An Analysis of the Financial Crisis of 2008: Causes and Solutions

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Abstract

This research evaluates the fundamental causes of the current financial crisis. Close financial analysis indicates that theoretical modeling based on unrealistic assumptions led to serious problems in mispricing in the massive unregulated market for credit default swaps that exploded upon catalytic rises in residential mortgage defaults. Recent academic research implies solutions to the crisis that are appraised to be far less costly than a bailout of investors who made poor financial decisions with respect to credit analysis. JEL: G11, G12, G13, G14

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The financial crisis in 2008 is of such epic proportions that even astronomical amounts spent to address the problem have so far been insufficient to resolve the it. Besides the well-publicized $700 billion approved by Congress, the Federal Reserve has attempted to bail out institutions and markets with about $1.3 trillion in investments in various risky assets, including loans to otherwise bankrupt institutions and collateralized debt obligations like those backed by subprime mortgages that are defaulting at rapid rates (Morris, 2008). A further $900 billion is being proposed in lending to large corporations (Aversa, 2008), making a total of nearly $3 trillion in bailout money so far, without even counting the massive sum of corporate debts guaranteed by the U.S. government in the last year. An analysis of the fundamental causes of this "colossal failure" that has put "the entire financial system… at risk" (Woellert and Kopecki, 2008) is warranted in order to both solve the problem and avoid such events in the future.

Root Cause of the Crisis: Mispricing in the Massive Credit Default Swaps Market

Many blame defaulting mortgages for the current financial crisis, but this massive tragedy is only a component and symptom of the deeper problem. The pricing of credit default swaps, whose principal amount has been estimated to be $55 by the Securities and Exchange Commission (SEC) and may actually exceed $60 trillion (or over 4 times the publicly traded corporate and mortgage U.S. debt they are supposed to insure), are totally unregulated, and have often been contracted over the phone without documentation

(Simon, 2008), is the primary fundamental issue from which all the other problems of the crisis emanate.

Credit default swaps are actually rather simple instruments in concept, merely mandating that one party paying a periodic fee to another to insure the debts of some entity (such as a specified corporation) against default for a particular amount of time like 5 years. They are effectively debt insurance policies that are labeled otherwise to avoid the regulation that normally is imposed on insurance contracts. This unregulated market grew astronomically from $900 billion at the turn of the millennium to over $50 trillion in 2008 after Congress enacted a law exempting them from state gaming laws in 2000 (*PIA Connection*, 2008)..

Any investment in a debt requires compensation not only for the time value of money but also a premium for the credit risk of the debt. Compensation for the time value of money is usually provided by the debt promising, at a minimum, a yield equal to that of the rate available on default-free government securities like U.S. Treasury bonds. The credit risk premium above that rate must compensate investors for not only the expected value of default losses but also for the systematic risk relating to the debt, as well as for any embedded options (Murphy, 1988).

In a credit default swap or bond insurance contract, there is no initial investment in the debt by the insuring party, and so only a credit risk premium is required. This premium must, however, include both the default risk premium and the systematic risk premium. Appropriate appraisal methods for estimating those premiums have long been known (Callaghan and Murphy, 1998).

However, many practitioners today apply pure mathematical theories to evaluate credit risk and estimate credit risk premiums to be required (Glantz and Mun, 2008). The models of such "'quants' who have wielded so much influence over modern banking" are often "worse than useless" (*NewScientist*, 2008b). Some investors in debt securities look only at the credit ratings provided by a few rating agencies such as Moody's and Standard & Poors (S&P), which themselves evaluate credit using such models. Those models, which use statistics to uncover past relationships between debt defaults and a few variables, as in the seminal Altman (1968) study, can ignore very important factors and possibilities (Woellert and Kopecki, 2008). While some have suggested that the models only need to be improved (*NewScientist*, 2008b), all statistical models are subject to the problems of spurious correlations between variables that are magnified as the number of variables are increased, and so it is questionable whether credit analysis can ever be conducted without some human judgment.

Existing mathematical credit risk models have "a tendency to underestimate the likelihood of sudden large events" (Buchanan, 2008) that are especially important in the credit markets where the tail of a distribution is key in predicting the defaults that typically have a low probability of occurrence (Murphy, 2000). The mathematical models typically fail to consider inter-related systematic risks (Jameson, 2008), and they tend to make unrealistic assumptions such as markets always being in equilibrium (*NewScientist*, 2008a). Despite their "poor risk modeling" in actuality (Jameson, 2008), the statistical accuracy of the models in predicting backward into the past (using historic data) resulted in the mathematical modelers developing such a "faith in their models" in forecasting the

future that they began to "to ignore what was happening in the real world" (*NewScientist*, 2008b).

In addition, without human judgment, financial models of credit risk are subject to manipulation, both legally and fraudulently. Just for instance, the modeling predictions at the rating agencies have, at least recently, been biased toward granting higher ratings than merited in order to compete for revenues from the debtors who pay to be rated and are a "colossal failure" (Burns, 2008). The result has been that a large portion of the credit default swaps were mispriced.

The mortgage crisis itself may have largely been caused by the mispricing of credit default swaps. A major contributor to the lack of subjective judgment and verification of the model inputs was the fact that mortgage brokers were motivated by loan origination commissions to just maximize the volume of issued mortgages that often required no money down and no proof of income because the risks associated with such lending policies were "blurred" to the final investors who took positions in them through collateralized debt obligations or CDOs (Buchanan, 2008). One factor causing CDO investors to accept such uncertainties may very well have been that such mortgage-backed securities were widely insured against losses from default by insurers like AIG, which itself placed "blind faith in financial risk models" and their small elite staff of modelers who initially generated large income for the firm that later turned into decimating losses (Morgenson, 2008). AIG's modelers likely justified their pricing by applying purely statistical credit scoring procedures using a limited number of factors that didn't incorporate the effects of requiring no documentation for the inputs to the models

and having no human credit analyst to provide a subjective judgment. In many cases, the unverified inputs to the models were even widely recognized to be false or misleading.[1]

In addition, many of the more sophisticated mathematical models of debt instruments were based on theories that implied the systematic risks of debts could be hedged or diversified away (Duffee, 1999). As a result, many modelers questioned the need to require any yield compensation for systematic risks (Elton, Gruber, Agrawal, and Mann, 2001) that debt investors normally receive because the risks of debt investments can't be fully diversified away (Murphy, 2000). Unfortunately, the theories that indicate debt investors only need to charge sufficient interest to cover expected default losses are based on unrealistic assumptions, such as no transaction costs and a continuous distribution of returns (Merton, 1974). As a result, their conclusions are invalid despite the accuracy of their mathematics.

Such modeling procedures resulted in many credit default swaps being priced to have the periodic payment compensate the insuring party for average default losses. Without the extra yield cushion that normally is required to cover the systematically above-average default losses that inevitably occur in some years, debt investors had set themselves up for large losses at some point. With many of the insuring parties of credit default swaps being banks and other financial institutions that were highly leveraged with large current obligations, suffering losses created the risk of these insurers defaulting on their own obligations under the credit default swaps,[2] leading to a potential domino effect on their swap counterparties and a systematic cascade of defaults.

Compounding the problem of failing to charge a systematic risk premium in the credit default swaps was the previously mentioned problem of underestimating even average default losses because of the failure to utilize subjective human judgment in the statistical modeling of default risk. The result was that the payments on credit default swaps didn't even cover future default losses in average years.

Such underpricing of credit default swaps resulted in a credit bubble, as investors hedged their debt investments with the insurance of the credit default swaps to reduce their risk at abnormally low costs and drive up debt prices. As a result, investors were able to borrow at extremely low premiums to default-free U.S. Treasury rates for several years (as indicated by the very low spreads between Treasury yields and corporate debt yields, especially junk yields, until 2007 that were readily observed daily in the financial press like the *Wall Street Journal*).

For a while, the recipients of the periodic insurance payment on the credit default swaps were able to generate large profits from the contracts, as defaults were initially lower than the insurance payments. That situation was especially prevalent in the mortgage market because newly issued mortgages generally default at lower rates than more seasoned ones. In addition, many of the newly originated mortgages had adjustable rates that offered a low teaser payment for the first 1-5 years of the loan before they were contracted to rise according to a formula based on market rates of interest, and default rates naturally rise with such adjustable-rate mortgages (ARMs) over time.However, given that no systematic risk premium was being charged, and given that the default risk premium was less than the default losses that would be estimated by expert human credit

analysts, the profits were almost certain to turn into losses as soon as defaults rose to a more normal level.

The Foreclosure Catalyst

In fact, default losses on subprime mortgages began to exceed expected default losses in 2007. One of the reasons for the rise in mortgage defaults was the increase in interest rates charged on the loans that had been set at introductory teaser rates which were contractually raised to market levels after the introductory period (ranging between 1 and 5 years) expired. The resulting foreclosures brought an excess supply of homes onto the market that caused residential real estate prices to fall, contributing to further mortgage defaults. As the market value of mortgages fell, the viability of many banks and other financial institutions was called into question, resulting in a wholesale bank run that required the Federal Reserve to bailout the system with several hundred billion dollars in liquidity in the summer of 2007.

As investors began to perceive that defaults could spread beyond mortgages, the systematic risk premiums began to rise across all debt instruments, resulting in a fall in debt prices across the board. Systematically falling debt prices led to further increases in perceived systematic risk and further increases in systematic risk premiums in a cycle that brought us to the 2008 financial crisis.

The Liquidity Crisis

Exasperating the cycle along the way were the failures of several large financial institutions such as Bear Stearns, Freddie Mac,[3] Fannie Mae, Lehman Brothers, and AIG. These failures were related to the investments of those institutions into debt contracts of various types that had fallen in value to the point where their liabilities exceeded the market value of their assets. In some cases, such as that of Bear Stearns, there was also a liquidity crisis, insofar as the market value of the liability of that investment bank on its massive portfolio of credit default swaps began to rise so much that the counterparty was able to demand additional collateral be put up as security against payment on the credit default swaps.

A similar liquidity crisis later ensued at AIG, with that insurance company having insured a massive amount of collateralized mortgage obligations. As previously explained, much of the mortgage crisis may be attributed to AIG and other insurers of mortgage paper like AMBAC and MBNA. In particular, many of the subprime mortgages may never have been originated and packaged into pools if there hadn't been an agreement by the insurance companies to guarantee the mortgage-backed securities with specified characteristics against default. The premiums charged on the credit default swaps do not appear to have provided sufficient compensation for the higher default rates on mortgages with lower (or no) downpayments, especially when no documentation was required and no human credit analysis was undertaken.

The problem of underpricing the insurance payments on credit default swaps may have been at least partially exasperated by the mathematical models of the insurers not fully allowing for the rising defaults that normally occur on adjustable rate mortgages as the interest rate rises following initially low teaser rates. Unrealistic expectations of ever-

rising home prices that would enable refinancing mortgages when the introductory teaser rates rose after a few years may have also contributed. Although the existence of evidence of a possible bubble top in real estate prices at that time (Shiller, 2005) would make the latter expectations appear to be especially implausible, AIG was able to record large profits from its insurance scheme until those higher default rates materialized (Morgenson, 2008).

As more institutions failed, market risk premiums rose ever further, leading to further calls for collateral on firms that were receiving the periodic payments on credit default swaps. The resulting liquidity squeeze can cause more defaults and market risk premiums rising ever farther in a vicious cycle without interventions by the Federal Reserve to supply needed cash. Nevertheless, despite the Fed's massive efforts to date, credit risk premiums rose to over 8% on a leading index of credit default swaps (Moses and Harrington, 2008).

The Size of the Problem

Despite the enormous amount already spent by the federal government to bailout the financial markets, much more may be needed to save the system as it is. In particular, assuming the average debt for the $62 trillion in credit default swaps merited a Baa credit rating, and assuming credit risk premiums being charged that equaled only 2/3 that of the expected default losses on those credits, data provided in Murphy (2000) indicate that the contracted underpricing was {{1/3}0.33%)+1.35%=1.46% per year. That comes to a market value loss of .0146x$62 trillion=$ per year, or about $5 trillion over the typical 5-

year life of a credit default swap. Those huge market value losses exist even though initially the premium of 0.22% on the credit default swaps may have exceeded the typical abnormally low default losses on ARMs shortly after origination. While there may have been some hedging or offsetting contracts that would reduce the scope of the cost of a full bailout, it is unclear how large an offset that would be.

In addition, it should also be mentioned that the premiums charged for the credit default swaps in no event covered the abnormally large default losses that periodically occur during recessions. With the financial crisis likely to result in such a downturn, the losses on the credit default swaps are likely to be even larger for the duration of that recession. That could easily raise the cost of a bailout by over $1 trillion per year of an economic slowdown. Since the very existence of the financial crisis may negatively affect the economy through reduced consumer spending (caused by the uncertainty) and decreased bank lending (caused by rising credit risk and credit risk premiums), such additional costs may be further magnified by a more severe and protracted recession. The total cost of the crisis could exceed $10 trillion.

Possible Solutions to the Crisis

There are perhaps other solutions to the crisis besides a massive bailout of the markets. One simple policy would be to nationalize the depository institutions of the failed corporate holding companies, and simply let the holding companies and all other failed institutions go bankrupt and default on their credit default swaps. The nationalized banks could then go back to making loans as they did in the old days, having real human

beings make credit-granting decisions. The cost of this policy to taxpayers might be rather small, especially since most of the losses on the defaulting credit default swaps would either be offsetting or be incurred by investors like hedge funds.

For institutions suffering strictly from a liquidity crisis but having a firm value in excess of their liabilities, simple enforcement of the regulations on short sales might be of great assistance. In particular, as shown theoretically and empirically by Murphy, Callaghan, and Parkash (2005), companies with inadequate internal liquidity can have their stock price shorted down to zero and then be totally unable to access the capital markets, thereby resulting in the failure of the firm. To inhibit such shorting down of value, the illegal "naked" shorting that is concentrated in foreign markets but also goes on in the U.S. because of inadequate enforcement by clearing agents (Boni, 2006) could be prevented by having the SEC start to enforce the laws requiring delivery of borrowed shares by short sellers. Since there is an estimated $1 trillion in illegal "naked" short sales (Financial Wire, 2004), which have been alleged to be related to the activities of organized crime (Weiss, 1997),[4] enforcing the requirement that short sellers deliver securities they sell like any other seller would result in a short squeeze that would send stock market prices soaring, as those short sellers had to buy back the securities they sold to deliver the shares they had never borrowed. Most importantly, however, such a policy would inhibit the bankruptcy of the thousands of firms that have been shorted out of existence (Financial Wire, 2005) simply because of a short-term liquidity crisis.

The real estate and mortgage crisis itself could possibly be resolved by allowing defaulting mortgagors to refinance with shared appreciation mortgages (SAMs) that would lower their payments in return for the lending institution receiving a share in the

future appreciation on the home (Murphy, 2007). The SAMs could possibly be standardized to both reduce legal costs and also potentially create a secondary market for them in the form of SAM pools in which investors seeking diversification into residential real estate might be interested. By replacing foreclosure solutions with SAMs, less homes would be put on the market for sale, thereby reducing the downward pressure on real estate prices. The cycle of falling real estate prices leading to more mortgage defaults and foreclosures, which cause further drops in real estate prices that prompt more foreclosures, might therefore not only be stopped but even reversed.

Conclusion

By analyzing the root causes of the financial crisis, it is possible to estimate the costs of resolving that crisis utilizing current policies of bailing out investors who made poor investment decisions. Although the cost of the bailout may be staggering, cheaper solutions appear to exist. In any event, it would seem imperative that the financial managers of the future be better educated in the art of credit analysis.

Endnotes

1. The huge market for Alternative-A or "liar loans" that required no documentation of income or assets but generated large fees for mortgage bankers, who sold them to other investors (Zibel, 2008), may never have existed without such guarantees.
2. Callaghan and Murphy (1998) have shown that bankruptcy is typically caused by liquidity problems when external capital is typically not available. Murphy, Callaghan, and Parkash (2005) have demonstrated theoretically and empirically why external capital isn't available during liquidity crises.
3. The failures of the two federal agencies were preceded in 2005 by a successful $2 million campaign by Freddie Mac to lobby Congress from restricting their own investments in higher-risk mortgages (Yost, 2008).

4. The extensive resources an international criminal consortium dominated by emigrants from the former Soviet Union has allocated to financial market manipulation since the 1991 overthrow of communism there (Friedman, 2000) may be connected to the increase in both the complaints and the significance of the illegal naked shorting. The fact that many of the naked short sales are currently rumored to emanate in some form from unauthorized USA stock listings on the Berlin Stock Exchange (Koh, 2005), which promotes itself (e.g., in its brochure entitled "Boerse Berlin Bremen" under the heading "Schwerpunkte des internationalen Angebots) as listing more U.S. stocks than any other foreign exchange in the world and having market makers with connections to Eastern Europe, also supports this very tentative hypothesis, albeit only circumstantially.

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