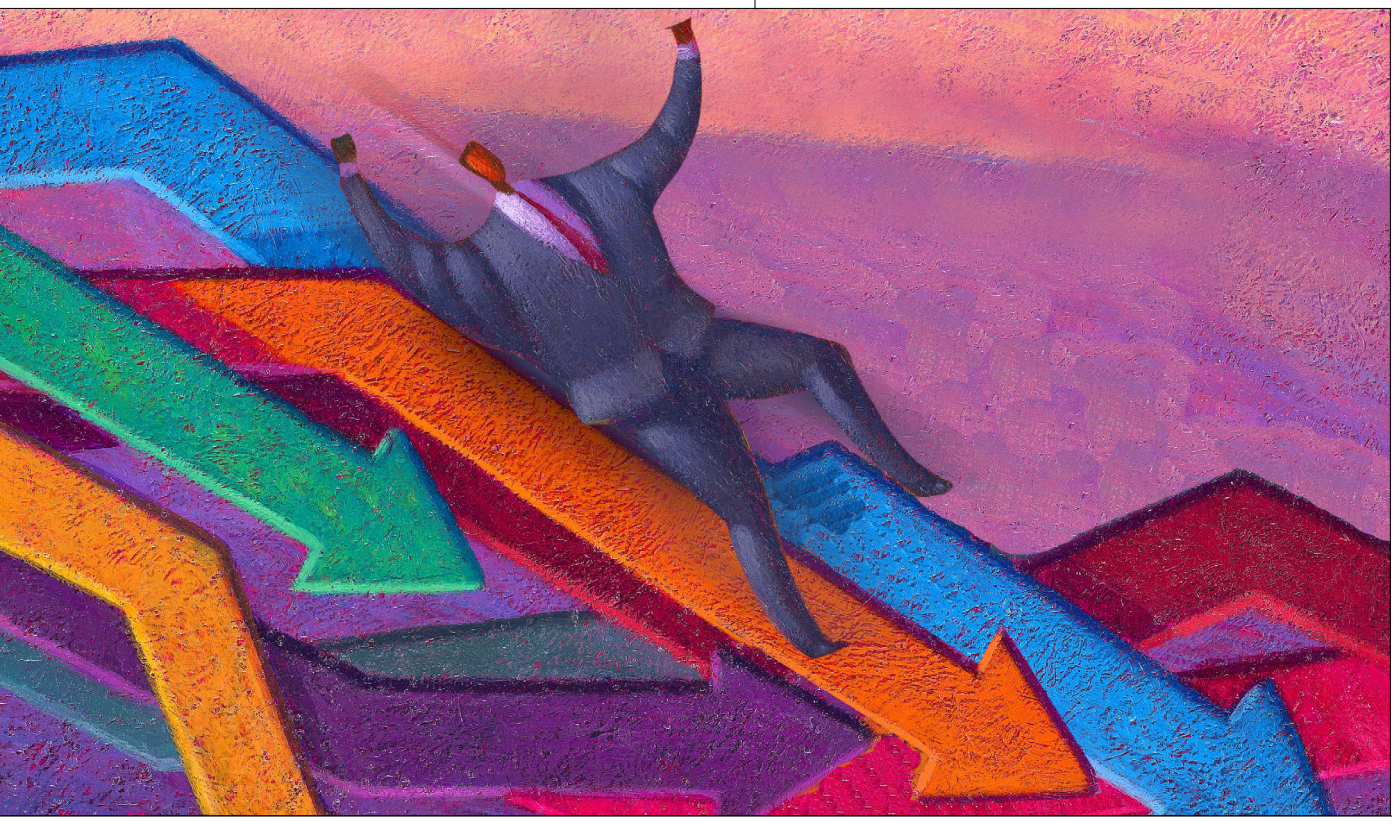
Investigating the US Subprime Crash

How did the subprime mortgage crisis begin? What factors caused this market to spiral out of control? What lessons has this collapse taught us, and what risk management strategies should we implement to prevent future incidents? **Dr. Chris Marrison** answers these questions and offers a subprime resolution.

The collapse of the US subprime mortgage market has bankrupted financial institutions in the US, Europe and even Australia. The ripples of this crash have frozen the markets not just in subprime mortgages but across all asset-backed securities and even across plain corporate bonds. This article looks at origins of the subprime crash, the players in this drama, the lessons it has taught us and the steps that risk managers and regulators should take to protect against future crises.

Just as in any other crash investigation, we must first look at what happened and then draw lessons from this information to reduce the possibility of future incidents. The subprime crisis originated in the fall of 2001 in the US equity market — a market that sent investors "looking for yield" in the "undervalued" residential real estate market. As traditional ways of investing (e.g., buying property) became saturated, imaginative lenders started pushing new products (e.g., teaser rates and negative amortizing mortgages). They also pushed these products into a new market: the subprime customer.

Banks felt justified in changing their underwriting standards so greatly because they placed their trust in quantitative models to cherry-pick only the customers with the best risk/return ratios. Furthermore, they had ways for passing off the risk to other investors via asset-backed securities and other credit derivatives. The leading names in this market were Ameriquest, New Century, General Motors



Acceptance Corp., Option One, Credit Suisse First Boston and Lehman Brothers' Structured Asset Securities Corp. (SASCO) affiliate.

Pushing into new products and markets guided by models started off as a good idea, but then, under the momentum of commissions, originators took risks that went beyond the scope of the models and the original risk appetite. Front line salesmen were awarded commissions based not on risk-adjusted profitability but on crude measures of accounting profit — such as 0.25% of the loan value for normal loans and 0.5% for high-margin loans doled out to high-risk, subprime customers.

Once the staff was hired and the commissions were flowing, the inconvenient truth of the rising risk was not sufficient to slow the momentum until the collapse hit. When the collapse eventually happened, it was caused partly by a small fall in the value of the underlying homes and partly by a slight rise in interest rates. These factors caused lenders to be less willing to refinance borrowers when the period for their teaser rates came to an end and the high interest payments started. Previously, the borrowers had been able to avoid the high interest period by switching to another lender — but now they were faced with high interest payments, and they started to default.

Another significant factor was the lag between when loans were originated and when the defaults occurred, because it typically takes a couple of years between the start of a new set of loans and the first significant defaults. If your lending practices are stable over time, then the current losses are indicative of the risk of the new loans that you are originating. However, the subprime lenders were pushing into ever more risky segments, so their current losses indicated much lower risk than the risk of the new loans.

For example, the loans that were originated in 2004 may have had a 1% chance of defaulting once their teaser rates ended two years later. So when lenders were experiencing default rates of 1% in 2006, they thought that this risk was manageable. However, by 2006, lenders had already saturated the market for low-risk customers and had pushed into segments where there was more like a 10% chance of default. This lag effect gave a false sense that the risks were not too bad, but eventually the losses started to mount, and in 2007 investors reassessed the whole sector and were not happy with what they saw.

Crash Phases

This sequence of events can be put in a framework of four phases that also apply to similar crashes. Phase one is business as usual. Phase two is the introduction of new ways of doing business that are innovative and successful. Phase three occurs when investors move out of the realm of the economically sensible, spurred on by the fact that there have been few losses from the earlier, more sensible investments. Phase four kicks in when the delayed losses from assets originated in phase three start to hit the accounting books and the risk can no longer be ignored, precipitating the collapse.

Estimates of the eventual loss on subprime loans range from $100 billion to $150 billion. There are approximately $600 billion in subprime mortgages — about 20% of all US mortgages. A simple estimate of the total subprime losses is to say that 50% of the loans will default and that in those defaulting loans, loan recovery values will fall to 50%, leaving losses of $150 billion. It is very unlikely that the normal market value of properties will fall by 50%, but in the clean-up from the Savings and Loan crisis, packages of distressed real estate loans commonly sold for half their face value because of the glut of property disposals.

Dr. Chris Marrison

While $150 billion sounds like a lot, the potential subprime losses are (relatively) economically small: $150 billion is one-third the cost of the latest Iraq war or 10% of the value of the companies in the S&P 500. It is only 1% of the US GDP (bringing US GDP growth in line with EU growth), and it is only 0.2% of America's unfunded Medicare and Social Security liabilities. So a $150 billion hit to the system is significant, but not in itself the reason for a marketwide crisis and would not in itself be sufficient to knock the US into a recession.

However, in the summer of 2007, the reaction to the subprime crisis has been a spasm in the markets, not just in the US but globally. Investors started discounting and rejecting assets and derivatives backed by subprime loans. This extended to all kinds of complex assets, and then banks quickly became very loath to lend to other financial institutions.

There are two related reasons for this general market crisis: re-evaluation and ignorance. The re-evaluation is investors asking themselves if the world is really going as well as they thought. The ignorance is that investors do not know who will end up footing the $150 billion bill. This is because, along with the "innovative" financial products being offered to customers, there were even more innovative financial products, such as collateralized debt obligations (CDOs), to package the subprime loans. These were offered to sophisticated investors like hedge funds, as well as to less sophisticated investors.

One such investor was the German middle-market bank IKB, which was persuaded that CDOs on US subprime mortgages would enhance its returns and which has just

now received a $10 billion bail out (by the German central bank KfW) to counter their losses. What's more, many European and Asian investors now find themselves holding securities they do not fully understand, backed by assets in far-off American states.

This complex repackaging of risks means that the banks themselves do not know their exposure. For a dollar lost on a subprime loan, they do not know how many dollars their investment will fall. This in turn means that potential lenders to any bank do not know if they will be paid back.

The price of this ignorance is that the credit markets have frozen and companies with otherwise sound businesses have been pushed toward collapse, because they cannot get the loans that their businesses require. This spreads the contagion across all markets.

Some of this contagion has been immediate, but some will be delayed. Historically, it has taken about a year between the fall of the retail market and a later fall in the commercial real estate market. So risk managers need to act now to restructure assets — e.g., to call covenants and put in swaps and reserves to avoid the worst of the next wave.

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To make this happen, the banks need to execute a three-pronged plan: (1) get a picture of their exposures quickly; (2) understand the extent to which the risks are systemic across their portfolio; and (3) identify the most exposed assets. If this identification of the risks is precise and objective, it can also be published to lenders and investors to give them faith that the institution is sound and is deserving of low-cost funding.

These problems will work themselves out in the next few months: the losses will be realized, banks will understand how much they lost, some of the financial players will be removed and the fundamental reason for the subprime crisis will abate. By that point, the dislocation of the crisis may have thrown the general markets into a more pessimistic phase and a general downturn, or the markets may have recovered and be "looking for yield" in the next "undervalued" asset class.

Lessons Learned and Suggestions for a Subprime Resolution

What can we as professional risk managers learn from this crash? The most immediate lesson is that the crash was avoidable and the market players should not be bailed out by the government; otherwise, they will have no incentive to implement proper risk management steps to avoid future crashes.

Financial institutions and investors made these mistakes through a mixture of denial, ignorance and willful ignorance. Investors should demand clarity and understanding, and those who do not are amateur risk managers who should be punished through the risks they bought.

One particularly insidious form of bail-out is the call for the government to help the "common folk" to pay their extreme mortgages. If the government simply gives money to the borrowers or pays the mortgages on their behalf, then the borrowers will be happy, the investors will be fully repaid, the taxpayers will owe $150 billion more and no financial institutions will have made a loss. However, there is an alternative that can not only help the borrowers but also let the careless investors suffer the losses and minimize the bill to the taxpayers.

If the government wants to help the people without footing the bill for the bankers, it should buy the raw packages of subprime loans at their (low) market value and then help those customers who have loans in the package. The purchase of the loan package will ripple through all the other securities based on that loan package, realizing the losses to all the banks and investors along the chain. Any improvement in the loans' performance from government assistance will then feed straight back into improved government income on the loans they hold.

For example, consider a loan package containing 500 loans of $100,000 each. Currently, this loan package with a face value of $50 million can probably be bought in the market for $30 million, because investors suspect that the borrowers could default on around half of the principal. If the government bought this package for $30 million, then the bank selling the package would crystallize its loss of $20 million, and all the CDOs and derivatives that depend on this package could also crystallize their losses. The government would then hold a package of loans that are expected to pay back about $30 million.

If the government then went to the 500 borrowers of the loans in that package and offered them help amounting to $10 million in repaying their loans, the government could eventually expect to get back $40 million — rather

than just the $30 million that it originally paid. By being the owners of the securities whose value improves when the borrowers are helped, the government makes sure that there is minimal overall loss to the taxpayer and avoids bailing out the willfully ignorant investors

The Next Steps

Assuming that there is the market discipline of not bailing out the banks, institutions will be interested in managing their future risks. What should we risk professionals recommend?

The typical answer from the quants is to say that banks should have models to quantify the risks. At a technical level, we should recognize that statistical models like value-at-risk (VaR) and economic capital are good for giving a relatively objective view of the risk and quantifying risk-adjusted profitability. However, we also need to realize that the information in the tails of those distributions does not tell us much about how a crisis could unfold and what can be done to guard against it.

For protection from crises, we need to also employ other metrics, such as stress testing. Unfortunately, with regard to crisis management, the real story is that models have not been used. For example, in the chain of loan originators and investors in the complex securities backed by those loans, few people used detailed models, and those who did tended to use them for pricing and ignored them when the indicated risk became inconvenient.

In his book, *Life and Death: Managing Risk in Extreme Environments* (Kogan Page, forthcoming), Duncan Martin draws analogies between risk management in the real world and risk management in the financial world. One story that Martin relays is that engineers at Chernobyl told him that they had disconnected the safety mechanisms for the nuclear power plant — because they got in the way of doing business and because they did not believe that a meltdown was possible. This seems terribly familiar.

Though models warn you of risks, you need incentives to heed the warnings. The standard risk manager's recommendation is to ensure that internal compensation (such as commissions) is given on a risk-adjusted basis and is delayed until outcomes become more clear, rather than giving incentives based on short-term accounting income (such as loan margins).

At a market level, regulators need to ensure that banks set their capital cushions according to the risks they are running. If the regulators are not satisfied with the way the banks are measuring their risk, the regulators should increase the required capital to cover the unknowns. There should be clear information on risk — both within the banks and released to the market — to provide market discipline.

If these principles sound familiar, it is because they are the core of Basel II. Though some of the rules for applying this capital accord still need improvement, its principles are sound. Basel II, however, should be applied across the banking industry in the US — not just to the few largest banks. The Savings and Loan crisis, the Long-Term Capital Management crisis and the subprime mortgage crisis were all led by institutions outside the top 20 banks.

One last interesting point about the subprime collapse is the notable lack of historical comment from risk managers. To my knowledge, no chief risk officer went "on the record" to warn that this crisis was looming. If they had any concerns, then their voices were muted by the dealmakers at their institutions.

Risk officers can try to be more assertive, but in this industry power goes with the flow of money. The only way that the voices of CROs will be heard is if investors learn to ask them to stand by their risk reports and to sign off on their understanding of their companies' risks.

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A few will rise to that sobering challenge, and those that do will finally have a hand next to the emergency brake. When that happens, there will be a greater chance that financial institutions will use risk models for phase two (cherry-picking customers), without over-running into phase three (willful ignorance).

The lessons from this crisis simply reinforce the lessons from all other crises. As risk professionals, we know what to do — we just have to get the industry to do it. But we cannot truly move forward until investors demand better clarity and insist on having a better understanding of the risks in their investments. ■

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