

Credit Derivatives, Macro Risks, and Systemic Risks

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In the early to mid-1990s, derivatives received a great deal of negative publicity in the popular media. Several unfortunate incidents ultimately led Gastineau and Kritzman (1996), in the revised edition of their *Dictionary of Financial Risk Management*, to define a derivative as, "in the financial press, anything that loses money."

The proximate causes of these derivatives disasters were a variety of factors: Metalgesellschaft experienced a cash flow mismatch between long-term over-the-counter (OTC) forward contracts and marked-to-market short-term exchange-traded futures; Gibson Greeting was encouraged to enter into complex, and probably inappropriate, financial transactions that it apparently didn't fully understand; Procter & Gamble and Robert Citron of Orange County assumed significant investment risk, exacerbated by a "surprise" interest rate hike; Barings Bank employed a rogue trader who was able to engage in fraud because of the lack of institutional risk control; and, of course, just about everything went wrong at Long-Term Capital Management (LTCM). Many of these incidents were highlighted prominently soon thereafter in books with titles such as *Derivatives: The Wild Beast of Finance* (Steinherr 1998).

At least one market participant (an investment bank) felt that the label "derivatives" was so detrimental that it renamed its offerings "risk management products." Many remain skeptical of the value that derivatives can provide; one hedge fund manager, speaking to a group of summer MBA interns at an investment bank in New York a couple of years ago, when asked if he used options as part of his investment strategy, replied, "I don't go to that crack house."

The (interest rate) swap market has been around for only about twenty-five years, yet it is one of the largest and, arguably, one of the most important and successful financial markets in the world. Credit derivatives are much newer, having been first publicly introduced by the International Swaps and Derivatives Association (ISDA) in 1992 but not broadly traded until after the standardization of the documentation in 1999.¹

What about “credit”? The origin of the word, as our classics scholars know, comes from the Latin—proximately from *creditum* (meaning “loan”) and ultimately stemming from *credere* (to entrust) and *credo* (I believe), which, for our purposes, is what every bank or lender does (in terms of expecting to be paid back with interest) and, more generally, what every counterparty expects (in terms of performance) when entering into an OTC derivative contract. There is nothing new about lending and borrowing, though Grant (1992) has chronicled the alleged long-term relaxation, and accompanying deterioration, of credit practices in the United States. Chacko et al. (2006) go one step further—identifying credit risk as a disease: “It makes you uneasy, queasy, almost to the point of nausea. Well, we are here to inform you that you have just been infected with the Credit Risk virus. And you won’t be cured until the money is safely returned. In the modern world, this is a virus as ordinary as the common cold” (3). Ryan and Risk (2006) refer to the “predicament” relating to credit derivatives as “akin to battling a rare disease” (at least rare thus far). Others have used expressions like “contagious” and “cancerous growths” in their descriptions of these instruments.

What happens when you combine wild beasts with some ubiquitous, virulent pathogen? Avian flu? No, credit derivatives! Who wouldn’t be scared?

When the topic for this session was first proposed, the distinction between macro risks and systemic risks initially struck me as quite different. I would like to address the first (on which, I believe, there has been a fair amount of both academic and practitioner research and to which I will dedicate only something of an overview) and then transition to the second set of risks (which, I believe, constitutes the actual issues relevant for the policy discussions to be subsequently addressed here).

Credit Derivatives and Macro Risks

When one thinks of macro risks, what come to mind are exposures to changes in those aggregate or fundamental economic factors that could affect the economy as a whole in general or the financial markets and the banking sector in particular.

Before considering the macro risks that might affect the credit markets, a distinction should be drawn—one that I heard made by a credit derivative market maker a few years ago. He pointed out that, while trading credit derivatives is surely trading credit, there is a difference between trading the market’s perception of credit (as realized in corporate and some sovereign bond spreads) and trading “real” credit. By real credit he meant trading instruments that are triggered not by the possible likelihood of bankruptcy; not by changes in default probabilities, recovery rates, or credit ratings or by changes in those ratings; and not by any other circumstances that may influence the market price of credit risk in any particular name but by the actual act of filing for bankruptcy, by missing payments on borrowed money, by debt repudiation or moratorium, or by restructuring under financial duress—in other words, trading instruments that kick in when one comes to not believe in some institution’s ability and willingness to repay debt. Of course, one would like to think that there is a fairly close correlation between these two types of credits and that the marketplace would respond by providing financial capital to what is perceived to be a potentially rewarding arbitrage strategy between the two (capital structure arbitrage having been one of the faster growing of the hedge fund strategies out there). But the distinction between real credit and perceived credit is not trivial, as most commonly seen reflected in the presence (or absence) of total returns swaps for corporate securities in (from) the catalogue of credit derivatives.²

What’s in a name? Insurance or derivative? One of the fundamental reasons for the success (or, at least, the popularity) of credit derivatives is their ability to sep-

arate the hedging or acquisition of credit risk from the traditional vehicles that have allowed a position in credit (that is, bonds and loans). Credit derivatives are often likened to “financial credit insurance” (and, indeed, they have been referred to in that manner and certainly can be utilized in that way),³ even if the NAIC (National Association of Insurance Commissioners) constantly reminds derivative salespeople (and their compliance departments) that they cannot market derivatives as insurance, which is a unique product, separate from financial contracts: swaps, forwards, futures, and options.⁴

Obviously, investment banks that have lending relationships with corporates and sovereigns welcome the ability to lay off credit risk without the consent, or even the knowledge, of their counterparties. This lending goes to the very heart of relationship banking. Moreover, thanks to credit derivatives, these banks have embraced the relaxation of capital requirements previously imposed on the traditional lending businesses.

Consideration of macro risks for credit derivatives raises three issues. The first is whether the ability to lay off credit risk has influenced the activities associated with bank lending or capital market issuance practices. The second is whether

1. See Skinner (2005). Also see Neal and Rolph (1999), who wrote, “Estimates from industry sources suggest the credit derivatives market has grown from virtually nothing in 1993” (3). A very entertaining article (Tett 2006a) gives some insights into the development of the credit derivative market.
2. Nelken (1999) notes, “There is considerable uncertainty in the market about when an instrument is a credit derivative and when it is not. One definition of a CD [credit derivative] is any contract whose economic performance is primarily linked to the credit performance of the underlying asset. This definition would technically rule out TR [total return] swaps, because their performance is only partially linked to the credit quality of the underlying and is mostly linked to the market risk of the underlying” (173).
3. Skinner (2005) says, “Credit default swaps . . . are actually default insurance” (280). Nelken (1999) notes that “a credit derivative works very much like an insurance policy. . . . The credit swap market is very similar to the insurance and reinsurance markets” (5). Goodman (2001) argues that “credit default swaps are really quite simple—they are conceptually similar to insurance policies” (144). And Anson (1999) states, “This type of swap may be properly classified as credit insurance, and the swap premium paid by the investor may be classified as an insurance premium. The dealer has literally ‘insured’ the investor against any credit losses on the referenced asset” (44).
4. In a March 16, 2007, e-mail message to me from Matti Peltonen, Chief Risk Management Specialist, New York State Insurance Department, Peltonen cites a letter, dated April 30, 2002, written by James Everett, Capital Markets Counsel, New York State Insurance Department, providing the department’s legal interpretation in response to an inquiry asking whether credit default swaps constitute insurance. Peltonen notes in his e-mail: “The New York Insurance Department (NYID) consistently finds that derivative contracts are not insurance contracts as long as the payments due under the contracts are not dependent on proving an actual loss. For example, in considering catastrophe options (cat options) that provide for payment in the event of a specified natural disaster (such as a hurricane or major storm), the NYID stated that cat options were not insurance contracts. A cat option purchaser did not need to be injured by the event or prove it had suffered a loss from the event. In reaching this conclusion, the NYID distinguished between a ‘derivative product,’ which transfers risk without regard to an actual loss, and ‘insurance,’ which only transfers the risk of a purchaser’s actual loss.”

This distinction is not to be taken lightly. *Risk Transfer* (May 26, 2004) informs us: “If a derivative contract were found to be an insurance policy, the derivative could only be sold by a licensed insurance broker. Thus a derivative counterparty that is not so licensed—one ultimately found to have been selling an insurance policy—would be acting unlawfully. In California, this would be a misdemeanor. In Connecticut, fines, imprisonment, or both can be imposed for acting ‘as an insurance producer’ without a license. Under Delaware law, a Delaware corporation can lose its ‘charter’ to do business if it acts ‘as an insurer’ without a ‘certificate of authority’ to conduct an insurance business.”

macroeconomic factors might act as catalysts in initiating widespread credit crises and their associated implications for credit derivative markets. The third is whether the greater dispersion of credit risk in the economy among a broader class of firms, investors, and institutions is a positive and stabilizing development.

Credit derivatives and lending behavior: Moral hazard? The first question asks whether lending practices have changed in light of the new credit risk management products. This question addresses the ability to lend, the willingness to lend, and possibly the degree of thoroughness contained in the process of due diligence that has typically attended most bank lending activities. We tend to use the expression “moral hazard” technically to refer to a situation in which an additional or heightened risk arises because of the presence of a contract or mitigating arrangement, which subsequently causes one of the naturally risk-averse parties involved to relax its behavior with respect to its efforts to avoid a negative underlying outcome. The prototypical example of a market instance of this phenomenon is, not surprisingly, insurance; for example, a homeowner who possesses fire insurance may reduce her actions and expenditures to keep her domicile free from circumstances that might cause inadvertent combustion. Gladwell summarized this problem nicely:

Insurance can have the paradoxical effect of producing risky and wasteful behavior. Economists spend a great deal of time thinking about such moral hazard for good reason. Insurance is an attempt to make human life safer and more secure. But, if those efforts can backfire and produce riskier behavior, providing insurance becomes a much more complicated and problematic endeavor. (2005, 2)

Have banks really become less cautious in their lending behavior? A number of factors make this question more of a discussion point than a well-posed question in search of a definitive answer: Recent advances in banking deregulation, the Basel Accords, modernization of financial markets, the evolving role of financial institutions, consolidation in the banking (especially the investment banking) industry, heightened competition, collapsing spreads, innovative products, and new technology all add noise to the question at hand.

That said, Nout Wellink, President of Netherlands Bank and Chairman of the Basel Committee on Banking Supervision, properly pointed out in February 2007: “The role of banks as the ultimate holders of credit assets has become less important. . . . We are therefore witnessing a fundamental change in the business of banking from buy and hold strategies to so-called ‘originate-to-distribute’ models” (2007).

There have been claims that the current state of credit markets has been altered by the existence and infusion of credit derivatives. More specifically, it has been posited that traditional lenders have become less concerned with the accurate credit quality assessment of their borrowers because the lenders, through the use of credit derivatives, will no longer be the ones “holding the bag” when the ultimate creditors “cease to believe.” Plender tells us,

If the real worry is systemic risk, a more fundamental threat comes from the change in the structure of the banking industry whereby credit risk is packaged into tradeable IOUs or hedged via credit derivatives and shunted off bank balance sheets. Yet . . . moral hazard . . . complete with the marked decline in risk premiums and in lending standards, is the story of credit markets this decade. The mechanics of moral hazard in the exponentially growing newer financial markets entail the destruction of the old relationship between banker and borrower. This is

because banks no longer retain the credit risk in much of their lending. They originate and distribute; and where the intention is to distribute, the lender is inevitably less bothered about loan quality. (2006)

With the recent events in the subprime lending market (which, I believe, have little to do with credit derivatives), one could argue that this situation may have resulted simply from a turn in the credit cycle and housing market and might attach no greater significance than that. The ability to minimize financial fluctuations and lessen price volatility is typically not included among the benefits associated with free markets. Was the unprecedented level of subprime lending a result of a change in the market's appetite for credit risk, a reflection of the influx of ready, new investors into this area, or simply an error on the part of those who assessed the risks in this case? Those who sing the praises of free markets usually assert that, while markets are not always correct and can frequently be "wrong," they are generally not stupid.

There may be a more subtle dynamic at work in this context. Whalen reports,

In the age of derivatives-enabled structured finance, the term "private equity" has become passé. Nearly every financial buyer deal we see coming to market involves a large degree of debt finance, regardless of the type of sponsor. Looking at the staggering numbers for public and private bond issuance in 2006, measured in the trillions of dollars, it seems clear to us, at least, that OTC derivatives and kindred structures like collateralized debt obligations [CDO] are driving a process whereby assets are being packaged and sold at prices that understate the true economic risk. (2007)

One last thought: Knowing that insurance is available is quite different from having a policy "in hand"; it is not wise to wait until flames are coming from the roof to seek an insurance quote. The issue of liquidity will be explored later.

Debt: The big picture. Currently, the United States is seriously in debt. On an aggregate level, U.S. households "owe," on average, 122 percent of their net income. National debt is ready to top \$9 trillion (and this amount does not include future Social Security and future Medicare liabilities). Corporate debt is at an all-time high; business-sector and financial-sector debt exceeds \$23 trillion. Moreover, the United States is relying on significant amounts of foreign funding. By the end of the third quarter of 2006, the United States had borrowed in excess of \$860 billion (around 6.5 percent of gross domestic product [GDP]) from abroad to finance its expenditures, and *BusinessWeek* predicts more than 6 percent GDP growth in 2007. Overall, the debt of the United States was estimated (at the end of 2006) at \$48.4 trillion. The question that begs answering is whether any changes have occurred in the banking system, lending markets, regulatory framework, or institutional landscape to warrant this explosion in credit risk. The presence of credit derivatives is probably more a reflection of an attempt to manage credit risk than a manifestation of the spread of this credit disease.

Macro risks and contagion. The second macro issue is the extent of the potential impact of changes in the credit cycle and the ability of the system and the market participants to handle such changes. By analogy, if the government were to put something into the water that drove the death rate to zero, the life insurance business, one would think, would become extremely stable and relatively uninteresting; no one, or at least no one who knew what was in the water, would subsequently refer to this industry as risky. Insurance companies would collect the premiums and never

need to make a payout. If there were no bankruptcies, defaults, repudiations, or need for restructuring, credit markets (and credit derivative contracts in particular) would be dull and uninteresting. In the end, it will be credit events that test these products, contracts, markets, and institutions.

If credit derivatives are triggered by credit events, then, on a macro scale, we might want to consider what tends to influence the incidence of these events. Neal and Rolph tell us,

Credit risk is influenced by both business cycles and firm-specific events. Credit risk typically declines during economic expansions because strong earnings keep overall default rates low. Credit risk increases during economic contractions because earnings deteriorate, making it more difficult to repay loans or make bond payments. Firm-specific credit risk is unrelated to business cycles. (1999, 5)

Credit derivative modeling will be looked at in more detail later, but some credit models have incorporated aggregate economic variables as potential explanatory drivers of credit conditions. For example, Das (2005) identifies the model developed by McKinsey and Company (under Tom Wilson) as one in which macro variables play a primary role: “The model focuses on the risk of a credit portfolio explicitly linking credit default and credit migration behaviour to the macro-economic factors that are major drivers of the credit quality of the portfolio” (590). Although one might think that inclusion of these macro variables could enhance/improve credit analysis, Das informs us that “in practice, the increasingly favoured models are *reduced form models*” (590).

There is no shortage of academic or practitioner research attempting to identify and evaluate those discernable variables that influence the number and severity of bankruptcies, defaults, and so on. While it is intuitive that economic downturns would generally coincide with the incidence of credit events, we can ask what macroeconomic factors in particular are the most significant in that context.

Ed Altman (a professor of finance at New York University’s Stern School of Business and one of the foremost authorities on credit, bankruptcy, and defaults) and other academic researchers have incorporated various macro factors into their credit models and analyses and have attempted to evaluate the importance of those variables. These factors have included the level of interest rates, leverage, inflation, unemployment, aggregate measures of indebtedness, nominal and real GDP growth rates, changes in those growth rates, savings rates, liquidity premiums, the ratio of high-yield debt to total debt outstanding, returns (and changes in returns) of aggregate equity indices, and, in a few cases (see Frye 2000 and Gordy 2000), a single systematic factor referred to as “the state of the economy.” The inclusion of these factors is intended to capture the drivers of the probability of default and/or the recovery rate (or, conversely, loss given default) in the event of bankruptcy/default. In some instances, these variables are examined in conjunction with a number of other firm-specific factors such as industry or sector or geography as well as more traditional credit indicators like the degree of corporate leverage, the ratio of free operating cash flow to total debt, and EBIT or EBITDA (earnings before interest, taxes, depreciation, and amortization) interest coverage multiples.

Interestingly, in examining the empirical importance of macroeconomic variables that have been recognized as statistically significant in the work of others, Altman et al. (2003) find that these variables add little in terms of explanatory power or incremental statistical significance.⁵

The open state of this research is reflected in the current work of Professor John Binder (2006) of the University of Illinois–Chicago, who has recently found a counter-intuitive positive empirical relationship between probability of default and recovery rates. Furthermore, in a recent telephone conversation I had with a senior risk manager at a large, high-profile hedge fund, the manager articulated an unsolicited belief in support of the notion that default probabilities and recovery rates (on bank debt, at any rate) should be expected to exhibit a positive relationship.

To summarize: If the level of interest rates, the state of the credit cycle, the dummy variable acting as a proxy for boom or recession, or any of the macro variables included in these credit studies proved likely to announce or even trigger widespread defaults, then we might consider these macro risks as a potential source of systemic risk. Perhaps less ambitiously, consider the heretofore generally accepted negative relationship between probabilities of default and recovery rates. If the deterioration of the economy serves as the single driving factor (raising default probabilities and reducing recovery rates), then this deterioration could potentially, on an economywide basis, trigger credit derivatives and simultaneously generate systemic risk in the banking and financial sectors. The lack of unambiguous significance in the literature of aggregate macro phenomena on credit (and credit events in particular), viewed in conjunction with standard firm-specific characteristics, tends to mitigate our immediate and urgent concern with macroeconomic risks per se as a source of systemic risk via the conduit of the credit derivatives markets. But the likelihood of a macro event as a catalyst for triggering credit derivatives certainly remains a possibility.

Macro risks are exposures to changes in those aggregate or fundamental economic factors that could affect the economy in general or financial markets and the banking sector in particular.

One final aspect of the macro relationship to credit involves what Lucas and others have referred to as “policy rules” (and the associated critique of attempting to estimate relationships econometrically when the behaviors of market participants change with changes in policy regime). While this consideration may serve to challenge the weak statistical significance in the empirical studies of macro variables and credit events, what it really introduces is the notion that Federal Reserve and governmental policies (in particular, monetary and credit policies) themselves respond to the myriad economic data and financial considerations discussed at each Federal Open Market Committee meeting. While that relationship may be obvious enough, it raises the issue of whether policy action itself may trigger a series of credit events. After all, if it were not for the unexpected tightening of interest rates in 1994, the first interest rate hike since 1989, there never would have been a Procter & Gamble derivative fiasco or an Orange County bankruptcy.

Before leaving this section, I would like to quote Ed Altman’s conjecture that we may be navigating in a new and heretofore unexplored world of credit. One fact that he pointed out is that the U.S. high-yield market had less than \$10 billion notional outstanding in 1978, whereas currently there is over \$1 trillion outstanding—exceptional growth by any standard. Furthermore,

5. Altman et al. (2003) note: “Macro variables are added in columns 7–10; we are somewhat surprised by the low contributions of these variables since there are several models that have been constructed that utilize macro-variables, apparently significantly, in explaining annual default rates” (16). They also observe: “Macro variables—as before—tend to have no evident effect on BDR (the weighted average default rate on bonds in the high yield bond market)” (19).

the (junk) market is not dominated by fallen angels, despite GM and Ford's inclusion in 2005, but by newly issued non-investment grade securities. . . . In addition, the U.S. has seen a substantial rise in the size of the syndicated loan market. Syndicated lending has risen more than 60% in the last three years and rose to total outstandings of \$1.5 trillion in 2005. The growth in this sector has been paced by more risky leveraged loans. Leveraged loans . . . are now estimated to be about \$500 billion, or about one-third of the syndicated loan market in the U.S. These higher risk and return loans are increasingly being financed by non-bank institutions, such as CLO (collateralized loan obligation) hedge funds. While large banks typically arrange these highly leveraged syndicated loans, in recent years more than three-quarters of the funds have been provided by non-bank institutions. . . . As is readily apparent from examining the history of high-yield bonds, however, markets are dynamic and constantly shifting. And there are times when even the most carefully constructed and tested forecasting models can be off the mark. The last few years has been one such period. Given the unique environment in the credit markets during the last several years, which has been fueled by massive liquidity and the advent of new participants like hedge funds, it is worth asking whether historically based estimates of default probabilities and recovery rates are still relevant. (Altman 2006, 2-6)

The next section provides more discussion on hedge funds and who is taking on this mushrooming credit risk.

Concern with Credit Derivatives from Market Professionals

Concern has been articulated from many quarters about the rapidly expanding market in credit derivatives. With nearly \$35 trillion notional outstanding and annual growth rates that have ranged between 40 percent and 160 percent, credit derivatives easily qualify as one of the most quickly developing product areas within the capital markets. The explosive growth in credit derivatives in recent years (in terms of face amount outstanding, trading volume, and the sheer variety of products available) has raised questions about many facets of this phenomenon. Like any new market, credit derivatives have experienced some growing pains (and I will mention a few of the problems that have arisen), but most of the anxiety that has been voiced centers on three aspects of this market:

1. the sheer size of the notional outstanding (and, more importantly, the fact that the face amounts being traded in many names—independent of the added volume via credit indices—are integer multiples of the current notionals outstanding in that name's debt [bonds and loans]);
2. the increasing involvement of the hedge fund community in this market; and
3. the operational backlogs and issues surrounding confirmations, clearing, and settlement.

Credit derivative notional versus underlying outstanding debt. Currently, in the auto industry alone, primarily at General Motors and Ford, the notional outstanding in credit default swaps (alone) is estimated to be fourteen to eighteen times higher than the underlying bonds, notes, and loans. Gillian Tett, the capital markets editor at the *Financial Times*, tells us that, in the overall market, “the total size of the CDS [credit default swap] universe is now believed to be 10 times bigger than the total pool of underlying cash bonds” (2006b).

What would happen if “something went wrong”? What do we even mean by “wrong”? For some in this market, a credit event could be interpreted as “something gone right.” Nevertheless, concern about the size of this market should not be underestimated.

Gerry Curtis, a distinguished investment adviser based in Boston, recently noted the following:

Possibly a bigger source of risk (than the issuance of low quality debt securities) is the sale of credit default swaps to buyers who do not own the bonds that are insured. There are many bond issues outstanding in which the amount of credit default swaps is substantially greater than the amount of bonds outstanding. If the issuer defaults on the bonds, the loss to the seller of the credit default swap is many times greater than the premium received by the seller. The favorable default rate on junk bonds in 2005 and 2006 has enhanced the willingness of buyers to purchase “junk” bonds and/or sell credit default swaps. (2007)

This sentiment has been echoed by many other traditional institutional asset managers who are wary of what credit derivatives might do to their portfolios and markets. Part of the concern seems to stem from a general belief that credit default swaps, which originally played a useful role in hedging default risk associated with debt issuance, have been carried to excess and are now vehicles for speculation and counterproductive.

There is absolutely no scarcity of negative sentiment regarding credit derivatives, as illustrated by article titles such as “Somebody Turn On the Lights” (Mayer 1999), “Credit Derivatives Trigger Near System Meltdown” (Dodd 2005), and “[Credit] Derivatives Will Collapse the World’s Financial System” (Jefferies 2006). By some measures, Lyndon LaRouche’s admonition that “the amount of indebtedness outstanding is greater than could ever be repaid, so the system is hopelessly bankrupt” (Gallagher 2007) appears discerning and contemplative by comparison (and is only slightly less disturbing than Gallagher identifying LaRouche as a “leading economist”). On the topic of this rhetoric, I agree with Partnoy and Skeel (2006a), who write, “Unfortunately, opinion on the credit derivatives issue is polarized between alarmists who oppose financial innovation and supporters who naïvely embrace it.” Let’s examine what has gone wrong and could go wrong as a result of the volume mismatch.

Historically, the credit default swap market has been primarily a physically settled market. By that, I mean that upon exercise (following the declaration of a credit event), the buyer of credit protection would deliver acceptable debt (as in a previously agreed-upon range of bonds and/or loans) or deliverables in exchange for the face value of that debt (with little in the way of variations from par). For securities that are already distressed, the typical quote would involve points up front in addition to the periodic credit default swap premium (where that premium is quoted in terms of basis points per annum for any fixed horizon—five years being the most common as well as the de facto default tenor—and typically paid quarterly).

The point is that, if there are multiples of the underlying debt being traded in the credit default swap market, then it would seem obvious that physical settlement could be problematic. There is at least the potential for a bottleneck. When Argentina defaulted in January 2002, the major broker-dealers got together to net all the trades before the securities ultimately traded hands; as in the past, an orderly capital markets settlement occurred following this credit event (as opposed to the protracted cross-border legal proceedings that have accompanied sovereign defaults). For the most part, the primary credit derivative dealers are the large global investment banks;

in most of the recent industry polls (BBA [British Bankers Association], ISDA, Fitch, Risk), banks account for around 55 percent of credit derivative buying and 40 percent of credit derivative selling. These figures are not surprising because banks often act as the market makers and intermediate counterparties in this product area. That said, in the case of Argentina, it took an unusual proactive measure on the part of the banks and dealers to ensure a smooth settlement; without this coordinated action, there could have been a problem.

Why not move to cash settlement? Would that not eliminate the possible squeeze scenario? There have actually been instances in which, upon the occurrence of credit events, the outstanding debt has traded up (as it needed to be acquired to be subsequently delivered). For example, when Delphi entered bankruptcy, its debt, which had been trading around 57 cents on the dollar, traded up, peaking at 71 cents before ultimately falling back to around 60 cents.

Many of the academic texts suggest that cash settlement of credit derivatives has not only been possible but common. These books are wrong (or at least “more wrong” in the case of the United States, as opposed to Europe, where cash settlement is more common). Even credit index documentation (and it is in the indices that cash settlement makes the most sense), when last I looked, indicated physical settlement on the term sheets.

The reason for the staunch resistance to cash settlement (where the payout would be based on the difference between face value and market value) hinges on the process for the determination of what market value really is. In the past, with other products, recourse to polling a number of other market makers and broker-dealers and then possibly averaging the quotes (midmarket or otherwise) would serve to determine the unwind cash flow. So what had been the objection to cash settlement for credit derivatives (and it had been a large one)? One Morgan, for example, may feel singularly uncomfortable if another Morgan (which may have positions in that name’s debt and/or the credit derivatives themselves) is a significant contributing factor in the broker poll. Physical settlement, then, avoids valuation disagreements and the need for market polls.

This overarching concern with the notional imbalances has led to concerns along these lines:

With more credit derivatives being traded than bonds available, a default by GM could spark panic buying of the company’s bonds, driving up prices. The contracts would be worthless if prices rose to 100 cents on the dollar because investors would have to pay the same amount for the bonds as they received in payouts. ‘The current method has the potential to significantly distort the economics of the trade,’ says James Batterman, an analyst at Fitch Ratings in New York. ‘There are no limits on the amount of derivatives exposure vis-à-vis deliverables.’ (Hamish Risk 2006)

To be blunt, I have to question Risk’s use of the word “worthless” (or at least ask for clarification “to whom?”); I would replace his use of “investors” with “speculators”; and as for the use of the expression “the economics of the trade,” I think the economics speak for themselves.

Another concern after a bankruptcy or default, not unrelated to the necessity of a broker poll or some other process for the determination of market value, is the likely loss of liquidity in the securities of the affected debtor. Thin markets tend to make people uncomfortable about taking, for example, the last traded price as a market consensus, and, following credit events, even if the debt continues to trade, it is often

accompanied by spotty markets. Some have argued that the downgrade of the autos (which was not a credit event in and of itself) was not such a tremendous shock but that the significant market impact resulted from the institutional response—as bond funds, whose prospectuses require they hold investment-grade paper, scrambled to dump Ford and GM and sought other investment opportunities.

The credit derivative market has responded to the credit-derivative-notional-versus-underlying-debt mismatch and the issues related to polling by developing a process that seems to meet the needs of market participants: an auction. Going forward, with credit events, the broker-dealers (supported by Creditex and Mark-It Partners and in line with ISDA protocol) will participate in an actual auction (not just a polling) through which the investment banks will provide inside markets, market orders, limit orders, and automated electronic trades and arrive at a final settlement price. If one Morgan thought the other Morgan was too low on his valuation for the defaulted debt, the first Morgan could express his belief by buying it in that market (voting with his dollars as it were), independent of credit derivative positions. This process has already been successfully implemented for Calpine, Collins & Aikman, Dana, Delphi, Delta, Dura, and Northwest Airlines over the last couple of years, has been supported and embraced by the dealer community (contributing members include ABN Amro, Bank of America, Barclays, Bear Stearns, BNP Paribas, Citigroup, Commerzbank, Credit Suisse, Deutsche Bank, Dresdner, Goldman Sachs, HSBC, JP Morgan, Lehman, Merrill Lynch, Morgan Stanley, Royal Bank of Scotland, Société Générale, and UBS), and has recently (February 2007) been extended to electronic tradable tranche fixings for credit indices (see Markit 2007).

This auction process now allows for the cash settlement of credit default swaps following a credit event (making the derivative/underlying debt imbalance something of a nonissue as well as making the invariably uncomfortable polling unnecessary) and should help allay fears about the sheer number and notional magnitude of these derivatives being traded.

Many market professionals remain largely unfamiliar with the specifics of these contracts:

However, for a CDS (credit default swap) contract to be valid, it needs to be backed up by some tangible bonds in the marketplace (even if far smaller in size). Usually that is not a problem, since few companies are debt free. But if corporate events occur which prompt a company to withdraw its bonds—such as a merger—this can suddenly make CDS contracts worthless. . . . For the CDS market is now so monstrously large that the behaviour of the derivatives is exerting an increasingly large impact on the cash market. The tail, as they say, is wagging the dog. (Tett 2006b)

There are actually well-defined protocols for such corporate activities as mergers, acquisitions, spin-offs, and other corporate actions called succession events (which I will not go into here).

I will offer one last thought on underlying mismatches before leaving this topic (as it is one of the main sources of concern regarding credit derivatives). There are a number of (very successful and important) derivative contracts that cover underlyings that themselves are relatively small, illiquid, not traded, or even nonexistent as a stand-alone asset. Dozens of instances come to mind. The Treasury bond futures contracts are on a notional 6 percent (semiannual) coupon twenty-year U.S. Treasury bond; there is no such thing (and even if, by chance, there were today, there

wouldn't be tomorrow). What's made this contract particularly interesting is (1) the fact that it has been, and continues to be, physically settled (giving rise to lists of eligible-for-delivery securities, conversion factors, cheapest-to-deliver instruments, embedded options, etc.) and (2) the fact that the U.S. Treasury stopped issuing bonds for a time. While the futures contracts never stopped trading (though deliverables always did remain) and while a large portion of the volume of trade has shifted

The reason for the staunch resistance to cash settlement of credit derivatives hinges on the process for the determination of what market value really is.

to the ten-year Treasury note futures contract, there is no reason why bond futures, in principle and in practice, could not trade even if there were no deliverables. CMTs (constant-maturity Treasuries) also qualify by this criteria. Eurodollar futures, the most actively traded futures contract in the world, are cash-settled three-month LIBOR futures (and they have their own quirks), but they are nominally on ninety-day deposits (which the Chicago Mercantile Exchange will never make or take). The S&P 500 derivatives complex (futures and options on the futures at the Merc and options on the Chicago Board Options Exchange [CBOE]) pay off based on where the underlying stocks close; we once claimed that there was no S&P 500 cash product, but exchange-traded funds (SPDRs or ticker "SPY") have mitigated that assertion. VIX derivatives traded on the CBOE are contracts that have payoffs based on the implied volatility as determined by several option quotes. OTC variance swaps also have payoffs based on actual volatility (in this case, usually the non-detrended historical variance of returns). There is no variance (per se as an asset) that trades, but no one worries about the settlement of these contracts. Nondeliverable forwards (NDFs) on Chinese yuan or renminbi have paid off without involving the underlying currency, and the foreign exchange (FX) market, the largest market of them all, generally trades on an order of magnitude forty times larger than the volume associated with the entire global value of international trade; if excessive volume or speculation were reasons to terminate trading in a product, FX would be the first to go.

Of course, with every derivative (be it a future, forward, swap, or option), for every seller, there's a buyer, and for every buyer, there's a seller. While I am decidedly not of the opinion that derivatives are zero-sum instruments, I understand the statement that "risk is neither created nor destroyed, just repackaged and redistributed." Given the propagation of derivatives in general and the growth of credit derivatives in particular (and recognizing that many of these OTC trades are leveraged), there are those who think their existence adds risk to the marketplace. Risk is a two-edged sword. Whether one gets long a credit name by buying its corporate bonds or selling credit protection via a credit default swap, the major difference is funding (and therefore leverage). If this fact sounds odd, consider that, far and away, the most common equity derivative strategy is selling puts—synthetically; this overlay strategy, which involves buying (or owning) the underlying stock and writing (or selling) calls against that long stock position, is most often referred to as a buy-write or covered-call or covered-write (or over-write). Many consider this strategy to be a low-risk investment play. Most would consider naked put selling, though, to be extremely risky. The primary difference between these two strategies is basically funding. So why would someone prefer one strategy over the other? That's a good question.

By the way, in 2003 the size of the OTC credit derivative market topped the size of the entire OTC equity derivative market (Banks, Glantz, and Siegel 2007, table 1.2), and this ratio now stands at around five.

Hedge funds and credit derivatives. Although hedge funds have been involved in some of the larger derivative disasters (I once heard someone on a trading floor say, “Long Term Capital Management,” to which someone else interjected, “They were neither. They didn’t last long and apparently didn’t manage their capital very well either.”), many hedge funds understand the risks of derivatives (and credit derivatives in particular) well, use them responsibly and effectively, and provide support and depth to a market dealing in risks that were once concentrated in the banking industry.

Independent of the ongoing trend that continues to see flows into hedge funds, they command under 3 percent of global investable wealth (around \$1.25 trillion). Although any statement that begins with the words “every hedge fund” is likely false (given the range of strategies employed by the myriad hedge funds out there today), most do indeed “hedge.” The most common hedge fund strategies continue to be equity long-short. This approach might involve, for example, going long General Motors stock and short Ford stock. While there are many ways to get market neutral, the main idea is that if the market goes up or down, you’re okay if you’re simultaneously long and short; if the auto sector goes up or down, you’re covered (because you’re long and short). This strategy bases its returns on the specific overperformance/underperformance in the chosen pair of securities. Variants of this strategy typically do not involve very high leverage (either using borrowing to magnify one’s positions or using derivatives to command greater positions than the cash market would provide). Typically, greater leverage is employed in risk arbitrage (that is, merger or takeover strategies) and in convertible bond arbitrage (buying convertible corporate debt, hedging the equity risk by shorting the corporation’s stock, and turning the exposure into a volatility trade). The one strategy that usually involves larger degrees of leverage is fixed income arbitrage; LTCM (which was, after all, primarily a fixed income hedge fund) told its investors that it intended to lever its positions twenty to twenty-five times (that is, for every \$1 they received, they were going to take on \$20 to \$25 of risk). That said, it’s been argued that one of the most problematic aspects of the LTCM debacle is the ease with which the firm was able to lever its positions and access financial resources from the major banks. In that regard, I think the banks have learned their lesson. Nevertheless, Alex Ineichen (2001), a world-class authority on hedge funds, has argued that, “many of LTCM’s strategies would have worked if they could have held onto their assets for some months longer” (7).

Many hedge funds use credit derivatives to lay off risk. Consider one of those convertible arbitrage funds (buying convertible bonds and selling stock). If the funds want to strip out the credit risk of these bonds (which they own), they could pay so many basis points per annum to know that, worst case, they have the right to sell this debt for its face value. On the other hand, some hedge funds are engaged in more sophisticated strategies (for example, buying five-year credit protection on Ford and selling five-year credit protection on General Motors—with no intention of holding this trade for five years). Unlike buying straight corporate debt and attempting to short another corporate bond (thus tying up financial capital), doing two credit default swaps may give the hedge fund exactly the exposure it would like (with only a net capital charge or net margining on the part of its counterparty/counterparties). Chilcote (2006) reports that “hedge funds lost hundreds of millions of dollars, owing to their exposure to derivative contracts and the downgrading of General Motors’ and Ford’s debt in May” (1). One need only hear this assertion to raise the obvious question, If the hedge funds lost, then who won?

Chilcote goes on to characterize “hedge funds . . . that specialize in credit-default swaps” as “secretive.” Louis Moore Bacon is one of the grand old men of the hedge

fund industry (and credited with an extremely impressive track record at Moore Capital). Bacon, at a Hedge Fund Symposium in London in 2000, identified what he called the five warning signs for hedge funds: (1) size (getting too big and exhausting the available investment opportunities within one's area of expertise—and beyond some point morphing from being one of the hunter-gatherers to “becoming the game”), (2) leverage (taking on too much risk), (3) transparency (in tremendously understated fashion, Ineichen [2001] tells us, “Full transparency of current positions is commercially unwise.”), (4) funding (asset and liability mismatches), and (5) hubris (what Lowenstein [2000, 89] has identified as potentially the most dangerous “Greek” of all). Perhaps the greatest detriment to hedge funds today is their association with LTCM (where all five of the above factors came into play in a significant and negative way). At any rate, many hedge funds are understandably reluctant to disclose their positions. Not only is this their stock in trade (that is, their security selection process, hedging techniques, valuation models, portfolio construction methods), but hedge funds know that a market participant with deeper pockets could trade against them.

This scenario is not just the creation of the paranoia of a few hedge fund managers; it is probably far more likely to occur than one would think. Take the case of Amaranth Advisors LLC (a large hedge fund that was based in Greenwich, Connecticut). Amaranth apparently got into trouble in the fall of 2006 with losing positions in energy derivatives, though it did utilize what it referred to as a multistrategy approach and traded convertible bonds as well as other instruments. Amaranth's typical leverage ranged between 6 and 8.

The *Wall Street Journal* reported the following (after Amaranth's \$6 billion loss):

Hedge funds are among Wall Street's biggest customers, and the Street gives them red carpet treatment as the fees roll in. But the Amaranth case shows how Wall Street dealt with a fund after it had traded its way into a deep hole. Information the fund revealed about its holdings as it grasped for a lifeline let other commodity-market players, Wall Street firms included, exploit its positions. As they drove prices relentlessly against Amaranth, its losses swelled, and instead of facing a big but possibly survivable setback, it collapsed. (Davis, Zuckerman, and Sender 2007; also see Stoyeck 2007)

There were disturbingly similar allegations in the case of LTCM.

If someone were to claim that hedge funds constitute a major source of systemic risk, the natural place to start looking for it would be with the investment banks. None of the investment banks or securities houses, to my knowledge, have complained about the fact that around half of all trades on the New York Stock Exchange are done by hedge funds. Furthermore, don't hold your breath—many of the larger investment banks are generating 15 percent, 20 percent, 25 percent or more of their revenues from hedge funds. This revenue is not surprising because many hedge funds trade very actively and opportunistically. In principle, the investment banks, as prime brokers, clearing agents, and flow trading counterparties, should be in an excellent position to properly assess a hedge fund's credit risk and charge/margin for market exigencies, but there is at least the potential for a perceived conflict of interest.

Moreover, Thomas F. Huertas, director of the Financial Services Authority (FSA) in London, has shared his further concerns, as far as margining goes, with *Risk* magazine regarding the issues of rehypothecation, cross-margining, and the geographic and legal access to capital.

Blaming hedge funds in general for market disasters is like blaming well-fed vultures for dead animals; while the two are often seen together, it doesn't mean that one is the cause of the other. Contrary to what seems to be the norm, Alan Greenspan (2005) has praised the ability of hedge funds to make the financial markets more efficient, to bring some contrarian balance in times of overly enthusiastic exuberance, and to provide needed liquidity to markets, especially in turbulent market scenarios.

In situations in which hedge funds have gotten into trouble, we should ultimately look for the real source of the problem (which may have been nothing more sinister than a bad investment or a strategy gone awry). Although it was felt at the time that LTCM required a Fed-orchestrated bailout for the good of the financial system as a whole, subsequent hedge funds have gone away with little in the way of concern that the banking system or financial markets (national or global) might be at risk or in peril. Furthermore, LTCM was atypical (particularly at the time) in its size; it was far and away the largest hedge fund at that time (based on assets under management). It's seldom pointed out that LTCM returned financial capital to investors as investment/trading opportunities in the market waned. With regard to the exceptional events surrounding LTCM, I'd like to quote one authority:

The primary mechanism for regulating excessive leverage and other aspects of risk-taking in a market economy is the discipline provided by creditors, counterparties, and investors. In the LTCM episode, unfortunately, market discipline broke down. LTCM received generous terms from the banks and broker-dealers that provided credit and served as counterparties, even though LTCM took exceptional risks. Investors, perhaps awed by the reputations of LTCM's principals, did not ask sufficiently tough questions about the risks that were being taken to generate the high returns. Together with the admittedly extraordinary market conditions of August 1998, these risk-management lapses were an important source of the LTCM crisis. (Bernanke 2006)

(One can only wonder whether LTCM would be around today if they had utilized credit derivatives as part of their arbitrage strategy.)

The demise of Amaranth is an excellent counterpoint. There was no furor in the financial press (at least, not until the role of the investment banks started to become better understood); there was no talk of a government-sponsored bail-out; and the possibility of collateral damage or systemic risk never even seemed to have been mentioned. Moreover, no one blamed derivatives for this implosion. Amaranth was a hedge fund (but at least part of its portfolio was assumed by another large hedge fund). There were certainly losses, but no former employees appeared on television lamenting the loss of their retirement savings. Maybe we're getting it right. Or, at any rate, bashing hedge funds just because they are hedge funds seems to be losing popularity.

Having worked at UBS, I believe I have some insight into the investment banks' point of view. Alarm bells would surely be tolling if a bank knew that every hedge fund had on exactly the same trade(s); this sort of concentration of risk (gone wrong) may have repercussions for hedge funds' banking counterparties—even if the *klumpen-risk* (the individual net exposure of the broker-dealer to a particular entity) is nominally managed to be small. In essence, if every hedge fund were doing the same thing, although booked as separate institutional relationships, it would be nothing more than a multiple-counterparty LTCM scenario. The job of credit risk control for hedge funds has to be one of the more challenging roles at an investment bank today.

This systemic danger (of hedge funds taking on similar positions) has not gone unnoticed. The European Central Bank (ECB) has warned,

The increasingly similar positioning of individual hedge funds within broad hedge fund investment strategies is another major risk for financial stability which warrants close monitoring despite the essential lack of any possible remedies. This risk is further magnified by evidence that broad hedge fund investment strategies have also become increasingly correlated, thereby further increasing the potential adverse effects of disorderly exits from crowded trades. (2006, 142)⁶

The influx of financial capital into hedge funds, in conjunction with the concentration of trading strategies in this universe, probably explains the recent less-than-stellar industry performance.

To say that hedge funds have been under tremendous, continual, ongoing scrutiny would be an understatement. The question is whether (and how) regulatory intermediation would help. Greenspan spoke at an IMF Conference in Beijing in June 2005 on hedge funds; *Risk* magazine reported as follows:

Greenspan said (beyond his belief that some market participants were taking on “risks for which their compensation is inadequate,” that the hedge fund industry had expanded too quickly and should temporarily shrink, and that CDO returns were destined to be disappointing in the near term) he was not particularly concerned that this may have a negative impact on financial stability, as long as banks and other lenders are managing their credit risks effectively. (2005, 10)

In other words, for those who qualify as eligible investors in hedge funds, *laissez faire*, and as for the investment banks that are the ultimate risk watchdogs, watch your credit risk! As Juvenal asks, though, “*Quis custodiet ipsos custodes?*” (Who will guard the guardians?)

I’d like to make one last point about hedge funds and credit derivatives. Philippe Jorion (2005), a recognized authority on risk management (both market risk and credit risk), reports an interesting (and possibly surprising) fact about the use of credit derivatives by hedge funds (based on a 2003 BBA survey): “Hedge funds and securities firms . . . are fairly balanced, each with about 16% of protection buyers and sellers” (546).

This statement makes you wonder where the credit risk is going, then, doesn’t it?

Operational risks. When I first entered the financial world, it was with a proprietary option trading firm based in Chicago known as O’Connor and Associates. At the time, much of its trading took place on exchange floors (in Chicago and around the world). O’Connor was recognized as being among the best at what it did (and what it claimed to understand, better than anyone else, was risk management). For an O’Connor trader, there was one ultimate cardinal sin—not knowing your position. It is this unpardonable offense, for the world of credit derivatives generally, that has led to well-warranted criticism and ill-informed hysteria.

Greenspan, over the years, has been among the staunchest defenders of derivatives, claiming that they reallocate risk into the hands of those who are best capable to take on, to warehouse, and to dynamically manage those risks. In 1999 Greenspan said, “By far the most significant event in finance during the past decade has been the extraordinary development and expansion of financial derivatives. . . . These instruments enhance the ability to differentiate risk and allocate it to those investors

most able and willing to take it . . . a process that has undoubtedly improved national productivity growth and standards of living” (1999).

There are also those at the other end of the spectrum. Indeed, there have been some interesting articles comparing and contrasting the thoughts and beliefs of Alan Greenspan and Warren Buffett on this topic since both have been outspoken on the uses and value of these instruments (see Weinberg 2003). For those who have not been following these discussions, Buffett has labeled derivatives “financial weapons of mass destruction.” It’s been said that much of what Buffett has claimed is disingenuous because he has used derivatives himself, but he does make an important point to be revisited later.

It is interesting, then, to hear of not only a criticism of derivatives from Greenspan but to hear of a Federal Reserve intervention (back in September 15, 2005) ordering a group of credit derivatives dealers “to get their act together” on the heels of a revelation that significant unprocessed credit derivative trades were outstanding—the cardinal sin. How can one manage risk if one doesn’t know what the risks are? And how can one know what the risks are if one doesn’t know what one’s positions are?

Timothy Geithner, president of the Federal Reserve Bank of New York, last year touched on (and reiterated) this potential problem:

These concerns . . . suggest the need for greater caution by financial institutions in several important areas. . . . It is very important that the major dealers make the investments necessary to improve the operational infrastructure that underpins the credit derivatives and broader OTC derivatives markets. Operational risk and infrastructure failures have played a prominent role in past financial crises, and the infrastructure weaknesses that have characterized the credit derivatives markets since their inception are an ongoing source of concern. (2006, 3)

Since the September 15, 2005, castigations (which reflected concerns originally articulated in June 1999 on the heels of the LTCM disaster),⁷ the industry has worked diligently to reduce those trade backlogs and expedite the processing, confirmation, and settlement of credit derivatives. Originally, the fourteen banks agreed, among other things, to cut the number of unsigned trades by 70 percent before July 2006. Not only was that goal exceeded,⁸ but in 2005 the larger credit derivative traders reduced the average confirmation lag from twenty-three days to sixteen days.

The FSA (the U.K. financial regulatory authority) in their *Financial Risk Outlook 2006* wrote,

Credit derivatives provide a valuable mechanism through which financial market participants can manage their credit risk, bringing together those who wish to reduce credit exposures with those who are prepared to increase them. The market

6. This sentiment was also contained in the International Monetary Fund’s annual report (2005), which suggested that there might be a meltdown in the credit derivatives market if all the investors were to “run for the exit at the same time.”

7. These concerns were outlined in a document known as “Improving Counterparty Risk Management Practice,” put out by the Counterparty Risk Management Policy Group under the direction of Gerald Corrigan and Stephen G. Thieke and then updated and reissued, again by Corrigan, in July 2005 with the title “Toward Greater Financial Stability—A Private Sector Perspective,” addressing current topics of concern.

8. “Credit derivative dealers have reduced a backlog in processing trades by more than 80%, more than their target, an industry trade association said” (Credit derivative banks 2006).

has continued to grow at a rapid pace and firms such as hedge funds have become increasingly important, as both buyers and sellers of these instruments. Operational and legal risks may arise if the market is unable to keep up with this growth.

Without confirmation that a trade has taken place, parties to the transaction are exposed to legal and financial uncertainty. If a credit event occurs while a credit-derivative transaction remains unconfirmed, doubt as to its legal validity and contractual responsibilities could prevent the transaction from being executed. This uncertainty could create liquidity problems and act as an accelerant in a financial crisis. (2006, 15)

Similarly, Platt (2006) tells us, “The rapid growth in global credit derivatives is putting stress on settlement systems and operational controls, despite significant progress in clearing a big backlog of unconfirmed trades.” Although improvements are reassuring, this concern over the recent rapid growth points to the possibility of a catalyst for a systemwide breakdown. It is neither the instruments themselves nor the fact that hedge funds are increasingly involved in credit derivatives that constitutes the greatest concern. Operational risk is certainly a well-founded consideration on its own.

Some initiatives have been proposed that could act to mitigate some of the operational risks. For one thing, the European exchange Eurex started trading futures on the iTraxx index at the end of March 2007. These futures behave like the credit default swaps that trade over the counter but with the exchange counterparty support (reducing counterparty risk), with much more transparent pricing, and with the associated daily mark-to-market margining. The Chicago Mercantile Exchange has also reported its intention to list credit event futures contracts (originally targeted for first quarter 2007, revised to a June 17, 2007, start date) and, as usual, the CBOE is close behind. As is not uncommon, given the rivalry between the OTC market and the exchanges, the banks initially declined to participate in trading these exchange-listed contracts, one head of credit trading in London calling the contracts flawed.

So What Are the Risks?

Early problems. Mention was made of glitches in the development of credit derivative products and markets. There are some classic errors that were made early on in this market’s history (many of which have achieved almost folklore status). In one instance, namely Anderson, credit protection was sold and bought on a company that turned out to be a parent/holding corporation that did not have any outstanding debt. In essence, there were no deliverables. This sort of slip has been addressed, among other safeguards, by the creation of the REDs (Reference Entity Database Service), which is intended to eliminate any ambiguity regarding the precise legal names of counterparties (that may have similarly labeled affiliates or possibly unrelated but close-sounding names) and which links a particular name to a specific debt issue. For the purposes of, say, a credit default swap, this service ensures that the credit being traded is properly identified. For the record, what one is buying/selling protection on, in terms of the institution and the level of debt (for example, senior unsecured) referenced, may differ from the deliverables in the case of a credit event—obviously an issue, but hardly a source of systemic risk.

A facet of this market that is often not discussed is the bilateral nature of a credit default swap. Reference has been made to these contracts as options—specifically put options on debt. A credit default swap (CDS), though, is a swap (not an option)

and can be triggered by either the buyer of protection (which is what most of us think of) or the seller of protection. One might ask why a protection seller would trigger a CDS when that action would result in his/her receiving defaulted debt that is trading, say, 70 cents on the dollar. The answer is that there are a number of reasons why a protection seller may wish to do this. Perhaps the most important (particularly in the early days before the standardization of the documentation, or “standard docs”) involved the need for a market maker who had, say, sold protection for 45 basis points and then purchased it, from another counterparty, for 42 basis points (if this trade is not assigned) to ensure that there was not a substantive difference between the debt that was being received and the debt that was required for delivery (which, at some point, involves a notice of physical settlement—a letter indicating the specifics of the debt that is going to be proffered). If the market were to continue with physical settlement, this procedure could pose a systematic concern, but, in light of the new auction process (and accompanying cash settlement), is not a cause for a systemic breakdown.

Conseco. Because of its landmark nature, let me very briefly review the Conseco case. In September 2000, Conseco (an insurer, lender, and financial services company based in Indiana) found itself in financial difficulty. It had acquired a home lender known as Green Tree Financial, which made mobile home loans; unlike most home equity loans, where the value of the home tends to rise, this often is not the case with mobile homes. Conseco, therefore, experienced an urgent need for financing and, through its bankers (Bank of America and Chase Manhattan), was able to renegotiate its debt. Officially, this renegotiation constituted a credit event (under the category of restructuring). It was alleged that at least one of the banks, having bought credit protection on Conseco, subsequently triggered credit default swaps. Moreover, since there was not a bankruptcy (in which the majority of debt might have traded *pari passu*) because Conseco was still a viable business, there remained a credit term structure. Longer-dated Conseco debt was trading 68 cents on the dollar (whereas the extended fifteen-month loan was trading 92 cents on the dollar). Those who had bought protection and chose to exercise obviously delivered the longer-dated debt. The subsequent clarification of exactly what constitutes restructuring, who may “call” the credit event, and what may be delivered (leading to the definition of modified restructuring, or “Mod R,” which requires the deliverable to be like the protection traded) reflects some of the growing pains associated with the credit derivative marketplace.

Credit risk models. It has long been known that credit risk is not an easy nut to crack (read, “concept to model”). Anyone who has ever traded options, for example, knows that the Black-Scholes formula does not precisely fit the real world, but for European-style options on non-dividend paying stocks, it works fairly well. There are a great many quotes along the following lines: “Models are to be used, but not to be believed,” “All models are wrong” and “I’ll take a good trader over a great model any day.” Nevertheless, models have their uses. Why is modeling credit risk so difficult?

As far back as 1999 (the year of the publication of the first comprehensive, standardized ISDA credit derivative documentation), Phelan and Alexander concisely summarized what they perceived to be the primary impediments to developing a framework for evaluating credit risk:

Credit risk is more difficult to model than market risk for several reasons. First, the lack of a liquid market makes it difficult—or impossible—to price credit risk for a specific obligor and tenor. Second, true default probabilities in the market

cannot be observed. Users must determine these probabilities by either inferring default rates based on observed historical experience of the public credit ratings, using a model such as KMV's Credit Monitor, or determining the default rate through a subjective credit approval process. Third, default correlations are quite difficult to observe or measure, making it hard to aggregate credit risk. And fourth, to calculate the equity/capital cushion, it is necessary to estimate the tail risk probabilities of asymmetric, fat tailed loss distributions. (1999)

There are some substantive difficulties listed here.

Jorion (2005) tells us in his *Financial Risk Managers Handbook*, "Risk management starts with the pricing of assets" (3). Theoretical valuation is the key to understanding and managing risk.

It is no surprise that when one looks at aggregate market data on credit derivatives broken down by market participant (whether from BBA, Risk, ISDA, or Fitch), it appears that banks/dealers account for about half of the buying and half of the selling. In short, the market makers are probably acting as market makers. When I was at UBS, it drew a distinction between what it called "flow business" and "structured business"—the former being primarily a market-making operation or market conduit and the latter generating trades that would likely not be backed-to-back (even if they were ultimately hedged using more standardized credit products). If a market maker is running a matched book, the removal of one link in the settlement chain should not be particularly problematic (and certainly shouldn't bring down a systemic cataclysm). For that reason, as long as the dealers properly manage their credit risk (in the sense of counterparty collateralization and risk capital), one would think a credit event—even on a big name like GM—wouldn't start a meltdown. One hedge fund trader once lamented that one of the large banks kept asking him to share his positions (which he was adamant he would not do); the trader indicated that he was more than willing to incur capital charges and margining based on his direct exposures to that bank but that he would not disclose his portfolio to that institution; as mentioned earlier, this sort of reluctance on the part of most hedge funds to share their positions is understandable. In one of the less cogent articles suggesting that credit derivatives might result in the systemic breakdown of the financial markets, Chilcote (2006) noted that "Long-Term Capital management did not disclose its risk or positions to investors or counterparties" (1). This observation runs counter to the criticisms of former LTCM principals who claim, in their search to find a source of financial support to allow them to weather the Russian debt crisis, that they were taken advantage of by the larger banks once their positions had become known.

Back to valuation, why is credit risk so difficult? When we consider credit events, we are talking about low-likelihood, tail probabilities (which are often recognized as particularly unstable). James (1999) told us, "there is no robust way of finding the fair value of a credit derivative" (1). Partnoy and Skeel (2006b) go one step further; with regard to credit derivatives, they write, "The mathematical precision of the models is illusory" and "If the mathematical models have serious limitations, how could they support a multi-trillion dollar industry?" One of the most difficult modeling issues involves the portfolio risk management of credit risk. At issue is the determination of the correlation between defaults, a consideration particularly important in tranching products (such as synthetic collateralized debt obligations and first-to-default structured products). One hears credit risk modelers talk about such things as fat tails, copulas (elliptical, Archimedean, extreme value, Clayton's, Frank's, Gumbel's), and conditional correlation coefficients. Unfortunately, our intuition, in the context of

credit derivatives, often fails. For example, financial theory typically advocates the benefits of portfolio diversification, but, as those familiar with first-to-default products understand, a diversified credit pool is not a good thing for the investor.⁹

The autos: What went wrong? The automobile manufacturer downgrade in 2005 surprised some investors, who lost money and, at first, did not understand why. Let's look at this event in a bit more detail.

On May 5, 2005, Standard and Poor's, the credit rating agency, downgraded Ford one notch to BB+ and GM two notches to BB (these moves signifying a change in their debt ratings from investment grade to subinvestment grade or "junk"). Although S&P had given anticipatory hints that these downgrades were possibly to be expected, the market response was immediate and chaotic.

By the date of the downgrade, many hedge funds were engaged in capital structure arbitrage on the automakers. This arbitrage often involved trading debt versus equity or one level of debt (such as senior unsecured) versus another level of debt (such as junior subordinated). One trade that many hedge funds used was a long bond and short stock position; the idea was that if the automakers did poorly, the ability to recoup something on the debt was relatively high (given that some recovery value on the bonds was to be expected), whereas if the company went under, the equity would likely be worthless. Many hedge funds, instead of buying the bonds, effectively got long the auto credit risk (synthetically) by selling protection through credit default swaps and then short sold the stock (or effectively got short by purchasing equity put options). What could go wrong?

Blaming hedge funds in general for market disasters is like blaming well-fed vultures for dead animals; while the two are often seen together, it doesn't mean that one is the cause of the other.

After the downgrade, the price of protection skyrocketed. On their credit trade, hedge funds had a mark-to-market loss. One would think the equity (being subordinate to the debt in case of distress or impending bankruptcy) would lead the bonds, and this presumption is reasonable. But, at that time, in a very public way, an opportunistic corporate raider named Kirk Kerkorian suggested that he might want to acquire a large block (28 million shares) of GM stock at \$31 per share (a 13 percent premium over the previous closing price). GM equity took off (causing those who were short the stock—or long the equity puts—to experience a mark-to-market loss); for those using stock as a hedge for their credit derivatives, they lost on their hedge too.

There were other trades that hedge funds had on that also blew up. We have not gotten into the details of some of the more structured index credit derivatives, but some hedge funds traded tranches of portfolios of credit risk. In selling protection on the equity tranche (which isn't equity at all, but debt—though, like equity, this tranche experiences the first losses) and hedging by buying protection on the mezzanine tranche (which takes the next hit) of various structured credit derivatives, essentially these investors were entering into a correlation trade. In the case of the automakers in May 2005, what we saw was a case of correlation gone wrong. The impact on Ford and GM was huge, but other corporate spreads were essentially unchanged. The price of protection on the equity tranche tripled, rising from 16 percent to 50 percent, whereas the mezzanine tranche was unaffected.

9. Any reader interested in the underlying mathematics is directed, as a first step, to Malevergne and Sornette (2006).

Table
Tightening of the Bid-Ask Spread over Time

February 23, 2005		May 15, 2007	
GMAC	225–235	GMAC	166–170
GM	285–295	GM	430–435
Ford	230–240	Ford	544–549
IBM	12–22	Boeing	8–12
HPQ	20–30	Dow	31–34
Lehman	22–27	Citi	9–11

Note: Spreads are shown in basis points.

Liquidity. One of Warren Buffett's favorite similes goes something like this: Derivatives are like hell—easy to enter and almost impossible to exit.

Although this characterization may be glib, it touches a nerve. Liquidity does constitute a systemic concern. There are different definitions and, therefore, measures of liquidity, but in this context, it refers to the ability to trade continuously in markets made up of several competing dealers with reasonable two-sided bid-offer spreads offering conventional trading volumes.

There is grave concern that if a number of

names simultaneously experienced credit events, the system would grind to a halt.

On this count, although one usually thinks of the large investment banks as the market makers, hedge funds may actually prove helpful. Dodd (2006) tells us, “The OTC market in credit derivatives is often cited as a case in point where hedge funds play a critical role in market liquidity. Indeed it is likely the case that market depth and bid-ask spreads are improved by the participation of hedge funds.”

One of the simpler (and arguably wanting) measures of liquidity is the bid-ask spread. Incorporated into that basis point differential (quoted annually for standard five-year protection) is a reflection of the number of market participants, the evolving transparency and convergence of valuation, the willingness of the dealers to broker credit risk, the reduction of market maker edge, and the general competitiveness of this area. The table shows a few representative examples of how this bid-ask spread has changed over the past couple of years. Based on these market quotes, the bid-ask spread has tightened (reflecting competition, market participation, and market liquidity) from around 10 basis points in 2005 to a range of 2 to 5 basis points in 2007.

Perhaps of greater concern regarding liquidity, though, would be the response of the broker-dealer community—either in their unilateral response to simultaneous large-scale credit events or in the treatment of their counterparties under such a scenario. Of course, two-sided trade flow is the lifeblood of a market maker; without that flow, the best a trader can hope for is to dynamically manage his risks as they accumulate—and this point brings us back to hedging, modeling, and valuation.

Small number of dealers. In 2004, 81 percent of credit derivatives bought and 75 percent of credit derivatives sold were accounted for by only fifteen large banks. When the New York Fed summoned the credit derivatives dealers on September 15, 2005 (to admonish them for their operational shortcomings in credit derivatives), only fourteen institutions were present. The most recent Fitch Global Credit Derivatives Survey (September 21, 2006) reports that the top ten institutions make up 66 percent of the volume in credit derivatives. Even that figure may be misleading since the majority of the volume in credit derivative trading is done by four counterparties: JP Morgan, Morgan Stanley, Deutschebank, and Goldman Sachs.

While the small number of dealers involves industrial organization, it bemoans the fact that a large percentage of the volume of credit derivative trading is concentrated in the hands of a relatively few dealers.

Greenspan admits, “One development that gives me and others some pause is the decline in the number of major derivatives dealers and its potential implications for market liquidity and for concentration of counterparty credit risk” (2003).

There is no doubt that an unexpected departure of any one of these primary dealers would have very negative repercussions on the credit derivatives market. But, not to be dismissive, in light of the fact that credit derivatives account for only about 7 percent of the OTC derivatives volume and cognizant that all these banks are major players in most of the OTC derivatives markets, a number of market participants would probably have more to worry about than credit derivatives.

Legal risk. At the end of the day, credit derivatives are almost exclusively unique bilateral OTC contracts and, as such, are only as good as the contractual documentation the attorneys draft. This fact explains the preponderance of lawyers on and around credit derivative desks.

In the world of derivatives, some still remember a trade (an interest rate swap contract) entered into by the local U.K. municipal authorities of Hammersmith & Fulham; when interest rates moved against the municipal government's position, they sought (and eventually obtained from the House of Lords) a formal judgment ordering the nullification of the transaction as illegal.

In the world of credit derivatives, a number of issues have ended up in court. Most recently, Bear Stearns bought protection from Aon on a Philippine corporate backed by a government agency. Aon then bought protection from Société Générale on the Republic of the Philippines.

When the Philippine agency withdrew its backing of the Philippine corporate, this withdrawal constituted a credit event on the Bear Stearns-Aon CDS but did not trigger the Aon-Soc Gen CDS. The 2nd U.S. Circuit Court upheld the content of the respective contracts, lending support to the process and providing additional confidence in the use of standard documentation.

An incredibly disturbing statistic highlights the importance of maintaining proper legal documentation: A September 2004 Fitch report indicated that in some 14 percent of credit derivative claims, there have been subsequent legal proceedings. "In some instances, the disputes have involved assertions that one of the parties breached fiduciary duties owed to its counterparty, the risks associated with the transaction were not adequately disclosed, or the transaction was not suitable for the counterparty." Caveat vendor! (Seller beware!)

Insider trading. Allegations of insider trading have even been made in the credit derivatives market from both the practitioner community (Joint Market Practices Forum 2003; Credit default swaps 2006) and the academic community (Acharya and Johnson 2005). Insider trading rules are well defined for "securities," but OTC credit derivatives formally fall outside their purview. What this consideration really speaks to is the potential for material nonpublic information flow within the larger broker-dealers.

And, really, after consideration of all these risks, what is the worst that could happen? Stephen Ross tells us,

As a general rule, regulatory and legislative activity follows any period of financial tragedy, and, however well intentioned, its statutes are often structured in some haste and as much in response to the drama of the events as to the logic. Not unexpectedly, they usually take the form of prohibiting certain activities that were held up by the media as grotesque examples of abuse, and rarely do they take account of the reality that the cure might be worse than the disease. . . . What is remarkable is not the failures, but rather how exceptional they are and how well the market system seems to work overall. (2000)

Conclusion

The mission of the Federal Reserve System falls into four categories (my emphasis added):

- conducting the nation's monetary policy by *influencing* the monetary and *credit conditions in the economy* in pursuit of maximum employment, stable prices, and moderate long-term interest rates;
- *supervising and regulating banking institutions to ensure the safety and soundness of the nation's banking and financial system* and to protect the credit rights of consumers;
- *maintaining the stability of the financial system and containing systemic risk that may arise in financial markets*;
- providing financial services to depository institutions, the U.S. government, and foreign official institutions, including playing a major role in operating the nation's payment system. (BOGFRS 2005, 1)

There is no doubt that credit derivatives affect at least three of these duties in a significant way. The probability of systemic risk in the banking industry stemming from macroeconomic events related to credit derivatives is probably much lower than in the past because of the dissemination of default risk among a broader investor base. This claim may not be true, though, of the insurance industry (“insurance companies account for only 1% of protection buyers versus 20% of protection sellers” [Jorion 2005, 523]). For the financial system as a whole—recognizing that hedge funds, on balance, supply and demand comparable magnitudes of credit derivatives to and from the market—hedge funds would appear to provide a buffer for traditional lending institutions. One caveat is the potential for concentration risk if hedge funds all end up taking on the same (losing) positions.

The distribution of risk has its downside, though, in terms of control. Some may recall the days when the Fed targeted the money supply. Because banks were so clever at creating money substitutes (regardless of the various definitions of money: M1, M2, M3b), eventually the Fed simply gave up attempting to control or target the monetary aggregates. One wonders whether there is an analogue at work with the control of credit risk (through credit derivatives).

The impressive growth of the marketplace for credit derivatives speaks for itself. Recent developments in the settlement procedure, reductions in operational risks, and other advances to improve the clearing, transparency, and liquidity of the market bode well for the continued success of these products. Nevertheless, potential concerns still remain: These include moral hazard associated with the due diligence responsibilities of those involved in the debt origination process; the relatively small number of large broker-dealers; potential conflicts of interest (given the role of the banks as hedge fund counterparties in conjunction with their traditional role in a lending/credit function); the ability to manage credit/counterparty risk; the challenges associated with modeling and hedging the more complex of the credit derivatives; liquidity; and, as always, legal risks.

Considering catastrophic or systemic risks brings to mind a quote from Donald Rumsfeld:

As we know, there are known knowns; there are things we know we know. We also know there are known unknowns; that is to say we know there are some things we do not know. But there are also unknown unknowns—the ones we don't know we don't know. (U.S. Department of Defense 2002)

Here is one last conjecture for a potential source of systemic credit risk. Donald Perry wrote:

A hot topic of debate has been the financial shock that precipitated the stock market crash of 1929. Following that decline there was increasing unemployment, business bankruptcy, bank failure and deflation. Similar conditions are being mirrored today. . . . We have the largest debt bubble in history at a time when there is growing business failure and unemployment. As continuing growth in debt and the derivatives market weaken the US and world financial condition, some have wondered what future shock could precipitate a massive economic collapse similar to 1929? . . . There is speculation that the shock may come from the combination of Iraq war costs, increasing terrorism, tax cuts, unemployment, weakening pricing power, and travel aversion. Whatever the merits to such speculations, a more sobering shock appears to be on its way. I am referring to Severe Acute Respiratory Syndrome (SARS), an infectious disease that originated in southern China around November of last year and can result in a type of fatal pneumonia. . . . Although I am not a financial expert, I wonder if this disease may become the needle or 'shock' that could pop the debt and derivative bubbles. (2003)

Will avian flu, after all, be the final straw?

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