A Minsky Tour through the 2007-2009 Financial Crisis


Minsky reminds us that we can think of all economic agents as banks facing a survival constraint. In such a world each entity is charged with making sure that cash inflows and cash on hand will together be sufficient to cover cash outflows. A key question in this world is what constitutes the optimal leverage ratio. If you assume predictable inflows and hospitable debt markets for refinance, then very high leverage ratios make sense. In an uncertain, and potentially unfriendly debt market world, leverage needs to be limited and cash on hand needs to be in ample supply.

Attached is a chart of the corporate financing gap. It is a useful metric when thinking about Minsky’s ‘cash box constraint’. Recall that Minsky argued that financing decisions were driven by revenue generating expectations, by thoughts about future accessibility to capital markets and by asset price expectations. One can characterize four distinct cycle dynamics of the post war period in the following fashion:

1. From 1965 through 1980 the ‘Great Inflation’ convinced CEO/CFO decision makers to use increasing amounts of debt, a consequence of the likelihood that accelerating inflation would lift their top lines making debt service easy.
2. Volcker’s triumph over the ‘Great Inflation’ produces a decade of modest leverage (from 1982 through 1996 the ratio never tops 2%).
3. Greenspan’s misguided easy money spectacle, mislabeled the ‘Great Moderation’ produces a period of asset market inflation. In such circumstances, enthusiasm about asset price appreciation—Ponzi finance—rather than belief in inflated top lines, generates the justification for two bouts of crazy leverage.
4. Needless to say, the extraordinary caution, visible 2009-2012, speaks to the inherently backward looking nature of attitudes about risk taking.
By the mid-1990s, the Greenspan put, the Goldilocks economy and the proliferation of newfound financing strategies that offered up ways to ‘leg off’ risk, conspired together to convince the power brokers throughout the world of finance that big leverage was the right and just way to make big profits.

I. Ponzi Finance Takes Over in Residential Real Estate

That insight certainly was embraced to a fair thee well by home buyers, in 2002 and thereafter. Hanna showed us in chapter two that big leverage can deliver handsome returns to a risk seeking home buyer—as long as home prices kept climbing. Data now confirms that by 2005 the lion’s share of the borrowers in residential real estate had embraced Hanna’s high leverage/high risk/high reward strategy. In sum, a first and important layer of newfound increased leverage was now in place.

II. Regulatory Arbitrage: Banks’ Levered Bets on Hanna Leveraged Loans

Not to be outdone by mom and pop home buyers, banks devised newfound mortgage backed instruments that allowed them to disguise rising leverage ratios, amid the move to new G-10 Bank for International Settlements (BIS) capital adequacy standards. The Basel Committee on Banking Supervision devised new, uniform standards for determining acceptable levels of capital. Banks, however, were convinced that risks were small and capital requirements unnecessarily limited returns on equity.

Consider the balance sheets of two super simplified newly created banks. Bank A, below, has deposits of $100 million, with 10 equity owners who each put up $1 million. The banks average cost of funds—the interest it pays on its deposits—average 3%. So it pays out $3 million. It collects an average of 5% per loan, so it collects $5 million. Its profit, $2 million, is split between its 10 equity investors, each collecting $200,000 as the bank’s return on equity is 20%.

<table>
<thead>
<tr>
<th>BANK A (millions)</th>
<th>assets</th>
<th>liabilities</th>
</tr>
</thead>
<tbody>
<tr>
<td>cash</td>
<td>$10</td>
<td>deposits $100</td>
</tr>
<tr>
<td>loans</td>
<td>$100</td>
<td>capital $10</td>
</tr>
<tr>
<td>total</td>
<td>$110</td>
<td>total $110</td>
</tr>
</tbody>
</table>

Bank B chooses a higher leverage strategy. By issuing only $5 million in equity, it splits the same $2 million in profits and each owner gets $400,000, for a 40% return on equity. Capital requirements, this painfully simple example reminds us, limit ROE for banks—that is, if the world works out according to expectation.

<table>
<thead>
<tr>
<th>BANK B (millions)</th>
<th>assets</th>
<th>liabilities</th>
</tr>
</thead>
<tbody>
<tr>
<td>cash</td>
<td>$5</td>
<td>deposits $100</td>
</tr>
<tr>
<td>loans</td>
<td>$100</td>
<td>capital $5</td>
</tr>
<tr>
<td>total</td>
<td>$105</td>
<td>total $105</td>
</tr>
</tbody>
</table>
The Basel Capital Requirements, ostensibly, were designed to assure that banks would have adequate reserves against unanticipated loan losses. But their design allowed bankers, through the use of securitized products, to end run desired reserve increases. Stated reserves rose. Properly measured reserves fell.

\[
\text{Basel Capital Ratio} = \frac{\text{Capital (tier 1 and tier 2)}}{\text{(assets [weighted by credit risk] + credit risk equivalents)}}
\]

Numerator: 50%, tier 1 capital was equity; 50%, tier 2 capital was convertible bonds…

Denominator: Assets were added up on a risk weighted basis—the riskier the asset the more capital required. The Basel Committee assigned risk weights to asset classes:
- No Risk: cash, gold, OECD government bonds
- 20% Risk: AAA or AA rated bonds or asset backed securities
- 50% Risk: Mortgage Loans
- 100% Risk: Loans to companies, bonds rates A or lower

Consider now, how a traditional bank would operate. They originate and keep mortgages. The mortgages on their balance sheet are 50% risk assets, so if they have $5 million capital with $100 million in mortgage loans, according to BIS standards they are well capitalized with a 10% risk based capital ratio.

<table>
<thead>
<tr>
<th>Oldtime Bank (millions)</th>
<th>assets</th>
<th>liabilities</th>
</tr>
</thead>
<tbody>
<tr>
<td>cash</td>
<td>$5</td>
<td>deposits</td>
</tr>
<tr>
<td>mortgages</td>
<td>$100</td>
<td>capital</td>
</tr>
<tr>
<td>total</td>
<td>$105</td>
<td>total</td>
</tr>
</tbody>
</table>

Now consider the magic of mortgage backed product, the slicing and dicing of mortgages and the rocket science models that let very risky—read Hanna inspired—mortgages appear on bank balance sheets as AAA, and therefore low risk/low capital need assets.

Collateralized debt obligations, CDOs, were created from bundles of whole mortgages. These securities were broken up into tranches. A stylized CDO is presented below.

<table>
<thead>
<tr>
<th>Subprime ABS</th>
<th>AAA</th>
</tr>
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<tbody>
<tr>
<td>A tranche</td>
<td>top 25%</td>
</tr>
<tr>
<td>B tranche</td>
<td>next 25%</td>
</tr>
<tr>
<td>C tranche</td>
<td>next 25%</td>
</tr>
<tr>
<td>D tranche</td>
<td>Equity</td>
</tr>
<tr>
<td></td>
<td>B rated</td>
</tr>
<tr>
<td></td>
<td>stub</td>
</tr>
</tbody>
</table>
The tranches were designed to separate out the winning mortgages from the deadbeats. If 25% of the mortgages failed, the entire loss associated with that 25%, would be absorbed by the equity holder—the D tranche. If 50% of the mortgages defaulted, the C tranche would absorb the next 25% of failed mortgages.

The A tranche, in this construct, would collect 100 cents on the dollar, if only 25% of the mortgaged properties paid off their loans. Over the 60 years of national data available to Moody’s and S&P there had never been a period where even 15% of mortgages failed. So they felt justified in labeling the A tranche triple A and the B tranche double A.

Now let’s return to the bank. The banker can now sell his whole loans—in the example below we have him sell half of the loan portfolio. He then increases his deposit base and buys twice as many ABS securities with AAA and AA ratings. He can do this of course, because the BIS capital requirements for AAA and AA ABS are less than half the reserves needed for whole mortgage loans.

Recall that he needs 50% capital on his whole loans—that amounts to $2.5 million on his $50 million. He only needs 20% capital on his AAA and AA assets, which translates to $2 million on his $100 million in Subprime backed ABS. According to BIS standards the bank has 11% risk weighted capital reserves ($5 million/$45 million).

<table>
<thead>
<tr>
<th></th>
<th>BIS/ABS bank (millions)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>cash</td>
<td>$5</td>
<td></td>
</tr>
<tr>
<td>mortgages</td>
<td>$50</td>
<td></td>
</tr>
<tr>
<td>ABS</td>
<td>$100</td>
<td></td>
</tr>
<tr>
<td>total</td>
<td>$155</td>
<td></td>
</tr>
</tbody>
</table>

Let’s compare the two banks. Clearly, if the world works out BIS/ABS bank has a substantially higher ROE. The yield on the AAA and AA tranches are only modestly lower than the yield on the whole loans, a consequence of a belief in very low default rates. That said, Oldtime Bank has $ 5 million in reserves against $100 million in mortgages. BIS/ABS Bank has $5 million in reserves against $150 million of assets backed by mortgages. Clearly the system now has much HIGHER leverage, and much LOWER reserves against mortgages, in an absolute sense.

AIG also increased the leverage in the system. A unit of AIG got into the business of writing credit default swaps (CDS) for mortgages. This was insurance on mortgage instruments. AIG collected a fee and promised to make good on the mortgage loans, if the borrower defaulted. Because AIG had a triple A rating, their insurance allowed larger portions of the CDO tranches to secure AAA and AA ratings—after all, they were guaranteed by a AAA company.
Moreover, we happen to know that the subprime loans entered into in 2004-2007 were inspired by Hanna. That is to say, they were highly leveraged. So we now the banking system making a leveraged bet on loans that were highly leveraged in the first place.

Some Hedge Funds, not surprisingly, decided that they could outdo both Hanna AND her banker. Bear Stearns formed a super leveraged hedge fund that bought subprime ABS. They had only $1 in equity for every $50 of ABS they purchased. Think of the leverage that Hanna had, then think of owning $50 million in loans to hanna like borrowers, with only $1 million in equity. It was wildly profitable—for about two years. Minsky tells us that when a great deal of leverage is in place, small disappointments can have disastrous consequences. The leverage in place by 2007, had no parallel in modern day economic history.

**End Running Regulation: The Shadow Banking System**

Traditional banks have access to ensured deposits and can borrow at the Fed window, thus the risks of a traditional bank run were greatly reduced in the aftermath of the Great Depression. The crisis that enveloped the U.S. and the world, 2007-2009, reflected to a great degree, the fact that much of the financing of residential real estate moved outside of normal banking channels. Two investment banks, Bear Stearns and Goldman Sachs, played a key role in effecting this transformation. Not surprisingly, both entities were wiped out in the panic of 2007-2008.

What was the seminal difference between normal banking and the efforts put forth by Bear Stearns and Lehman? Gorton and Metrick put it this way,

> Traditional banking is the business of making and holding loans with insured demand deposits as the main source of funds. Securitized banking is the business of packaging and reselling loans, with repo agreements as the main source of funds. (Securitized Banking and the Run on Repo, Yale and NBER)

In the three figures that follow, Gorton and Metrick, diagram essential differences between securitized banking and traditional banking. The key difference they identify? Lacking insurance protection, investors receive collateral from the bank, in the form of a ‘repo’ agreement.

> “The investor ‘buys’ some asset (i.e., the collateral) from the bank for $X and the bank agrees to repurchase the same asset some time later (perhaps the next day) for $Y. The percentage (Y-X)/X is the repo rate, and is analogous to the interest rate on a bank deposit. Typically, the total amount of the deposit will be some amount less than the value of the underlying asset, with the difference called a “haircut”. For example, if an asset has a market value of $100 and a bank sells it for $80 with an agreement to repurchase it for $88, then we would say that the repo rate is 10% (=88-80/80) and the haircut is 20% (100-80/100). If the bank defaults on the promise to repurchase the collateral, then the investor has the right to terminate the agreement and keep or sell the collateral.”
Figure 1: Traditional Banking

Figure 2: Securitized Banking
The two keys to being a bank are borrowing short/lending long and having very high debt to equity ratios (using substantial leverage). The shadow banking system did both in spades.

The Bear Stearns Hedge Fund Goes Belly Up

Since leverage drove success, 1990-2005, aggressive leverage promised BIG success. Recall that Hanna had a highly leveraged position in her home. A Bear Stearns hedge fund was created that bought 1000s of mortgage backed product, ultimately tied to people like Hanna, using 30 to 1 leverage. In other words, they borrowed $3 billion from investment banks and insurance companies, to leverage the $100 million of equity that they had. The ‘healthy’ spread between their cost of funds and the rates they collected from their MBS made this a very lucrative fund to be in—until it collapsed.

How did the hedge fund borrow? Much of its borrowing occurred in the ‘repo’ market. The fund would ‘lend’ it MBS to a bank, investment bank, or insurance company, for cash, for a very short period. It would pledge to buy it back at a somewhat lower price. As noted above, the investors (lenders) lent somewhat less than the full value of the underlying security—they imposed a ‘haircut’ on the value.

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**Figure 3: Traditional Banking vs. Securitized Banking**

<table>
<thead>
<tr>
<th>Traditional Banking</th>
<th>Securitized Banking</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Reserves</td>
<td>(1) Haircuts</td>
</tr>
<tr>
<td>- Minimum levels set by</td>
<td>- Minimum levels set by counterparties:</td>
</tr>
<tr>
<td>by regulators.</td>
<td>- No borrowing from central bank.</td>
</tr>
<tr>
<td>(2) Deposit Insurance</td>
<td>(2) Collateral</td>
</tr>
<tr>
<td>- Guaranteed by the</td>
<td>- Cash, treasury securities, loans,</td>
</tr>
<tr>
<td>government</td>
<td>securitized bonds</td>
</tr>
<tr>
<td>(3) Interest Rates on</td>
<td>(3) Repo Rates</td>
</tr>
<tr>
<td>Deposits</td>
<td>- Can be raised to attract</td>
</tr>
<tr>
<td>- Can be raised to</td>
<td>counterparties when funds are low.</td>
</tr>
<tr>
<td>attract deposits when</td>
<td>(4) Loans Securitized</td>
</tr>
<tr>
<td>reserves are low.</td>
<td>- Some securitized bonds may be</td>
</tr>
<tr>
<td>(4) Loans Held on</td>
<td>kept on balance sheet used as</td>
</tr>
<tr>
<td>Balance Sheet</td>
<td>collateral.</td>
</tr>
</tbody>
</table>
Through early 2005, two things were true. Repo rates were relatively low, reflecting the low fed funds rate. Haircuts were nearly non-existent, owing to the fact that most sub-prime MBS had been repackaged and awarded AAA or AA status. By early 2007, however, things began to change. Repo rates rose, in step with the rising fed funds rate. And news began to spread about the true state of affairs for many Hanna like borrowers. Suddenly, the ratings on sub-prime MBS lost their power to bamboozle. And soon thereafter, the Bear Stearns hedge fund faced an insurmountable problem. Their financiers began to impose big haircuts on their assets. Recall this fund had 30 to 1 leverage. Simply imposing a 10% haircut was a disaster for the fund. Funding on 90% of their assets would provide them with $2.7 billion. With $100 million in equity they’d be $200 million short.

What to do? In ‘normal times’ you simply sell assets and shrink your balance sheet. But amid a bubble gone bad, your ability to sell questionable assets is all but gone. And to the extent you try to sell, you drive down the transaction prices for these newly unwanted assets, which, in turn causes your financiers to impose stricter haircuts. An adverse feedback loop has gone into play.

**Bear Stearns Goes Belly Up**

Very rapidly it became clear that this super leveraged hedge fund bet on super leveraged Hanna/Ponzi financed housing could neither repo nor long term sell its assets. It went bankrupt and Bear Stearns ‘absorbed’ the funds and promised to make good on the losses.

As a large manufacturer of these products themselves, Bear Stearns had its own cache of sub-prime MBS. Soon enough, they found themselves in the same place as their hedge fund. They were unable to fund their book as the market lost confidence in them. The Fed swooped in, had someone absorb their assets, allowed their equity to collapse to almost zero, and the world, for at time, moved on.

**We Establish the Bear Stearns Precedent**

Many market participants believed that the Fed had revealed a strategy to deal with potential other severely impaired financial companies tied to the bursting housing bubble. Take over the firm. Fire all its employees, drive equity to roughly zero. In combination, these steps were perceived as sufficiently onerous to avoid ‘moral hazard’ associated with a government bailout. Conversely, all liabilities above equity, in the Bear Stearns bail-out, were honored in full. Thus ‘lender of last resort’ seemed now to mean lend to honor all but equity for investment banks as well as banks. Thi step made sense to most market players precisely because they knew that putting debt obligations into a bankruptcy proceeding, given the extraordinary interaction between institutions, would almost certainly bring the whole system down.
Lehman Starts to Look Like Bear Stearns

The Powers Meet, The Deal Sours, Lehman Declares Bankruptcy

A Modern Day Bank Run in the Repo Market

Financial Markets Collapse: Implied Defaults Exceed Depression Era Bankruptcy Levels

The Mad Dash For Cash By Main Street CEOS/CFOs Drives Real Economy Into Free Fall

Commercial paper market shuts down. Bank backstop lending is called into question. To hoard cash, there is a breath taking surge in firing and order cancellation.

Hank Paulson Just Says No To Free Market Rhetoric: The $700 Billion TARP

Obama Team Debates: In the End Says No to Mark-to-mayhem and bank nationalization

Overwhelming Force Is Deployed: The Alphabet Soup Goes After Collapsed Markets

The Alphabet Soup Triumphs? The Markets Rally Furiously