst – fall in house prices

↓  
Speculative  
demand falls  
↑

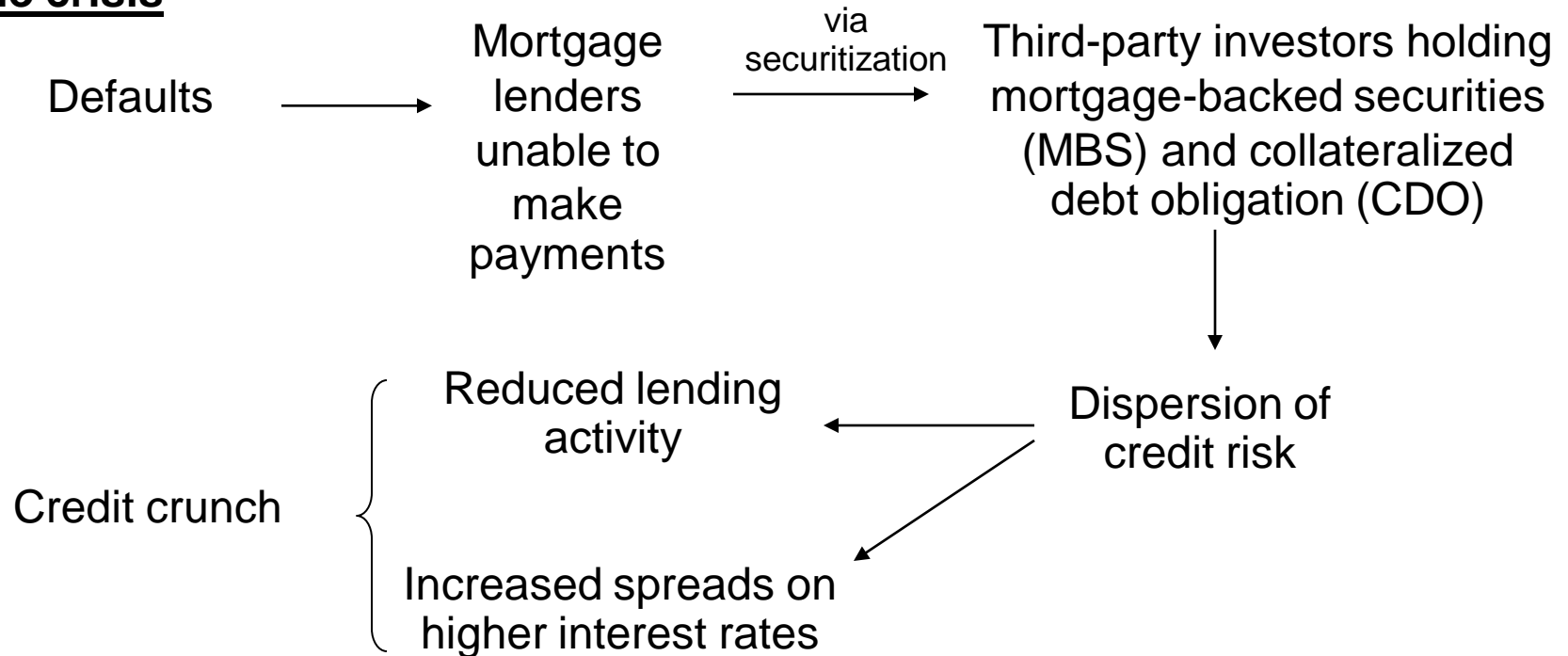
Easy initial term expires  
and ARM interest rates  
reset higher



Defaults and  
foreclosure  
activities  
increased

- **Foreclosures accelerated in the US in late 2006 and triggered a global financial crisis through 2007 and 2008**
- **During 2007, nearly 1.3 million US housing were subjected to foreclosure activity, up 79% from 2006.**

## The crisis



- Major banks and other financial institutions around the world have reported losses of approximately US\$ 435 billion as of 17 July 2008
- As the value of the underlying mortgage assets declined, investors holding MBS or CDO faced significant losses.
- Credit crunch prompted central banks around the world to take action to provide funds to banks to encourage lending and restore faith in the commercial paper markets.

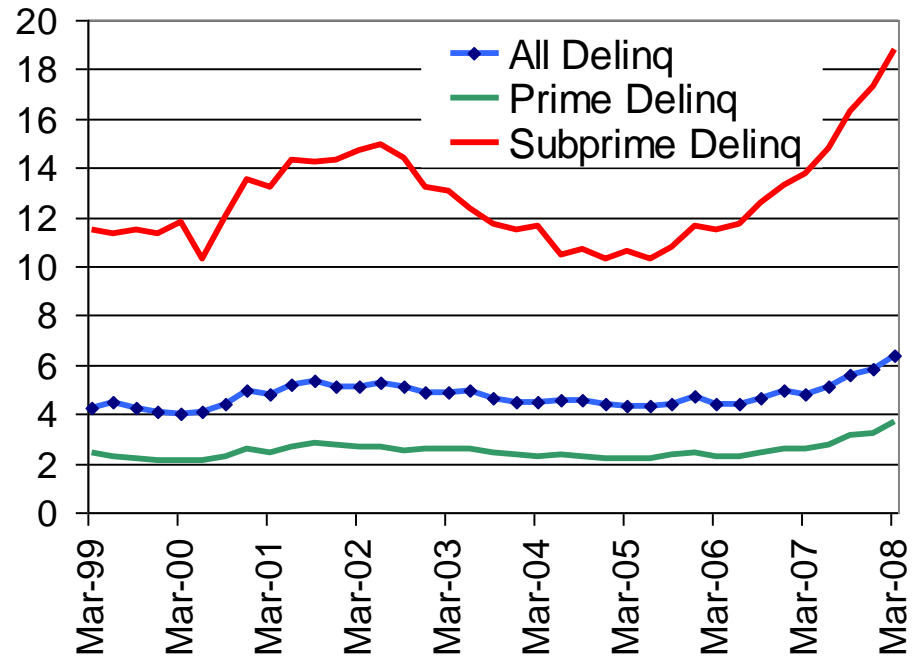
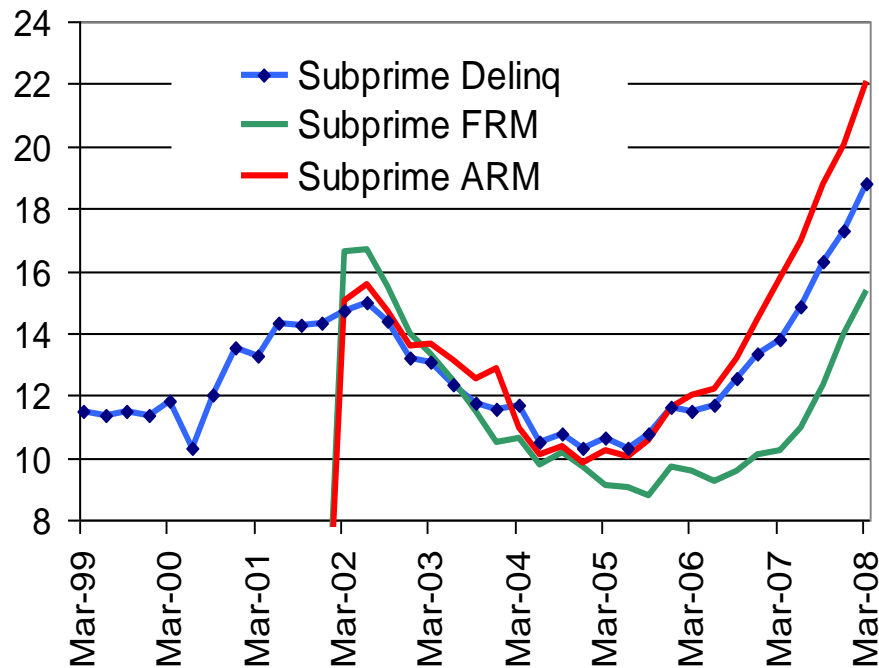
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# Background

- **Subprime lending**: the practice of making loans to borrowers who do not qualify for market interest rates owing to various risk factors, such as income level, size of the down payment made, credit history, and employment status
- The value of subprime mortgages was estimated at \$1.3 trillion as of March 2007.
- Approximately 16% of subprime loans with adjustable rate mortgage (ARM) were 90-day delinquent or in foreclosure proceedings as of October 2007, roughly triple the rate of 2005. By January 2008, the delinquency rate had risen to 21% and by May 2008 it was 25%.

# Background

- **Subprime ARMs** only represent 6.8% of the loans outstanding in the US, yet they represent 43.0% of the foreclosures.
- The estimated value of subprime ARMs resetting at higher interest rate is \$400 billion for 2007 and \$500 billion for 2008.



# Background: risks involved

- **Credit risk:** risk of default transferred from banks originating loans to third-party investors via repackaging of mortgage payments into MBS and CDO
- **Asset price risk:** The valuation of MBS and CDO was derived from the collectability of subprime mortgage payments and the existence of a viable market into which these assets can be sold. Rising mortgage delinquency rate reduced demand for these assets and lower their prices.
  - Losses to asset holders: banks and institutional investors
  - Companies that borrowed money using MBS or CDO assets as collateral faced margin calls.
- **Liquidity risk:** The ability of companies to obtain funds by issuing commercial papers pledging MBS or CDO as collaterals is affected and subjected to higher interest rate charge on loans.
- **Counterparty risk:** Major investment banks and financial institutions have taken significant positions in these products, their financial health declined.

# Causes and Parties involved

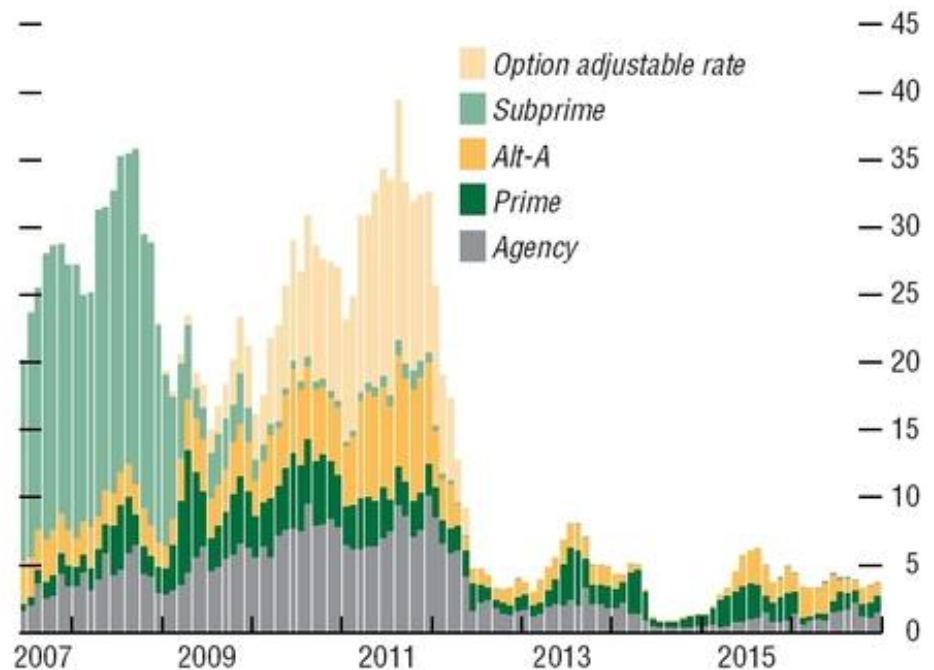
## ■ **The housing downturn**

- **Subprime borrowing was a major contributor to an increase in home ownership rates and the demand for housing. Home ownership increased from 64% in 1994 to 69.2% in 2004.**
- **This demand helped fuel housing price increases and consumer spending. Between 1997 and 2006, the US home prices increased by 124%.**
- **Some homeowners used the increased property value to refinance their homes with lower interest rate and take out second mortgages against the added value to use the funds for consumer spending.**
- **When house prices declined, many homeowners were unwilling to sell their homes at reduced market prices. This increased the supply of housing inventory available. Sales volume of new homes dropped by 26.4% in 2007. The excess supply of home inventory places significant downward pressure on prices.**
- **As prices decline, more homeowners are at risk of default and foreclosure.**

# Causes and Parties involved

- **An increase in the payment delinquency rate for subprime ARM borrowers**
  - **Easy credit + assumption that house prices will continue to rise encouraged many subprime borrowers to obtain ARMs they could not afford after the initial incentive period**
  - **Depreciation in house prices make refinancing more difficult while loans were reset to higher interest rates and payment amounts**

**Figure 1.7. Monthly Mortgage Rate Resets**  
(First reset in billions of U.S. dollars)



Source: Credit Suisse.

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# Causes and Parties involved

- **Speculation was a contributing factor**
  - **During 2006, 22% of homes purchased (1.65 million units) were for investment purposes and additional 14% (1.07 million units) purchased as vacation homes and in 2005 these figures were 28% and 12% respectively. Thus, nearly 40% of home purchases were not primary residences.**

# Causes and Parties involved

- **Lenders offered an increasing array of higher-risk loans to higher-risk borrowers**
  - **'No Income, No Job and no assets' loans were made (Ninja loans)**
  - **Risk premium required by lenders to offer a subprime loan declined. The average difference in mortgage interest rates between subprime and prime mortgages (subprime markup or risk premium) declined from 280 bps in 2001 to 130 bps in 2007. (The Federal Reserve Study)**
  - **High-risk loan options were available, for example:**
    - **The interest-only adjustable-rate mortgage (ARM): allows the homeowner to pay just the interest (not principal) during an initial period**
    - **Payment option loan: homeowner can pay a variable amount, but any interest not paid is added to the principal**

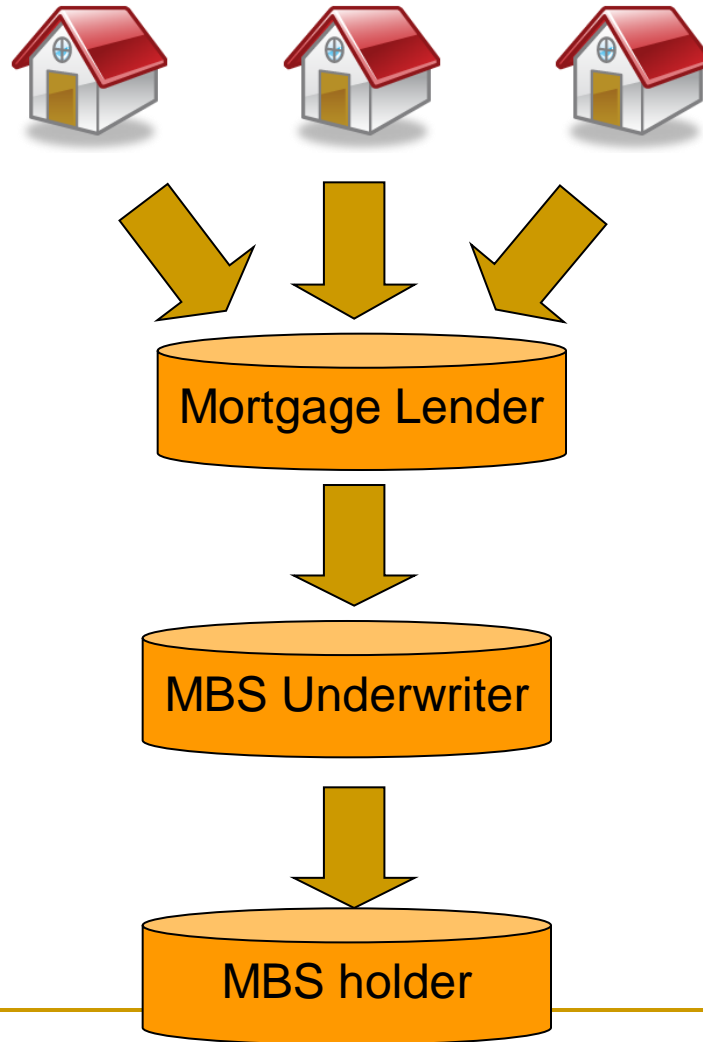
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# Causes and Parties involved

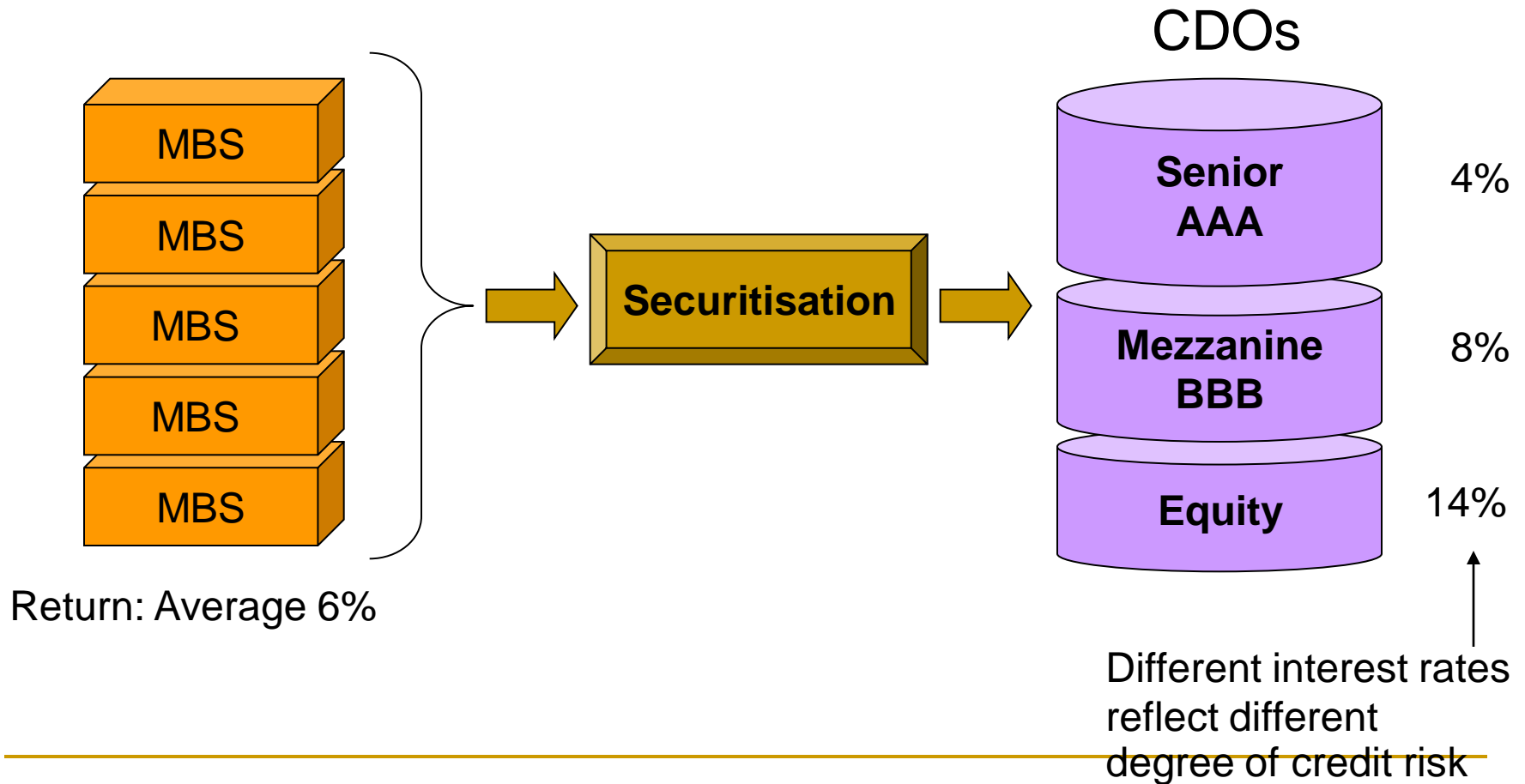
- **Securitization**

- **Securitization is a structured finance process in which assets, receivables or financial instruments are acquired, classified into pools and offered as collateral for third-party investment.**
- **Due to securitization, investor appetite for MBS and the tendency of rating agencies to assign investment-grade ratings to MBS, loans with high risk of default can be originated, packaged and the risk readily transferred to others.**

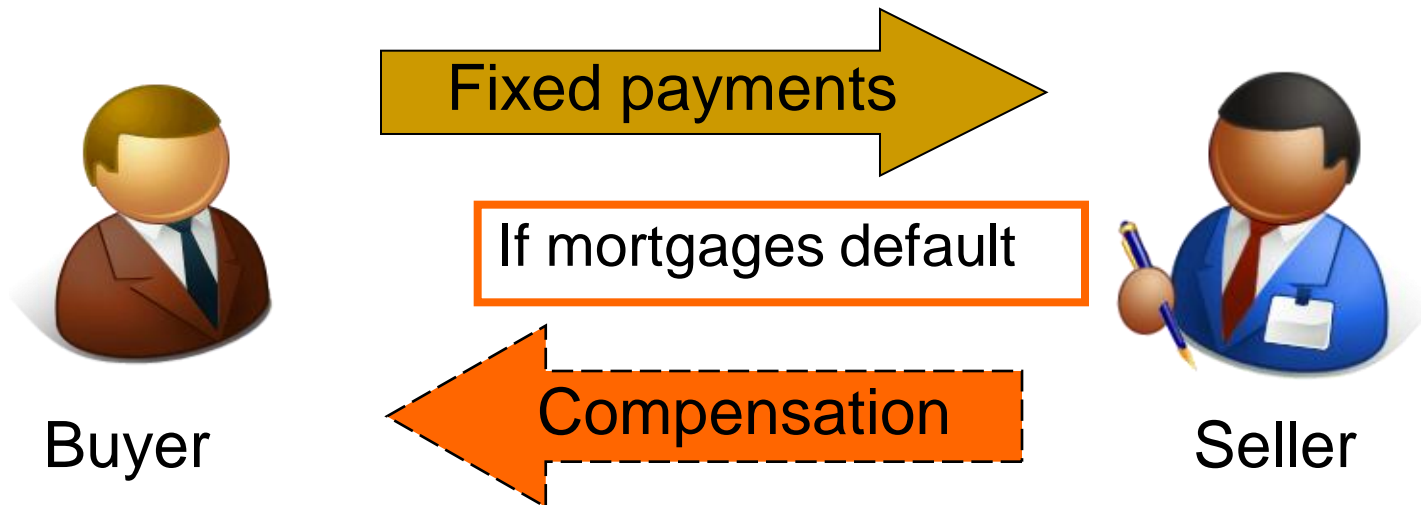
# Mortgage-backed securities (MBS)



# Collateralised debt obligations (CDOs)



# Credit default swaps (CDS) buying insurance against credit risk



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# Causes and Parties involved

- **Credit rating agencies**
  - **Under scrutiny for giving investment-grade ratings to securitization transactions (CDOs and MBSs) based on subprime mortgage loans.**
  - **There might be conflicts of interest as rating agencies were paid by the firms that organize and sell the debt to investors.**
  - **Rating agencies have lowered the credit ratings on \$1.9 trillion in MBS over the past four quarters putting additional pressure on financial institutions to lower the value of their MBS.**

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# Causes and Parties involved

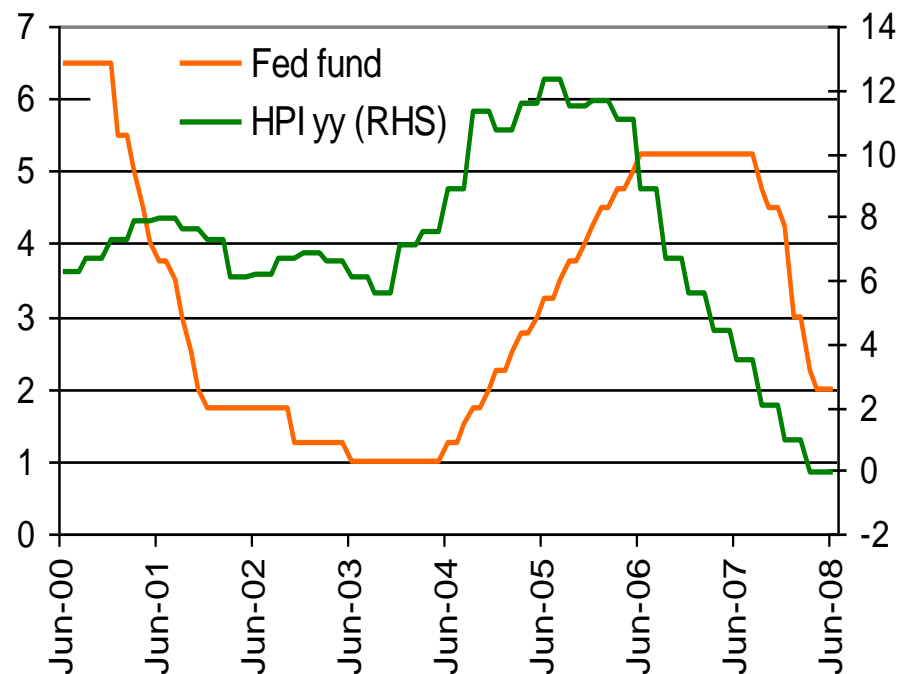
## ■ **Central Banks**

- **More concerned with managing the rate of inflation and avoiding recession, less concerned with avoiding asset bubbles.**
- **React after the bubble burst rather than prevent the bubble as defining bubbles is an intricate task**
- **'Lender of last resort' can create moral hazard – FRBNY rescued Long-Term Capital Management in 1998 might encourage more risk-taking activities**

# Causes and Parties involved

## ■ Central Banks

- The lowering of the fed funds rate after the collapse of the dot-com bubble from 6.5% to 1.0% between 2000-2003 partially fueled the rise in house prices.



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# The Impact

- **Stock markets**

- **DJIA dropped below 13,000 by August 15, 2007 after its record high of above 14,000 on July 19.**
- **Similar drops occurred in most markets around the world.**
- **Mortgage lenders and home builders fared terribly.**
- **Panic encouraged investors to take money out of risky mortgage bonds and shaky equities and put it into commodities – contributing to world food price crisis and oil price increases.**

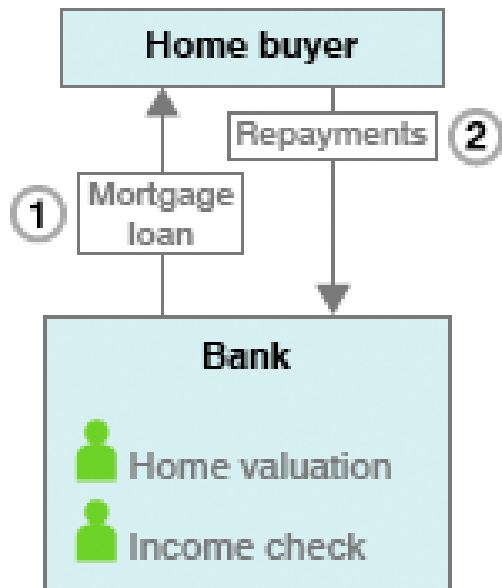
# The Impact

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## ■ **Financial institutions**

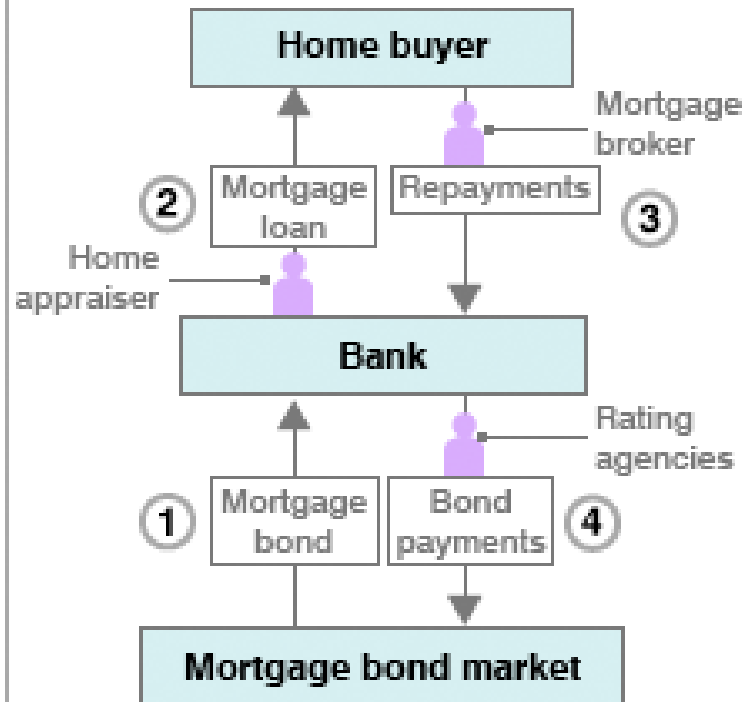
- **As of May 2008, financial institutions had recognized subprime-related losses and write-down exceeding \$379 billion.**
- **Outside the US, IKB Deutsche Industriebank filed for bankruptcy. India's second largest bank, ICIC, reported mark-to-market loss of \$263 million.**
- **Northern Rock and Bear Stearns required emergency assistance from Central Banks.**
- **In September 2008, Merrill Lynch is sold to Bank of America and Lehman Brothers collapse**
  
- **Financial institutions laid off employees.**

### Traditional model



- ① Bank grants mortgage
- ② Homebuyer pays bank

### Sub-prime model



- ① Bank sells mortgage bond
- ② Bank grants mortgage
- ③ Homebuyer pays bank
- ④ Bank pays bondholders

Key:

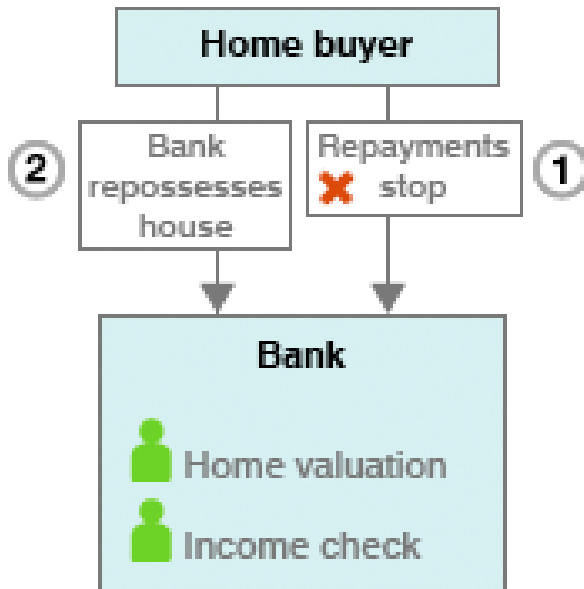
→ Flow of money

Safeguards

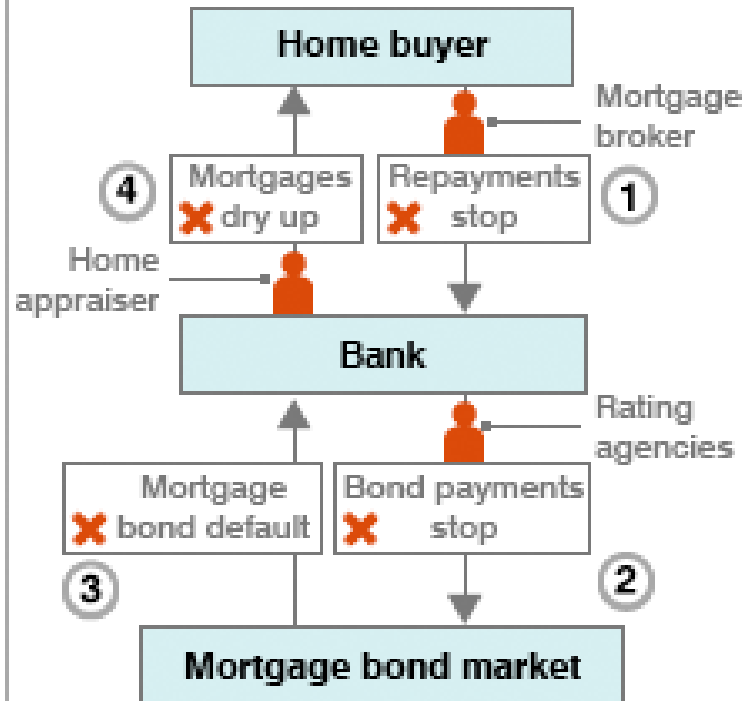
Bank checks

Independent checks

### Traditional model



### Sub-prime model



- ① Homebuyer defaults
- ② Bank repossesses home

- ① Homebuyer defaults
- ② Bond payments cease
- ③ Bond market dries up
- ④ Bondholders repossess

Key:

→ Flow of money

✗ Flow of money stops

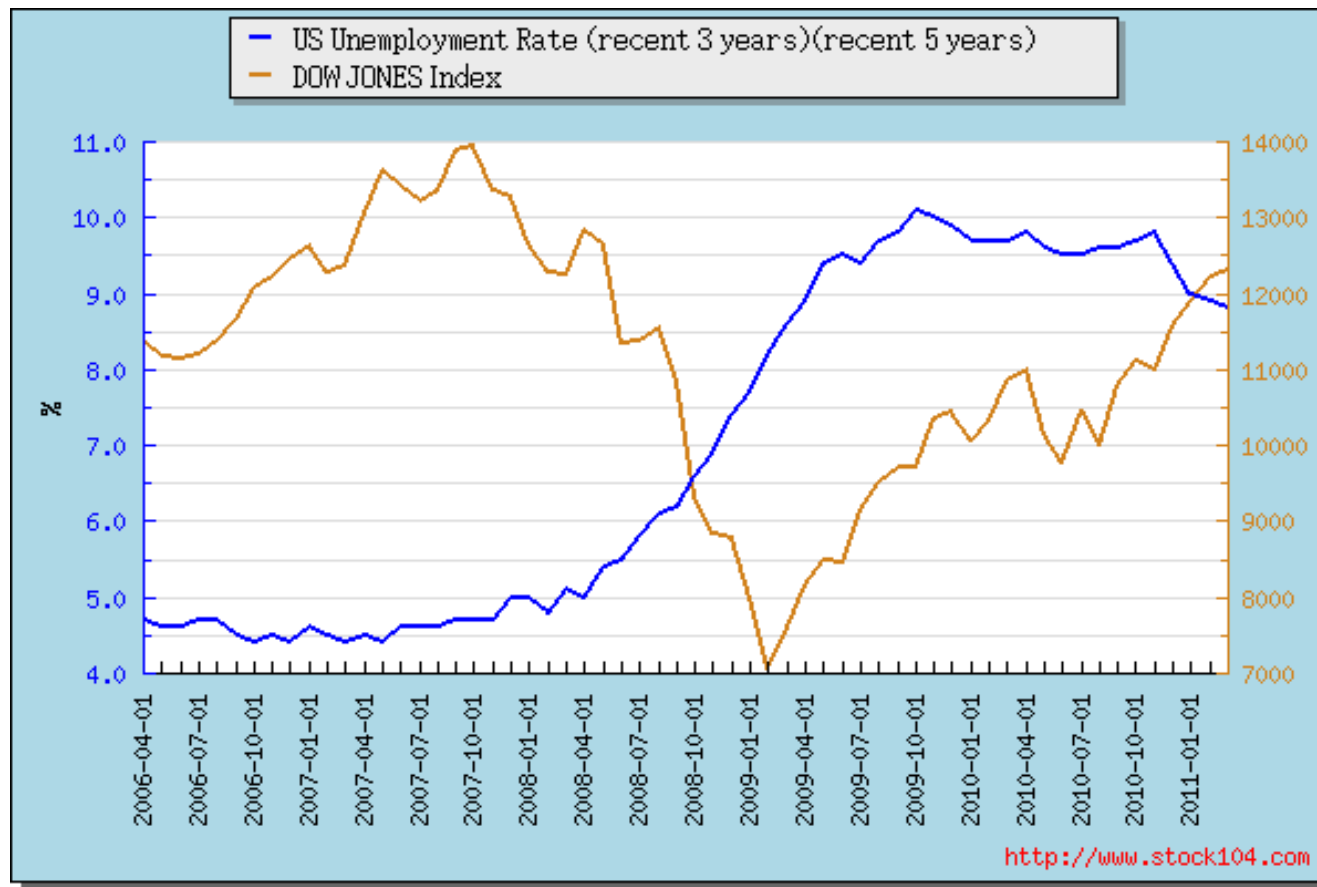
Safeguards

👤 Bank checks

👤 Flawed independent checks

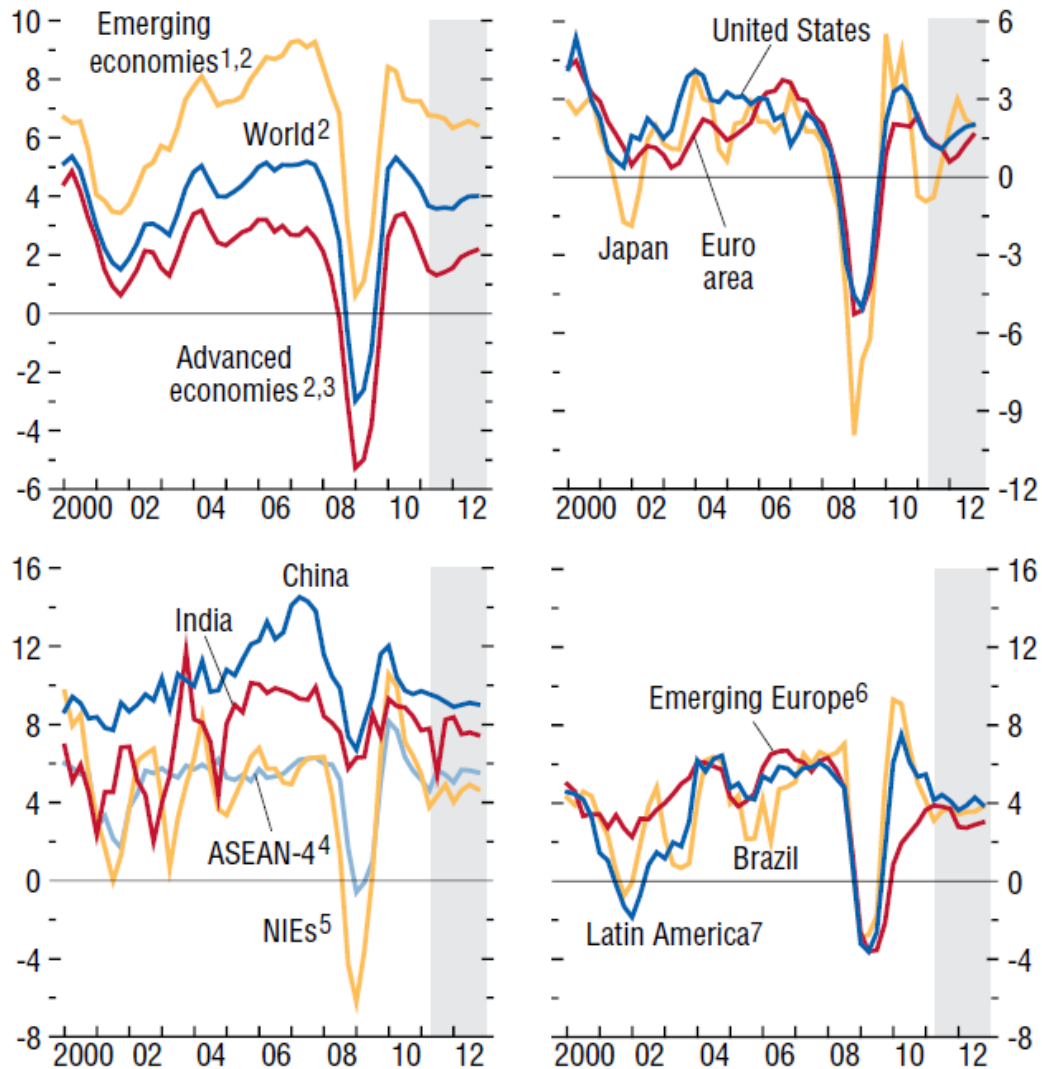
# The Impact

- The US economy



# The Impact

## Real GDP growth



Source: WEO  
Sep 2011

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# The Impact

- **The global economy**
  - In September 2007, Northern Rock, a British Bank experienced a bank run. Customers had withdrawn GBP 1 billion within one day.
  - Iceland's banks failed in 2008 with an estimated loss of \$10 billion
  - The IMF estimated that the worldwide losses stemming from the US subprime mortgage crisis would cost around \$1 trillion.

# Actions taken

## ■ **The Fed**

- **The Fed funds rate cut from 5.25% to 0-0.25% between September 2007 and December 2008.**
- **The Fed and other CBs conducted OMOs to inject liquidity into the system and lowered interest rates on short-term loans to provide access to funds for those with illiquid MBS.**
- **The Fed is using the Term auction Facility (TAF) to provide short-term loans to banks and announced term repurchase agreements.**
- **In March 08, the Fed provided funds and guarantees to enable J.P. Morgan Chase to purchase Bear Stearns to avoid potential fire sale of nearly \$ 210 billion of Bear Stearns' MBS and other assets.**
- **The Fed lent to both financial institutions and non-financial institutions through various credit facilities**

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# Actions taken

- **The US government**

- **Economic stimulus package of \$168 billion mainly in the form of income tax rebates**
- **The Emergency Economic Stabilization Act of 2008, commonly referred to as a bailout of the U.S. financial system, is a law authorizing the US treasury to spend up to USD 700 billion to purchase distressed assets, especially MBS from the nation's banks.**
- **Troubled Assets Relief Program (TARP) was set up to purchase assets and equity from financial institutions**

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# Actions taken

- **Fannie Mae and Freddie Mac**
  - **The Federal National Mortgage Association (Fannie Mae) and the Federal Home Loan Mortgage Corporation (Freddie Mac), two largest government-supported enterprises, are the two largest single mortgage backing entities in the US. They back nearly half of all mortgages (\$12 trillion as of 2008). During the mortgage crisis, many feared they might run out of capital. Their stock prices dropped.**
  - **On September 5, 2008, the government took over management and placed them into conservatorship.**

# The role of Fannie Mae and Freddie Mac

Primary Mortgage Market



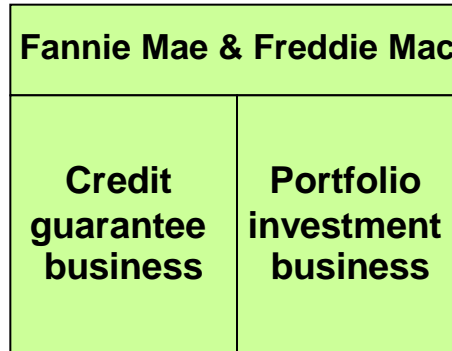
Applies for mortgage

Provides loan

Sells loans

Buy mortgages

Secondary Mortgage Market



Sells MBS&Debt

Buy MBS&Debt

Issues MBS

Buy MBS

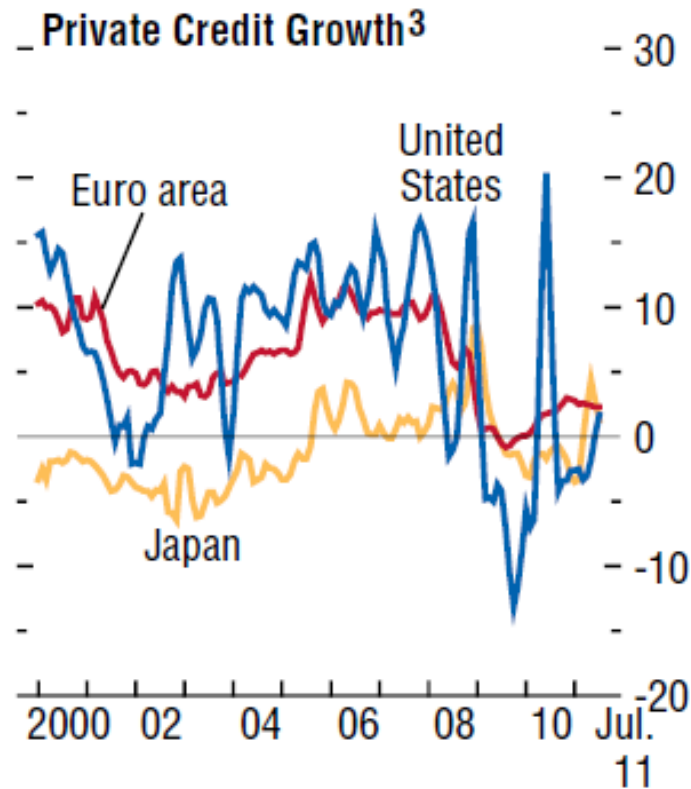
Issues Debt

Buy Debt

F&F trouble delayed recovery in the housing market

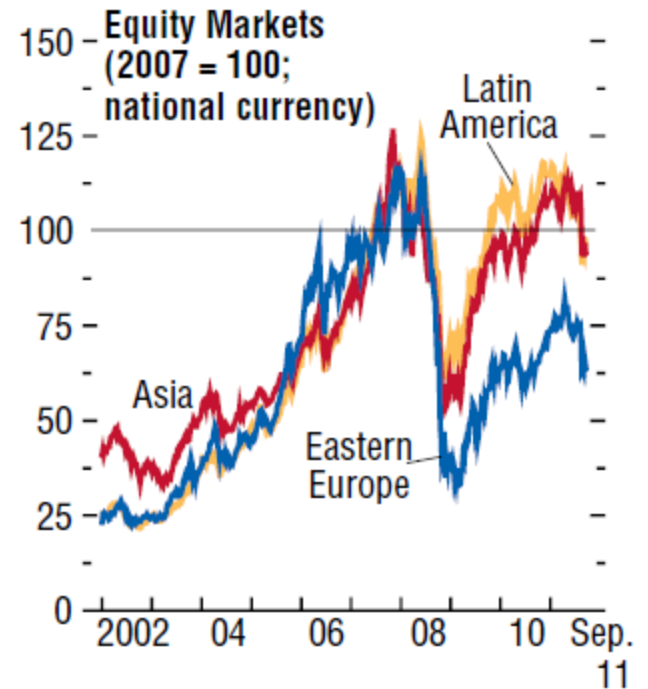
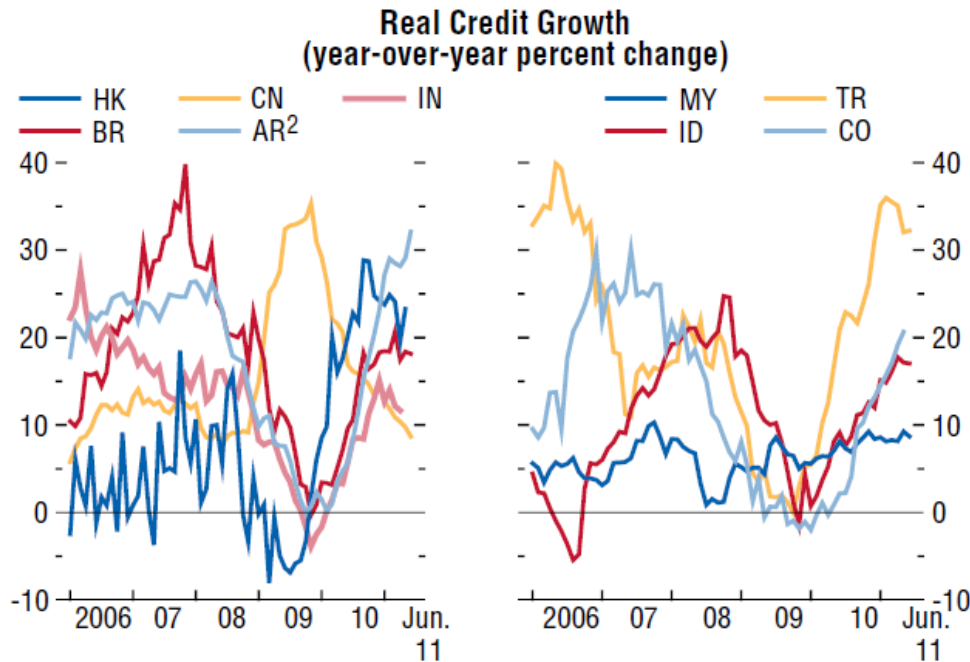
Financial market volatility

In advanced economies, banks' risks of defaults remain high and credit growth is yet to recover.



Source: WEO Sep 2011

Meanwhile, credit growth in many emerging markets is reaching high level and equity prices are close to their pre-crisis peaks



<sup>1</sup>AR: Argentina; BR: Brazil; CL: Chile; CN: China; CO: Colombia; HK: Hong Kong SAR; ID: Indonesia; IN: India; JO: Jordan; MY: Malaysia; NG: Nigeria; PE: Peru; SG: Singapore; TR: Turkey; VE: Venezuela; ZA: South Africa. Figure shows bank credit to the private sector.

Source: WEO Sep 2011

# Conventional and Unconventional Monetary Policy\*

- In general, unconventional measures can be defined as those policies that directly target the cost and availability of external finance to banks, households and non-financial companies.
- Why implement unconventional policy measures?
  - Cutting interest rate is no longer possible (zero-bound constraint)
  - Monetary policy transmission process is significantly impaired
    - After the collapse of Lehman Brothers, market liquidity dried up leading to a sharp rise in market interest rate.
- Need to bear in mind the risk of hindering the functioning of markets

\* Keynote lecture by Mr Lorenzo Bini Smaghi, Member of the Executive Board of the European Central Bank, at the International Center for Monetary and Banking Studies (ICMB), Geneva, 28 April 2009

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# How are unconventional measures implemented?

- Direct quantitative easing
- Direct credit easing
- Indirect (or endogenous) quantitative/credit easing

# Direct quantitative easing

- **Focused on buying longer-term government bonds from banks**
  - When long-term government bonds are purchased, the yields on privately issued securities are expected to decline in parallel with those on government bonds
  - If long-term interest rates were to fall, this would stimulate longer-term investments and hence aggregate demand, thereby supporting price stability
- **Examples:**
  - The Bank of Japan's policy between 2001 and 2006
  - The Fed's QE1 (Nov 08-Mar 10) and QE2 (Nov 10)
- **Limitations:**
  - Real interest rate and inflation expectations matter
  - Increase in monetary base does not necessarily lead to easier monetary condition
  - Risk of accumulating significant losses for the central bank if bond prices fall

# Direct credit easing

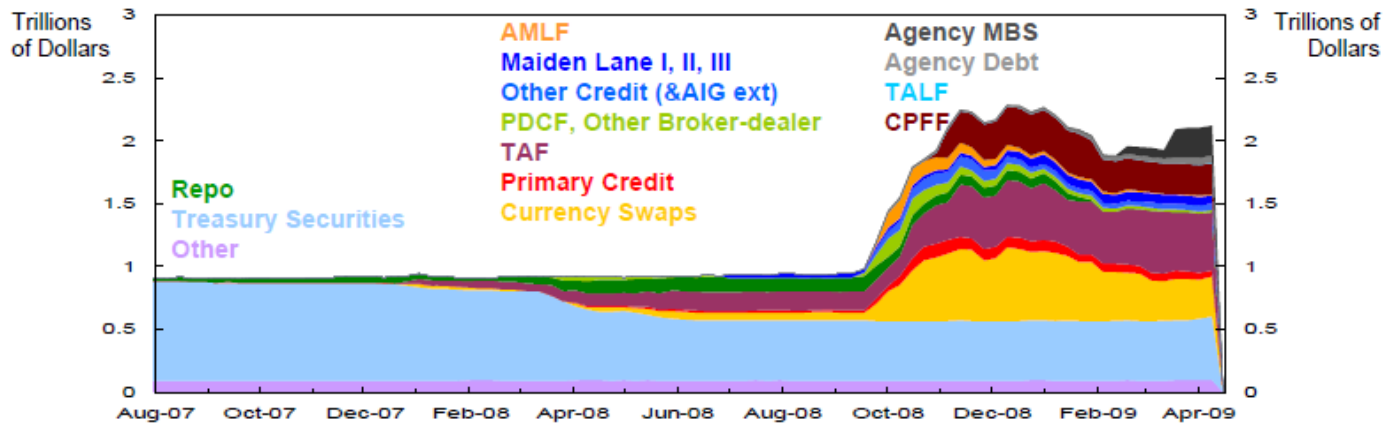
- **Directly addresses liquidity shortages and spreads in certain (wholesale) market segments through the purchase of commercial paper, corporate bonds and asset-backed securities**
  - **Outright purchases of privately issued securities affect the risk profile of the central bank's balance sheet**
  - **policy-makers need to carefully assess the eligibility of all assets on account of the implications they could have for the risk exposure of the central bank's balance sheet**
- **Examples:**
  - **The Fed since Dec 07: Term Auction Facility, Commercial Paper Funding Facility, Purchase of GSE-Backed Asset-Backed Securities**
- **Limitations:**
  - **Outright purchases of privately issued securities need to be carefully planned to avoid allocative distortions in terms of industries, firms or regions**
  - **The size of the issuer matters**
  - **Given the limited depth of corporate bond markets in many economies, purchases of privately issued securities be difficult**

# Indirect (or endogenous) quantitative/credit easing

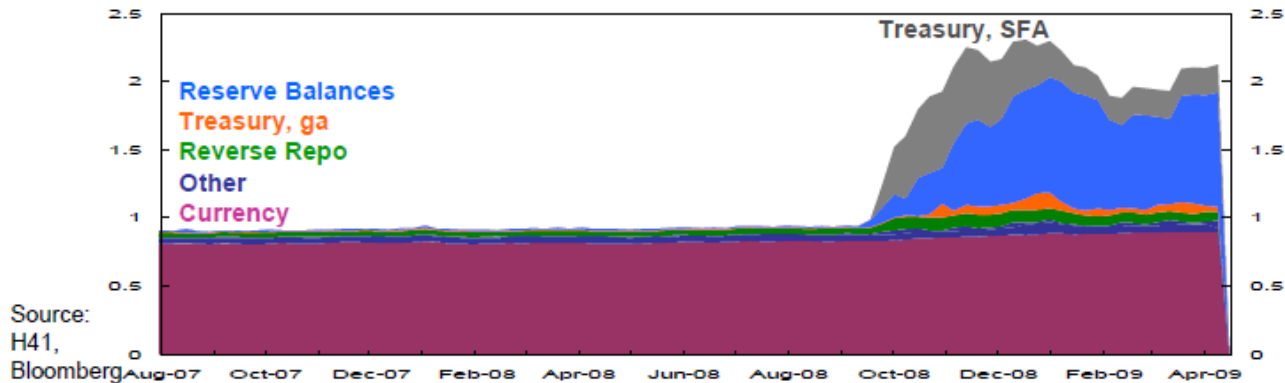
- **lending to banks at longer maturities, against collateral which includes assets whose markets are temporarily impaired**
  - This policy affects directly the yield curve over the horizon at which policy operations are conducted or committed to be conducted
  - The increase in the monetary base is determined endogenously by the banking system, based on banks' preference for liquidity and thus on the state of stress of the banking system
  - By enlarging the pool of the collateral accepted for the refinancing operations with the central bank, the financing conditions by banks to these sectors are facilitated, which should be reflected in the credit spreads that banks charge in particular to the corporate sector
- **Examples:**
  - **The ECB in Oct 08: a “fixed-rate full-allotment” procedure**
    - eligible counterparties in the euro area have had access to unlimited liquidity for periods ranging from one week up to six months at a fixed rate
    - expanding the list of assets eligible as collateral in Eurosystem refinancing operations

# Impact of unconventional policies: Expanding central bank's balance sheet

## Federal Reserve Assets

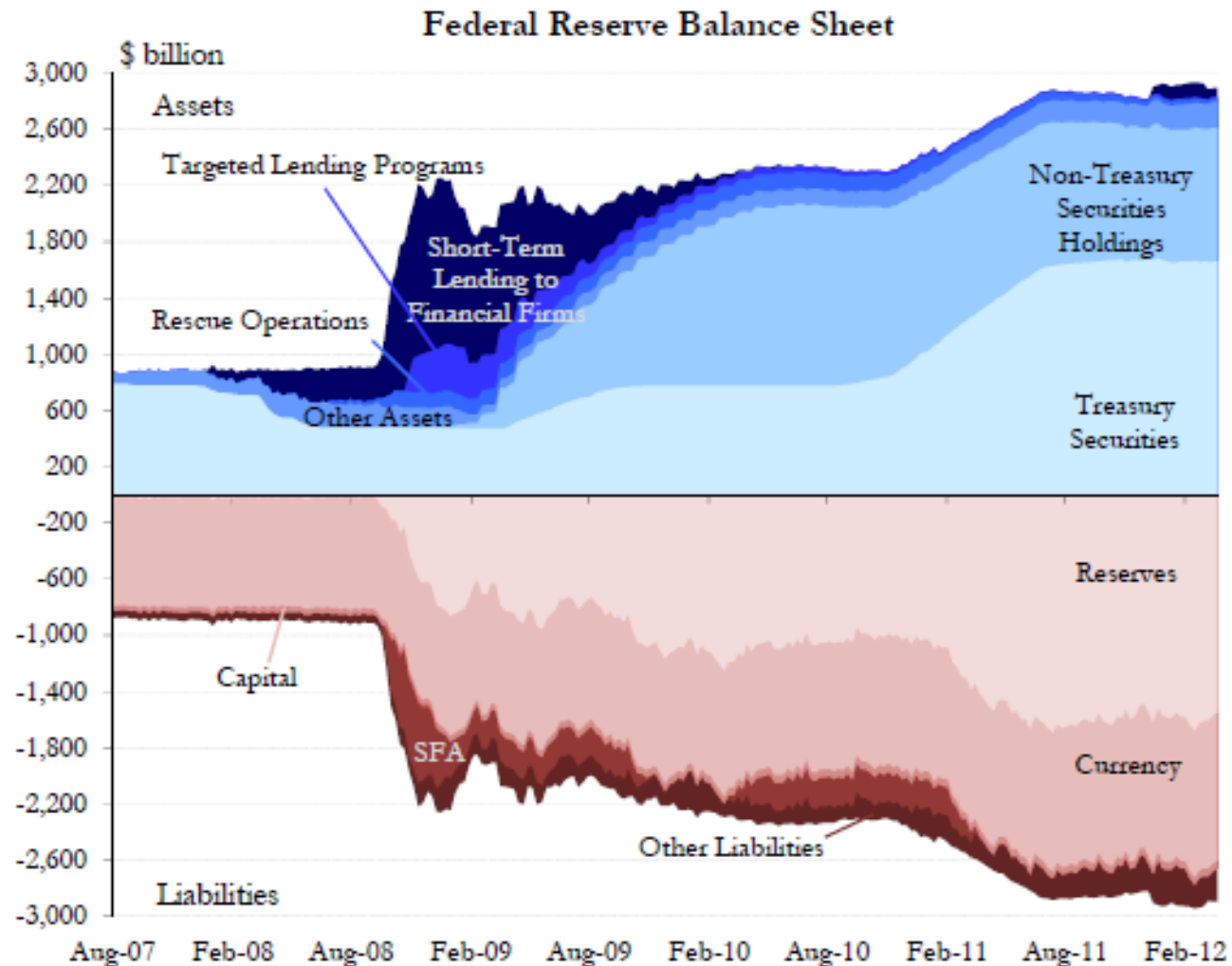


## Federal Reserve Liabilities

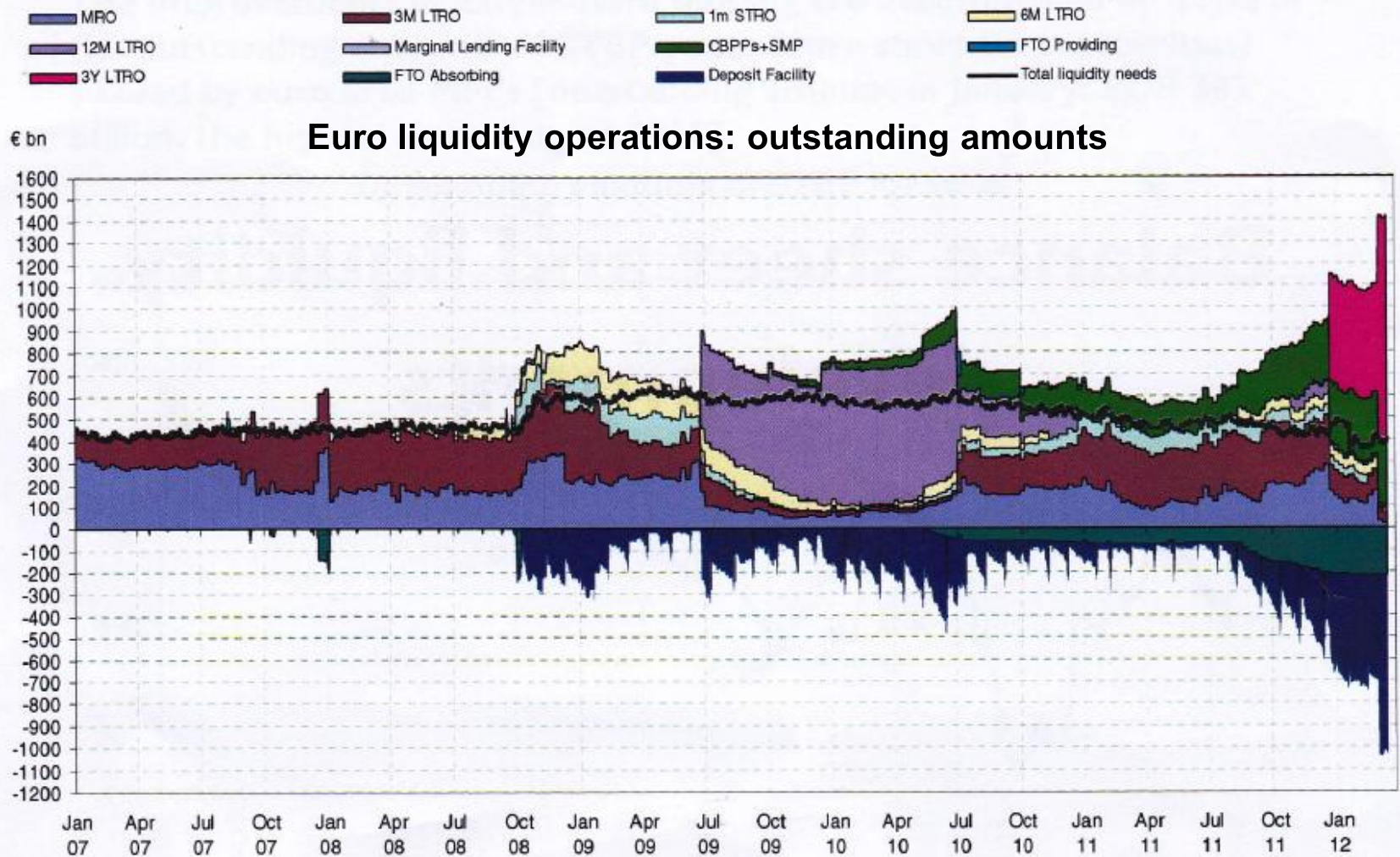


Source: Gertler (2009)

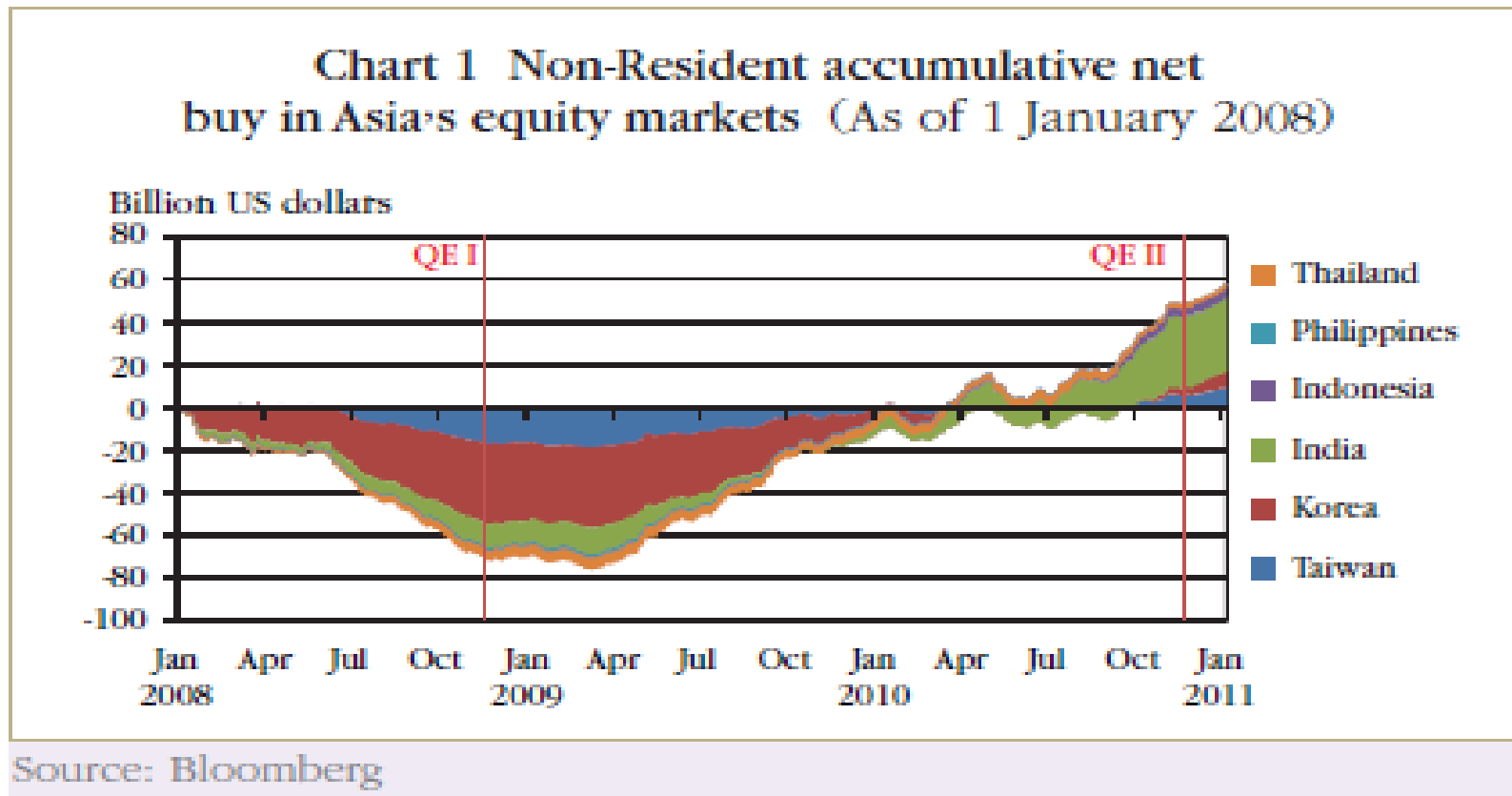
# Impact of unconventional policies: Expanding central bank's balance sheet



# Impact of unconventional policies: Expanding central bank's balance sheet



## Impact of unconventional policies: Capital flows into Asia



Source: Bank of Thailand (2011)

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# References and data sources

- **World Economic Outlook (April and September 2011)**
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- **Rungcharoenkitkul P (2008), 'Subprime mortgage crisis and its impact on financial markets and the global economy', Financial Markets Operations Group, Bank of Thailand**
- **International Economics Department (2008), 'Report on the global economy', Monetary Policy Group, Bank of Thailand**