

Demystifying Macroeconomics The Sub-Prime Mortgage Crisis

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The Sub-Prime Mortgage Crisis

1. Sub-prime mortgages and derivatives
2. What accounts for growth in sub-prime mortgages and CDOs?
3. What caused the sub-prime mortgage crisis?
4. Why did the mortgage crisis spread?
5. What steps have been taken to remedy the crisis? Are they adequate?

What is a Sub-Prime Mortgage?

A mortgage is the pledge of a property to a lender as security for a loan to purchase the property.

A sub-prime mortgage is a mortgage by a borrower who has a FICO credit score below 620, limited credit history or some other credit impairment (Coval, Jurek and Stafford, p. 18).

What is a Collateralized Debt Obligation (CDO)?

A CDO is a derivative security that is issued against a portfolio of underlying securities, such as mortgages.

Under certain assumptions, CDOs are much less risky than the underlying mortgages.

An simple example explains how a CDO can lower risk.

CDO Example

Suppose:

There are two \$1.00 IOU's with two payment outcomes--\$1.00 and zero.

The probability of full payment is 90 percent for each IOU.

Payments are independent events.

CDO Example

Create two new securities:

The **senior** security pays \$1.00 unless both IOU's default.

The **junior** security pays zero if either IOU defaults.

Default probabilities are:

1 percent for the **senior** security

19 percent for the **junior** security

Actual Mortgage Securitization is More Complicated

The initial pool has many mortgages.

There are more than two tranches.

The securitization process is repeated by pooling and tranching the CDO's to create a new security called a CDO².

A form of insurance (credit default swap) may be bundled with the lower tranches of the CDOs to lower their risk.

Rating Agencies Played a Crucial Role in the Issuance of CDOs.

Investors wanted safe assets.

Moody's, Standard and Poors, and Fitch gave their AAA rating to a high fraction of mortgage backed CDOs.

The rating agencies were earning more from rating CDOs than from rating traditional corporate bonds.

What Accounts for the Growth of Sub-prime Mortgages and CDOs?

Sub-prime Mortgages

\$96.8 Billion in 1996

\$600 Billion in 2006

CDO Products in 1997

\$9,000 Billion of which

\$5,000 Billion were rated AAA by rating agencies

(Coval, Jurek and Stafford, p. 2-4) •

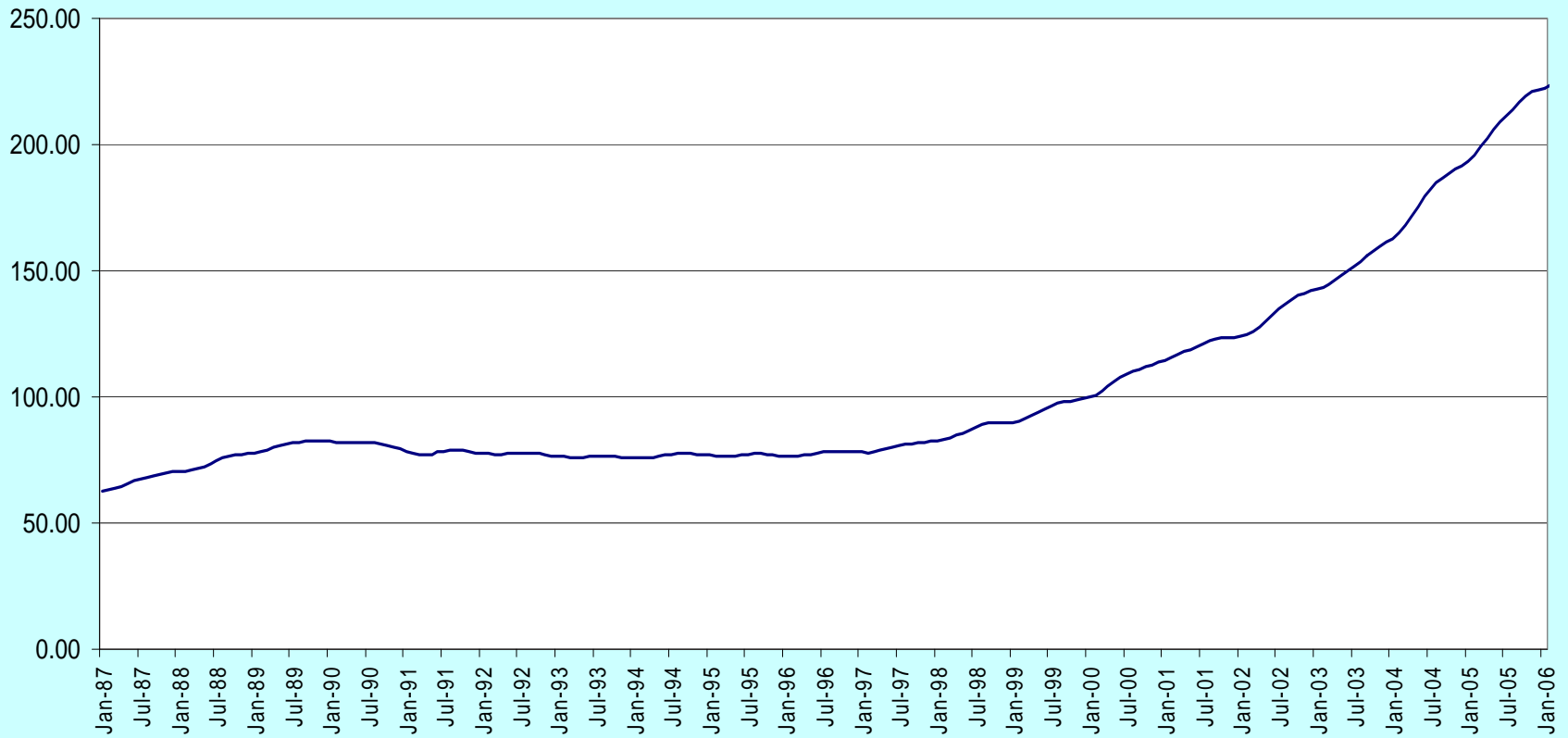
Demand for CDOs

One part of the story is willingness of individuals to buy real estate secured by non-standard mortgages.

That willingness was at least in part fueled by a desire to participate in the boom in real estate.

Real Estate Speculation Explains Some of the Growth in Sub-prime Mortgages

Composite Case Shiller Home Price Index



Demand for CDOs

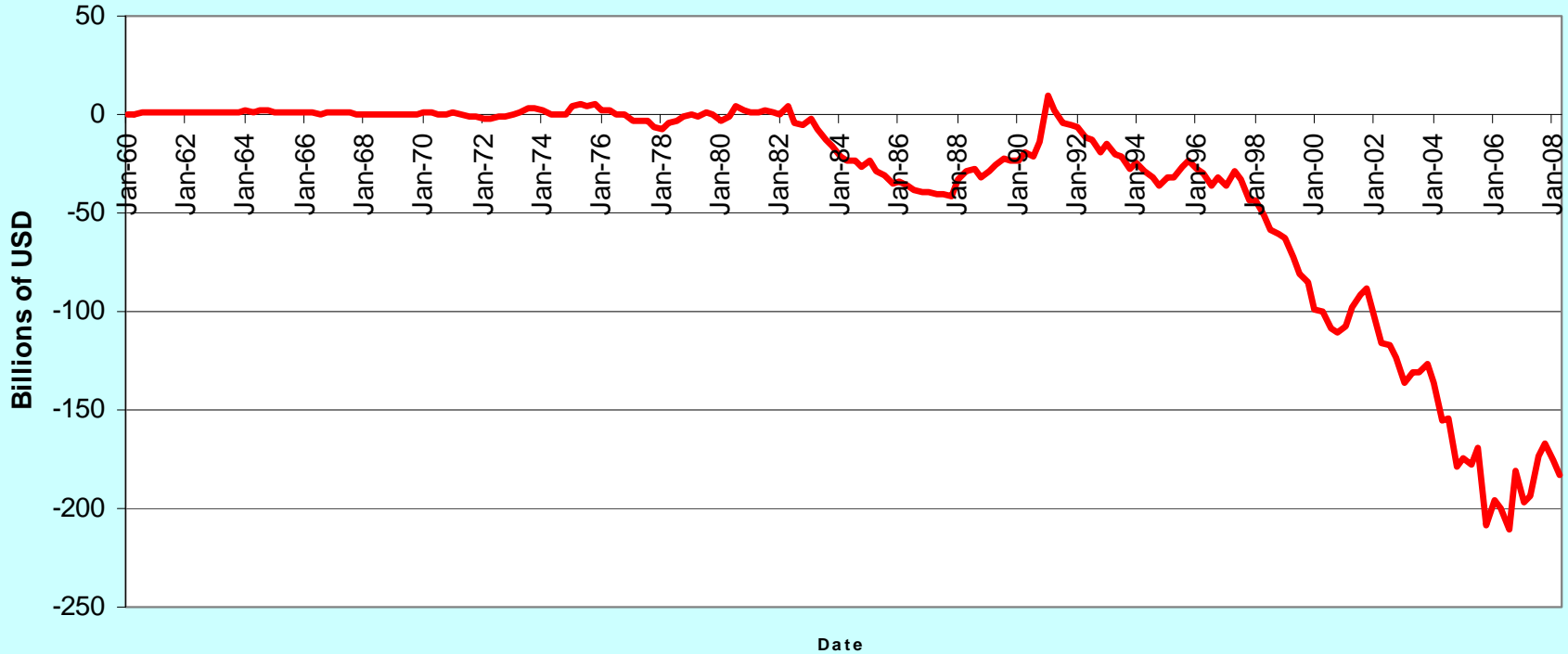
A second part of the story is the large demand for low-risk, dollar-denominated securities.

The demand is related to the international debt position of the US.

In recent year, US Treasury Securities have had low yields.

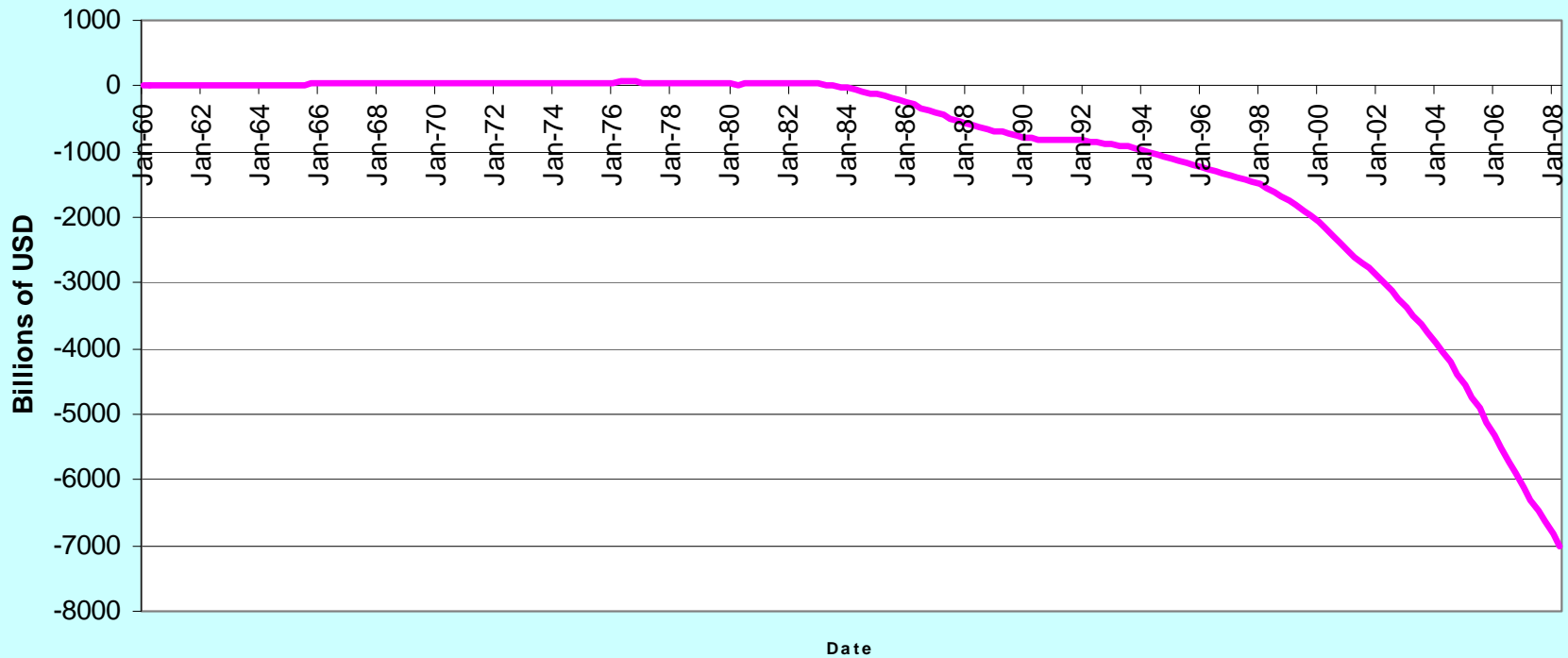
U.S. Current Account Deficits Create A Demand for Dollar Securities

US Balance of Payments on Current Account

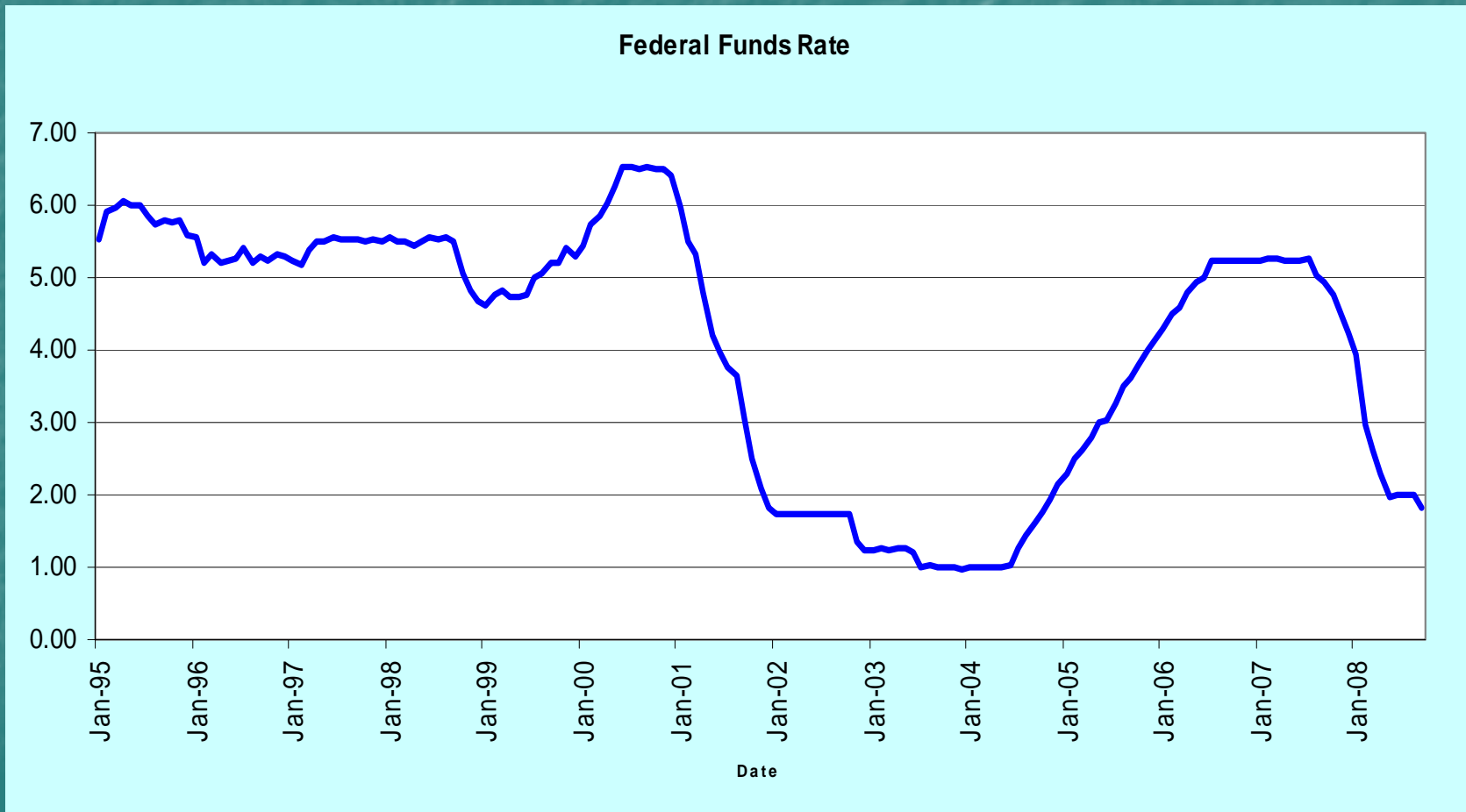


Total Foreign Demand for U.S. Securities Can Be Measured by the Cumulated Current Account

Cumulated Current Account



Fed Policy Has Kept Yields on Treasury Securities Low



Foreign Governments were urged to Buy Mortgage Backed CDOs

U.S. Urges China to Buy Mortgage-Backed Securities (Update2)

By Josephine Lau

July 13 (Bloomberg) -- The Bush administration is urging **China's central bank** to buy more government-backed mortgage bonds in an effort to sustain financing for U.S. home loans.

U.S. Department of Housing and Urban Development Secretary **Alphonso Jackson** is in Beijing to persuade the Chinese central bank to buy more securities from Ginnie Mae, a corporation under HUD that guarantees \$417 billion in federally insured, fixed-rate mortgages.

What Caused the Sub-prime Mortgages Crisis?

The Performance of CDOs is very sensitive to assumed correlation in the performance of the underlying mortgages. The correlation estimates were too small.

The performance of CDOs is very sensitive to the price of housing. Rating Agencies assumed house prices would continue to rise rapidly.

Rating Agencies Underestimated Correlations

As correlations rise the CDOs become riskier.

In our example, if the underlying securities have a positive payout (instead of zero) correlation, then the default probability of the senior tranche can rise as high as 20 (rather than 1) percent.

The Housing Bubble Burst

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ECONOMIC VIEW

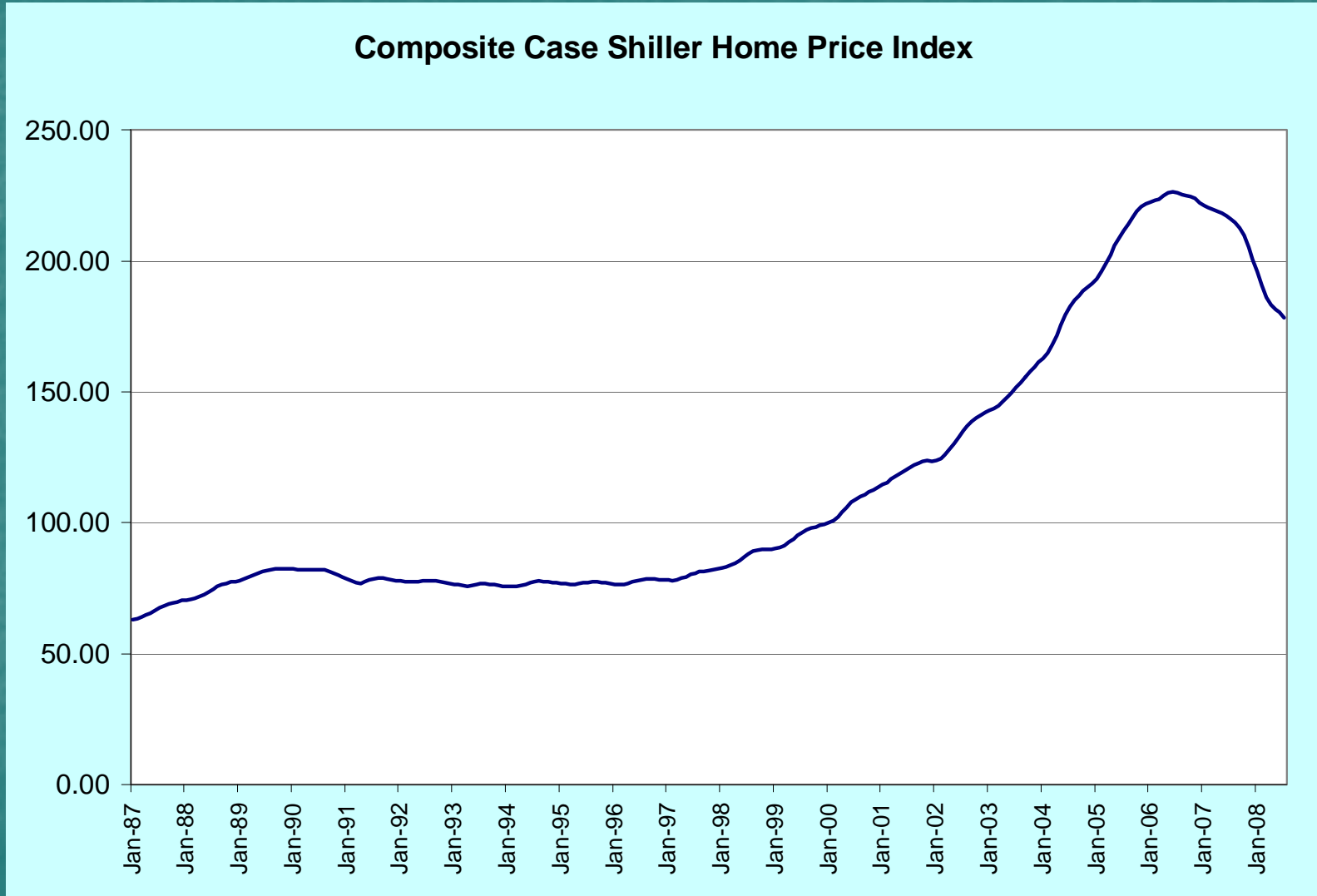
Sniffles That Precede a Recession

By ROBERT J. SHILLER

A RECESSION has much the same pattern as the flu — starting with vague feelings of malaise and quickly building in misery until a patient's activities are drastically curtailed. Then, all too gradually, comes an extended period of recovery, accompanied by lingering symptoms of discomfort.

In some respects, the current situation looks a lot like the period leading up to the 1990 recession. We were coming out of a housing boom then, and the economy was emerging from an associated lending crisis — the savings-and-loan debacle. Now we are dealing with the subprime mortgage “crisis,” but so far, we have not seen the decline in nonresidential investment that occurred in 1990.

Housing Prices Fell After June 2006



As Housing Prices Fell, So Did the Value of Sub-Prime Mortgages and Mortgage-Backed CDOs.

In March 2007, First Pacific Advisers discovered that Fitch used a ratings model that assumed constantly appreciating home prices.

FPC: "What if home prices were to decline by 1% to 2% per year for an extended period of time?"

Fitch: "The models would break down completely"

FPC: "...how far up the rating scale would it harm?"

Fitch: "It might go as high as the AA or AAA tranches."

(Coval, Jurek and Stafford, p. 25)

Why Did the Crisis Spread to Other Financial Institutions?

All financial firms use borrowed funds to make investments.

All financial firms are illiquid.

No financial firm can survive a run unassisted.

Assets	Borrowed Funds (.95)
	Capital (.05)

Why Did the Crisis Spread to Other Financial Institutions?

Potential lenders were afraid to lend to financial institutions whether or not they had substantial balances of mortgage-backed securities among their assets.

Potential lenders realized that they might not be repaid if others refused to lend.

In a sense, the crisis moved lenders from “we all lend” equilibrium to a “none of us lend” equilibrium.

The Ted Spread Shows that Credit Markets Were Breaking Down



The Ted Spread is the difference between the 3 month London interbank rate and the 3 month T Bill rate.

Why Did the Crisis Spread to Stock Markets?

The sub-prime crisis morphed into a lending crisis.

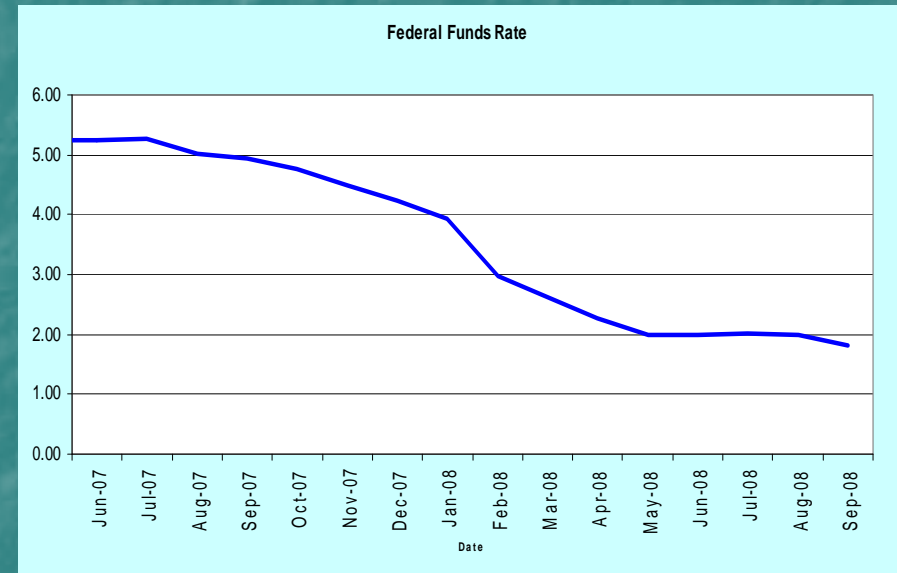
Lending is the life blood of investment.

Without lending, many firms cannot raise funds to finance their operations, to install new capital, or to purchase new technology.

Stock prices fell because the lending crisis threatened lower firm earnings in the future.

What Steps Have Been Taken to Remedy The Crisis?

In 2007, the Federal Reserve responded with its standard policy tool. It began a series of reductions in the Federal Funds Rate



The Federal Reserve Act Gives the Fed Other Powers

The Federal Reserve Act of 1913 was intended to “furnish an elastic currency” and to “afford means of rediscounting commercial paper.”

Section 13, Paragraph 3 of the Act as amended says:

3. Discounts for Individuals, Partnerships, and Corporations

In unusual and exigent circumstances, the Board of Governors of the Federal Reserve System, by the affirmative vote of not less than five members, may authorize any Federal reserve bank, during such periods as the said board may determine, at rates established in accordance with the provisions of section 14, subdivision (d), of this Act, to discount for any individual, partnership, or corporation, notes, drafts, and bills of exchange when such notes, drafts, and bills of exchange are indorsed or otherwise secured to the satisfaction of the Federal Reserve bank: *Provided*, That before discounting any such note, draft, or bill of exchange for an individual, partnership, or corporation the Federal reserve bank shall obtain evidence that such individual, partnership, or corporation is unable to secure adequate credit accommodations from other banking institutions. All such discounts for individuals, partnerships, or corporations shall be subject to such limitations, restrictions, and regulations as the Board of Governors of the Federal Reserve System may prescribe.

[12 USC 343. As added by act of July 21, 1932 (47 Stat. 715); and amended by acts of Aug. 23, 1935 (49 Stat. 714) and Dec. 19, 1991 (105 Stat. 2386.)

Time Line of US Actions

- 12-6-07 President Bush outline rescue plan for sub-prime borrowers.
- 12-13-07 Fed coordinates offer by five central banks to loan billions to commercial banks.
- 3-7-08 Fed makes \$200B in loans available to banks and other financial firms.
- 3-17-08 Fed backs \$30B in loans to JP Morgan to assist in acquisition of Bear Sterns.
- 7-14-08 Treasury announces loans to shore up Fannie Mae and Freddie Mac.
- 9-7-08 Fannie and Freddie are nationalized.

Time Line of US Actions

- 9-14-08 Lehman Brothers allowed to fail.
- 9-16-08 Fed announces \$85B loan to AIG in return for 80% ownership share.
- 9-29-08 Congress rejects \$700B bailout of financial firms.
- 10-3-08 Congress passes amended bailout.
- 10-12-08 Fed okays Wells Fargo acquisition of Wachovia.
- 10-14-08 US announces a \$250B plan to purchase shares in a wide variety of banks.
- 10-21-08 Fed pledges \$540B to guarantee commercial paper and CDs held by money market funds.

The Response of US Stock Prices

DJ INDU AVERAGE (DOM JONES & CO)
as of 29-Oct-2008



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Will The Remedies Be Adequate?

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October 21, 2008

Signs of Easing Credit and Stimulus Talk Lift Wall Street

By [MICHAEL M. GRYNBAUM](#)

After weeks of extraordinary efforts by the world's governments and central banks, the frozen flow of credit began to thaw on Monday.

The tentative re-emergence of trust among lenders — a rare commodity of late — raised hopes that the immediate financial pressures on banks, businesses and municipalities could ease somewhat, cushioning the blow of a likely recession.

That encouraging signs appeared at all was enough to bring a wave of relief to Wall Street, where the Dow Jones industrial average rose 413 points, or 4.7 percent. As recently as last Friday, it was far from certain how quickly the unprecedented moves to unlock global credit, including the partial nationalization of some of the world's biggest banks, would make a difference.

"Fear really appears to have receded considerably," said John V. Miller, the chief investment officer of Nuveen Asset Management.

Teaching Via The Sub-Prime Crisis

The balance sheet of a financial institution shows that it is inherently illiquid.

Monetary policy is more than changes in the Federal Funds rate.

The Fed and Treasury face asymmetric information problems. They would like to restore confidence without creating strong incentives for risk taking.

The relationship between stock prices and economic fundamentals explains why stock prices fell.

Financial markets of the world are interconnected. The sub-prime crisis is a global crisis that requires government and central bank coordination.