

Lessons from the Global Financial Crisis (Or Why Capital Structure Is Too Important to Be Left to Regulation)

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The worldwide financial markets and the global economy have suffered from a financial crisis on a scale not experienced since the 1930s. But the crisis now appears to be over. Credit spreads have returned to more normal levels, activity in credit markets has recovered strongly, and the volatility of day-to-day movements in share prices has declined. Moreover, the recovery of the global economy, of which the U.S. is such an important part, now appears strong enough to suggest that the recession of 2008-9 may turn out to have been a mild one of short duration. The IMF is forecasting global growth of 4% in 2011 after recording a marginal decline of about 1% in 2009, and thus the global financial crisis does not appear to have led to an economic crisis.

But if the credit markets have recovered their appetite for risk-bearing, the same cannot be said of U.S. banks. As can be seen in Figure 1, the money supply has continued to trend lower for much of the past year, and bank credit growth has turned negative. Moreover, U.S. banks continue to hold extraordinarily large volumes of cash reserves in excess of their regulated reserve requirements. Estimated at over \$1 trillion dollars, today's excess bank reserves are on a scale that exceeds those held by U.S. banks during the 1930s. In the '30s, of course, many banks were struggling—and failing—to prevent themselves from going under. The huge reserves of U.S. banks today almost certainly reflect their reluctance to lend for fear of having too little capital to cover the realized and potential losses on their lending books.

One immediate goal of U.S. policymakers has been to encourage U.S. banks to become more willing to use their excess cash and extend more credit for the sake of the economy. A critical difference between now and the 1930s is that today's Fed does not regard the demand for excess reserves as a case for tightening monetary policy. After the market crash of 1929, the increase in excess bank reserves was mistakenly interpreted by the Fed as a sign of excessive monetary policy ease. But the correct interpretation, then as now, was that banks in their understandable anxiety to survive the crisis had increased their demand to hold cash reserves. And then as likely now, the excess reserves were not a signal of accelerating money supply growth and inflation to come.

But if the current state of the banking industry in the U.S. offers little cause for comfort, the comparison with money supply and economic trends in the '30s is much more favorable. The money supply and the economy have held up very much better through this crisis. The decline in the money supply in the '30s represented the failure of monetary policy of the time. It contributed significantly to the extraordinary collapse of the economy between 1929 and 1933. By 1933 the money stock had declined by 33% and National Income (in prices of the day) had fallen by half. With prices also falling significantly during that period, real income fell by a devastating 30% between 1929 and 1933.

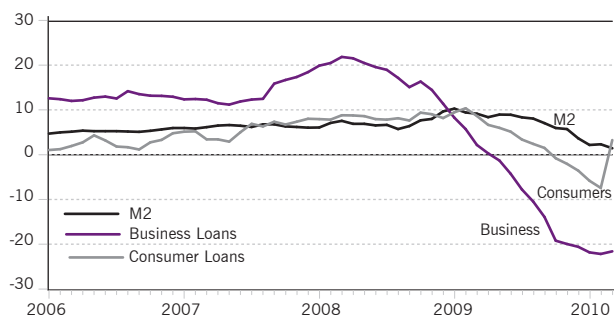
The hoped-for transition by the banking system to normal demands for reserves over the next few years will have to be closely monitored by the Fed. As Fed Chairman Ben Bernanke is well aware, excess reserves can lead to excess supplies of the broadly defined money supply, with the usual inflationary consequences. The question in this case will not be about the relevant monetary theory, but the effective practice of monetary policy.

The failure of the Fed to prevent a dramatic decline in the money supply in the 1930s has been the subject of intensive analysis by Milton Friedman, Anna Schwartz, and Allan Meltzer, among many others. Friedman and Meltzer are among the foremost monetarists who have argued that the Fed singularly failed in what they regard as its primary duty to maintain consistent growth in the money supply in line with the growth potential of the economy. In the words of Friedman and Schwartz,

The monetary collapse was not the inescapable consequence of other forces, but rather a largely independent factor which exerted a powerful influence on the course of events. The failure of the Federal Reserve System to prevent the collapse reflected not the impotence of monetary policy but rather the particular policies followed by the monetary authorities and, in smaller degree, the particular monetary arrangements in existence.... [D]ifferent and feasible actions by the monetary authorities could have prevented the decline in the stock of money – indeed, could have produced almost any desired increase in the money stock.¹

1. Milton Friedman and Anna Jacobson Schwartz, *A Monetary History of the United States 1867-1960*, (NBER, Princeton University Press, Princeton, 1963).

Figure 1 U.S. Money Supply and Bank Credit Growth



Source: Federal Reserve Bank of St Louis and Investec.

Allan Meltzer, writing later in his monumental history of the Fed, came to the conclusion that the Fed was not misinformed but rather misguided in its belief in the “real bills doctrine,” broadly speaking the idea that the Fed could not do wrong provided it discounted only bills that originated in real economic activity. The Fed governors in the ’30s took the view that the Fed in the 1920s had strayed from this path and so encouraged speculative excesses. The goal of monetary policy in the ’30s was therefore thought to be to accommodate the requirements of the real economy, without becoming an independent force designed to stimulate economic activity. As Meltzer wrote,

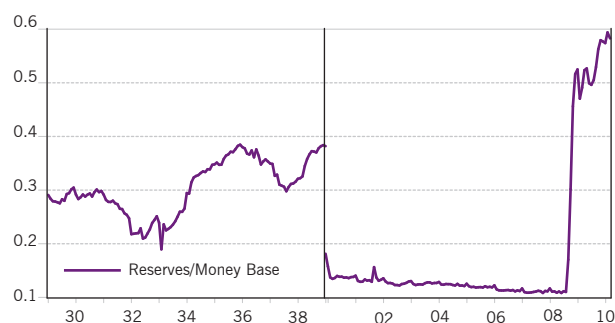
There is no doubt that early in the decline the Federal Reserve knew a major contraction was under way. Whatever its causes, monetary policy could have lessened the decline. At issue here is why it failed to do so.

...The main reason for the failure of monetary in the depression was the reliance on an inappropriate set of beliefs about speculative excesses and real bills....³

Another influential observer of Fed action in the 1930s, current Fed Chairman Bernanke, came to a very similar conclusion about the failure of the Fed and the reasons for it—namely, the Fed’s mistaken belief that the system had to be purged of its excesses. As he said in a recent speech,

After the stock market crash of 1929, many thought a financial and economic crisis was necessary—even desirable—to wring out speculative excesses that had been built up in the 1920s. Remarkably, despite the fact that the Federal Reserve had been founded to mitigate financial panics, the central bank made

Figure 2 U.S. Ratio of Bank Reserves to Money Base²



Source: Federal Reserve Bank of St Louis and Investec.

essentially no effort to prevent the wave of bank failures that paralysed the financial system at the start of the 1930s. Indeed the Treasury Secretary at the time, Andrew Mellon, believed in the tonic effects of weeding out weak banks and famously advised President Herbert Hoover, “Liquidate labor, liquidate stocks, liquidate the farmers, liquidate real estate ... it will purge the rottenness out of the system.”⁴

The blood-letting of that time nearly killed the patient. But the experience has had a profound influence on public attitudes to banking and the financial system since then, making them much more receptive to the possibility of intervention thereafter. And it now seems clear that the lessons from the 1930s were to prove very helpful in managing the GFC of 2008-09. There is no doubt that the U.S. has benefited from having a monetary historian at the helm of the Fed in this time of crisis.

Lessons from the London Money Market on the Role of the Lender of Last Resort

Allan Meltzer has also pointed that out that the senior officials of the Fed of the time chose to ignore the lessons from 19th-century London that were drawn so eloquently by Walter Bagehot, the editor of the *Economist* magazine, in his classic book *Lombard Street: A Description of the Money Market*.⁵ Bagehot’s thoughts were highly influential in the theory and practice of central banking, but not at the Fed in the 1930s, though, as Meltzer points out, the Fed leadership would have been well aware of Bagehot’s book and the thinking behind it.

Bagehot was very clear about what he regarded as the responsibility of the *de facto* central bank of England, the

2. The ratio of Total Bank Reserves to the Money Base (adjusted for Reserve Requirements as reported by the Federal Reserve Bank of St Louis. The two series are Adjusted Reserves (ADJRESNS) and the Money Base (Adjusted for Reserve Requirements (AMBNS)).

3. Allan H. Meltzer, *A History of the Federal Reserve, Vol 1 1913-1951* (University of Chicago Press, Chicago and London, 2003, pp. 271 and 282).

4. Ben Bernanke, “Economic Policy; Lessons from History,” Speech April 8, Federal Reserve System.

5. Walter Bagehot, *Lombard Street, A Description of the Money Market*, London John Murray, 1920 First Edition (Kegan, Paul and Company. 1873)

privately owned Bank of England, to the monetary system. As the banker's bank holding the cash reserves of other banks on deposit, the Bank of England held the ultimate reserve of cash. Its duty, as Bagehot argued, was to lend very freely against commercial bills and other securities that would be regarded as of very low risk of default in normal times, when other lenders had become too scared to do so:

.....whatever bank or banks keep the ultimate banking reserve of the country must lend that reserve most freely in times of apprehension. (p. 63)

Lombard Street was an attempt to bring the existing theory of the time about the proper reaction of the Bank of England to periodic financial panics in line with the actual practices that had been so helpful in alleviating crises of liquidity:

The practice of the Bank has, as we all know has been much and greatly approved. They do not now manage like the other banks in Lombard Street. They keep an altogether different kind and quantity of reserve; but though the practice is mended the theory is not. (37-8)

Bagehot was very proud of the achievements of Lombard Street in mobilizing capital or, as he put it, turning what in other countries would have been "idle" money into "borrowable funds" put to productive uses. Consider, for example, the following statement, which appears as relevant to today's conditions as it must have seemed to market participants during the series of financial crises during the 19th century:

We have entirely lost the idea that any undertaking likely to pay, and seen to be likely, can perish for want of money; yet no idea was more familiar to our ancestors, or is more common now in most countries... (6-7)

Moreover, Bagehot was not at all confident about the self-correcting capabilities of the London money market. Periodic liquidity crises stemming from a variety of causes, including a succession of poor harvests, could undermine what was understood to be a "delicate" structure. Indeed, he expected a crisis every ten years or so after some bank had proved to have lent poorly and undermined the confidence on which the system depended. What was important for Bagehot, then, was appropriate management of more or less inevitable crises through timely intervention by the Bank of England in making available its reserve of cash on sympathetic terms. In Bagehot's words, "...money will not manage itself; and Lombard Street has a great deal of money to manage."

Modern free banking, independent of central bank intervention, of the kind advocated by Friederich von Hayek, among others, would be an experiment for which 19th-century banking in England provides some salutary lessons. It is,

moreover, not an experiment likely to be conducted any time soon. In company with the great pioneering monetarists cited here, Friedman and Meltzer, we would argue instead for better central banking in the form of effective management of the money supply. The money supply should, according to monetarist propositions, be regarded as an objective of monetary policy somewhat independently of interest rate settings. Interest rates and free reserves can provide misleading signals about the thrust of monetary policy. Control over the money supply and targeting its growth, as recommended by monetarists, is a form of intervention in and regulation of the financial system and the banks. It is arguably the only intervention in the system that should be supported.

It seems to these observers that Walter Bagehot would have approved enthusiastically of the attempts by Bernanke's Fed to add liquidity to the credit markets in New York and elsewhere in all its variety. But we are not as certain that he would have approved of the direct injection by the government of capital into the banks. His idea was that the central bank would provide liquidity to the financial markets that were in danger of free fall from want of liquidity and the forced sales of ordinarily good securities by otherwise sound banks, thereby forcing their prices ever lower and their yields ever higher. Such support in the form of abundant liquidity would in Bagehot's view prevent contagion but might not necessarily save a bank that had not managed its lending prudently.

The issue of too big to fail would not have occurred to Bagehot, nor would he have been concerned about the moral hazards of expected support for the money market in an unfolding crisis. But in the 21st century, it is not clear that the authorities should assist the system with injections of capital into banks that have been weakened by poor lending decisions.

One common justification for such capital injections is that Chapter 11 is widely believed to be poorly suited for financial institutions. Bankruptcy law, like all forms of law, is also a form of regulation of market forces. Credit is more readily provided when potential lenders are confident that the assets of a failed business will be fairly and rapidly shared out amongst creditors. More effective procedures for winding down failed banks or financial institutions, to the extent they encourage risk-taking in financial markets and stimulate economic growth, would represent a "positive economic externality." How this is best done is worthy of careful analysis and discussion, informed as it should be by the recent crisis. There may well be a useful role for government agencies in the winding down of financial institutions

But, as many economists have argued, if banks in the future are unable to raise capital from the marketplace to secure their survival, then perhaps they should be allowed to fail, regardless of how large they have become. Preventing banks from being too big to fail may well prevent the system

from evolving efficiently. The antithesis of *too big too fail* is *too small to succeed*. And to the extent there are economies of scale and scope in banking, regulations designed expressly to limit the size and activities of banks could end up reducing the efficiency and competitiveness of a nation's financial system. More important, regulations that depress the prospects for a revival of profitable lending and other banking activity regulation may make it more difficult for financial businesses to raise the additional capital that could secure their survival during a financial crisis or prevent such a crisis occurring. We return to this important issue below.

The traditional lender-of-last-resort functions exercised by central banks and practiced by the present-day Fed might be sufficient to protect the system against contagion and crisis. But financial institutions, in order to survive, would be forced to ensure their own capital adequacy through the marketplace. If they are unable to do this, because they have mismanaged the timing of their capital structures and capital-raising exercises—and as a consequence are judged by the market as unable to do better in the future even if given more capital to invest—they should be allowed to fail so that other stronger institutions can gain the deserved market share.

In our own recent work on the capital adequacy of financial institutions during the crisis—work that we review below—we find evidence that suggests that much of the capital infused by government agencies into possibly failing financial institutions may not in fact have been necessary to prevent financial contagion and a breakdown of the system. Based on that work, we argue that the all-important task of the central bank is to keep credit markets and, as important, equity markets functioning normally, so that potentially sound institutions can go to market to replenish their capital and survive. The terms on which such capital will be made available in adverse circumstances may be considered unattractive, but they should be judged irresistible by their own shareholders.

The findings of our work could also be viewed as undermining the case for regulating financial markets through tougher capital adequacy requirements by demonstrating that the capital that matters is not accounting or *book* capital, but rather the market value of equity capital. The capital that stands between business success and failure is the market value of a company's equity. Regulating the book value of the capital that banks are forced to hold is very likely to mean that banks will have too much capital in ordinary times and too little in times of crisis. Nor should we trust that meeting regulatory requirements will always be enough to allow a financial institution to survive a crisis. A financial institution and its management have every reason and incentive to make sure it always has enough capital. The task for central banks is to ensure that the capital markets remain open for capital-

raising at all times, but especially when a crisis threatens or has broken.

Learning from the Crisis

The fundamental source of the crisis can be identified easily enough as the rise and fall of the U.S. real estate market. The total value of American homes is estimated to have fallen by about 33% from its peak value of \$22.8 trillion in 2006 to \$16.6 trillion at the end of 2009. U.S. mortgage write offs to date have been estimated by the IMF to be \$588 billion, with estimates of global mortgage-related losses now running at \$2.3 trillion. In 2009 real estate was estimated to account for 24.3% of all U.S. household assets and 73.3% of all household liabilities. The share of equity in homes has declined from over 50% of the value in 2006 to about 37% now.⁶ Shocks of this size to the all-important U.S. housing market were bound to bring on a crisis, regardless of how mortgage debt was sliced and diced in the marketplace.

But, of course, the crisis of falling house prices and failed mortgages could not have happened had prices not risen as much as they did earlier. And while the availability and terms of mortgage debt surely contributed to the price appreciation that preceded the collapse and made it possible, responsibility for what now looks like a housing bubble should be laid at the feet of not only the bankers who originated and distributed the mortgages, but the government-sponsored mortgage lenders Fannie and Freddie and the regulators who were supposed to oversee the process.

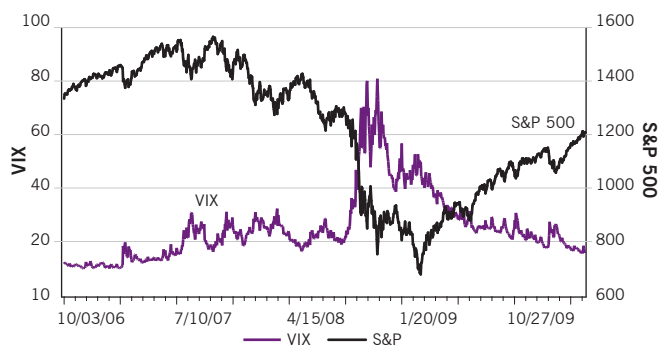
But let's confine our attention to the banks. Under Basel II, which was introduced in the 1990s, banks were regulated in new, apparently improved ways, with an emphasis on ensuring that they held enough capital for the risks they were assumed to be running. The problem, however, was that under Basel II, mortgage lending was assumed to be a much lower-risk activity than it proved to be. Basel III is now in the pipeline and will demand of the banks much more of what is assumed to be state-of-the-art capital adequacy and risk management requirements that extend to off-balance sheet activity.

That the cure for every problem with regulation is more regulation seems almost inevitable, given the climate of opinion about the lack of confidence in the self-regulating capacity of financial markets and indeed markets in general. But for students of financial markets and regulation, the idea that regulation can prevent a future financial crisis may itself be a major source of mischief. In our judgment, it would be wrong to blame the crisis on the failures of regulation. The crisis was a market failure, but it was nevertheless a market failure that no conceivable regulation could have averted.

And thus perhaps the most important lesson from the crisis is that periodic financial market failure should be regarded as not only distinctly possible, but expected and planned for.

6. Federal Reserve System. Flow of Funds Data

Figure 3 Share prices (S&P 500) and Their Volatility (Vix) (Daily Data 2006–2010)



Source: Bloomberg and Investec

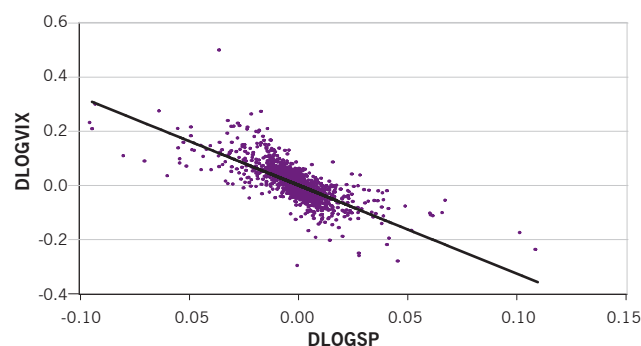
That was Bagehot's understanding. But, as he also argued, the understandable fear of a crisis should not be allowed to stand in the way of encouraging the financial markets to consistently mobilize capital, as best they know how, to the great advantage of the real economy. The issue for Bagehot, as it should be for us today, is how best to deal with a financial crisis *when* it occurs. For central banks to be able to exercise the power to print money and exchange it for good securities that would otherwise have to be dumped on the market, with highly infectious consequences, seems as important today as it has ever been.

In the pages that follow, we provide evidence that many of the leading financial houses could have survived the crisis on their own merits and without the TARP money that some were obliged to accept. But, as with all economic history, it will not be possible to “air brush” out TARP and its influence. The counterfactual of what would have happened without TARP money (most of which has been paid back to the taxpayer with interest and more) will be decided by debate, not science. Furthermore the lessons of the crisis for true capital adequacy and good management of capital structures may well prove a permanent one.

Perhaps the most striking feature of the crisis has been the extreme behaviour of the credit and equity markets. As illustrated in Figure 3, the markets went sharply south and volatility went as sharply north.

This negative relationship between share prices and volatility might be regarded as counter-intuitive by those trained in option pricing theory. A share is an option on the assets of the company and if asset volatility increases, these options are potentially worth more, other things being equal. But other things are clearly not equal in this case, since the increased volatility also reflects, to some extent, an increase

Figure 4 A Scatter Plot—Daily Moves in the S&P 500 (Dlogsp) and Daily Moves in the Vix (Dlogvix) (Correlation -0.73)



Source: Bloomberg and Investec

in the credit risk of financial (and other highly leveraged) companies. And as the value of the assets of such companies approach the “barrier of solvency,” both the declines and increased volatility of equity prices can be seen as contributing further to increases in the perceived default risk of such companies. The effect of the decline in share prices is to raise the leverage of the company—that is, the ratio of its debt to the market value of its equities will have risen making the company more likely to default. Or rather less likely to be able to replenish equity capital by calling on the stock market.

Milliken and the Issue

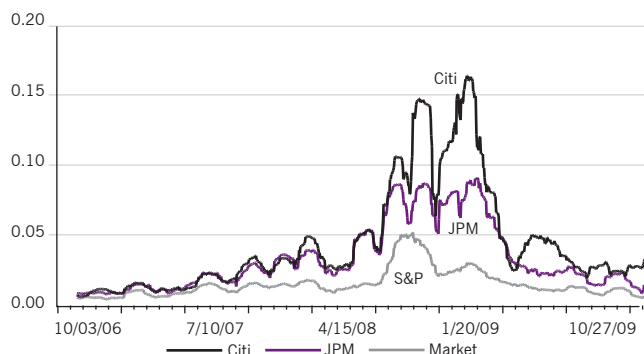
In a *Wall Street Journal* article published in 2009,⁷ Michael Milken described the possible valuation effects of leveraged capital structures, and by implication the importance of capital structure management, as follows:

The late Nobel laureate Merton Miller and I, although good friends, long debated whether this kind of capital-structure management is an essential job of corporate leaders. Miller believed that capital structure was not important in valuing a company's securities or the risk of investing in them. My belief—first stated 40 years ago in a graduate thesis and later confirmed by experience—is that capital structure significantly affects both value and risk. The optimal capital structure evolves constantly, and successful corporate leaders must constantly consider six factors—the company and its management, industry dynamics, the state of capital markets, the economy, government regulation and social trends. When these six factors indicate rising business risk, even a dollar of debt may be too much for some companies.

Over the past four decades, many companies have struggled with the wrong capital structures. During cycles of credit expan-

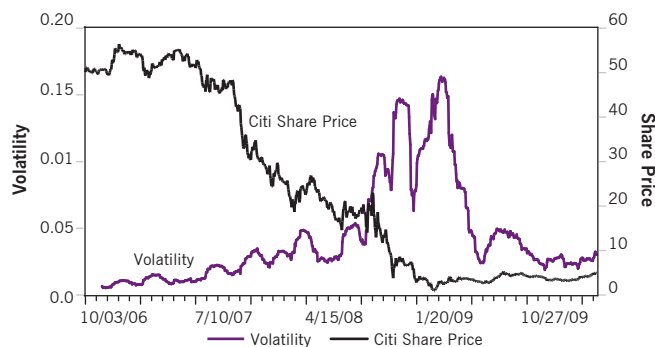
7. Michael R Milken, “Why Capital Structure Matters: Companies that repurchased stock two years ago are in a world of hurt,” *Wall Street Journal* April 21 2009

Figure 5 **Volatility Through the Crisis—Market (S&P 500), Citi and JPM Daily Data 2006–2010.**



Note: Volatility measured as the 30-day rolling moving average of the Standard Deviation of Daily Price Moves.
Source; Bloomberg and Investec

Figure 6 **Citi—Volatility Up, Share Price Down**



Note: Volatility measured as the 30-day rolling moving average of the Standard Deviation of Daily Price Moves.
Source; Bloomberg and Investec

sion, companies have often failed to build enough liquidity to survive the inevitable contractions. Especially vulnerable are enterprises with unpredictable revenue streams that end up with too much debt during business slowdowns. It happened 40 years ago, it happened 20 years ago, and it's happening again. Overleveraging in many industries—especially airlines, aerospace and technology—started in the late 1960s. As the perceived risk of investing in such businesses grew in the 1970s, the price at which their debt securities traded fell sharply. But by using the capital markets to deleverage—by paying off these securities at lower, discounted prices through tax-free exchanges of equity for debt, debt for debt, assets for debt and cash for debt—most companies avoided default and saved jobs. (Congress later imposed a tax on the difference between the tax basis of the debt and the discounted price at which it was retired.)

Issuing new equity can of course depress a stock's value in two ways: It increases the supply, thus lowering the price; and it "signals" that management thinks the stock price is high relative to its true value. Conversely, a company that repurchases some of its own stock signals an undervalued stock. Buying stock back, the theory goes, will reduce the supply and increase the price. Dozens of finance students have earned Ph.D.s by describing such signaling dynamics. But history has shown that both theories about lowering and raising stock prices are wrong with regard to deleveraging by companies that are seen as credit risks.

Two recent examples are Alcoa and Johnson Controls, each of which saw its stock price increase sharply after a new equity issue last month. This has happened repeatedly over the past 40 years. When a company uses the proceeds from issuance of stock or an equity-linked security to deleverage by paying off debt, the perception of credit risk declines, and the stock price generally rises.

The decision to increase or decrease leverage depends on market conditions and investors' receptivity to debt. The period

from the late-1970s to the mid-1980s generally favored debt financing. Then, in the late '80s, equity market values rose above the replacement costs of such balance-sheet assets as plants and equipment for the first time in 15 years. It was a signal to deleverage...

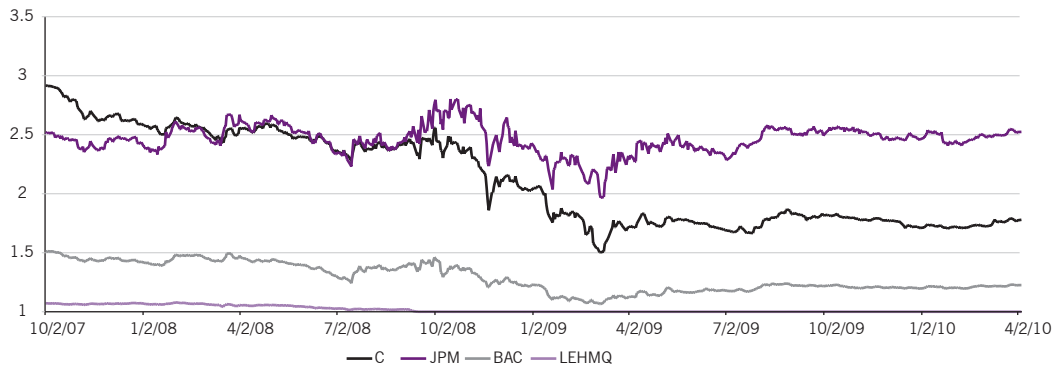
Capital structure decisions, as the GFC has made clear, are especially important for highly leveraged financial institutions. As shown in Figure 5, during the peaks of the crisis the volatility of Citi's stock price rose to a level that was almost twice the volatility of JP MorganChase's shares, which in turn was almost twice the peak volatility of the S&P 500. And in Figure 6, one can see Citi's stock price plummeting as its volatility rises.

The next step in our analysis was to show how their lower share prices reflected investors' perception that the value of assets of these financial institutions was close to their "solvency barriers". Without going into detail here, a solvency barrier is the minimum level of assets at which the market is assumed to be willing to provide the company with new equity. Once that level is pierced, no outside capital is assumed to be forthcoming, and the possibility of bankruptcy becomes highly likely. (See the appendix for a full explanation of this method, which stems from the option pricing work of Robert Merton.)

In Figure 7, we show the relationships of "inferred" asset values to the inferred solvency barrier for four financial institutions: Citi, Bank of America, Lehman Brothers, and JPMorganChase. What's clear from the figure is the extreme weakness of Lehman in this regard, certainly as compared to the positioning of JPMorgan and even Citi, which strengthened appreciably after the failure of Lehman in September 2008.

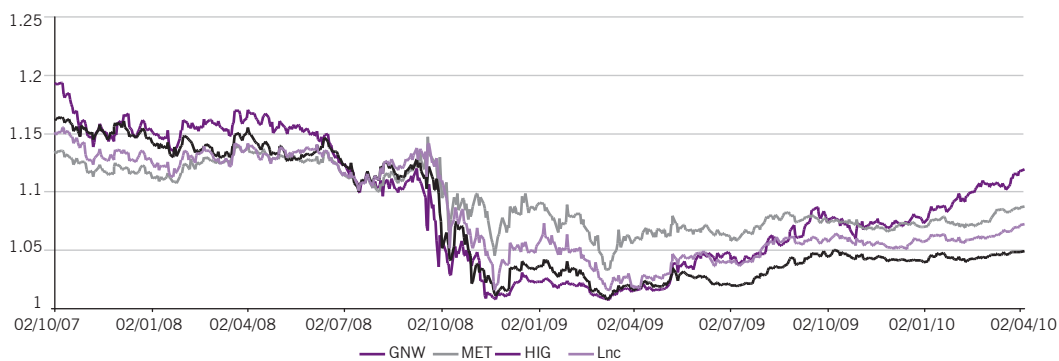
We have also calculated these ratios for a number of U.S. insurance companies. As can be seen in Figure 8, their

Figure 7 **Critical Ratios of Asset values to the Default Barrier—The Story of Four Banks**



Source: Bloomberg and Investec

Figure 8 **Ratios of Asset to Barrier Values—Life Insurance Under Threat**



Source: Bloomberg and Investec

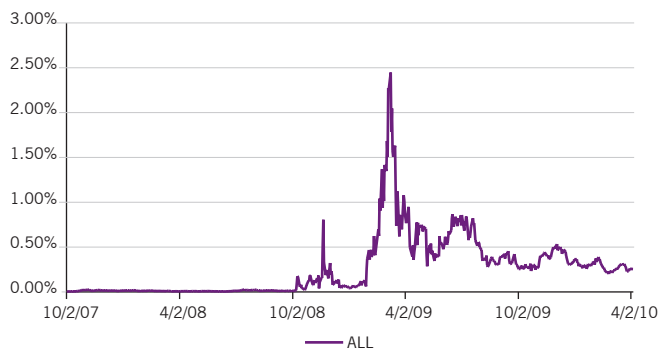
solvency ratios were generally lower than that of the banks to start with and deteriorated further approaching the terminal one at the height of the crisis. Insurance companies are particularly vulnerable to a financial crisis since they offer, in part, guaranteed returns to policy holders that are secured by financial securities. During a crisis, the value of their liabilities effectively goes up, as their guaranteed returns become more desirable (they are a put on the market), while the value of their assets (a call on the financial markets) deteriorates. Their ability to meet the claims that are expected to be made upon them becomes more doubtful, adding to the volatility of their share prices that brings them closer to their default barriers. The need for adequate capital, and perhaps capital-raising, is very obvious in these cases.

Using this analysis of asset values in relation to solvency barriers, it is also possible to measure the risk of default for any quoted company. We show the results of such calculations for four companies: AllState, JPMorganChase, Lehman Brothers and Metlife in Figures 9–13. The case of

Lehman is particularly instructive because it was allowed to fail. It is clear from our analysis that Lehman was always very undercapitalized, and in grave danger of default should the perceived value of its assets fall with an associated rapid drop in its share price and capital-raising ability—as, of course, eventually happened with disastrous consequences for its shareholders and creditors. But the actual outcome also suggests the promise of our analysis in that, just as Lehman’s estimated default risk is approaching 1.0, the company fails in all its efforts to raise new capital, whether from public or private sources.

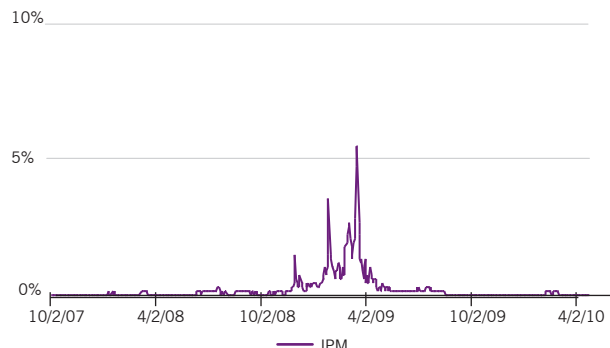
MetLife, a bank holding company that offers life and other insurance provided a shining example of how to manage through a financial crisis with the aid of the financial markets while resisting the offer of capital from the government. As can be seen in the Figure 13, the company managed to stay well above its “implied barrier” even during the depth of the crisis. The case of MetLife is especially instructive because the insurer refused Tarp money, having chosen to raise equity

Figure 9 **All State; Default Risk—From No Risk to Significant Risk and Back Again**



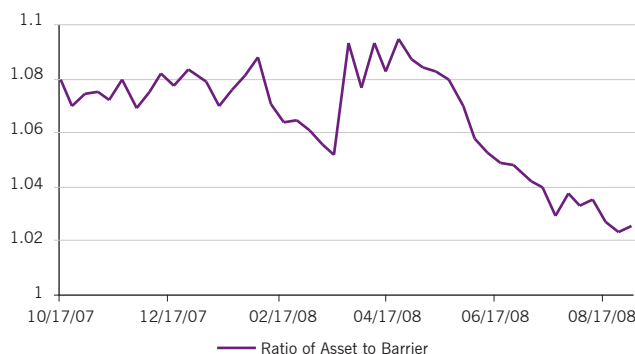
Source; Bloomberg and Investec

Figure 10 **Risk of Default JPMorgan—Demonstrating Strength**



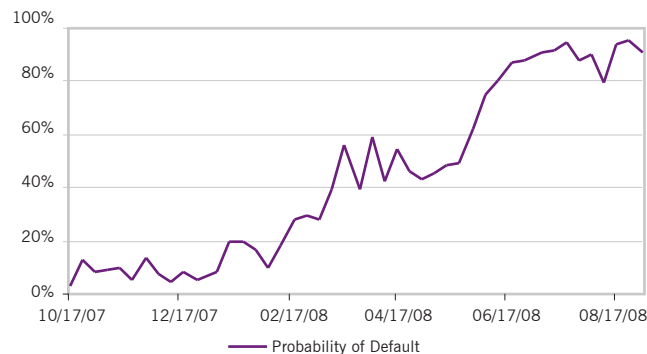
Source; Bloomberg and Investec

Figure 12 **Lehman; Ratio of Assets to Barrier**



Source; Bloomberg and Investec

Figure 13 **Lehman; Rolling Probability of Default⁸**



Source; Bloomberg and Investec

capital in the marketplace in the Fall of 2008. Indeed, the company made the following statement at the time:

NEW YORK--(BUSINESS WIRE)--Apr. 13, 2009--MetLife, Inc. (NYSE: MET) issued the following statement today in response to inquiries regarding its potential participation in the U.S. Department of the Treasury's Capital Purchase Program:

MetLife, which has been a federally chartered bank holding company since launching MetLife Bank, N.A. in 2001, has elected not to participate in the program.

"MetLife is well positioned, with approximately \$5 billion in excess capital, a strong balance sheet and leading market positions in our core group and individual insurance businesses, where

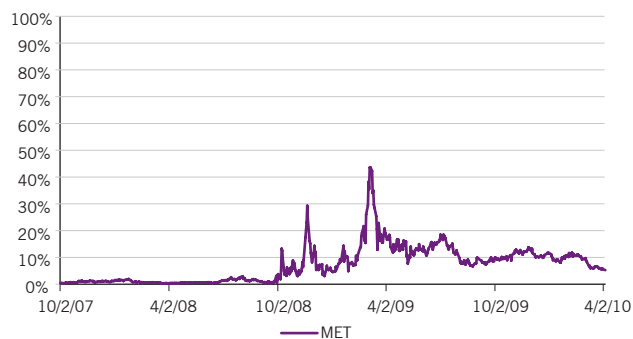
our revenues continue to be healthy," said C. Robert Henrikson, chairman, president and chief executive officer of MetLife, Inc. "MetLife has already taken actions to reinforce its strong financial position, including raising capital in the marketplace. We have therefore decided not to participate in the Program."

"Although a number of economic challenges remain, MetLife is well positioned to continue meeting the needs of our clients," added Henrikson. "We repositioned our investment portfolio over a year ago for the current recession; completed a successful \$2.3 billion common stock offering last October; and successfully remarketed over \$1 billion in debt earlier this year. We are confident that we have the financial strength to continue to succeed now and over the long-term."

"MetLife also confirmed today that, as a federally chartered bank holding company with more than \$100 billion in total

8. Forecast probabilities estimated using 12-month rolling windows. These estimates could have been estimated by observers at the time.

Figure 13 **Default Risk; the Case of MetLife—Estimating Risk of Default Within 12 Months.**



Source: Bloomberg and Investec

assets, the company is one of the top 19 U.S. banking organizations participating in the Treasury’s capital planning exercise being conducted under the department’s Capital Assistance Program. MetLife is working closely with the Federal Reserve on this exercise.”

Conclusion

We have outlined our reactions to the crisis and the lessons we think should guide monetary policy reactions to a crisis, or potential crisis, and the regulation of the system. The main regulation we approve of is the power given to central banks to add liquidity without limit to the financial markets when a crisis threatens. We also encourage improvements to bankruptcy law that would allow speedy resolution of the claims of creditors, though not to the point where they can ignore credit risk.

We have also tried to demonstrate why managing capital structures is too important to be left to the regulators. It is the primary function of the firm to manage its capital to avoid default. This should involve, among other things, paying very close attention to what the market is telling them about their capital adequacy. It also means adding capital or reducing liabilities in sufficient time to maintain the true solvency ratio or some equivalent metric. When companies are faced with the possibility of financial distress, raising equity capital can cause share prices to rise rather than fall when such capital-raising reduces perceived credit risks.

Of course, the shareholders being asked to supply the new capital would have to be convinced that is the case. And management would have the challenging task of convincing its shareholders that the timing of such a share issue was meant to preserve a basically sound and profitable enterprise (whose main liability is an excessively leveraged capital structure). The idea of contingent share capital—of

management’s effectively having a call upon its debtholders for additional equity without having to seek additional approvals from shareholders—is also appealing in this regard. In the days of Bagehot, “partly paid up” share capital could have served this contingent function—and a revival of this instrument might be called for. That is effectively what private equity does when distinguishing between “invested” capital actually raised and “committed” capital that may be called upon if necessary.

Capital management that is sensitive to the dangers inherent in leverage will work best when the capital markets themselves remain open, even if only at lower valuations for bonds and shares. It is the essential task of central banks to keep them open, a task that they performed with distinction through this crisis, thereby allowing financial firms to replenish their capital. Was TARP essential to this purpose? We will never know for sure. We know that many financial institutions were in no danger of default and strong enough to stand on their own capital adequacy through the crisis. We do not know, however, what would have happened to the system, how much contagion would have occurred, had TARP not been on offer to those that might otherwise have gone under.

Having a TARP on hand just in case is an acceptable precaution. But if financial institutions are offered infusions of capital from the government because of the danger of contagion, and no other capital is forthcoming, they should be taken over by the government and delisted without any value offered to existing shareholders. The institution can then be reorganized in a measured way so that it can subsequently auctioned off to the market with the value of its franchise protected to some valuable degree. It should be widely appreciated that it is the entire system, not the offending bank or banks, nor their shareholders or senior managers, that will have been bailed out—for the obvious benefit of the economy and all, including taxpayers, who depend upon it.

The question of what any pre-determined TARP-like fund would cost the taxpayer seems to be an entirely irrelevant consideration. It could be a large contingency item on the Federal balance sheet. The Fed should have the discretion to draw on this fund should it, in its wisdom, think it necessary to supplement its open market facility. The knowledge that such a fund is available would in all probability help avoid contagion in the first instance. But if it were to be drawn upon and the system thereby saved, the taxpayer, as with TARP to date, is bound to retrieve its investment with a profit as the system recovers.

And as for financial reform in the U.S., the lessons of the recent crisis suggest there is no alternative to relying on the judgment of a hopefully wise central bank to respond should another credit crisis occur. In the credit crisis of 2008-09 the Fed did what central banks are supposed to do.

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Appendix Estimating the Value of the Assets of Listed Companies and Measuring the Probability of Default

Robert Merton (1974) expressed the equity of a firm as a call option on the assets of the firm with a strike price equal to the liabilities. Subsequent work (see, for example, Brockman and Turtle (2003)) refined this approach by modelling equity as a down and out call option on the assets of the firm. The key difference between the two approaches is that a down and out option allows one to model the possibility of bankruptcy before the liabilities are due.

Shareholders will only be willing to invest in the shares of a company when they perceive that the assets of a firm exceed a minimum value. This we refer to as the "barrier" in line with the down and out call option framework. Should the market infer that the level of assets has dropped below this barrier, equity investors will be unwilling to provide further equity capital should the firm need it to pay of debts or to sustain operations and so the company faces bankruptcy. Wong and Choi (2009), adopting a similar approach, found that the barrier varies across both time and sectors. This barrier is typically lower than the book value of liabilities. Investors may be willing to invest in a company with a negative book net asset value given some probability the firm will recover.

We follow the approach of Wong and Choi (2009) and

Dionne and Laajimi (2009) and estimate the barrier and the market implied value of a firm assets within a maximum likelihood estimation framework. Following the assumption that assets follow a geometric Brownian motion, one can apply the formula for the value of a down and out call option for equity prices.

$$E_t = B(V_t, \sigma_a, H) \quad (1)$$

Where

E_t is the share price at time t

V_t is the value of assets at time t

σ_a is the volatility of the changes in asset values

H is the barrier

It is possible to invert the formula to determine the value of assets for a given E_t , σ_a , and H . Thus

$$V_t = B^{-1}(E_t, \sigma_a, H) \quad (2)$$

We use a time to maturity of 10 years. (Brockman and Turtle (2003) showed that the barrier level was largely insensitive to the choice of a time to maturity.)

It may be seen from the formula above that the implied asset values are sensitive to both the assumed volatility of asset prices and the barrier. Duan, Gauthier and Simonato (2004) provided a description of a method to simultaneously estimate

H , σ_a and μ , the growth of the unobserved assets using Maximum Likelihood Estimation (MLE).

The algorithm for finding the MLE estimates can be described in 4 steps (as per Hao (2005)).

1) Using equation (2) calculate the series of asset values for a share given an initial estimate for σ_a and H . Our initial estimate for σ_a is 0.1 and our initial estimate for the barrier is the liabilities per share of the company. These initial estimates are arbitrary and are only used to get the algorithm started.

2) Using the asset prices from the step above, calculate the MLE for μ , σ_a and H .

3) Given σ_a and H from step 2, redo step 1

4) Repeat until the likelihood converges (difference < 0.00001)

The optimization was implemented using the "optim" function in the "stats" package using the statistical program R. The optimization was completed using a Nelder Mead simplex.

We estimated the barriers and implied asset values for a number of US companies using daily data from 02 October 2007–21 April 2010. We demonstrate these results in the figures included in the main body of the report. We draw attention to the ratio of the value of the assets to the barrier.

Following Dionne and Laajimi (2009) we then calculated the probabilities of default as:

$$P(D) = N\left(\frac{-\ln(V/H) - \mu\tau}{\sigma\sqrt{\tau}}\right) + e^{-\frac{2\mu\ln(V/H)}{\sigma^2}} N\left(\frac{-\ln(V/H) + \mu\tau}{\sigma\sqrt{\tau}}\right)$$

A select few of these probabilities are presented. However this approach assumes that the barrier is constant over this time period. Thus the probabilities of default are calculated at each point using information that would not have been available at that time. As an alternative we could calculate the estimates of default using the previous 1 year of data and then rolling forward such estimates week by week. This then provides the probabilities of default as they could have been calculated at each time point with information available at the time.

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