

Balance Sheet Adjustment

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Puzzle

- Financial Deleveraging: Haircuts rise, security holders liquidate to reduce debt
 - Leverage falls
- Incomplete description
 - For every seller there is a buyer....
- Note: Deleveraging in flows is not puzzling
 - Savings rate rises, less debt, etc.
 - Decade adjustment

Objectives

- Fact-finding:
 - Understand how assets have shifted across the financial sector
 - How much has been sold?
 - Buyers?
 - How have they financed?

Objectives

- Asset prices
 - Look at Euler of equation of buyers if you want to understand what determines prices.
 - Constrained agents (i.e. those who face a borrowing constraint) are inframarginal.
- Government
 - Buyers are supported by the government
 - How does government affect incentives?

Debt Market

Mortgage and Credit Related Securities	Outstanding
Total ABS (including auto, credit card, home equity, manufacturing, student loans, CDOs of ABS)	2480
ABS CDOs	400
Mortgage Related	8990
Agency GSE MBS	6094
Non-Agency MBS	2897
Corporate Bonds	6043
Asset-Backed Commercial Paper	1250
Total for Securities	17513

Table 1: Mortgage and Credit Securities (\$ billions)

Source: SIFMA (2008 Q1)

- There is an additional \$10tn of mortgage/credit loans in financial institutions' portfolios.

Financial Sector

Hedge Funds	-731
Broker/Dealers	-324
Insurance Companies	-185
Commercial Banks	
All Securitized Assets	731
Total (for securitized assets)	-512

Money Market

	Q4 2007	Q1 2009
Repo Agreements and Fed Funds		
Liabilities		
Commercial Banks	1327	463
Broker/Dealers	1223	419
Bank Financing		
Checkable Deposits	587	666
Small Time and Savings Deposits	4078	4755
Large Time Deposits	1927	1725
Corporate Bonds	688	1216

Table 14:

Source: Flow of Funds of Federal Reserve (\$ Billions)

Computations

- Suppose we measure assets at time as A_t
$$A_{t+1} - A_t = \text{Purchases} - \text{Losses} - \text{Maturity}$$
- We roughly see if purchases balance out,
 - $\text{SUM}(\text{purchases}) = 0$
- t is Q4 2007 and $t+1$ is Q1 2009

Measurement Issues (1)

- Double counting
 - Suppose bank makes a \$100 repo loan to a hedge fund, that uses the \$100 to buy an MBS
 - Hedge fund liquidates the MBS back to the bank
 - i.e. Hedge fund assets fall by \$100
 - Total bank assets (MBS + Repo Loan) remains the same
- SUM may not be zero
 - This problem is most pronounced for repo and we will try to exclude repo from our computations

Measurement Issues (2)

- Suppose banks improperly mark-to-market.
- For example suppose banks mark books at $t+1$ at \$100 too high a value
- But also report \$100 smaller losses than true
$$100 + A_{t+1} - A_t = \text{Purchases} - (\text{Losses} - 100)$$

Losses

Financial Institution	Total Losses
Commercial Banks	500
Insurance Companies	207
GSEs	153
Brokers and Dealers	100
Hedge Funds	170

Table 3: Financial Institution Losses (\$ billions)

Sources: Bloomberg WDCI (2009), Hedge Fund Flow Report by Barclay Hedge (2009)

•Note: losses are as reported by institutions

Hedge Funds

Strategy	4 th Qtr 2007	1 st Qtr 2009	Redemptions and Trading Losses
Convertible Arbitrage	42	11	31
Distressed Securities	176	69	107
Emerging Markets	353	125	228
Equity Strategies	538	303	235
Event Driven	162	57	105
Fixed Income	160	69	91
Macro	91	61	30
Merger Arbitrage	39	5	34
Multi-Strategy	224	122	102
Other	61	20	41
Sector-Specific	130	58	72
Hedge Fund Industry	1975	973	1002

Table 4: Equity Capital (or Assets under Management) of Hedge Fund Industry (\$ billions)

Sources: Hedge Fund Flow Report by Barclay Hedge (2008, 2009)

Mortgage/Credit Assets

- Focus on distressed, fixed income, macro, and a proportional amount of multi-strategy and sector specific funds' capital.
 - \$514 bn in Q4 2007
 - \$257bn in Q1 2009
- Also, leverage falls
 - 2.8 times to 1.7 times in aggregate
- Given losses of 170bn and maturity rate of 7%
 - Sales = \$731bn

Pure Broker/Dealers

	Assets	Nov 2007	Feb 2008	March 2009
Goldman Sachs	Trading Assets	453	499	350
	Credit and Mortgage Related	132	142	62
Morgan Stanley	Trading Assets	375	446	259
	Credit and Mortgage Related	148	161	83
Merrill Lynch	Trading Assets	235	232	158
	Credit and Mortgage Related	173	160	128
Total Credit and Mortgage Related Assets		453	463	273

Table 6: Trading Assets of Investment Banks(\$ billions)

Source: SEC Filings of the above-listed Broker/Dealers

Insurance Companies

	Q4 2007	Q1 2009
Liberty Mutual	13.5	12.6
Berkshire Hathaway	3.6	2.8
AIG	134.5	45.4
Allstate	23.3	11.6
Travelers	7.1	5.9
CAN Insurance	11.4	7.3
Hartford Financial Services	29.3	13.3
Progressive	2.5	2.1
Total	225	101

Table 7: Mortgage and ABS Holdings of Top 8 Insurance Companies (\$ billions)

Source: SEC Filings

Commercial Banks

	4 th Qtr 2007	1 st Qtr 2009
Cash and Reserves	76	813
Securities	2253	2419
Loans and Leases	6807	7031
Other assets	243	800
Total Financial Assets	9379	11063

Note: Data is from Flow of Funds, which is back-filled to reflect the effect of mergers.

Securities

	4 th Qtr 2007	1 st Qtr 2009
US Chartered Commercial Banks		
ABS	84	140
MBS		
Agency and GSE-backed	929	1085
Privately Issued	272	237
Savings Institutions		
MBS		
Agency and GSE-backed	169	175
Privately Issued	111	47
Foreign Banking Offices		
Agency and GSE-backed Securities	57	45
Bank Holding Companies		
Agency and GSE-backed Securities	10	22
Banks in US Affiliated Areas		
Agency and GSE-backed Securities	27	23
Total Securities	1659	1774

Table 10: Holdings of Securities by Commercial Banks (\$ billions)

Sources: Flow of Funds of Federal Reserve, FDIC Statistics on Depository Institutions Report

Securities

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ABCP

- ABCP (including SIVs) outstanding fall from 1.25tn to 650bn over this period
- Most of this is taken back on to bank balance sheets
 - ABCP investors lose 1.7% (Acharya, Schnabl, Suarez, 2009)
 - Can account for asset/loan growth
 - Hard to measure how much, but some SIVs are still not consolidated
- Banks did not take back the assets and sell it (as other sectors likely would have).

Other Repayment Scenarios

	0%	7%	12%
Hedge Funds	-832	-731	-659
Broker/Dealers	-414	-324	-259
Insurance Companies	-245	-185	-148
Commercial Banks			
All Securitized Assets	615	731	814
Privately-backed Assets	92	117	135
Total (for securitized assets)	-876	-512	-252

Fed/Treasury

	Maximum Total Assets	First Loss Borne by Insured Party	% Exposure of Remainder	Net Maximum Exposure
Maiden Lane (Bear Stearns)	30	1	100%	29
Maiden Lane II (AIG)	20	0	100%	20
Maiden Lane III (AIG)	30	5	100%	25
Citigroup	306	29	90%	249
Bank of America	118	10	90%	97
Total	504	44		421

Table 13: Federal Reserve/Treasury

Source: Caballero and Kurlat (2009)

Government Purchase of MBS

- As of 3/25/09 Fed owned \$236bn of GSE-backed mortgage debt in secondary market
 - No purchases of non-agency debt
- Part of Fed initiative to purchase up to \$1.25tn of GSE-backed MBS.

GSEs

- GSEs holding of Agency MBS rise by \$168bn
- Non-Agency MBS holdings fall by \$56bn
- Breakdown between new securitization and secondary market purchase?

Money Market

	Q4 2007	Q1 2009
Repo Agreements and Fed Funds		
Liabilities		
Commercial Banks	1327	463
Broker/Dealers	1223	419
Assets (main holders)		
Rest of the World	1100	583
Mutual Funds	713	603
Bank Financing		
Checkable Deposits	587	666
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Additional Data: Loans from FHLB rise by \$60bn from 12/31/07 to 12/31/08

Fact-Finding Conclusions

- Repo market tightening hits hedge fund and broker/dealer sector hard
 - Substantial shrinkage
- Commercial banking sector grows
 - Government guaranteed financing
- Government
 - Significant amount of “ring-fenced” asset purchase by government (stays on bank books)
 - Government has been active in purchasing Agency MBS

Bank Leverage

	1 st Qtr 2009
Total Assets	7608
Total Liabilities	6845
Equity Capital	763
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Leverage at 763 of Equity Capital	10.0
Leverage in Q4 2007	10.4

Table 20: Top 19 Commercial Banks (\$ billions)

Source: FDIC

Bank Leverage

	1 st Qtr 2009
Total Assets	7608
Total Liabilities	6845
Equity Capital	763
Preferred Stock (including TARP) raised in 2008	233
“True” Capital	530
Leverage at 763 of Equity Capital	10.0
Leverage in Q4 2007	10.4
Leverage at 530 of Equity Capital	14.4
Leverage if true Assets lowered by 200	22.4
Leverage if true Assets lowered by 400	55.4

Table 20: Top 19 Commercial Banks (\$ billions)

Source: FDIC

Marginal Buyers

- If you exclude the government (market orders...)
- Marginal buyer is the commercial banking sector
 - Purchase (or don't downsize) because of ability to borrow using government guarantee

Pricing Condition

- Hypothesis: Banks use debt financing to purchase assets, but limit themselves because asset purchase means higher leverage and hence higher distress risk
- Consistent with high risk premia, lack of liquidity
- Consistent with lack of lending
 - Rather buy assets at deep discount than make new loans