

For release on delivery
9:30 a.m. EDT (8:30 a.m. CDT)
May 5, 2005

Remarks by
Alan Greenspan
Chairman
Board of Governors of the Federal Reserve System
via satellite
to the
Federal Reserve Bank of Chicago's
41st Annual Conference on Bank Structure
Chicago, Illinois
May 5, 2005

Chicago is the birthplace of modern financial derivatives markets. So this conference seems an appropriate place in which to reflect once more on the prodigious growth of these risk-transfer instruments and their implications for financial stability. Two years ago at this conference I argued that the growing array of derivatives and the related application of more-sophisticated methods for measuring and managing risks had been key factors underlying the remarkable resilience of the banking system, which had recently shrugged off severe shocks to the economy and the financial system. At the same time, I indicated some concerns about the risks associated with derivatives, including the risks posed by concentration in certain derivatives markets, notably the over-the-counter (OTC) markets for U.S. dollar interest rate options. Today I will pursue those concerns about concentration in greater depth, drawing on discussions that Federal Reserve staff have had with market participants. I will also address concerns that some observers have expressed about the use of credit derivatives to transfer risk outside the banking system and about the growing role of hedge funds in bearing risk in derivatives markets and the financial system generally.

Derivatives: Potential Benefits and Risk-Management Challenges

Perhaps the clearest evidence of the perceived benefits that derivatives have provided is their continued spectacular growth. As a consequence of the increasing demand for these products, the size of the global OTC derivatives markets, according to the Bank for International Settlements (BIS), reached a notional principal value of \$220 trillion in June 2004. Indeed, the growth rate of the OTC markets was more rapid in 2001-04 than over the previous three years. At the same time, the growth rate of exchange-traded derivatives exceeded the growth rate of OTC derivatives over 2001-04. Throughout the 1990s, the Chicago futures and options exchanges debated whether the growth of the OTC markets was good or bad for their markets.

The data seem to have resolved that debate. In the United States, the Commodity Futures Modernization Act of 2000 has permitted healthy competition between the exchanges and the OTC markets, and both sets of markets are reaping the benefits.

The benefits are not limited to those that use derivatives. The use of a growing array of derivatives and the related application of more-sophisticated approaches to measuring and managing risk are key factors underpinning the greater resilience of our largest financial institutions, which was so evident during the credit cycle of 2001-02 and which seems to have persisted. Derivatives have permitted the unbundling of financial risks. Because risks can be unbundled, individual financial instruments now can be analyzed in terms of their common underlying risk factors, and risks can be managed on a portfolio basis. Partly because of the proposed Basel II capital requirements, the sophisticated risk-management approaches that derivatives have facilitated are being employed more widely and systematically in the banking and financial services industries.

To be sure, the benefits of derivatives, both to individual institutions and to the financial system and the economy as a whole, could be diminished, and financial instability could result, if the risks associated with their use are not managed effectively. Of particular importance is the management of counterparty credit risks. Risk transfer through derivatives is effective only if the parties to whom risk is transferred can perform their contractual obligations. These parties include both derivatives dealers that act as intermediaries in these markets and hedge funds and other nonbank financial entities that increasingly are the ultimate bearers of risk.

Concentration in Derivatives Markets: The Case of U.S. Dollar Interest Rate Options

Financial consolidation has reduced the number of firms that, by acting as dealers, provide liquidity to the OTC derivatives markets. Two years ago I expressed particular concern

about the implications of dealer concentration for risks in derivatives markets. Among the markets identified as appearing to be especially concentrated were the markets for U.S. dollar interest rate options. Those markets have become increasingly large and important as the U.S. markets for fixed-rate mortgage-backed securities (MBS) have grown and as an increasing share of those securities have come to be held by investors that manage the prepayment risks associated with those instruments. The dealers intermediate between these mortgage hedgers, who seek to purchase swaptions and interest rate caps, and sellers of various types of interest rate options. The mortgage hedgers include Fannie Mae and Freddie Mac and mortgage servicers. The options sellers include issuers of traditional callable debt and issuers of structured notes with interest rate caps or other embedded options. Hedge funds at times have been important sellers of options and suppliers of options market liquidity, especially during periods when increases in interest rate volatility have caused spikes in options prices.

Concentration in the OTC options markets raises at least three specific concerns. First, market illiquidity may result from a leading dealer's exit and that illiquidity has the potential to adversely affect Fannie and Freddie and other hedgers of mortgages and MBS. Second, meeting the demands for options by mortgage hedgers involves market risk to dealers, a concern that has been heightened by the fact that the notional value of options sold by dealers significantly exceeds the notional value purchased. Third, the failure of a leading dealer could result in counterparty credit losses for market participants.

The extent to which these concerns are valid depends on how effectively market participants manage market risk and counterparty credit risk. To obtain information on participants' risk-management practices, members of the Federal Reserve staff last summer

interviewed some of the leading market participants, including Fannie and Freddie and half a dozen leading derivatives dealers.

The potential for a dealer's exit to adversely affect mortgage hedgers is dependent upon hedgers' diversification of counterparties, the way in which hedgers use options, and the underlying reason for such an exit. Fannie and Freddie have about twenty dealers as options counterparties, including investment banks and foreign banks as well as U.S. commercial banks. However, only about five or six of them have direct access to the supply of options from debt issuers; the others must depend on the interdealer market for a substantial portion of their supply. The exit of one of these five or six may or may not adversely affect market liquidity, depending on the reason for the exit and on the way in which other dealers react. If a dealer is forced to exit because of a credit problem unrelated to its options dealing, other dealers are likely to take its place quickly. If the exit is the result of losses from options dealing, possibly in difficult market conditions, other dealers with similar positions are likely to be pulling back as well, which could leave the options markets quite illiquid.

In any event, Fannie and Freddie and other mortgage hedgers do not rely on continuous liquidity in the options markets. Rather, they purchase options periodically and opportunistically. Provided that options market illiquidity is not protracted (say more than a month), they could postpone transacting in those markets until liquidity returns, without exceeding their internal risk limits. By contrast, mortgage hedgers do rely on continuous liquidity in the swaps market because they currently use swaps to execute dynamic hedges of the prepayment risk that is not hedged up front with options, and those markets are less concentrated and easier to intermediate than the options markets. Still, as the hedgers are aware, the supply of liquidity available to them in the swaps market is not unlimited. Their periodic purchases of

interest rate options are intended to limit their reliance on dynamic hedging and their potential demands on swaps market liquidity. Nonetheless, concerns about potential disruptions to swaps market liquidity will remain valid until the vast leveraged portfolios of mortgage assets held by Fannie and Freddie are reduced and the associated concentrations of market risk and risk-management responsibilities are correspondingly diminished.

Articles that appeared in the financial press in early 2004 called attention to the fact that the BIS data showed that the notional value of U.S. dollar interest rate options sold by OTC derivatives dealers exceeded the notional value of options purchased. This difference had been growing as the options markets had grown and had reached more than \$800 billion in notional value (an amount equal to 15 percent of the notional value of options purchased) as of year-end 2003. Not surprisingly, an analysis of risks based solely on notional amounts turns out to be misleading. The interviews that Federal Reserve staff members conducted last year indicate that dealers run fairly well-balanced books in terms of sensitivities to changes in interest rates and especially to changes in interest rate volatility. The options that dealers sell tend to have terms that create less sensitivity to changes in interest rate volatility than the options that they buy. Thus, in order to limit the overall sensitivity of their options portfolios to changes in interest rate volatility, dealers must sell a larger notional value of options than they buy.

Because the terms of the options that they sell differ substantially from the terms of the options that they buy, dealers do assume significant basis risks, and their hedging strategies are dependent on options market liquidity when rates and volatilities are changing rapidly. In general, such risks are monitored and limited by various internal controls. If the options markets were to become illiquid, dealers could suffer significant losses; but their controls appear to be

sufficiently tight that the losses seem quite unlikely to be large enough to jeopardize such large, diversified intermediaries.

Participants in the OTC derivatives markets typically manage their counterparty credit risks to dealers by transacting only with counterparties that are perceived to be highly creditworthy, by entering into legal agreements that provide for closeout netting of gains and losses, and with the exception of most exposures to the few Aaa-rated dealers, by agreeing to collateralize net exposures above a threshold amount. All the major participants in the markets for U.S. dollar interest rate options markets that Federal Reserve staff interviewed follow these practices. The widespread use of collateral, in particular, usually is a powerful means of limiting counterparty credit losses.¹

However, when counterparties hold very large net positions in illiquid markets, as the hedge fund Long-Term Capital Management (LTCM) did in 1998, the effectiveness of collateral as a risk mitigant may be reduced significantly. In such circumstances, when the nondefaulting counterparties seek to close out their positions with a defaulting counterparty, those actions can cause market prices to move rapidly in directions that may amplify losses to levels significantly exceeding even very conservative collateral requirements. In contrast to LTCM, however, dealers typically limit the size of their net open positions in markets, even though their gross positions often substantially exceed the size of LTCM's. Thus, the collateralization of exposures to dealers is likely to be quite effective in limiting the counterparty risks from dealer concentration. Nonetheless, participants in the interest rate options markets and other derivatives markets should carefully evaluate the potential market effects of the failure of a dealer or any

¹ Concerns about the availability of high-quality collateral sufficient to meet the growing demands in these markets have abated as the use of cash as collateral has become widespread. The International Swaps and Derivatives Association estimates that, at the beginning of 2005, cash accounted for nearly three-quarters of the collateral held to support derivatives exposures.

other large market participant and the ways in which such effects could magnify both their counterparty credit risks and their market risks.

In summary, as we have come to understand more clearly how participants in the OTC interest rate options markets use those markets and manage the risks associated with their use, wariness about concentration in these markets, though diminished, has not disappeared. The Federal Reserve remains concerned that the stress tests that some large participants are using to evaluate potential losses in the event of a large participant's default do not fully capture the potential interaction of counterparty credit risk and market risk, especially in concentrated markets.

Use of Credit Derivatives to Transfer Risk outside the Banking System

Perhaps the most significant development in financial markets over the past ten years has been the rapid development of credit derivatives. Although the first credit derivatives transactions occurred in the early 1990s, a liquid market did not emerge until the International Swaps and Derivatives Association succeeded in standardizing documentation of these transactions in 1999. According to the BIS, the notional value of credit derivatives outstanding increased sixfold between 2001 and 2004, reaching \$4.5 trillion in June of last year. Moreover, this growth has been accompanied by significant product innovation, notably the development of synthetic collateralized debt obligations (CDOs), which allow the credit risk of a portfolio of underlying exposures to be divided or "tranching" into different segments, each with different risk and return characteristics. Recent growth of credit derivatives has been concentrated in these more-complex structured products.

As is generally acknowledged, the development of credit derivatives has contributed to the stability of the banking system by allowing banks, especially the largest, systemically

important banks, to measure and manage their credit risks more effectively. In particular, the largest banks have found single-name credit default swaps a highly attractive mechanism for reducing exposure concentrations in their loan books while allowing them to meet the needs of their largest corporate customers. But some observers argue that what is good for the banking system may not be good for the financial system as a whole. They are concerned that banks' efforts to lay off risk using credit derivatives may be creating concentrations of risk outside the banking system that could prove a threat to financial stability. A particular concern has been that, as credit spreads widen appreciably at some point from the extraordinarily low levels that have prevailed in recent years, losses to nonbank risk-takers could force them to liquidate their positions in credit markets and thereby magnify and accelerate the widening of credit spreads.²

A definitive evaluation of these concerns about nonbank risk-takers would require information on the extent of credit risk transfer outside the banking system and on the identities and risk-management capabilities of the entities to which the risk has been transferred. Unfortunately, available data do not provide this information. Data on the size of the credit derivatives markets are limited largely to the notional principal amounts of transactions. As discussed earlier, notional amounts often are misleading indicators of risk, and this problem is acute regarding credit derivatives. Critical to any evaluation of the CDO markets is an understanding that, per dollar of notional value, the risk (and risk transfer) associated with various CDO tranches varies enormously. The risk per dollar of notional amount of the "first loss," or equity, tranche can be thirty or forty times the risk per dollar of the senior tranche, which would be required to absorb losses only after the protection provided by the equity tranche and other more-junior tranches had been exhausted.

² Recent spikes in some credit default swap spreads do not appear to have induced significant stress, although this experience has been too limited to be definitive.

While available data cannot resolve these issues, a study conducted last year by the Joint Forum, which was based on interviews with market participants, does shed some light.³ The study concluded that notional values had significantly overstated the amount of credit risk that had been transferred outside the banking system to that point and that the amount of risk transfer was quite modest relative to the total amount of credit risk that exists in the financial system. The study found no evidence of “hidden concentrations” of credit risk. Risk-takers outside the banking system included monoline insurers and other insurance companies; private asset managers acting on behalf of pension funds, mutual funds, and other institutional investors; and hedge funds. As to the risk-management capabilities of these nonbank entities, the study found that they seem largely aware of the risks associated with credit derivatives.

The study did note that understanding the credit risk profile of CDO tranches poses challenges to even the most-sophisticated market participants. An especially difficult issue is the assessment of default correlation across different reference entities. In general, the valuation of CDO tranches is model dependent, and market participants need to carefully evaluate the models that they use and the model parameter assumptions that they make, notably the assumptions regarding default correlations. To limit legal and reputational risks, dealers should seek to foster a complete understanding of transactions among the investors to which they sell CDO products. The report cautioned investors in CDO tranches not to rely solely on rating-agency assessments of credit risk, in part because a CDO rating cannot possibly reflect all the dimensions of the risk of these complex products. The report also called attention to significant operational risks that have emerged as market participants’ back offices have struggled to keep pace with growing transactions volumes and more complex products. Despite recent automation initiatives, the lack

³ The Joint Forum (2004), *Credit Risk Transfer* (Basel: Bank for International Settlements).

of timely documentation of new transactions and assignments of existing transactions remains a significant problem.

Some other concerns about the transfer of credit risk outside the banking system seem to be based on questionable assumptions. Some observers believe that credit risks will be managed more effectively by banks because they generally are more heavily regulated than the entities to which they are transferring credit risk. But those unregulated and less heavily regulated entities generally are subject to more-effective market discipline than banks. Market participants usually have strong incentives to monitor and control the risks they assume in choosing to deal with particular counterparties. In essence, prudential regulation is supplied by the market through counterparty evaluation and monitoring rather than by authorities. Such private prudential regulation can be impaired--indeed, even displaced--if some counterparties assume that government regulations obviate private prudence. We regulators are often perceived as constraining excessive risk-taking more effectively than is demonstrably possible in practice. Except where market discipline is undermined by moral hazard, for example, because of federal guarantees of private debt, private regulation generally has proved far better at constraining excessive risk-taking than has government regulation.

In fact, while many focus on the dangers of risk transfer to highly leveraged entities that might be vulnerable to a sharp widening of credit spreads, a significant portion of the risks that are being transferred outside the banking system are being transferred through private asset managers to institutional investors that have much lower leverage than banks. Indeed, the increasing transfer of systematic risks from banks to entities with lower leverage and longer time horizons may, other things equal, push credit spreads lower. Such investors may naturally have a greater tolerance for risk than banks.

The Growing Role of Hedge Funds in Derivatives Markets and the Financial System

Generally

Of course, much of the unease about credit risk transfer outside the banking system reflects the growing role that hedge funds play in those markets and in the financial system generally. Although comprehensive data on the size of the hedge fund sector do not exist, total assets under management are estimated to be around \$1 trillion. Inflows to hedge funds have been especially heavy since 2001, as investors have sought alternatives to long-only investment strategies in the wake of the bursting of the equity bubble. By some estimates, the size of the hedge fund sector doubled between 2001 and 2004. A substantial portion of the inflows to hedge funds in recent years reportedly has come from pension funds, endowments, and other institutional investors rather than from wealthy individuals.

Hedge funds have become increasingly valuable in our financial markets. They actively pursue arbitrage opportunities across markets and in the process often reduce or eliminate mispricing of financial assets. Their willingness to take short positions can act as an antidote to the sometimes-excessive enthusiasm of long-only investors. Perhaps most important, they often provide valuable liquidity to financial markets, both in normal market conditions and especially during periods of stress. They can ordinarily perform these functions more effectively than other types of financial intermediaries because their investors often have a greater appetite for risk and because they are largely free from regulatory constraints on investment strategies.

But some legitimate concerns have been expressed about the possible adverse effect of hedge funds' activities on market liquidity in some circumstances. One such concern is the potential for rapid outflows from the sector in the event that returns prove disappointing. Disappointments seem highly likely given the number of recent investors in this sector, all

seeking arbitrage opportunities that of necessity will diminish as more capital is directed to exploiting them. Furthermore, some (perhaps many) hedge fund managers are likely to prove incapable of delivering the returns that investors apparently expect. Indeed, investors have already forced many hedge funds to fold after producing disappointing returns. Provided that investors do not force exiting funds to suddenly liquidate their assets, such exits contribute to the efficiency of the financial system and do not adversely affect market liquidity. Historically, investors have not been able to force the sudden liquidation of a hedge fund because investments have been subject to lengthy redemption or “lock up” requirements. However, there are reports that institutional investors have been able to negotiate much shorter redemption periods. If institutional money proves to be “hot money,” hedge funds could become subject to funding pressures that would impair their ability to supply liquidity to markets and might cause them to add to demands on market liquidity.

Another circumstance in which hedge funds could negatively affect market liquidity is if they became so leveraged that adverse market movements could lead to their failure and force their counterparties to close out their positions and liquidate their collateral. For example, the fear of the market effects of closeout and liquidation of LTCM’s very large net positions motivated its counterparties to recapitalize the hedge fund in 1998. LTCM was able to become so large and so highly leveraged because its derivatives and repo market counterparties, perhaps awed by the reputations of its principals, failed to effectively manage their credit risk to LTCM.

In the wake of the LTCM episode, the large banks and securities firms that were counterparties to hedge funds strengthened their management of hedge fund risk very significantly. Those improvements were motivated by their self-interest, which was reinforced by recommendations from their prudential supervisors and from the Counterparty Risk

Management Policy Group (CRMPG), a group of twelve banks and securities firms that were among the most significant counterparties to hedge funds.⁴ However, recently there have been reports that competitive pressures have resulted in some weakening of risk-management practices.

In light of these reports and of the rapid growth of the hedge fund industry, the Federal Reserve recently reviewed banks' management of hedge fund credit risk in relation to the recommendations that supervisors and the CRMPG made in 1999. The review indicated that, despite some recent slippage, banks have made considerable progress in implementing many of those recommendations and thereby in strengthening their risk-management practices. In particular, banks can now capture their aggregate credit exposures to individual funds, and their measures of the credit exposures now incorporate the risk-mitigating effects of collateral requirements. Furthermore, most banks now stress test the potential effects of volatile or illiquid markets on their exposures. Banks' due diligence procedures and hedge funds' disclosures have improved sufficiently that banks now can qualitatively assess the risk-management capabilities and overall risk profiles of the funds.

Nonetheless, the review noted some remaining weaknesses. First, because many fund managers are reluctant to provide banks with complete information about their portfolios or with forward-looking measures of the risks that the funds are assuming, the banks often cannot fully evaluate a fund's risk profile. Banks sometimes tighten collateral requirements and other credit terms to compensate for this lack of transparency, but most banks' policies could be improved by the establishment of clearer and firmer links between credit terms and transparency. Second, banks do not always aggregate stress test results across hedge fund counterparties to assess

⁴ Counterparty Risk Management Policy Group (1999). "Improving Counterparty Risk Management Practices," report available through the House Committee on Financial Services, <http://financialservices.house.gov/banking/62499crm.pdf>.

concentrations of exposures in volatile and illiquid markets. Third, and perhaps of greatest concern, in certain highly liquid markets, especially OTC interest rate swaps and repos, there are signs that competitive pressures may be eroding the protection that banks achieve through collateral requirements by reducing the initial margins that they obtain from hedge funds.

Thus, the review suggests that banks and their supervisors need to be alert to the possibility that further slippage of credit terms could result in material increases in credit risk to banks, a material loss of market discipline on hedge funds, and a material increase in the potential for hedge fund leverage to adversely affect market dynamics. Perhaps the recent widening of credit spreads will engender increased caution by managers of credit risk.

Moreover, as in 1999, cooperative private-sector efforts to identify and implement sound risk-management practices have the potential to reinforce the efforts of individual firms and their prudential supervisors. In this regard, a very encouraging development is the recent formation, by leading banks, securities firms, insurance companies, asset managers, and hedge funds, of a new group (CRMPG II) to assess improvements in risk management since 1999 and to update the CRMPG recommendations to reflect subsequent changes in risk-management practices and in the financial, regulatory, and legal environment.

Ensuring sound credit-risk management by hedge funds' counterparties remains the most promising approach to addressing concerns about hedge fund leverage. Some may believe that government regulation of hedge fund leverage would be more effective. But it would be very difficult to design a set of capital requirements for hedge funds that is appropriately sensitive to the diversity and flexibility of investment strategies that different funds employ and to the lack of diversification in the portfolios of individual funds. A regulatory capital regime that was not extraordinarily risk-sensitive would be ineffective at constraining hedge funds' risk-taking. At

the same time, it would impair their capacity to pursue strategies that enhance the efficiency and liquidity of our financial markets and thereby to contribute to the productivity and resilience of our economy.

Conclusion

The rapid proliferation of derivatives products inevitably means that some will not have been adequately tested by market stress. Even with sound credit-risk management, a sudden widening of credit spreads could result in unanticipated losses to investors in some of the newer, more complex structured credit products, and those investors could include some leveraged hedge funds. Risk management involves judgment as well as science, and the science is based on the past behavior of markets, which is not an infallible guide to the future. Yet the history of the development of these products encourages confidence that many of the newer products will be successfully embraced by the markets. To be sure, for that favorable record to be extended, both market participants and policymakers must be aware of the risk-management challenges associated with the use of derivatives to transfer risk, both within the banking system and outside the banking system. And they must take steps to ensure that those challenges are addressed.