Accounting Issues: Case for Marking to Market

- Market price reflects current terms of trade between willing parties
- Market price gives better indication of current risk profile
  - Market discipline
  - Informs investors, better allocation of resources
- Cautionary tales: US Savings and Loans crisis, Japan's lost decade

Theory of the Second Best

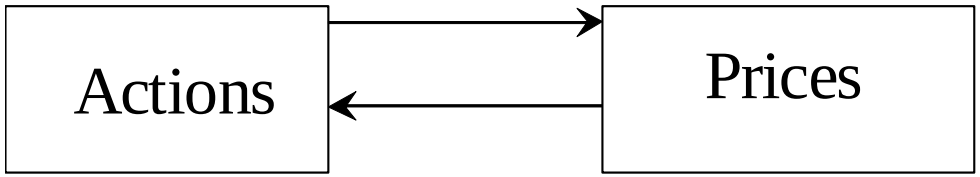
- When there is more than one imperfection in an economy, removing one of them need not improve welfare.

- In the presence of other imperfections (illiquidity, forced selling, bubbles, etc.) marking to market may not always be desirable.

Dual Role of Market Prices

Market prices play two roles

- Reflection of fundamentals
- Imperative for actions



Sometimes, reliance on market prices can distort market prices

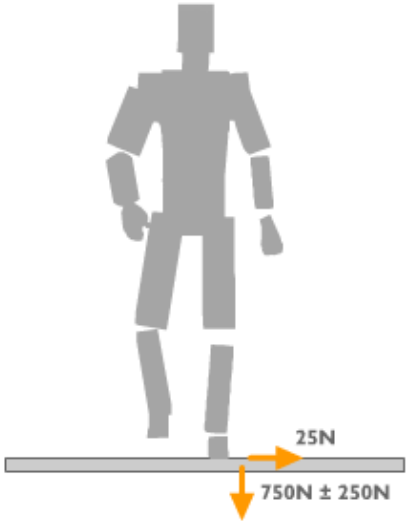
Millennium Bridge

Diagnosis

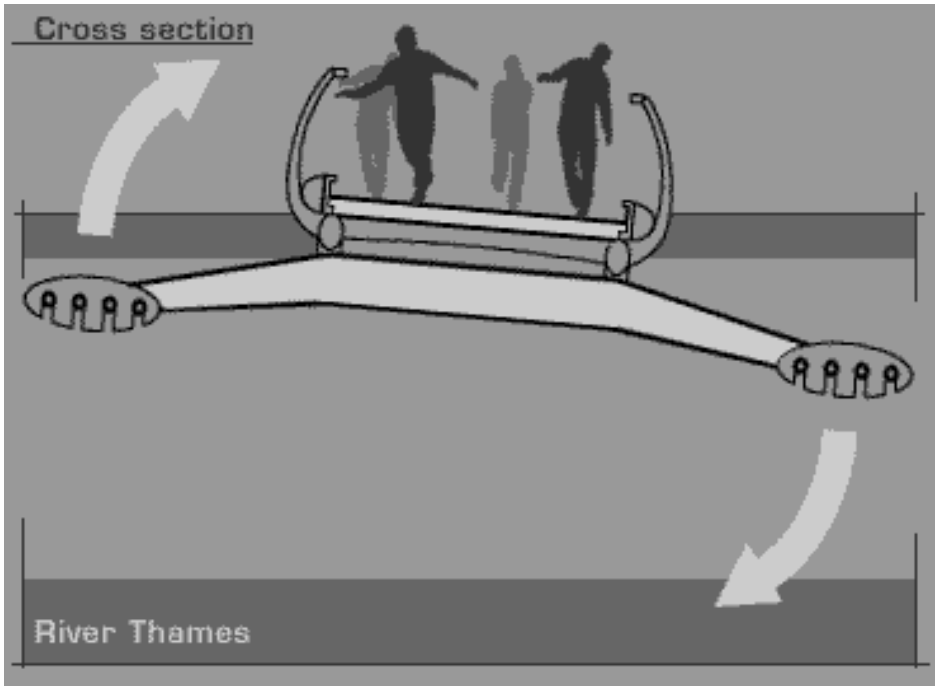
Trouble was at 1 hertz (one complete cycle per second)

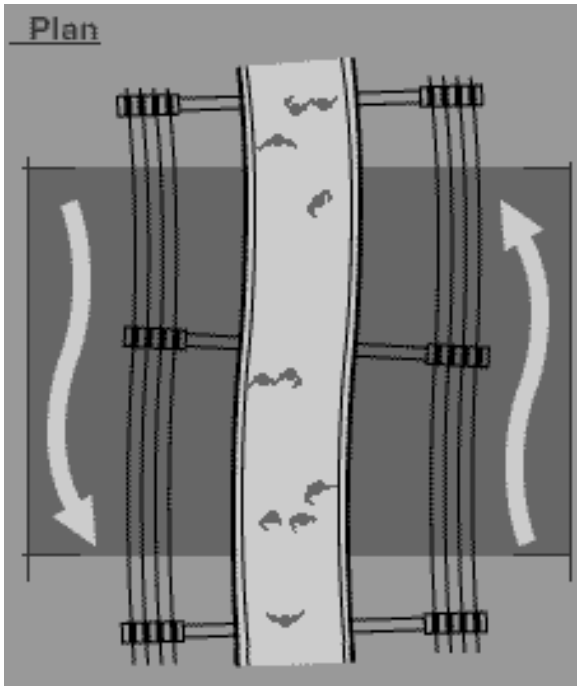
Walking pace is approximately two steps per second (2 hertz)

Although most force exerts down when walking, there is small sideways force every two steps (1 hertz)



Diagnosis

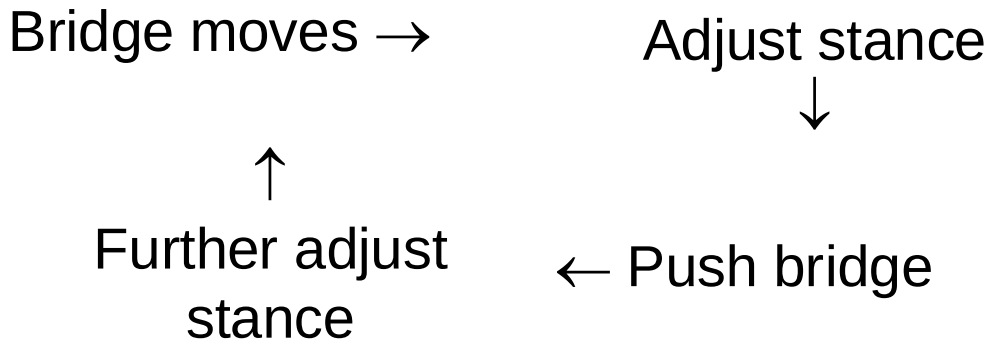




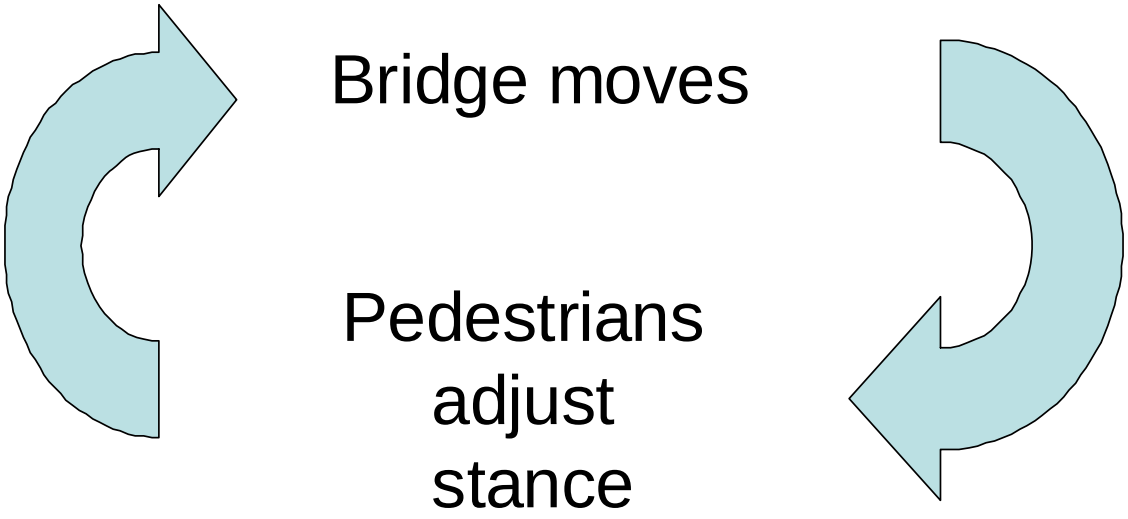
Probability of Coordination

What is the probability that a thousand people walking at random end up walking exactly in step, and remain in lock step thereafter?

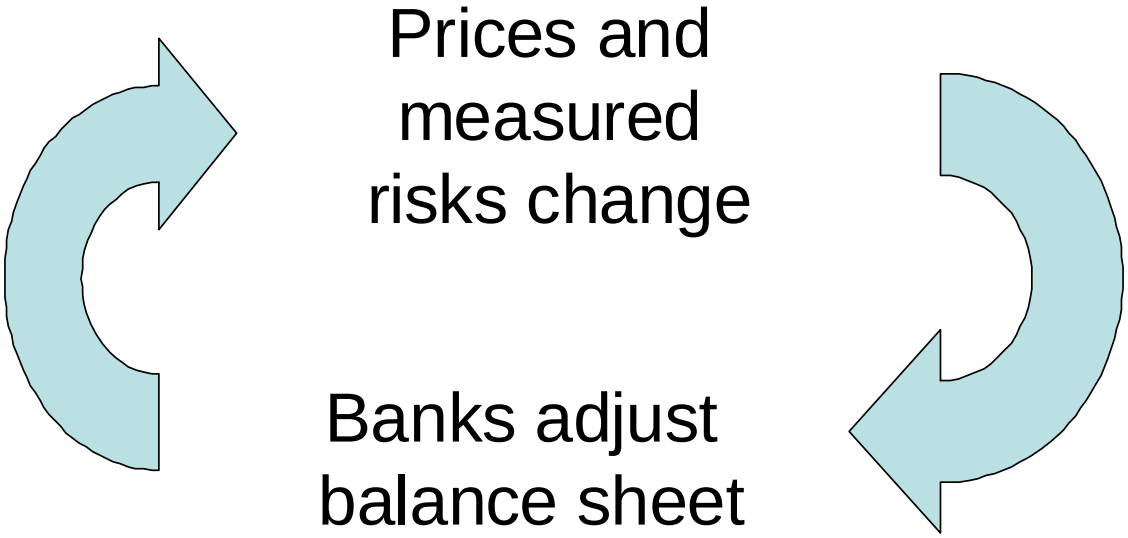
- If individual steps are independent, then probability is close to zero.
- But if there is a coordination mechanism, the probability is close to 1 under the right conditions.



Millennium Bridge Analogy



Millennium Bridge Analogy



Role of Accounting

When balance sheets are marked to market, asset price changes show up immediately on the balance sheet, and elicit responses from market participants - especially leveraged entities.

Diversity of positions aids stability of financial system. But market prices are a lightening rod that imposes uniformity.

Reliance on market prices may distort market prices.

The choice is between:

- Relying on degraded market signals
- Using valuation rules that filter out some price information

Marking to Market

Initial balance sheet

Assets	Liabilities
Securities, 100	Equity, 10
	Debt, 90

Assume price of debt approximately constant. Suppose the security price increases by 1% to 101.

Assets	Liabilities
Securities, 101	Equity, 11
	Debt, 90

Leverage falls to

$$\frac{101}{11} = 9.18$$

If bank targets **constant leverage**, it must take on additional debt of D to purchase D worth of securities on the asset side so that

$$\frac{\text{assets}}{\text{equity}} = \frac{101 + D}{11} = 10$$

The solution is $D = 9$. In other words, the bank takes on additional debt worth 9, and with this money purchases securities worth 9.

The demand curve is upward-sloping.

The new balance sheet looks like this.

Assets	Liabilities
Securities, 110	Equity, 11
	Debt, 99

The leverage is now back up to 10.

The mechanism works in reverse, too. Suppose there is shock to the security price so that

Assets	Liabilities
Securities, 109	Equity, 10
	Debt, 99

Leverage is too high $(109/10 = 10.9)$.

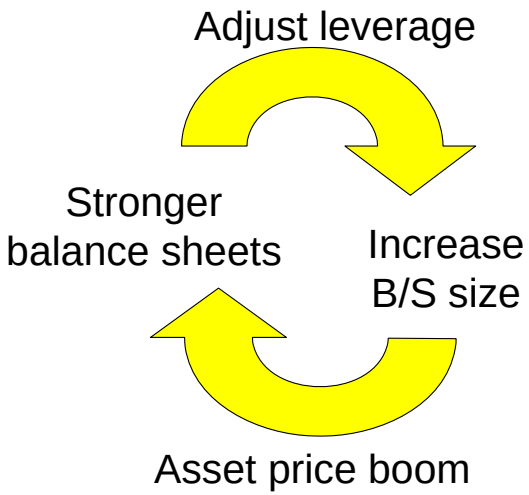
Sell securities worth 9, paydown debt of 9.

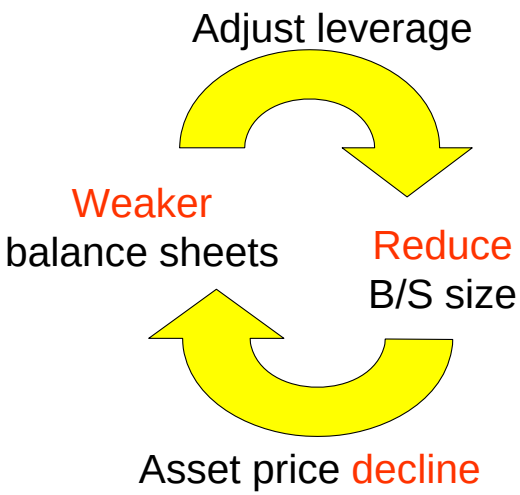
Assets	Liabilities
Securities, 100	Equity, 10
	Debt, 90

Back to leverage of 10.

Supply curve is downward-sloping.

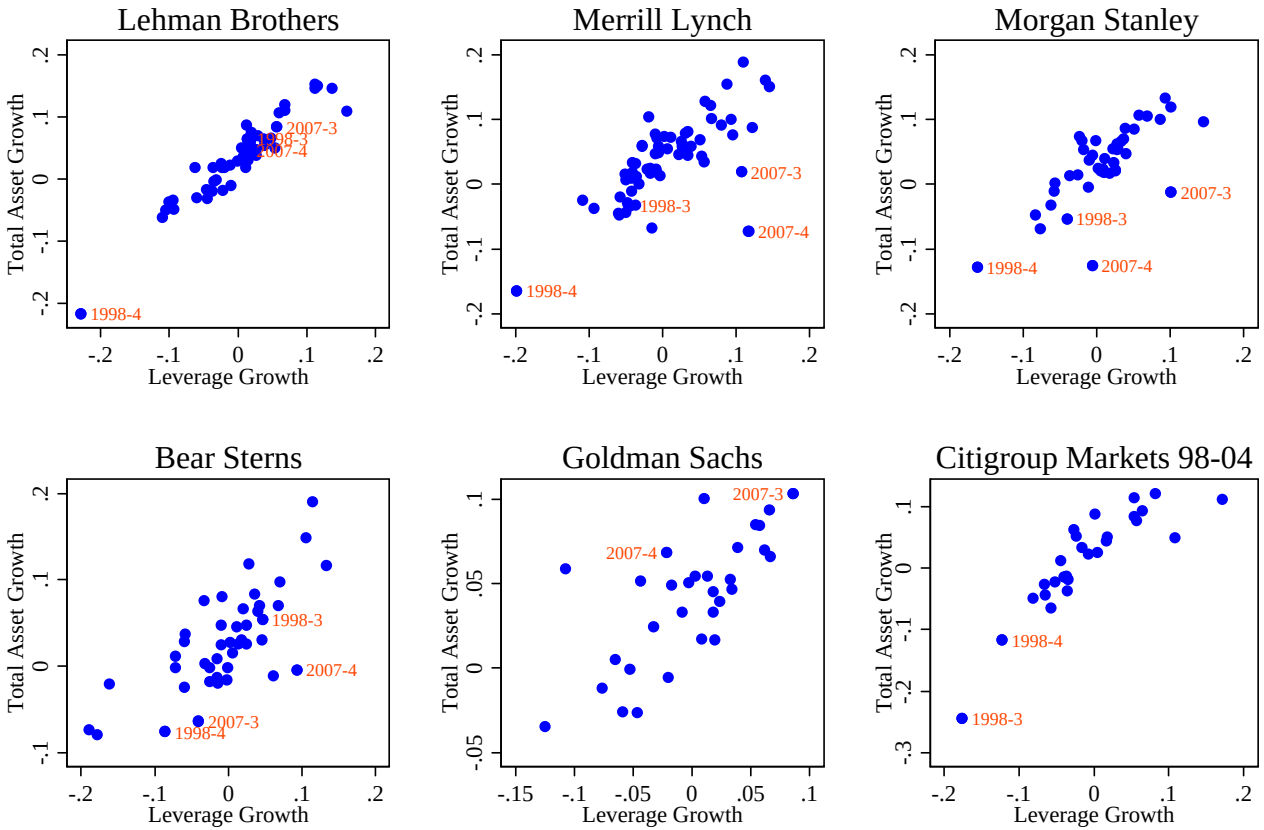
Amplification

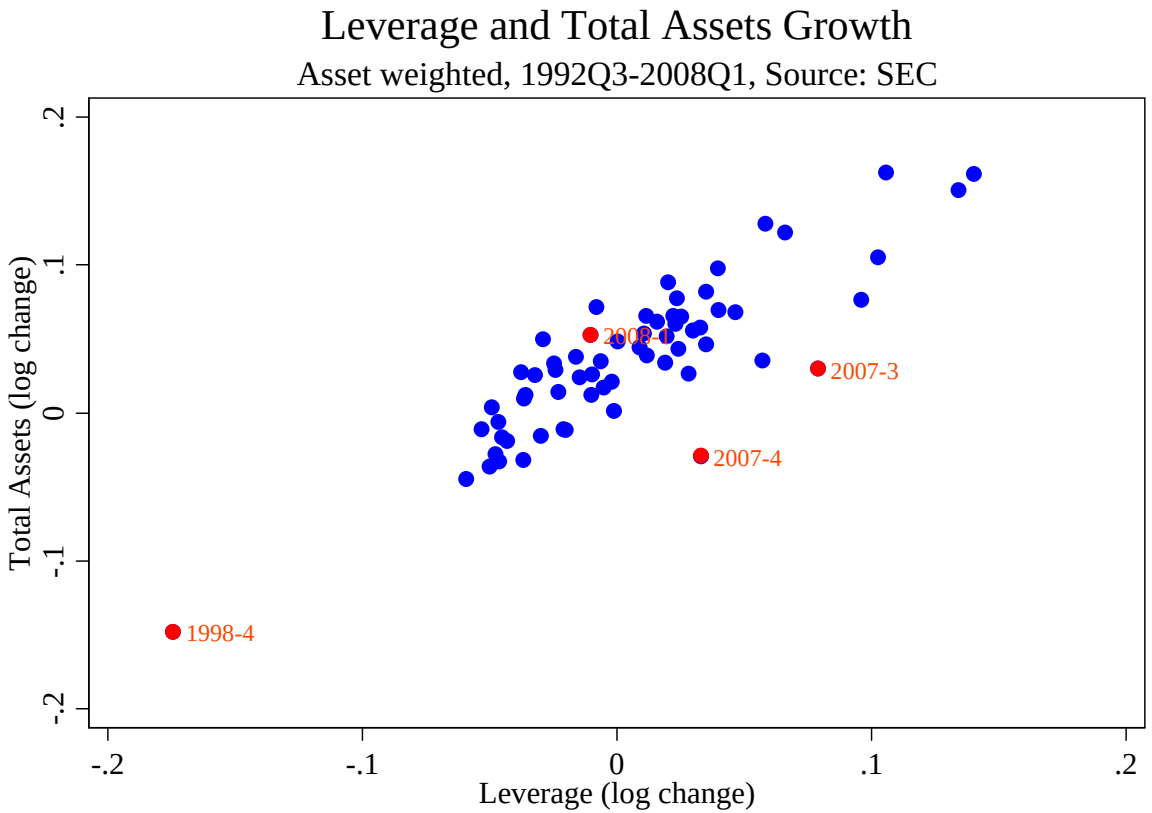




Security Dealers and Brokers

Total Assets and Leverage




Leverage and Total Assets Growth
Asset weighted, 1992Q3-2008Q1, Source: SEC
Total Assets (log change)
.2
.1
0
-.1
-.2
-.2
-.1
0
.1
.2
Leverage (log change)
2007-3
2007-4
1998-4

Explosive Combination

"The value added of a good risk management system is that you can take more risks."

[Anonymous risk manager, May 2007]

"While many believe that irresponsible borrowing is creating a bubble in housing, this is not necessarily true. At the end of 2004, U.S. households owned $17.2 trillion in housing assets, an increase of 18.1% (or $2.6 trillion) from the third quarter of 2003. Over the same five quarters, mortgage debt (including home equity lines) rose $1.1 trillion to $7.5 trillion. The result: a $1.5 trillion increase in net housing equity over the past 15 months."

[Wall Street Journal commentator, May 31, 2005]

Alternative Approaches to Policy

- Extreme choices are:
  - Using degraded market signals (marking to market)
  - Using obsolete historical information (historical cost accounting)

- "Mark to Funding" (Geneva Report, 2009) takes account of *ability to hold*, not *intention to hold*, as under current accounting rules.

Governance Issues

- Accounting rules have economic impact, but accounting standard setters do not see it as part of their remit to consider wider economic impact
- Accounting is a public policy issue, as much as prudential regulation or monetary policy.
- Is accounting too important to be left solely to the accountants?

Monetary Policy

Traditional distinction:

- Monetary policy for stabilization of real activity
- Financial regulation for financial stability

To the extent that the financial system as a whole holds long-term, illiquid assets financed by short-term liabilities, any tensions resulting from a sharp, synchronized contraction of balance sheets will show up somewhere in the system. Even if some institutions can adjust down their balance sheets flexibly in response to the greater stress, not everyone can. This is because the system as a whole has a maturity mismatch. While lender of last resort tools may mitigate the severity of the contractions in balance sheets,

they cannot prevent the contraction altogether. Something has to give, and there will be pinch points in the system that will be exposed by the de-leveraging. The pinch points will be those institutions that are highly leveraged and hold long-term illiquid assets financed with short-term debt supplied by lenders who reduce their exposure in response to deteriorating financial conditions. When the short-term funding runs away, the pinch point financial institutions will face a liquidity crisis. Arguably, this is exactly what happened to Bear Stearns in the US and Northern Rock in the UK, as well as a host of conduits and SIVs that have been left stranded by the ebbing tide of funding in the current credit crisis.

In this way, the expansions and contractions of balance sheets have both a monetary policy dimension in terms of regulating aggregate demand, but it also has a financial stability dimension. Therefore, contrary to the commonly encountered view that monetary policy and policies toward financial stability should be conducted separately, the perspective provided

by our study suggests that they are closely related. They are two sides of the same coin. The common coin is the marked-to-market balance sheet dynamics of financial intermediaries.

Debate on Bubbles

Although there has been a long-running debate on how far monetary policy should take account of financial stability goals, the debate has primarily focused on either 1) commercial banks, or 2) asset markets. The debate has not focused as much on the institutions that are at the heart of the market based financial system, such as security broker-dealers. In relation to asset markets, the question has been whether central banks should react to asset price bubbles. The case against reacting to asset price bubbles is a familiar one, and rests on the following arguments.

- Identifying a bubble is difficult.

- Even if there were a bubble, monetary policy is not the right policy tool in addressing the problem. An asset price bubble will not respond to small changes in interest rates. Only a drastic increase in interest rates will prick the bubble.

- However, such a drastic increase in interest rates will cause more harm than good to the economy in terms of future output and output volatility.

The claim that an asset price bubble will not respond to a small change in interest rates has mostly been argued in the context of the stock market, where the proposition is indeed plausible. However, the stock market is not the best context in which to discuss the financial stability role of monetary policy, as stocks are held mostly by unlevered investors. Much more central is the credit market, especially when backed by residential or commercial real estate. As argued already, a difference of a quarter or half percentage in the funding cost may make all the difference between a profitable venture and a loss-making one for leveraged financial intermediaries.

Focusing on the conduct of financial intermediaries is a better way to think about financial stability since it helps us to ask the right questions. Concretely, consider the following pair of questions.

Question 1. Do you know for sure there is a bubble in real estate prices?

Question 2. Could the current benign funding conditions reverse abruptly with adverse consequences for the economy?

One can answer "yes" to the second question even if one answers "no" to the first. This is because we know more about the script followed by financial intermediaries and how they react to changes in the economic environment than we do about what the "fundamental" value of a house is, and whether the current market price exceeds that value.

In any case, for a policy maker, it is the second question which is more immediately relevant. Even if a policy maker were convinced that the higher price of housing is fully justified by long-run secular trends in population, household size, rising living standards, and so on, policy intervention would be justified if the policy maker also believed that, if left unchecked, the

virtuous circle of benign funding conditions and higher housing prices will go too far, and reverse abruptly with adverse consequences for the economy.

Market-Based Financial System

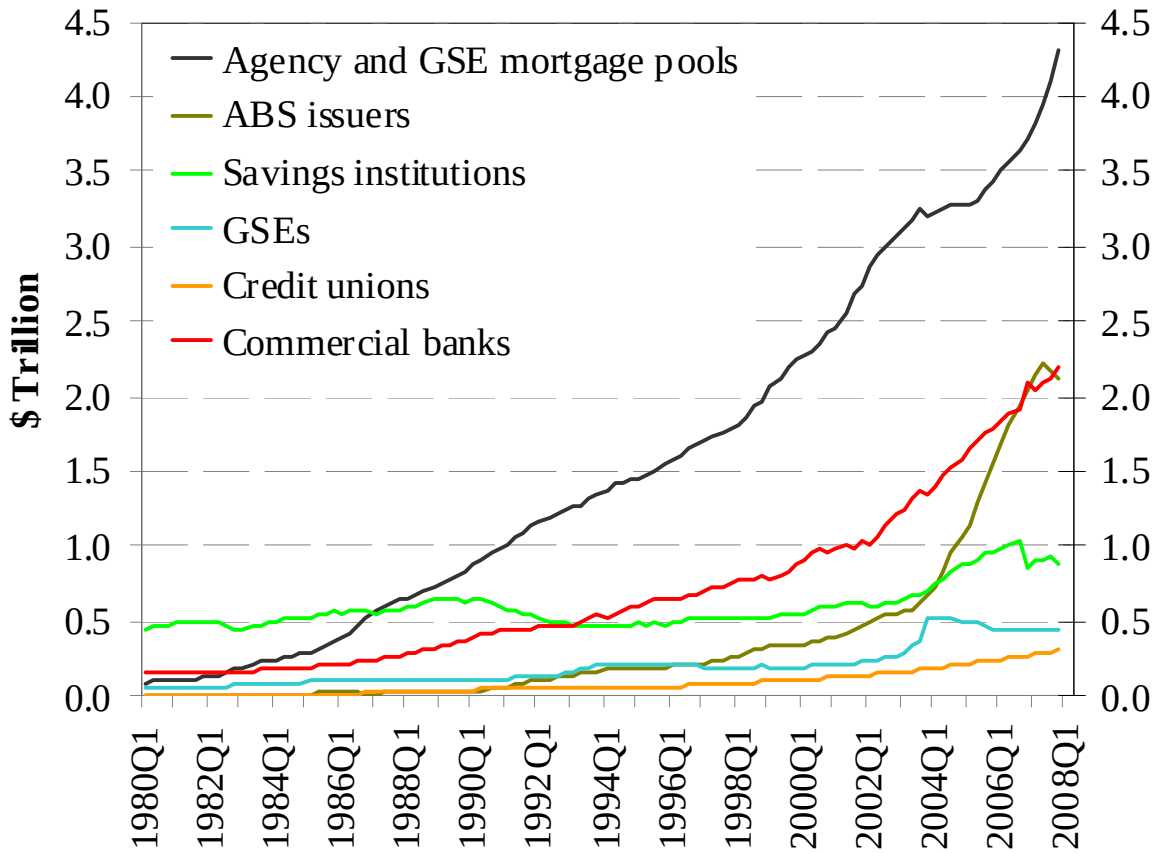

$ Trillion
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
Agency and GSE mortgage pools
ABS issuers
Savings institutions
GSEs
Credit unions
Commercial banks
1980Q1
1982Q1
1984Q1
1986Q1
1988Q1
1990Q1
1992Q1
1994Q1
1996Q1
1998Q1
2000Q1
2002Q1
2004Q1
2006Q1
2008Q1

Figure 1:

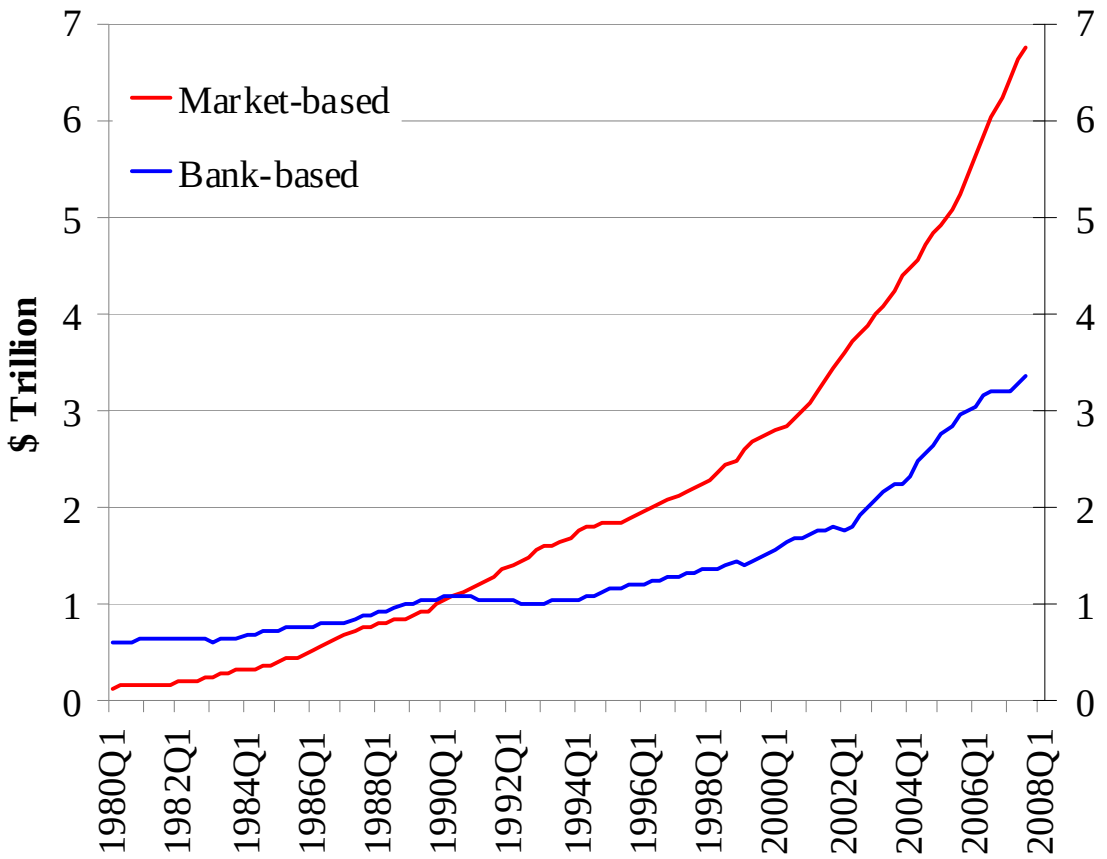

Market-based
Bank-based
$ Trillion
0
1
2
3
4
5
6
7
1980Q1
1982Q1
1984Q1
1986Q1
1988Q1
1990Q1
1992Q1
1994Q1
1996Q1
1998Q1
2000Q1
2002Q1
2004Q1
2006Q1
2008Q1

Figure 2:

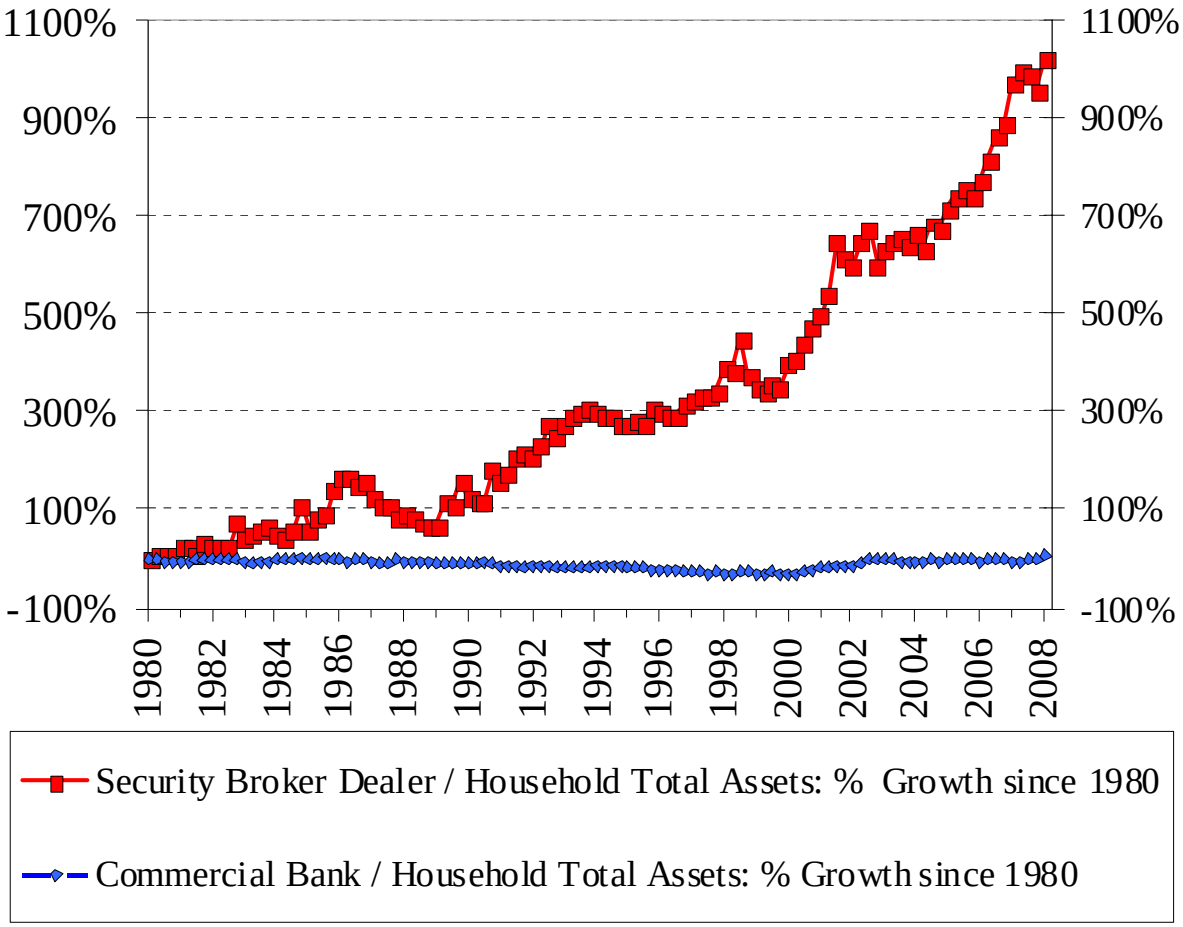

1100%
900%
700%
500%
300%
100%
-100%
1980
1982
1984
1986
1988
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
Security Broker Dealer / Household Total Assets: % Growth since 1980
Commercial Bank / Household Total Assets: % Growth since 1980

Figure 3:

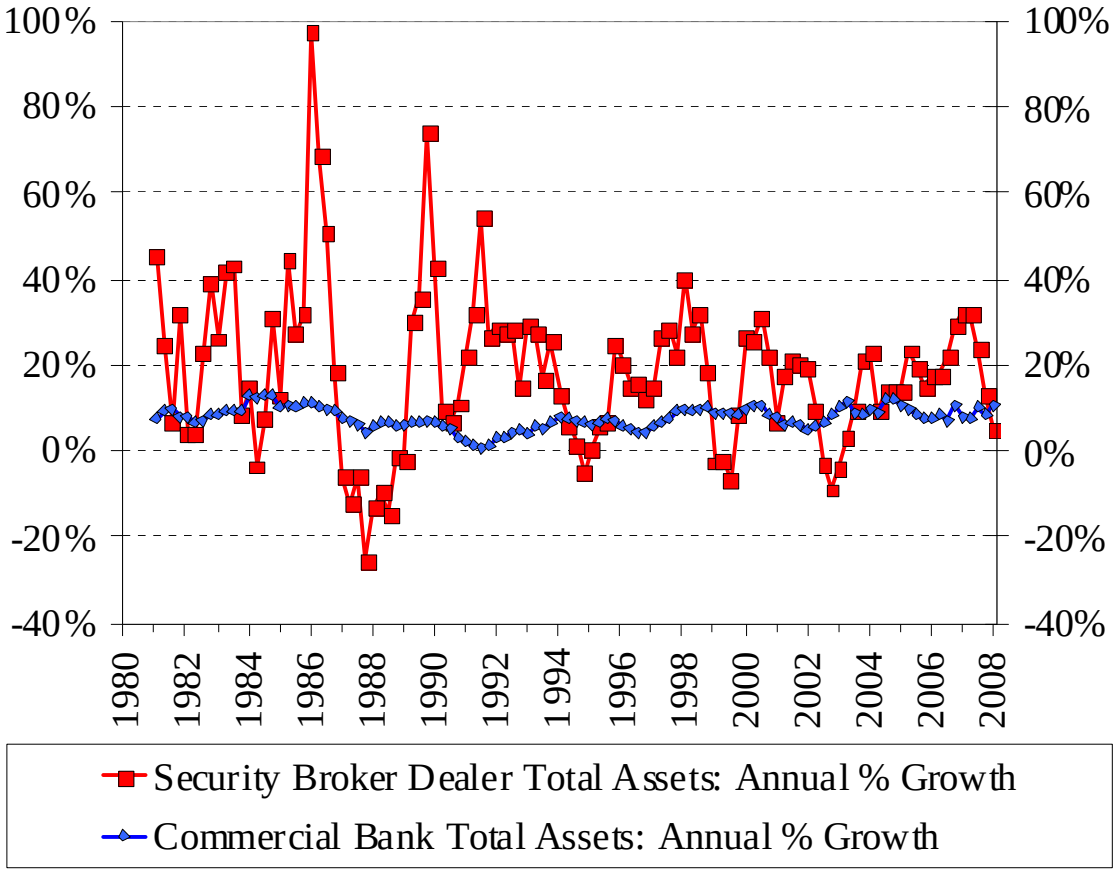

100%
80%
60%
40%
20%
0%
-20%
-40%
1980
1982
1984
1986
1988
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
Security Broker Dealer Total Assets: Annual % Growth
Commercial Bank Total Assets: Annual % Growth

Figure 4:

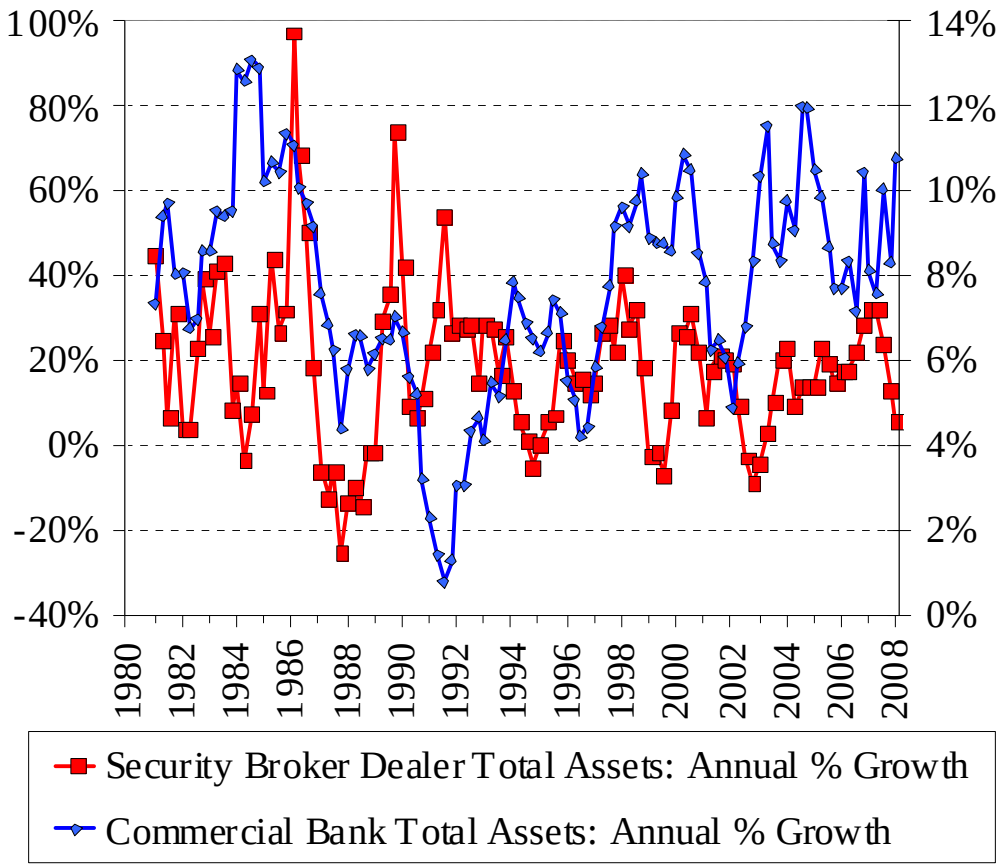

100%
80%
60%
40%
20%
0%
-20%
-40%
14%
12%
10%
8%
6%
4%
2%
0%
1980
1982
1984
1986
1988
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
Security Broker Dealer Total Assets: Annual % Growth
Commercial Bank Total Assets: Annual % Growth

Figure 5:

Table 1:
Broker-dealer assets are significant for macroeconomic variables

	(i)		(ii)		(iii)		(iv)		(v)	
	Consumption (4Q growth)		Durable Consumption (4Q growth)		Investment (4Q growth)		Housing Investment (4Q growth)		GDP (4Q growth)	
Broker-Dealer Variables										
Asset growth (1Q lag)	0.003		0.048	*	-0.007		0.062	**	0.005	
Equity growth (1Q lag)	0.008	**	0.013		0.026	**	0.055	***	0.006	*
Macroeconomic conditions										
Lag of left hand side variable	0.746	***	0.468	***	0.873	***	0.829	***	0.812	***
PCE core inflation (1Q lag)	-0.199		-2.225	***	0.247		0.344		-0.112	
Fed Funds Target (1Q lag)	0.066		0.667		-0.342	***	-0.253		0.003	
Financial Market Conditions										
S&P500 Return (1Q lag)	0.008		-0.002		0.039		0.041		0.009	
S&P500 implied volatility VIX (1Q lag)	0.018		0.075		0.126	**	0.183	*	0.026	*
10-year/3-month spread (1Q lag)	0.180	*	1.456	**	0.460		0.972		0.187	**
Baa/10-year spread (1Q lag)	-0.023		-0.182		-1.492	**	0.367		-0.183	
Constant	0.252		1.111		1.114		-7.078		0.238	

Figure 6:

Figure 7. Impulse Response Function of Housing Investment Growth to a Broker-dealer Asset Growth Shock (in units of standard deviations)

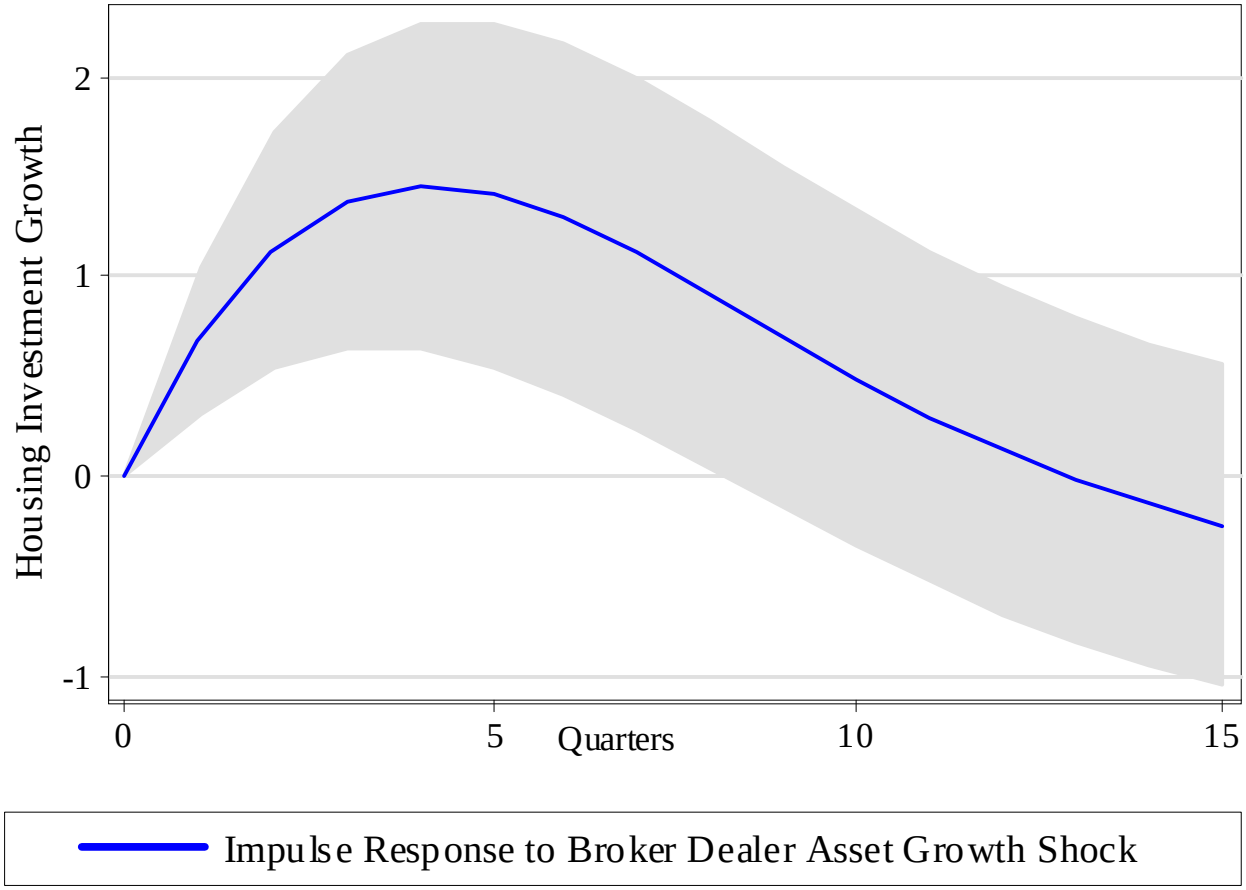


Figure 7:

Table 2:
Commercial bank assets do not have additional explanatory power for real activity (except housing investment)

	(i) Consumption		(ii) Durable Consumption		(iii) Investment		(iv) Housing Investment		(v) GDP	
Broker-Dealer Variables										
Asset growth (1Q lag)	0.002		0.050	*	-0.007		0.054	**	-0.001	
Equity growth (1Q lag)	0.009	**	0.015		0.026	**	0.057	***	0.007	*
Commercial Bank Variables										
(Orthogonalized with respect to Broker-Dealer Variables)										
Asset growth (1Q lag)	0.060		0.353		0.038		-0.045		0.027	
Equity growth (1Q lag)	0.004		0.047		0.011		0.088	***	0.005	
Macroeconomic conditions										
Lag of left hand side variable (1Q lag)	0.688	***	0.418	***	0.866	***	0.812	***	0.770	***
PCE core inflation (1Q lag)	-0.199		-2.114	***	0.258		0.395		-0.022	
Fed funds target (1Q lag)	0.092		0.716		-0.341	***	-0.375		-0.038	
Financial Market Conditions										
S&P500 return (1Q lag)	0.006		-0.011		0.037		0.031		0.011	
S&P500 volatility VIX (1Q lag)	0.020		0.081		0.125	**	0.171	*	0.036	*
10-year/3-month (1Q lag)	0.232	*	1.636	**	0.452		0.542		0.167	
Baa/10-year (1Q lag)	-0.088		-0.658		-1.576	**	0.388		-0.516	**
Constant	0.339		1.426		1.315		-5.618		0.944	

Figure 8:

Table 3:
Commercial bank equity has explanatory power
... but commercial bank assets do not

	(i) Consumption		(ii) Durable Consumption		(iii) Investment		(iv) Housing Investment		(v) GDP	
Commercial Bank Variables										
Asset growth (1Q lag)	0.063		0.329		0.055		0.024		0.039	
Equity growth (1Q lag)	0.009	***	0.048	**	0.022	**	0.007	***	0.011	**
Macroeconomic conditions										
Lag of left hand side variable (1Q lag)	0.714	***	0.412	***	0.882	***	0.792	***	0.785	***
PCE core inflation (1Q lag)	-0.200		-1.907	***	0.201		-0.033		-0.113	
Fed funds target (1Q lag)	0.084		0.642		-0.333		-0.042		-0.004	
Financial Market Conditions										
S&P500 return (1Q lag)	0.007		-0.021		0.043		0.012		0.008	
S&P500 volatility VIX (1Q lag)	0.017		0.067		0.126	**	0.035	**	0.027	**
10-year/3-month (1Q lag)	0.211	***	1.397	**	0.482		0.166		0.195	
Baa/10-year (1Q lag)	-0.128		-0.232		-1.741		-0.536		-0.244	**
Constant	0.080		-0.779		1.239		0.815		0.165	

Figure 9:

Figure 8: Response of Real Housing Investment to Fed Funds Shock.
Comparison of Nonstructural Models with and without Broker-Dealer Variables

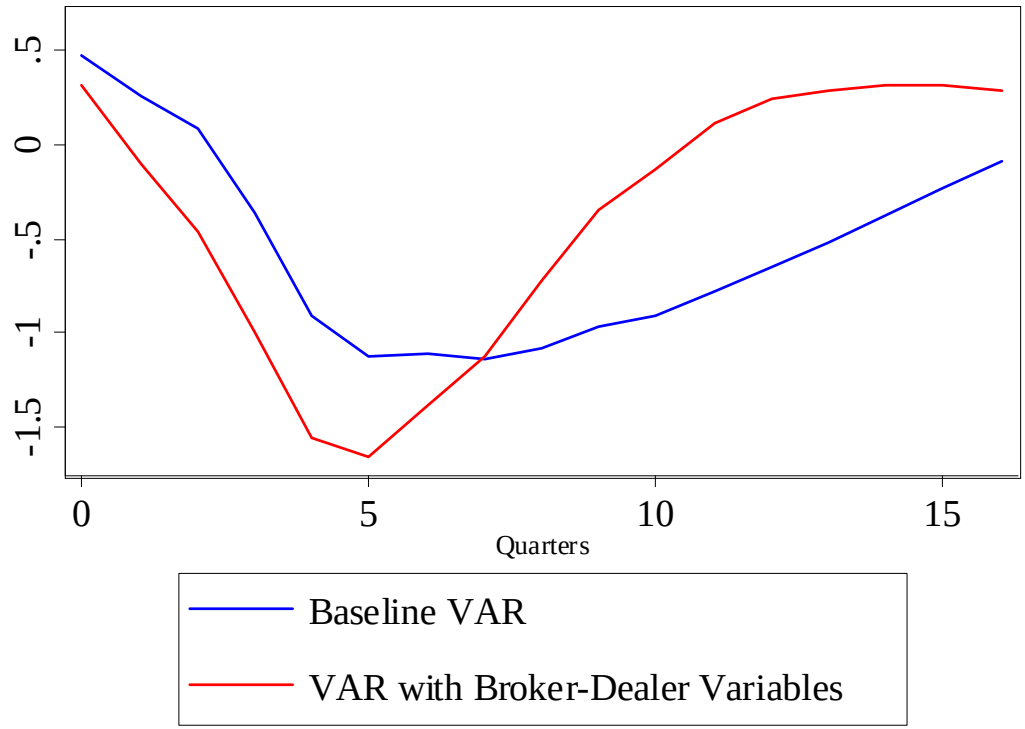


Figure 10:

Table 4:
Increases in the Federal Funds Target (and the Expectation of the Future Target)
Tend to Reduces Broker-Dealer Balance Sheets

	(i) Asset Growth Broker-Dealers		(ii) Asset Growth Broker-Dealers		(iii) Asset Growth Broker-Dealers		(iv) Asset Growth Broker-Dealers		(v) Asset Growth Commercial Banks	
Fed Funds										
Target (1Q change)	-15.87	***							0.071	
Target (4Q change)			-4.87	***						
Target (lag, 1Q change)					-11.65	***				
1-year Eurodollar future (spread to Fed Funds)							-15.42	***		
Macroeconomic Conditions										
Real GDP Growth (1Q lag)	0.553		0.833		-0.740		0.679		0.516	***
PCE Core Inflation (1Q lag)	-1.060		-1.065		0.284		-0.789		-0.966	***
Financial Market Variables										
S&P500 Return (1Q lag)	-0.013		0.118		0.159		0.151		0.013	
S&P500 Volatility VIX (1Q lag)	-1.125	***	-1.220	***	-0.941	***	-1.178	***	0.040	
10-year/3-month (1Q lag)	-5.697		-3.027		2.503		-2.242		-0.426	
Baa/10-year (1Q lag)	4.871	**	18.131	***	14.781		23.398	***	0.216	
Constant	36.787	***	37.538	***	40.102	***	36.550	***	7.112	***

Figure 11:

Table 6:
Monetary Policy is Pro-Cyclical Relative to Broker-Dealer Asset Growth
... Except in Crises

	(i) Fed Funds Target (change)		(ii) Fed Funds Target (change)		(iii) Fed Funds Target (change)		(iv) Fed Funds Target (change)	
Macroeconomic Conditions								
Fed funds target (1Q lag)	-0.090	***	-0.070	***	-0.070	**	-0.073	***
Real GDP growth	0.240	***	0.220	***	0.230	***	0.229	***
PCE core inflation	0.130	**	0.110	*	0.140	**	0.123	**
Broker-Dealer Balance Sheets								
Asset growth			-0.007	**	-0.009	***		
Asset growth * crisis dummy					0.038	**		
Asset growth (1Q lag)							-0.008	**
Constant	-0.698	***	-0.567	***	-0.587	***	-0.573	***

Figure 12:

Table 5:
Primary Dealer Repo Growth Expands when the Term Spread is Large

	Repo Growth Primary Dealers	
Fed Funds (13 week change)	-0.037	**
Fed Funds (13 week lag)	0.037	***
S&P500 Return (13 week)	0.000	*
S&P500 (13 week lag)	0.000	***
VIX (13 week change)	-0.001	
VIX (13 week lag)	-0.007	***
10-year / 3-month Treasury spread (13 week change)	0.049	**
10-year / 3-month Treasury spread (13 week lag)	0.087	***
Baa / 10-year credit spread (13 week change)	0.150	***
Baa / 10-year credit spread (13 week lag)	0.017	
Repo Growth (13 week lag)	-0.242	***
Constant	-0.163	

Figure 13:

Figure 9: Impulse Response of the Fed Funds Target to a Shock to Security Broker-Dealer Asset Growth in Crisis and in Normal Times

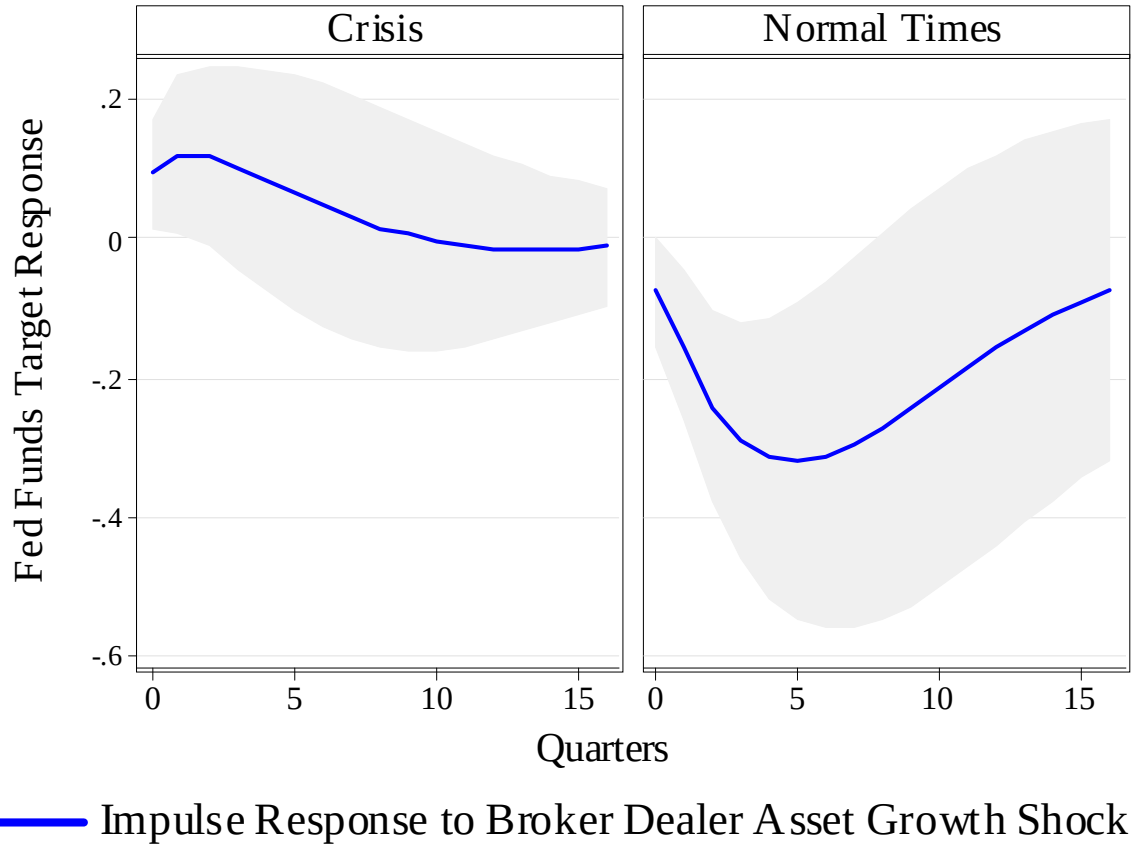
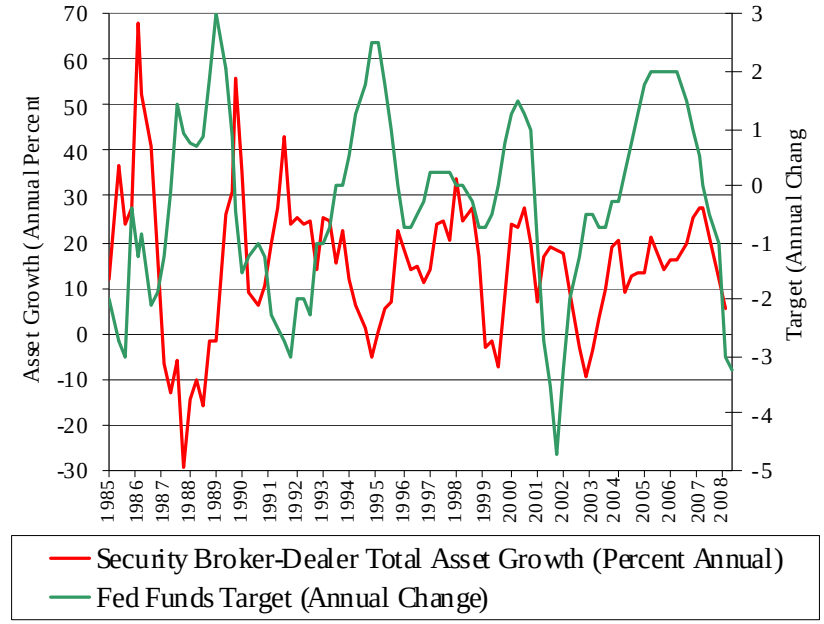


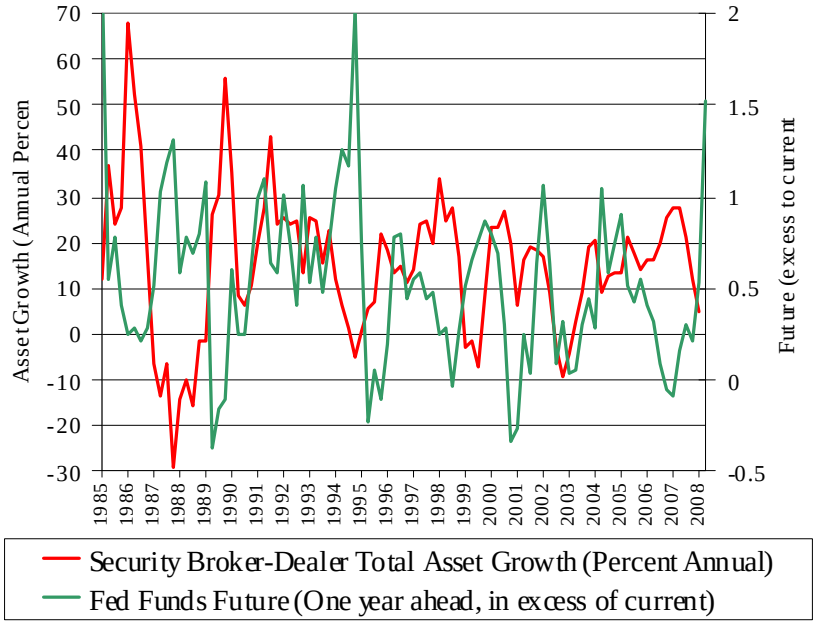
Figure 14:

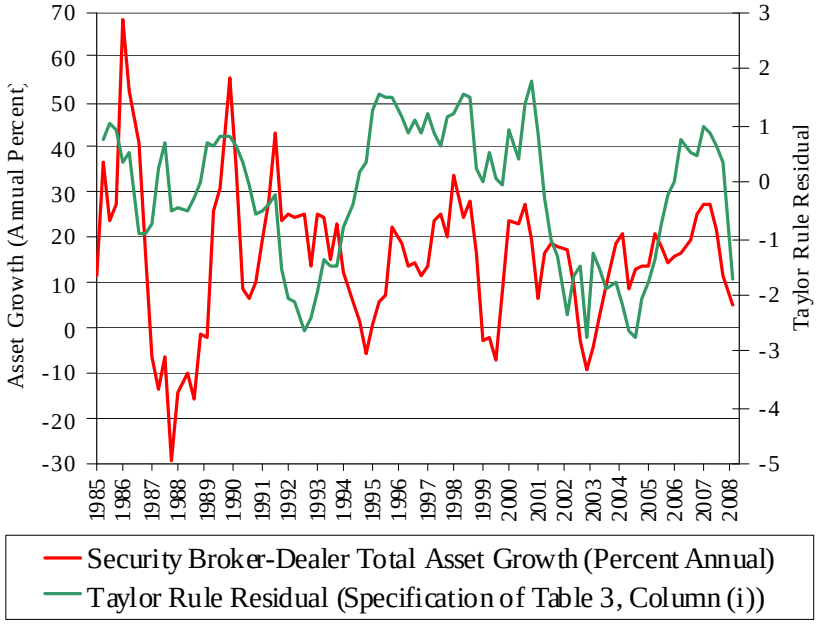
Table 7:
Pro-Cyclical Monetary Policy is Robust to Asset Price Controls and Controls for Future and past Macroeconomic Variables

	(i) Fed Funds Target (change)		(ii) Fed Funds Target (change)		(iii) Fed Funds Target (change)		(iv) Fed Funds Target (change)	
Macro Variables								
Fed funds target (lag)	-0.135	**	-0.116	**	-0.146	**	-0.084	***
Real GDP growth (4Q)	0.215	***	0.189	***	0.192	***	0.233	***
PCE core inflation (4Q)	0.200	**	0.141		0.187	**	0.169	**
GDP forecasted by four lags of broker asset growth (lag)					0.191			
PCE forecasted by four lags of broker asset growth (lag)					-0.239			
Balance Sheet Variables								
BD asset growth								
BD asset growth (lag)	-0.012	***	-0.009	**	-0.014	***		
BD asset growth (explained by four lags of GDP & PCE)			-0.014	*				
CB asset growth (lag)							0.029	
Financial Markets								
S&P500 return	0.009		-0.014		0.011	*		
S&P500 volatility VIX	-0.021		0.01		-0.017			
10-year / 3-month (lag)	-0.114	*	-0.021	*	-0.113			
Baa / 10-year (lag)	-0.079		-0.087		-0.176			
Constant	0.380		-0.096		0.677		-0.966	***

Figure 15


Asset Growth (Annual Percent
Target (Annual Chang
Security Broker-Dealer Total Asset Growth (Percent Annual)
Fed Funds Target (Annual Change)


Asset Growth (Annual Percen
Future (excess to current
Security Broker-Dealer Total Asset Growth (Percent Annual)
Fed Funds Future (One year ahead, in excess of current)


Asset Growth (Annual Percent)
Taylor Rule Residual
Security Broker-Dealer Total Asset Growth (Percent Annual)
Taylor Rule Residual (Specification of Table 3, Column (i))

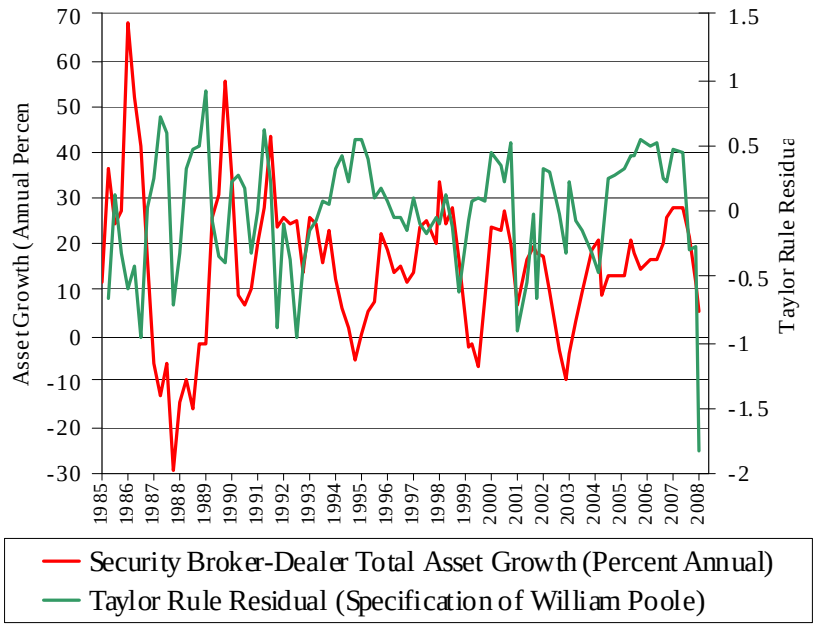

Asset Growth (Annual Percen
Taylor Rule Residua
Security Broker-Dealer Total Asset Growth (Percent Annual)
Taylor Rule Residual (Specification of William Poole)

Figure 16

Implications for Monetary Policy

Thee implications (at least)

- Forward-looking guidance on future policy rates or the publication of the central bank's own projections of its policy rate. Such communication not only has implications for market participants' expectations of the future path of short rates, but also for the uncertainty around that path. If central bank communication compresses the uncertainty around the path of future short rates, the risk of taking on long-lived assets financed by short-term debt is compressed. If the compression increases the potential for a disorderly unwinding later in the expansion phase of the cycle, then such compression of volatility may not be desirable for stabilization of real activity. Forward-looking guidance may compress volatility to a level that is artificially low if it does not take the aggregate effects of financial intermediary constraints into account. In this sense, there is the

possibility that forward-looking communication can be counterproductive.

- Secondly, there is a case for rehabilitating some role for balance sheet quantities for the conduct of monetary policy. Ironically, our call comes even as monetary aggregates have fallen from favor in the conduct of monetary policy (see Friedman (AER 1988)). The instability of money demand functions that makes the practical use of monetary aggregates challenging is closely related to the emergence of the market-based financial system. As a result of those structural changes, not all balance sheet quantities will be equally useful. The money stock is a measure of the liabilities of deposit-taking banks, and so may have been useful before the advent of the market-based financial system. However, the money stock will be of less use in a financial system such as that in the US. More useful may be measures of collateralized borrowing, such as the weekly series on repos of primary dealers.

- Finally, our results highlight the way that monetary policy and policies toward financial stability are linked. When the financial system as a whole holds long-term, illiquid assets financed by short-term liabilities, any tensions resulting from a sharp pullback in leverage will show up somewhere in the system. Even if some institutions can adjust down their balance sheets flexibly, there will be some who cannot. These pinch points will be those institutions that are highly leveraged, but who hold long-term illiquid assets financed with short-term debt. When the short-term funding runs away, they will face a liquidity crisis. The traditional lender of last resort tools (such as the discount window), as well as the recent liquidity provision innovations are tools that mitigate the severity of the tightening of balance sheet constraints. However, experience has shown time and again that the most potent tool in relieving aggregate financing constraints is a lower target rate. Past periods of financial stress such as the 1998 crisis was met by reduction in the target rate, aimed at insulating the real economy from financial sector shocks. In

conducting monetary policy, the potential for financial sector distress should be explicitly taken into account in a forward looking manner.

Appendix: Data Sources and Variable Definitions

Figure 1: US Flow of Funds, Board of Governors of the Federal Reserve. 1980Q1 – 2008Q1. Table L.218, home mortgage assets for various institutions.

Figure 2: Source data as in Figure 1. Bank based institutions: Commercial banking, Savings institutions, Credit unions. Market based institutions: Government-sponsored enterprises, Agency-and GSE-backed mortgage pools, Issuers of asset-backed securities

Figures 3-5: US Flow of Funds, Board of Governors of the Federal Reserve. 1980Q1 – 2008Q1. Security brokers and dealers, total financial assets, table L.129. Commercial Banks, Total Financial Assets, sum of tables L.110 and L.113. Households, total financial assets, table L.100.

Figure 7: Impulse response function computed from a first order vector autoregression of security broker-dealer asset growth, security broker-dealer

equity return, housing investment, PCE core inflation, Fed funds target, S&P500 return, S&P500 implied volatility VIX, 10-year/3-month spread, Baa/10-year spread. Variable definitions are given below.

Figure 8: Impulse response function computed from a first order vector autoregression of Fed funds target, GDP growth, PCE core inflation, security broker-dealer asset growth, security broker-dealer equity return, S&P500 return, S&P500 implied volatility VIX, 10-year/3-month spread, Baa/10-year spread. Variable definitions are given below.

Figure 9: In all for panels security broker-dealer growth, the Federal funds target, and the Federal funds future are as defined below. In the lower left hand panel, Taylor rule residuals are the residuals of a regression of Federal fund changes on the lagged Federal funds target rate, current GDP growth, and current core PCE growth. These residuals are the residuals of the regression reported in Column (i) of Table 3. The Taylor rule residuals of the lower left hand panel correspond to the Taylor rule described in

Poole (2005): Federal Funds = 1.5*(lagged core PCE inflation - 1.5) + 0.5*Output Gap + 2.3 + 1.5). The output gap is computed as the percent deviation of real GDP (Bureau of Economic Analysis) from potential real GDP (Congressional Budget Office).

Figure 10: The impulse response functions are computed from a VAR(4) using a standard Cholesky decomposition. The baseline specification includes annual GDP growth, annual PCE inflation, the Fed funds target, and annual housing investment growth. The specification with financial asset prices adds the market return, market volatility, the term spread, and the credit spread to the VAR (in that order, variable definitions given below). The VAR with security broker-dealers add annual broker-dealer total asset growth and broker-dealer annual equity growth to the macro variables (in that order).

Tables 1-4, 6-7: Variable definitions. All variables are quarterly from 1986Q1-2008Q1. GDP growth denotes the annual percentage growth

rate of real gross domestic product in chained 2000 US dollars, reported by the Bureau of Economic Analysis. Total consumption, durable consumption, total investment, and housing investment are the respective annual percentage growth rates as reported by the Bureau of Economic Analysis. Core PCE inflation is the annual percentage growth rate of the chained price index of personal consumption expenditures less food and energy, reported by the Bureau of Economic Analysis. The Federal funds target is set by the Federal Open Market Committee and calculated as average over the quarter. The term spread is the difference between the 10-year Treasury constant maturity yield and the three month constant maturity yield from the Federal Reserve Board's H.15 data release. The credit spread is the difference between Moody's BAA yield and the 10-year constant maturity yield, both from the from the Federal Reserve Board's H.15 data release. The S&P 500 return is the quarterly return reported by Standard and Poor's. The S&P 500 volatility index is the VIX since 1991, and the VXO from 1986-1990, as reported by the Chicago Board

Options Exchange. Security Broker and Dealers equity growth is the annual equity return from the Center for Research in Security Prices, according to the Standard Industrial Classification codes. Commercial bank equity is the annual equity return from the Center for Research in Security Prices, according to the Standard Industrial Classification codes.

Security broker-dealer total asset growth is the annual growth rate of total financial assets from table L.129 of the Federal Reserve Board's Flow of Funds. Commercial bank total asset growth is the annual percentage growth rate of the sum of total financial assets from tables L.110 and L.113 of the Federal Reserve Board's Flow of Funds. The crisis dummy equals 1 in 1987Q4, 1994Q4, and 1999Q1, and 0 otherwise. The Federal funds future is from the one year Eurodollar rate published by the Financial Times.

Table 5: The Primary Dealer Repo series is the memorandum item "Total Reverse Repurchase Agreements" of table 4 "Financing by Primary US Government Securities Dealers" from the weekly release of the FR2004 date

by the Federal Reserve Bank of New York. The other variables in Table 4 are the same as the ones used in Tables 1-4 and 6-7, at a weekly frequency.