CHAPTER II

THE INFLUENCE OF CREDIT DERIVATIVE AND STRUCTURED CREDIT MARKETS ON FINANCIAL STABILITY

There is growing recognition that the dispersion of credit risk by banks to a broader and more diverse group of investors, rather than warehousing such risk on their balance sheets, has helped to make the banking and overall financial system more resilient.[1] Over the last decade, new investors have entered the credit markets, including the credit risk transfer markets. These new participants, with differing risk management and investment objectives (including other banks seeking portfolio diversification), help to mitigate and absorb shocks to the financial system, which in the past affected primarily a few systemically important financial intermediaries. The improved resilience may be seen in fewer bank failures and more consistent credit provision. Consequently, the commercial banks, a core segment of the financial system, may be less vulnerable today to credit or economic shocks. At the same time, the transition from bank-dominated to more market-based financial systems presents new challenges and vulnerabilities. These new vulnerabilities need to be understood and considered in order to form a balanced assessment of the influence of credit derivative markets.

The credit derivative and structured credit markets have grown very rapidly in the past few years,[2] during a relatively benign environment, and market liquidity and certain aspects of the market infrastructure have not been fully tested by a severe or prolonged credit downturn. In particular, while these markets increasingly facilitate the "primary" transfer of credit risk, secondary market liquidity is still lacking within some segments, creating the potential for market disruptions. As such, these markets are subject to increased attention from supervisors and policymakers.

While the credit derivative markets raise some supervisory concerns, the information they provide is very useful for supervision and market surveillance. First, by enhancing the transparency of the market's collective view of credit risk, similar to bond markets before them, credit derivatives provide valuable information about broad credit conditions, and increasingly set the marginal price of credit. Therefore, such activity improves market discipline. Second, supervisors and other public authorities also may be able to use such market-based information to detect deteriorating credit quality, and to better monitor regulated institutions and other market participants. Finally, with the broadening of the product base (e.g., the development of mortgage and other asset-backed derivative instruments), these markets may also provide an early warning mechanism about economic stress in sectors beyond banking (e.g., the household sector).

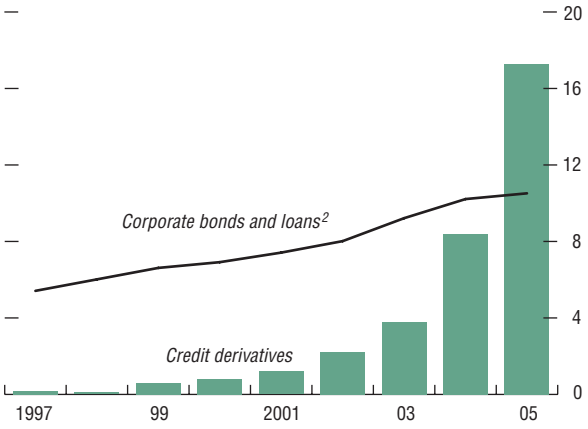
Going forward, these new instruments may also influence the dynamics of credit cycles. Benefiting from better and earlier information about credit quality, market participants, particularly banks, may be able to adjust credit portfolios in a more proactive and gradual manner. In this way, bank behavior may become less procyclical, and credit cycles less volatile. As more data become available on these new risk transfer markets, this may be an area for future empirical research.

This chapter reviews the growth of the credit derivative and structured credit mar-

[1]See Geithner (2006a) for a recent speech regarding credit derivatives, risk management, and related financial stability issues.

[2]See Box 2.1 for an explanation of these products.

Figure 2.1. Global Credit Derivatives Outstanding[1]
(In trillions of U.S. dollars)



Sources: Bank for International Settlements; International Swaps and Derivatives Association; British Bankers' Association; and *Risk* magazine.

[1]Credit derivatives, as reported here, comprise credit default swaps, credit-linked notes, and portfolio swaps.

[2]Data for 2005 are only available through the third quarter.

kets, and also what factors have influenced their growth, how they have increasingly facilitated risk transfer, and their implications for financial stability. The chapter ends with a discussion of policy implications and recommendations concerning these relatively new markets and related challenges. It should be noted at the outset that detailed data on structured credit products are not readily available, and relatively few studies have been done so far on the broader financial stability implications of these credit risk transfer markets. Based on available information, discussions with national authorities and market participants (particularly risk managers), and informed staff judgments, this chapter analyzes the possible influences of credit derivative markets on financial stability. As such, the conclusions should be viewed as tentative, and the underlying analysis as a contribution to the growing discussion and literature regarding these markets.

Market Growth and Development

Market Size and Structure

Credit derivative and structured credit markets have grown rapidly in size and complexity in recent years. Outstanding credit derivative contracts rose from about $4 trillion at year-end 2003 to an estimate of over $17 trillion at year-end 2005, and now exceed the stock of corporate bonds and loans (Figure 2.1).[3] Most of the recent growth has occurred among the most complex products, such as credit default swaps (CDSs) that reference more than one credit name (i.e., "portfolio swaps") (see prod-

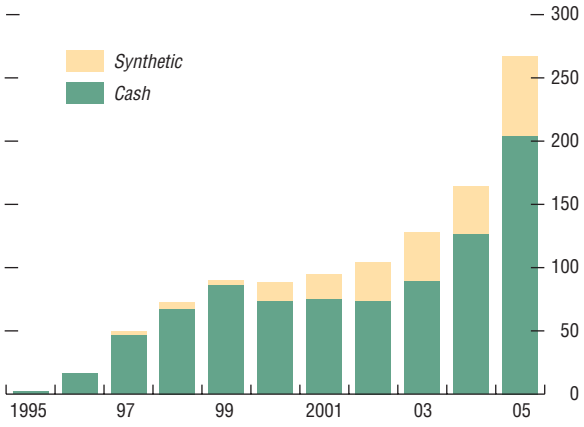
[3]The International Swaps and Derivatives Association's (ISDA's) semiannual survey. The Bank for International Settlements (BIS), which also conducts a semiannual survey, estimated outstandings to be $10.2 trillion at mid-2005, although the BIS survey covers fewer market participants and surveys only CDSs and portfolio swaps. Neither survey includes hedge funds, and only ISDA's survey includes insurance companies.

uct descriptions in Box 2.1). The markets for collateralized debt obligations (CDOs) have also grown significantly, often using synthetic structures (which package derivatives such as CDSs, rather than bonds), to better tailor credit exposures to meet investors' demands (Figure 2.2).[4]

Investment-grade corporate obligations (i.e., those rated "BBB–" and better) comprise most of the underlying credit transferred in the CDS and CDO markets, particularly in synthetic form, and there is growing interest in consumer credit and in emerging market (EM) obligations. According to a recent survey, 62 percent of gross protection sold related to nonfinancial corporate obligations.[5]

Activity in EM structured credit products has developed more slowly, primarily because of a relative scarcity of liquid underlying obligations and related default and recovery rate data, as well as a perception that EM credit is relatively more highly correlated.[6] To date, almost all EM credit derivative activity has involved sovereign and sovereign-backed obligations. However, investment banks have begun to apply synthetic risk transfer techniques to package EM credit risk more effectively (see Box 2.2, p. 57). In addition, there appears to be growing demand for structured

Figure 2.2. Global Issuance of Collateralized Debt Obligations: Cash Versus Synthetic
(In billions of U.S. dollars)



Source: Lehman Brothers.

[4]Detailed data on outstanding European and Asian CDOs are generally less available than for the United States. CDO activity in the United States and Europe is increasingly interlinked with synthetic activity. Globally, in 2005, about $205 billion of cash CDOs were issued, versus synthetic issuance of $65 billion (see Lehman Brothers, 2005). This should not be confused with portfolio swap activity, which is sometimes reported as "synthetic" CDO activity. According to Creditflux (2006b), whose survey covers about 60 percent of market volume, $224 billion of bespoke portfolio swaps and $455 billion of index tranche transactions were also executed in 2005.

[5]According to the most recent Fitch Ratings (2005a) survey, asset-backed securities and other structured credit products comprised only 4 percent of underlying reference assets, but their share is expected to grow.

[6]The more correlated the underlying assets, the more difficult it is to build a diversified structured credit product from the underlying portfolio.

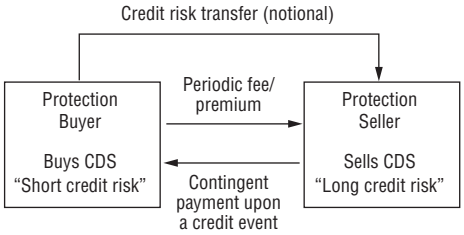
Box 2.1. Credit Derivatives: Basic Taxonomy and Terminology

Credit derivatives are instruments that transfer part or all of the credit risk of an obligation (or a pool of obligations), without transferring the ownership of the underlying asset(s). Increasingly diverse and complex products have fueled the evolution of the credit derivative markets.

Credit default swaps (CDSs) are the cornerstone of today's credit risk transfer market. They are bilateral agreements to transfer the credit risk of one (single-name CDSs) or more (portfolio swaps and CDS indices) reference entities (i.e., the underlying names on which credit risk is exchanged). A CDS resembles an insurance contract, in that it protects the "protection buyer" against predefined credit events, in particular the risk of default, affecting the reference entity (or entities), during the term of the contract, in return for a periodic fee paid to the "protection seller." The buyer of protection is therefore in a similar position as if he or she had sold short a bond issued by the reference entity, and the market price of the CDS reflects the riskiness of the underlying credit. Following a credit event, contracts settle either physically (i.e., through the delivery to the protection buyer of defaulting bonds and/or loans for an amount equivalent to the notional value of the swap) or in cash, with the net amount owed by the protection seller determined after the credit event (see first figure). For investors who cannot transact directly in derivatives, credit-linked notes (CLNs) are funded securities that trade like bonds issued by the reference entity, and, therefore, replicate a funded CDS.[1]

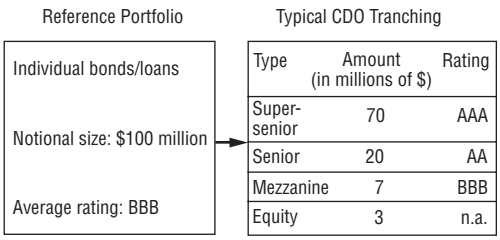
Structured credit products result from the extension of various securitization techniques and transfer the credit risk associated with a portfolio of reference entities (i.e., a pool of underlying collateral). They include multiname variants of CDSs (i.e., "portfolio swaps") and collateralized debt obligations. Structured credit products are often issued in "tranches" (collectively referred to as the product's "capital structure"). Each tranche can be thought of as a synthetic bond, with a specific risk-return profile determined by both the performance of the underlying portfolio and the tranche's seniority in the capital structure (i.e., the priority of its claims on the cash flows of the collateral pool). A typical capital structure comprises an "equity" tranche that absorbs default-related losses (often representing idiosyncratic risks) on the underlying portfolio up to the 3 percent "detachment point," one or more "mezzanine" tranches that absorb losses that exceed the 3 percent "attachment point" up to a 10 percent "detachment point," one or more "senior" tranches (10–30 percent), and a "super-senior" tranche (the final 30–100 percent), with the senior tranches viewed as reflecting systemic risk (see second figure). Traditional "cash" CDOs are backed by bonds and/or loans, whereas "synthetic" structured credit products reference portfolios of other credit derivatives (i.e., CDSs). Synthetic structures allow arrangers to offer tranches in unfunded form, because underlying reference assets need not be owned. In addition, in contrast with "full capital structure" cash CDO transactions, where all of the risk is transferred to the capital markets, in synthetic structures, only specific portions of the reference portfolio can be transferred to the capital markets (with the retained risk usually held and hedged by the structurer). This would also be possible with

Single-Name CDS Cash Flows



[1]Most CDS transactions are "unfunded" (involving no up-front payments by the protection seller), but if counterparty risk is a concern or a credit event is considered very likely, up-front payments and/or collateral may be required.

CDO Structure



a cash CDO, but the structurer would then have to fund the risk it retains. A "partially funded" CDO structure will typically transfer credit risk in both funded (most or all of the first 15 percent of potential losses) and unfunded form (the losses above 15 percent, which are typically purchased by highly rated monoline insurers and banks).

Synthetic structures facilitate product customization. For example, they have enabled the development of portfolio swap products based on customized stand-alone reference portfolios (i.e., single-tranche CDOs and portfolio swaps, referred to as "bespoke" structures), and standardized CDS indices and tranches thereon.[2] CDS indices and related subindices track the performance of baskets of the most actively traded single-name CDSs. The standardized features of indices (i.e., maturities and risk tranches, credit ratings, and sector delineations) have increased the liquidity of credit risk trading.

For a broader and more detailed description of credit derivative and structured credit products, see the recent Joint Forum report.[3] This study may be of interest to persons with little or no knowledge about these products, and in many other parts of the study a much more technical and sophisticated analysis is available for readers with a better understanding of these products and markets.

[2]The launch of index products based on a basket of single-name asset-backed securities CDSs on U.S. home equity loans in January 2006 is the most recent addition to the suite of credit index-based instruments.

[3]See Joint Forum (2005).

credit products in Asia and the Middle East, and foreign banks often meet this demand with repackaged European and U.S. credits.

Banks continue to represent most credit derivative market activity, but insurance companies, pension funds, and other asset managers are becoming increasingly active in structured credit markets, including newer credit derivative products.[7] The growth of hedge funds, particularly credit-oriented hedge funds, has accelerated market development and credit risk dispersion (Figure 2.3).[8] Proprietary trading desks at investment banks and brokers pursue trading strategies often similar to those of hedge funds, with both groups providing important price discovery

[7]According to the Fitch Ratings (2005a) survey, banks and broker-dealers accounted for the vast majority of the outstanding credit derivative protection purchased at year-end 2004. However, Fitch does not survey hedge funds, which they estimate account for up to 30 percent of credit derivative trading volume. In addition, although much of the trading occurs between banks, it is not necessarily between the same institutions, geographically or by type. For example, Fitch Ratings (2005a) reports that protection buying is dominated by large sophisticated banks, while smaller regional banks typically sell protection to realize more diversified credit exposure (i.e., outside their local market). In addition, insurers and financial guarantors accounted for 13 percent of protection sales in the Fitch survey, and 20 percent in the British Bankers' Association (BBA) (2004) survey.

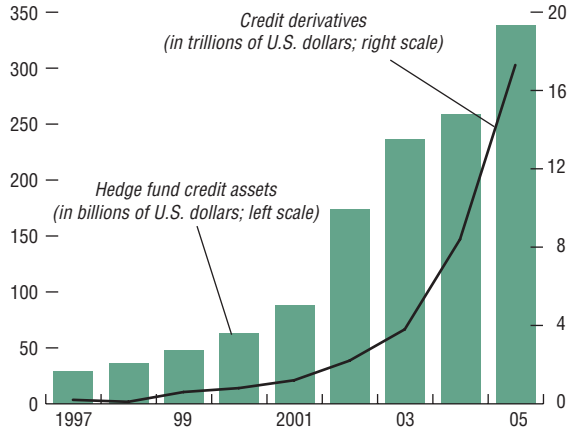
[8]Figure 2.3 shows how credit derivative growth has paralleled the growth of credit hedge funds. Although such hedge fund allocations remain small relative to the overall credit market and credit derivative market, such funds are typically the most active traders of credit products and have facilitated many of the innovations witnessed in recent years. The BBA (2004) survey estimated hedge fund exposure at $2 trillion.

and market liquidity benefits. Hedge funds frequently use CDSs to implement fundamental credit strategies, as well as to arbitrage intra- and intermarket anomalies (e.g., across equity and credit markets). They have also been a driving force behind the growth of the standardized CDS index market, the fastest growing segment of the portfolio swap market, as well as the emergence of correlation trading.[9] With the growth of hedge funds, banks and other buyers of credit protection have realized a much greater ability to transfer credit risk, particularly the sale of equity or "first loss" tranches.[10]

These developments have also improved liquidity in credit derivative markets in recent years. Nevertheless, liquidity is not consistent across all segments of this market. For example, the CDO tranche market provides market participants, especially banks, with a greater ability to transfer credit risk in what may be termed a "primary" risk transfer market. However, the diversity of participants within the different tranches of a CDO (or its capital structure) is often limited, and secondary market liquidity is therefore often also limited. This important issue and related market vulnerability is discussed in more detail below.

The development of structured credit products often has been led by European/London-based activity, rather than New York–based developments, although aggregate trading activity is about evenly split between London and New York. This is largely attributable to the need to overcome various structural frictions in Europe (see discussion below). An indication of this phenomenon has been the predominance of synthetic CDO issuance in Europe, whereas in the United States, aggre-

Figure 2.3. Credit-Oriented Hedge Fund Assets Under Management Versus Credit Derivatives Outstanding[1]



Sources: Bank for International Settlements; British Bankers' Association; *Risk* magazine; International Swaps and Derivatives Association; Greenwich Associates; Hedge Fund Research; JPMorgan Chase & Co.; and Center for International Securities and Derivatives Markets (CISDM) database.

[1]Credit-oriented hedge funds are all of those designated by the CISDM as fixed income, convertible arbitrage, distressed securities, risk arbitrage, and a 20% share of global macro hedge fund assets. Credit derivatives, as reported here, comprise credit default swaps, credit-linked notes, and porfolio swaps.

[9]Correlation trading involves trading on the basis of anticipated changes in the expected correlations of credit defaults and spread movements among specific credits and indices. See Belsham, Vause, and Wells (2005).

[10]See Fitch Ratings (2005b); and IMF (2004b, Box 2.9).

Box 2.2. Synthetic Credit Risk Transfer and EM Securitization

A recent synthetic CDO transaction ("Sphaera") illustrates how synthetic structures can be used to expand the potential for EM credits. The €500 million, 5-year offering transferred a portion of the credit risk associated with the issuing bank's own EM loan portfolio. The "reference assets" consisted of 100 equally weighted, senior unsecured credits, 97 of which carried a rating from at least one international rating agency. Geographically, the underlying credit emanated from 34 different countries in five major geographic regions. Reference obligations were 80 percent corporate, representing 15 different industry sectors, with banking and finance, and oil and gas (each 18 percent) the largest concentrations. All reference obligations were denominated in hard currencies and were originated under nondomestic law.

The use of synthetic structuring allowed the transaction to overcome several key obstacles to EM securitization. First, investors prefer to purchase securities that are issued under well-established legal frameworks, for greater clarity and risk assessment, particularly regarding default scenarios. By transferring the credit risk synthetically, the bank was able to more tightly define the "credit events" that determine the CDO cash flows and to reduce uncertainties concerning local legal and related frameworks. Second, the recovery rates used by the rating agencies to analyze and rate EM-referenced CDOs are often considered very conservative by market analysts. As such, a 40 percent recovery rate was specified, with the issuing bank assuming risks associated with recovery rates below 40 percent. In addition, the flexibility inherent in the "synthetic" structure allowed the issuer to offer two different forms of investor participation: "funded" credit-linked notes and "unfunded" CDSs, with little or no up-front payment. Along with the recovery risk, the bank also retained the equity tranche, which will absorb the first €32.5 million of credit losses. Even though it has become much more common to sell equity tranches, it is not uncommon for the issuer to retain the equity tranche in a new asset class or structure, such as this one. In addition, the issuing bank may have an informational and risk management advantage regarding the underlying obligations (as signaled by the structuring and contractual risk sharing), because the credits are all from their loan book.

Note: More information on the Sphaera transaction can be found on the Standard & Poor's website: *www.standardandpoors.com.*

gate CDO issuance has been about evenly split between cash and synthetic products.[11]

Influences on Market and Product Developments

Historically, regulatory arbitrage, legal and other institutional frictions, and rating agency support have been the main drivers of market growth and product innovation. More recently, the demand for more tailored, tradable, and investment-grade instruments has been an important motivation for developments in structured credit markets.

Regulatory Capital Management

Much of the early activity in these markets was motivated by regulatory arbitrage related to the one-size-fits-all regulatory capital requirement structure of the 1988 Basel Capital Accord (Basel I). Compared with banks' own ("economic") capital assessments, Basel I tended to prescribe relatively higher capital requirements on lower risk assets, and vice versa. As such, risk transfer activity often targeted a more appropriate allocation of regulatory capital, but arguably produced a riskier credit portfolio, because banks often

[11]See Standard & Poor's (2006a).

sold lower-risk assets. However, during the 1990s, more banks (especially in Europe) became focused on economic capital and efforts to improve balance sheet management and returns. This is evident in both greater investor scrutiny of bank returns and increasing securitization activity across a broader range of assets.

Risk transfer activity motivated largely by regulatory arbitrage is expected to diminish under the Basel II Accord, which aims to better align regulatory and economic capital. In contrast with Basel I, Basel II increases incentives to sell higher-risk assets, and increases the influence of market measures on required capital.[12]

Insurance companies are beginning to utilize securitization to better manage capital and to reduce risk concentrations. Although the volume of insurance securitizations completed to date is estimated at less than $15 billion by S&P, the potential seems greater, with global annual premiums totaling $3.2 trillion in 2004, of which $1.8 trillion is related to life insurance.[13] Industry experts see the greatest near-term potential in the life insurance sector, largely because of the relatively predictable cash flows, as well as relatively homogenous risk characteristics. However, the development of insurance securitization has been constrained by a lack of clarity of the regulatory and rating agency treatment of risk transfer. Transactions to date have primarily aimed at reducing specific concentrations (e.g., geographic, specific-event risk, and peak mortality risk), and are driven less by broader balance sheet management objectives (Box 2.3).[14]

In many countries, credit risk transfer activity is constrained by the absence of a comprehensive and consistent regulatory framework. For example, in some jurisdictions, whether and how financial institutions can use credit derivatives to buy or sell protection remains unclear, with transactions often requiring case-by-case approval.[15] Often, in both EMs and more advanced economies, the regulatory authorities may not have sufficient experience with these instruments to consider such transactions in a reasonably timely manner.

Structural Frictions and Impediments

Traditional "cash" risk transfer techniques involve the "true sale" of individual assets, such as a loan from one entity to another, or of multiple assets to a special purpose vehicle (SPV), which typically funds the purchase by issuing marketable securities. Legal and institutional frictions have prevented banks in some jurisdictions from transferring risks through such direct means.[16] Such frictions include transfer taxes, inadequate or inconsistent loan documentation, requirements related to borrowers' consent, uncertainties regarding the bankruptcy status of SPVs, and other legal difficulties. Synthetic risk transfer has been instrumental in overcoming many of these impediments. Indeed, most credit risk transfer in Europe has been achieved synthetically, in part because of market structure factors, such as less complete bond markets, but also related to these frictions. Nevertheless, today, even if various frictions are removed, synthetic activity is likely to continue to grow, particularly given the relative ease of execution and flexibility of such structures.

[12]See Standard & Poor's (2006b) for a discussion about how Basel II is expected to influence Spanish securitization. See also Reardon, Flanagan, and Sankaran (2006) for an analysis of Basel II securitization incentives.

[13]Swiss Re (2005, Statistical Appendix, Table 1).

[14]See Group of Thirty (2006).

[15]For example, in the Republic of Korea, the Foreign Exchange Transactions Act obliges insurance companies to obtain prior approval for credit derivative transactions from the central bank, and while most transactions are eventually approved, the approval process is reportedly lengthy. In addition, all derivative transactions that involve foreign currency must also be approved by the central bank. Similar procedures and requirements exist in other countries.

[16]In Germany, steps have been taken to reduce obstacles to true sale transactions (see IMF, 2004a).

Box 2.3. Use of Synthetic Techniques for Insurance Risk

A French insurance company recently transferred the loss exposure associated with its auto insurance portfolio, using an innovative synthetic CDO. Automobile policy claims are typically reinsured with an independent reinsurer, but this transaction ("FCC SPARC") essentially replaced the traditional reinsurer, with respect to 2.9 million personal auto insurance contracts originated in France representing €1.1 billion in premiums.[1] It was funded by the issuance of a four-tranche €233.7 million CDO. Investors are exposed to the risk of reduced principal repayment upon maturity if net claims exceed stipulated "trigger" levels.

A unique feature of this transaction is that the insurer annually resets the loss triggers for each tranche at levels sufficient to maintain each tranche's initial credit rating.[2] From the insurer's standpoint, the structure creates a new risk management tool for transferring insurance risk outside the traditional reinsurance market, which has the added benefit of reducing counterparty risk. In addition, the insurer anticipates regulatory capital relief, although French authorities are reported to be still examining the transaction with regard to the insurer's required capital reserves.

Other insurers have also securitized insurance risk. For example, the "Crystal Credit" transaction was backed by revolving short-term trade receivable credit reinsurance contracts. The total assigned credit was €113.5 billion, with €252 million of potential mezzanine-type losses absorbed by three tranches of securities sold to investors. The same reinsurer used similar structures to securitize life insurance risk ("ALPS Capital") and peak mortality risk ("Vita Capital").

Note: More information on the SPARC transaction and others discussed in this box can be found on the Standard & Poor's website*: www.standardandpoors.com.*

[1]In fact, presumably for legal or regulatory reasons, the insurer transferred the loss risk to a reinsurer, which in turn transferred the risk to a special purpose vehicle (SPV) that issued the securities.

[2]The loss triggers are analogous to the attachment points of a typical CDO tranche.

The development of structured credit markets in Asia and the Middle East has lagged significantly, in part because of the absence of developed bond markets. Banking systems in these regions are often less competitive and capital markets less developed. Consequently, banks in these regions may often lack the incentives and the infrastructure to transfer or more actively manage credit risk. This may be generally true in developing countries (and in some developed countries), and therefore the supply of "raw material" for structured credit transactions may be lacking.[17] However, legal and institutional frictions are also important in these countries, such as conflicting or incomplete local regulations and standards (e.g., creditors' rights and bankruptcy proceedings). Synthetic risk transfer techniques are increasingly used to overcome these frictions (see Box 2.2). In the Middle East and Southeast Asia, for example, financial institutions are increasingly looking to structure securitizations compliant with Islamic (*Sharia*) law using synthetic techniques (Box 2.4).

Rating Agency Role

Most investors require that their fixed-income holdings have a credit rating. As

[17]For example, there appears to be significant potential for the pooling of Japanese nonperforming loans (NPLs) into structured credit products. However, at least until FY2004, most Japanese banks preferred to make loan-loss provisions to write-off NPLs and enjoyed relatively generous regulatory treatment (e.g., the ability to include loss provisions and deferred taxes in Tier I capital), which provided disincentives to pursue market alternatives.

Box 2.4. Islamic Finance and Credit Risk Transfer

There is growing demand for investments compliant with Islamic (*Sharia*) law. Islamic financial institutions have created *Sharia*-compliant investments similar to fixed-income bonds.[1] For example, a *sukuk* is an asset-based obligation that can be structured so that it is virtually indistinguishable from a non-Islamic bond. Essentially, in a *sukuk*, at least 51 percent of the supporting assets must be *ijara,* or leased-back real assets (i.e., not debt instruments). In theory, it should not be difficult to structure *Sharia*-compliant ABSs and CDOs, but few of these exist. In fact, many regional funds invest in highly rated ABSs and CDO tranches related to credit that originated outside the region.

An obstacle to the growth of the *Sharia*-compliant structured credit market may involve legal uncertainties with respect to the "true sale" of assets, and the "bankruptcy remoteness" of the issuing vehicle, a structural friction also present in other jurisdictions. For example, Islamic courts appear to have considerable discretion in interpreting and applying *Sharia* law. As a result, this creates uncertainty, and obtaining a credit rating on a stand-alone *Sharia*-complaint structured transaction would be more difficult. Attempts have been made to create *Sharia*-compliant synthetic structures that use dual SPVs to minimize *Sharia* law risk. In such a structure, the underlying assets would be purchased by a local-jurisdiction SPV, which is funded by an offshore SPV, that issues the *sukuk* to investors. The point of the offshore SPV is to ensure that the securities' contract is issued under a well-established legal regime. The relationship between the two SPVs is governed by a CDS-like contract transferring the risks.

However, the rating agencies remain cautious about whether this structure insulates investors from the uncertainties of *Sharia* law, since the integrity of the structure depends upon the ability of the offshore SPV to oblige the local SPV to satisfy certain contractual terms and conditions. In fact, only one *Sharia*-compliant securitization has been rated by either Standard & Poor's, Fitch, or Moody's. However, this structure ("Solidarity Trust Services") was rated "AA" on the basis of a guarantee by the originator of the underlying assets, an "AA"-rated Middle Eastern supranational. It was also important for rating purposes that the guarantee's terms were governed under nonlocal law.

In Malaysia, residential mortgages are being securitized in a *Sharia*-compliant manner by a government-sponsored mortgage corporation.[2] Additional *Sharia*-compliant mortgage securitizations are reportedly in the process of being finalized.

Note: More information on the Solidarity Trust Services transaction can be found on the Fitch Ratings website: *www.fitchibca.com.*

[1]See El Qorchi (2005) for a discussion of Islamic finance, and Fitch Ratings (2005c) for a rating agency view of the impact of *Sharia* law on securitization.

[2]A recent transaction was rated "AAA" by the two domestic rating agencies.

such, rating agencies have played a significant role in the acceptance of new products by investors, with the analysis and rating of structured credit products heavily reliant on sophisticated quantitative modeling. Not surprisingly, the development of structured credit markets has coincided with the increasing involvement of people with the advanced financial engineering skills required to measure and manage these often complex risks. In fact, for many market participants, the application of such skills may have become more important than fundamental credit analysis.[18]

[18]Discussions with market participants raised questions as to whether the increased focus on "structuring" skills, relative to "credit" analysis, may itself present a concern.

Despite the key role rating agencies play in promoting the acceptance of structured credit products, some questions remain as to whether all investors fully understand the risk profile of these instruments, and how it differs from that of similarly rated corporate bonds.[19] In particular, structured credit products are likely to suffer more severe, multiple notch downgrades, relative to the typically smoother downgrade paths of corporate bonds.[20] Many investors (and their senior management) may therefore be negatively surprised during the next rating downgrade cycle. The rating agencies make an effort to inform investors of these risks through research reports and other programs. However, a more differentiated rating scale may be useful for structured credit products, to better ensure that such nuances are clear to investors, as well as to senior management and supervisors.

As a practical matter, the investors who may be least likely to appreciate such nuances (e.g., smaller regional banks and retail investors) typically only purchase the most senior (least risky) credit products. Similarly, the market for the more complex structured products are dominated by hedge funds and other sophisticated investors, who are believed to understand the ratings, and whose modeling expertise is often at least equal to that of the rating agencies. On the other hand, pension funds and insurers, typically buy-and-hold investors, often rely on ratings for internal and regulatory limits. With this very important group of investors in mind, risk managers, regulators, and the rating agencies should be encouraged to continue to improve the understanding of the ratings process, including in particular how such ratings may be expected to perform through the credit cycle.

The rating of CDOs that reference EM assets may be one area where rating agencies have actually slowed development. Because rating agencies have had difficulties developing reliable data and assumptions on a number of important criteria (e.g., recovery rates and correlations), industry analysts believe that the agencies have used conservative loss-given default (LGD) rates when considering EM structured products.[21] However, this LGD rate uncertainty was overcome in a recent transaction (see Box 2.2).

Investor and Cyclical Demand

Product development in structured credit markets has traditionally been influenced most by sellers and distributors of credit risk. However, today it is more often driven by investors' demands, with credit risk increasingly structured in more customized forms.

During 2005, product and market developments may have been particularly influenced by investor requirements and cyclical factors. Many portfolio swap products reflect investors' increasing desire for portfolio diversification and enhanced yield, particularly during the recent low-yield environment. Moreover, investors have shown a general preference for increased structural complexity and leverage, rather than greater credit risk (as reflected by lower credit ratings) or greater duration or maturity exposure. Such structures include CDOs of CDOs (CDO-squareds) and leveraged super-senior

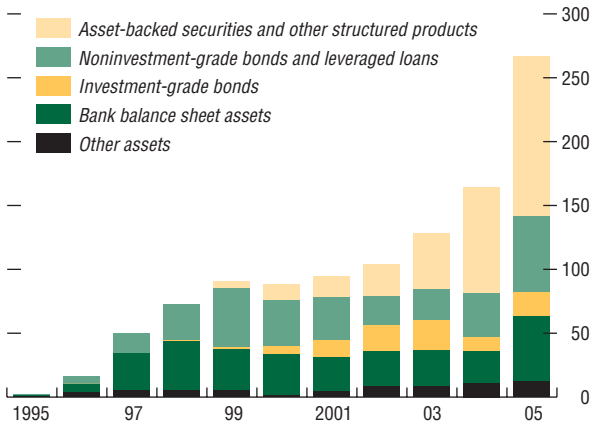
[19]For example, for some mezzanine structured credit products, zero recovery rates are much more likely than on similarly rated corporate bonds, yet the resulting default probabilities and expected losses are mapped into traditional corporate bond ratings, which are based on recovery rates that tend to be in the 40–60 percent range. Prince (2005) discusses some alternative structured credit rating methodologies that may better account for unexpected losses. See also Joint Forum (2005); Fender and Kiff (2005); and CGFS (2005).

[20]See Violi (2004) and Moody's Investors Service (2006) for an analysis of credit rating migration risk, and Fender and Mitchell (2005) for a discussion of how CDO structural risk increases the potential for multinotch rating downgrades. For example, the potential for zero recoveries on "thin" mezzanine tranches, where "thinness" is defined by the difference between attachment and detachment points, can produce "cliff" effects in tranche loss distributions.

[21]See Ho (2004) and Creditflux (2006a).

products.[22] In addition, slower loan growth encouraged the development of CDOs backed by asset-backed securities (ABSs) and other structured credit products, from which almost all of the growth in global cash CDO issuance since 1998 has come (Figure 2.4). Going forward, rather than using more leverage, further innovations are expected to combine credit risk with other types of risk (e.g., commodity and inflation risks).

Figure 2.4. Global Issuance of Collateralized Debt Obligations by Underlying Assets
(In billions of U.S. dollars)



Source: Lehman Brothers.

Financial Stability and Potential Economic Effects

Dispersion of Credit Risk

The use of credit derivatives has facilitated the distribution of credit risk across a broader group of investors, which, as discussed in previous issues of the GFSR, is believed to enhance financial stability. In the past, banks generally warehoused credit risk, seeking to provision against losses as the economy and the credit cycle evolved, often in a procyclical manner. Today, encouraged by supervisors and shareholders, banks increasingly prefer to act as credit originators, and to transfer credit exposures, particularly concentrations, to others via the capital markets. In doing so, banks are more actively managing a variety of credit risks.[23] Banks also use these markets to enhance profitability and to optimize their capital base. Through both risk transfer and increased returns on their capital, banks should become more resilient and financially stable.

[22]CDO-squared tranches, which reference mezzanine tranches of other CDOs, were introduced as CDS spreads narrowed to levels that made it less cost-effective for arrangers to issue straight mezzanine tranches.

[23]At this stage, these markets are mainly used by large banks. Smaller banks that, according to the Federal Reserve Board's U.S. commercial bank surveys, account for about half of U.S. real estate and consumer lending are not very active in risk transfer markets. See Standard & Poor's (2005); and Minton, Stulz, and Williamson (2005).

Credit risk transfer markets tend to shift credit exposures from banks to investors with liability structures and investment horizons that make them better suited to hold or trade these risks, such as insurance companies, regional banks (seeking portfolio diversification), pension funds, mutual funds, and, increasingly, hedge funds.[24] As a means to transfer credit risk to these diverse holders, the primary market activity of these new derivative instruments appears rather successful. Particularly among insurers, regional banks, and dedicated credit funds,[25] this transfer activity also achieves important risk management and investment objectives. However, since these investors often desire to buy and hold the acquired credit exposures (possibly hedging liabilities), secondary market liquidity may suffer. The same specificity of risk transfer that makes the primary market activity successful can also limit liquidity in the secondary market.

In the past, credit risk warehoused on bank balance sheets often contributed to increased performance volatility and failures during credit downturns. Such failures can be very costly to the financial system and the economy. By dispersing risk to a more diverse group of market participants, larger banks have been able to improve the liquidity and resilience of their balance sheets. Interestingly, empirical studies have found that smaller banks, owing to their relatively less liquid balance sheets, have also suffered during stress periods, and have been a significant factor in the broader transmission of shocks.[26] As such, transferring credit risk from banks via the capital markets helps to make the banking system, including smaller banks, less vulnerable to credit shocks.

In addition, primary risk transfer activity shows no evidence of simply shifting concentrations of credit risk from the largest banks, or the banking sector, to a very limited group of investors or another systemically significant sector. While precise data are difficult to obtain (particularly regarding net exposures within and across sectors), credit risk transfer markets have attracted a diverse group of market participants and appear to have spread credit risk rather broadly. Indeed, the investor group with perhaps the greatest appetite to hold credit risk is credit-oriented hedge funds. However, these active traders often show strong risk management skills, and hedge fund failures present stability concerns only to the extent a regulated bank or broker-dealer experiences financial stress as a result. During the past 12–18 months, the U.K. and U.S. supervisory authorities have given increased focus to this issue, and they have sought to evaluate the counterparty risk management practices of the banks and brokers most active with hedge funds. Continued improvements in counterparty risk management are crucial to ensure that future credit losses are less likely to be a significant policy concern.

Assessing the amount of risk transferred through credit derivative instruments raises methodological challenges, and is the subject of ongoing research (Box 2.5). The amount of risk transferred is not necessarily equal to the reported notional amounts. The complexity of these instruments requires that a measurement of risk transfer take into account the structure of the product, and those parts of the capital structure that are being traded. While the notional amount of single-name transactions accurately reflects the amount of credit risk transferred by these instruments, for portfolio swaps, the actual risk transferred can vary considerably. Most of the credit risk in these products resides in the equity tranche, which is the most leveraged part of a

[24]See IMF (2004a, 2004b, and 2005).

[25]These funds include those primarily or solely focused on credit and fixed-income markets, including, but not limited to, hedge funds.

[26]See Kashyap and Stein (2000).

Box 2.5. Delta-Adjusted Measure of Risk Transfer

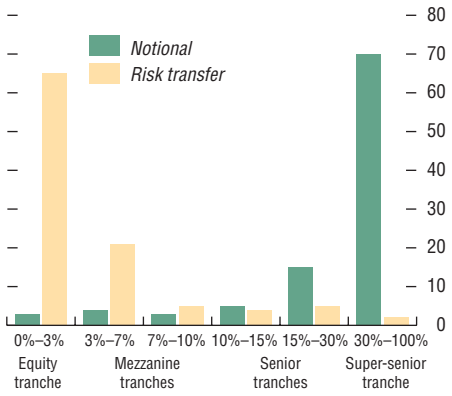
An indirect measure of the amount of risk transferred via a portfolio swap is the notional size of the portfolio of underlying credits that would fully hedge the exposure (i.e., the "delta-adjusted" exposure).[1] The size of this hypothetical hedge varies according to its position in the capital structure, because the hedge required to absorb the first defaults in a portfolio (the equity risk) is larger than that required to absorb the last defaults (in the senior and super-senior tranches). For example, the figure (right) shows that it would take an offsetting position of 21 percent of the underlying reference portfolio (e.g., CDSs) to hedge losses related to a "junior mezzanine" tranche (i.e., losses between 3 and 7 percent in the portfolio), whereas the notional value of the swap (and reported transaction amount) is only 4 percent of the entire pool. As such, the amount of economic risk transferred is more than five times greater than the notional value of the swap.

On the other hand, for senior mezzanine and senior tranches, the amount of risk transferred are fractions of the notional amount. For example, the more junior of the senior tranches (e.g., that absorbs losses between 10 and 15 percent of the portfolio) transfers economic risk of about 80 percent of its notional value, and the 15–30 percent senior tranche transfers risk equal to about 33 percent of its notional value.

JPMorgan Chase & Co. has estimated that delta-adjusted volume (i.e., a better approximation of economic credit risk transferred) for 2005 is on average about 1.7 times greater than the reported notional value of transactions.[2] Therefore, by this measure, the amount of credit risk transferred by the $2.9 trillion of outstanding portfolio swaps (as of June 2005) would approximate $5 trillion. This may also be viewed as consistent with the relatively higher spread paid to purchasers of mezzanine risk, for example, compared with similarly rated bonds, reflecting greater leverage as well as structural complexity. The implication is that the amount of risk transferred through a portfolio swap may be a multiple of its notional value and, therefore, that portfolio swaps may have a significantly greater impact on dispersing risk than indicated by reported notional transaction values.

Tranche Notional Value Versus Economic Risk Transfer[1]

(As a percent of the reference pool)



Source: IMF staff estimates.
[1]The structure is prototypical and will vary by transaction.

However, how these positions are managed also has important implications for financial stability. In particular, the leverage incorporated in structured credit products may increase the potential impact on the underlying assets and markets. For example, for every $100 million of junior mezzanine swaps (see figure above), a partially hedged position (e.g., 50 percent hedged) would require the purchase of about $263 million of credit protection on the underlying portfolio (50 percent of $100 million times the 21 percent, divided by the 4 percent tranche notional amount).[3] If some event triggers a need or desire to unwind the position, a $263 million offsetting trade may be required, with potential implications for liquidity and credit spread volatility on the underlying reference portfolio assets.

[1]A tranche's "delta" is equal to the theoretical change in its market value with respect to a change in the credit spreads of the underlying credits. See Gibson (2004) for more detail on delta calculations.

[2]See Flanagan, Ahluwalia, and Schmude (2005).

[3]Market participants have indicated that hedge funds may hedge only 50 percent of a junior mezzanine tranche. In addition, investors may use index tranches to hedge bespoke positions (due to the very liquid and inexpensive nature of trading indices), which may leave them with basis risks.

CDO structure (e.g., typically about 15 times).[27] By contrast, the senior tranches and higher-grade mezzanine tranches of portfolio swaps, which are generally held by banks and insurance companies, transfer less risk than indicated by notional amounts.

In addition, how positions are managed has important implications for financial stability. In particular, Box 2.5 also shows how equity and junior mezzanine tranches that are hedged can have a leveraged impact on the underlying credits. In fact, something along these lines happened in May 2005, as equity tranches suffered heavy mark-to-market losses in the wake of negative announcements regarding General Motors and Ford. Hedge funds and proprietary trading desks holding equity tranches that included these names rushed to cover their losses or to restructure their hedges, and because of the illiquid and leveraged nature of these positions, significant price gapping in the underlying CDS markets ensued.

When credit derivatives first became popular, the concentration of market-making activity for credit derivative products among a few dealers was identified as a potential source of vulnerability. From the perspective of financial stability, the limited number of market makers raised concerns about whether liquid markets could be maintained in the event a dealer stopped trading for any reason. The rapid development of the credit derivative markets in recent years has reduced these concerns. Many surveys indicate that the top 8–10 global dealers continue to have a large and relatively stable share (approximately 70 percent) of total gross positions over the last several years.[28] However, surveys also show that the degree of concentration varies considerably across products, and that the concentration among the top two or three dealers is much lower than in the past, with no single firm dominant in all or even most credit derivative markets. The relative ranking among the top institutions also varies considerably over time, indicating that product innovation has an important influence on a firm's short-term market share. More broadly, it is interesting to note that similar degrees of concentration are also evident today in the much larger interest-rate and foreign-exchange derivative markets.[29] Nevertheless, the withdrawal of a major dealer, while unlikely in view of the infrastructure commitment, revenue contribution, and their solid credit standing, could have a disruptive impact on the market, at least in the short term.

Market Liquidity and Other Vulnerabilities

Market Liquidity

In very broad terms, market liquidity refers to the ability of market participants to transact in open financial markets, under a range of circumstances. Underlying such a definition is the recognition that the resilience of the financial system, and therefore financial stability, depends critically on the ability of markets to meet sudden or temporary increases in demand for liquidity without major disruptions.[30]

Credit markets exhibit varying degrees of market liquidity, depending on a number of factors. For example, numerous European market participants emphasized that 9–12 months after issuance, the secondary market liquidity of many corporate bonds has often greatly diminished, in part because of the buy-and-hold nature of important investors, such as insurers and pension funds. As part of the

[27]Most market participants base their tranche risk metrics on the tranche's "delta" (see Box 2.5). Leverage is calculated by dividing each tranche's delta, expressed as a percent of its notional amount, by the delta of the underlying portfolio.

[28]See Fitch Ratings (2004a and 2005a).

[29]See CGFS (2003); Joint Forum (2005); Kimbell, Skalinder, and Newby (2005); and Campbell and Chen (2005).

[30]See Large (2005).

broader market structure, these factors also influence the market liquidity of structured credit instruments.

Credit derivative products have significantly enhanced the "transferability" of credit risks by allowing for the increased specificity of credit exposures, to meet different investor demands, particularly in the "primary" risk transfer markets. However, once transferred, secondary market liquidity risks and related contagion effects remain, and may constitute the most significant stability risk emanating from the structured credit markets. Evaluating, managing, and ultimately reducing liquidity risk is a key challenge for investors, as well as for supervisors and other public officials concerned with financial stability. Indeed, throughout our work on risk transfer, we have emphasized that analytical assessments of financial stability depend in large part on the "hard to quantify" issue of liquidity, and on the many qualitative considerations that must be included in its analysis (e.g., diversity of market participants).[31]

Market participants increasingly recognize that narrow bid-ask spreads and high transaction volumes can be misleading or incomplete gauges of secondary market liquidity. Such measures may offer the appearance of liquidity, but significant "one-way" flows may exist, particularly if there is a lack of diversity among market participants. In such markets, actual liquidity tends to fall well short of perceived or anticipated liquidity, and can lead to more volatile markets, liquidity disruptions, and price gapping. Increasing the diversity of market participants is important to maintain two-way flows and relatively stable liquidity conditions.

Liquidity Varies Across Products

Market liquidity in structured credit markets varies considerably across the range of products available. In recent years, credit derivative markets have developed in two opposite but complementary directions. The demand for trading and hedging tools has fostered the introduction and rapid growth of credit indices and standardized tranche products. Simultaneously, increased demand for more tailored credit exposures has fueled the market for bespoke transactions, with generally little or no secondary market liquidity. The different motivations underlying these developments are reflected in the product characteristics and their liquidity.

Market liquidity has improved rapidly for index products. The emergence of standardized CDS indices has attracted a variety of new participants to credit markets, resulting in an increasingly liquid market for index tranches, as relatively inexpensive tools to trade and hedge credit. Two-way liquidity seems to be readily available for on-the-run tranches of standard CDS indices.

The single-name CDS market may best illustrate the occasional divergence between real and perceived liquidity. This market is comprised of more than 2,000 reference names, including a growing number of high-yield and EM names.[32] However, daily updated prices are available for less than 25 percent of CDS names globally. An even smaller number of names is traded regularly (about 100 in the U.S. and European markets combined, and approximately 30–40 names in Asia-Pacific markets), and in sufficient size ($5–$10 million), to represent a truly liquid market.

Liquidity in EM CDS markets is even more limited, with only a few names, mostly sovereigns, trading on a regular basis.[33] Furthermore, even for standard quotes in liquid EM names, the dispersion of bid-ask spreads is wider, and the spread volatility higher, than in non-EM names. Trading and liquidity in EM CDSs largely reflects activity in the underlying

[31]See IMF (2004a and 2005).
[32]See Fitch Ratings (2004b).
[33]Among EM sovereign issuers, Mexico, Brazil, Russia, and the Philippines are the most regularly traded names.

cash markets, with EM names generally exhibiting greater liquidity during New York trading hours. As such, at this time EM structured products represent a very small part of this new market.

Liquidity in single-name CDSs, arguably the most efficient way to hedge a specific credit exposure, tends to evaporate quickly with increased market volatility, even for the most liquid names.[34] During such periods, protection buyers often significantly outnumber protection sellers. This highlights an important feature of CDS trading activity, namely, that many nonbank market participants (i.e., recipients of credit risk in the primary market) often do not use single-name CDSs to proactively hedge credit exposures, and typically seek to hedge positions in reaction to unfolding events. In doing so, they run the risk of being confronted with disappearing or very costly liquidity. In response, market participants have increasingly used the new and more liquid index products both to gain credit exposure and to hedge positions, particularly against general credit spread widening. As such, the index products help (in part) to address this reactive behavior. However, while such "proxy hedging" may help to protect positions against general spread widening, they may prove less effective as a hedge to idiosyncratic risks.

Among the most illiquid products are customized single-tranche "bespoke" instruments and CDOs. These instruments are highly tailored to meet specific investor and arranger needs, which facilitates primary distribution, but makes them rather illiquid thereafter. As such, they have typically developed as buy-and-hold investments. Indeed, the lack of secondary market liquidity may not be a major problem in this segment because users of these products are often long-term investors, such as insurers, pension funds, or regional banks, who desire the credit exposure and rarely engage in active trading. However, an investor wishing to unwind or modify a position may have to rely on the initial dealer/arranger of the transaction, who may not provide liquidity, or may do so only at a significantly depressed price.

Liquidity and Diversity

Hedge funds have been an important source of liquidity in credit derivative markets and, from this perspective, have the ability to provide a stabilizing influence. However, together with proprietary trading desks, they dominate activity in certain segments of the portfolio swap market (e.g., equity tranches and correlation trading), which can lead to liquidity problems. This was evident in May 2005, when hedge funds found it very difficult to exit or hedge portfolio swap positions because their dealer counterparties frequently had similar liquidity needs. According to market participants, "technical factors" overwhelmed fundamentals during this period, and thus prices arguably overshot (to the downside). A more accurate description may be that significant one-way trading volume and relatively tight bid-ask spreads led traders to believe that ample liquidity existed in these products. This proved to be incorrect when two-way flows were subsequently sought. Therefore, while the May 2005 episode was triggered by credit events involving General Motors and Ford, it was more fundamentally the result of liquidity disruptions in the narrow equity tranche market. However, the disruption remained relatively limited and short lived because new investors, primarily hedge funds with more diverse investment strategies (e.g., "macro" hedge funds) or with access to new capital (e.g., the largest credit hedge funds), entered the market, as they perceived prices to be well below fundamental levels. These investors provided important market liquidity and helped restore stability.

[34]See Fitch Ratings (2004c).

In other segments of the tranche market (i.e., throughout the capital structure), although investors with a longer-term horizon have played a positive role in facilitating primary credit risk transfer (as buyers of risk), they contribute only marginally to secondary market liquidity. Buy-and-hold investors, such as regional banks, insurance companies, pension funds, and structured finance CDO managers, tend to dominate the senior and mezzanine tranche markets. Their desire to diversify portfolios, hedge longer-term liabilities, and generally satisfy their differing asset-liability management strategies have historically insulated them from short-term market volatility.[35] In May 2005, for example, they generally did not sell their mezzanine tranches or buy equity tranches when dealers and hedge funds were looking for liquidity in both areas. Currently, even though positions in mezzanine risk appear balanced, long positions remain predominantly held by these buy-and-hold investors.

Most strategists, traders, and risk managers agree that the lack of diversity among market participants, and the related high degree of market segmentation, remain key structural influences and hindrances to secondary market liquidity. No doubt, the ability to tailor risk has enhanced primary market risk transfer. However, at present, the homogeneity of investors in the more segmented markets makes secondary liquidity unreliable. Better understanding of liquidity conditions, including potential sources of disruptions, are increasingly the focus of risk management considerations. Similarly, assessing the potential impact of changing accounting, regulatory, and prudential frameworks on investor behavior and market liquidity may also require increased attention from market participants and supervisors, as discussed in previous issues of the GFSR.[36]

Operational Risks

Operational shortcomings have been cited as a possible source of disruption in credit derivative markets, largely because of the rapid growth in trading volume and in the complexity of many new products. Industry groups and the official sector have expressed concerns over the mounting backlog of unconfirmed trades and the management of trade reassignments ("novations"), as well as the need to improve settlement procedures.[37]

The backlog of unconfirmed trades may reflect inadequate investment in back-office capacity by the major dealers in recent years. As noted above, the growth of credit derivatives closely parallels that of other financial innovations (e.g., interest rate swaps—see Figure 2.5), and therefore the volume of unconfirmed trades may represent "growing pains," and may be expected to decrease as the market matures, similar to these earlier markets.

In any case, regulators and supervisors, particularly the Federal Reserve Bank of New York and the U.K. Financial Services Authority (FSA), have sought to ensure that banks and dealers implement adequate systems. These supervisory authorities called for a collective commitment by the major banks and dealers to have more exacting standards for operational

[35]However, going forward, they may be subject to higher balance sheet and earnings volatility because of new and proposed accounting rules, as discussed in previous issues of the GFSR (IMF, 2004a, 2004b, and 2005).

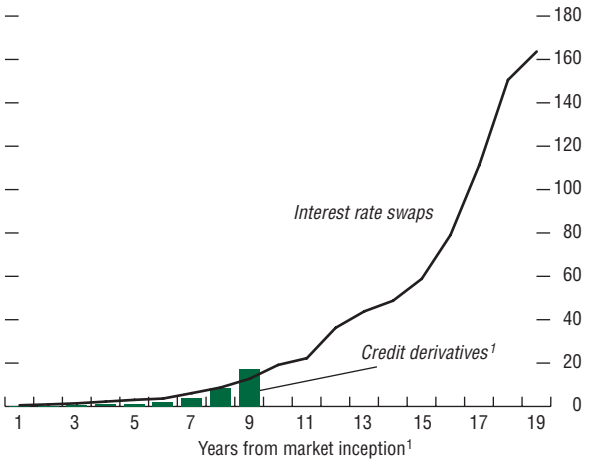
[36]Under the auspices of the Joint Forum, banking, securities, and insurance supervisors are currently conducting work on the management of balance sheet liquidity risk in these different sectors (see Joint Forum, 2006). Issues related to liquidity risks are also included in the proposed work program of the Institute of International Finance.

[37]Many of the recommendations of the Counterparty Risk Management Policy Group II (2005) targeted reducing confirmation backlogs and ensuring the integrity of trade reassignments. More broadly, the Group of Thirty (2003, p. 5) report has raised concerns that "unevenly developed national clearing and settlement infrastructure, and inconsistent business practices across markets, could be a source of significant systemic risk, and certainly of inefficiency."

performance.[38] The major credit derivative dealers committed to significantly reduce the number of confirmations outstanding.[39] The dealers also committed to strengthen their operating efficiency, including enforcement of the ISDA protocol regarding novation; improving information systems; automating more back-office procedures, including electronic matching platforms; and making proprietary platforms conformable to the Depository Trust & Clearing Corporation systems, which offer industry-standard processing platforms for other financial instruments.

With the entry of hedge funds as active traders in the credit markets, the issue of delays or incorrect notification procedures for reassignments (novations) of credit derivative contracts has also been raised by authorities. Indeed, some participants have reportedly executed trades without seeking the approval of the original counterparty, as required by the industry's master agreement set by its de facto standard setter, ISDA.[40] Such delays in confirming and executing reassignments raise counterparty risks and introduce operational uncertainty. ISDA has refined their novations protocol and, on February 1, 2006, opened a permanent web page to allow the industry to indicate their agreement or views regarding

Figure 2.5. Growth of Credit Derivatives Market Relative to Growth of Interest Rate Swaps Market
(In trillions of U.S. dollars, amount outstanding)



Sources: Bank for International Settlements; and International Swaps and Derivatives Association; British Bankers' Association; and *Risk* magazine.
[1]Credit derivatives data start from 1997; interest rate swaps start from 1987. Credit derivatives, as reported here, comprise credit default swaps, credit-linked notes, and portfolio swaps.

[38]Geithner (2005) called for commitments to reduce the backlog of unconfirmed trades, shorten confirm times, and increase the use of automated platforms. Other regulators have raised similar concerns, including the U.K. FSA and the former U.S. Federal Reserve Chairman Alan Greenspan. See FSA (2005) and Greenspan (2005).

[39]Confirmations outstanding for more than 30 days for the group of 14 major dealers were reduced by 54 percent, thereby meeting the January 31, 2006, target of reducing such outstanding confirmations from September 2005 levels by 30 percent. On March 10, 2006, the dealers set a 70 percent target for June 30, 2006, and committed to numerous trade-processing initiatives going forward.

[40]Unlike other financial instruments, obtaining approvals for reassigning credit derivative contracts involves a relatively more cumbersome three-party process. The original procedures in the ISDA master agreement were designed for situations where novations were infrequent.

the revised protocol. However, broad acceptance of this protocol by market participants is still subject to ongoing technical discussions.[41]

Although credit derivative markets functioned relatively smoothly during recent credit events (e.g., Collins & Aikman, Delta, and Northwest), the Delphi bankruptcy focused attention on the settlement process. It highlighted the potential risks and challenges that may arise when the notional value of outstanding CDS contracts far exceeds the outstanding amount of deliverable obligations, given existing settlement procedures that require physical delivery. Potential settlement problems were reduced by a special cash settlement protocol by ISDA for Delphi-referenced index-based products.[42]

Market participants believe the Delphi experience has caused many in the industry, and in the official sector, to reexamine the existing settlement procedures, and to consider the greater use of cash settlement, including for single-name CDSs. Going forward, the settlement protocol used for the Delphi settlement may provide a starting point for improved settlement procedures in the future. Industry representatives are actively discussing how to further improve and extend this protocol, and in January ISDA proposed to make cash settlement of net positions the standard protocol for all credit derivative transactions. Consequently, the proposal retains an element of physical settlement, and it may not necessarily eliminate deliverable-bond-market squeeze pressures when outstanding CDSs significantly exceed outstanding deliverable obligations.

Provision of Credit and Credit Cycles

Credit derivative markets may also influence the provision of credit and credit cycles in several important ways. First, credit derivatives improve the availability, quality, and timeliness of information in credit markets, thereby enhancing price discovery and reducing adjustment lags, particularly for banks. As credit pricing becomes increasingly more market based, the extension of bank credit becomes less subject to bank-specific factors. Second, risk transfer products may also influence the dynamics of credit cycles by increasing the sensitivity of credit risk management to changes in market pricing and sentiment, including the historical procyclicality of bank lending.

Provision of Credit

The growth of credit derivative trading has provided better and more timely information regarding credit market conditions. Credit derivatives improve price discovery, and may do so more efficiently than bond markets. Recent research provides evidence that changes in CDS spreads lead changes in bond spreads in the short run, and thereby increasingly set the marginal price of credit.[43] In short, the effectiveness of market prices would appear to have been enhanced by credit derivatives.

Credit derivative markets increasingly influence loan pricing and enable banks to delink loan origination decisions from traditional risk management considerations. An important prerequisite for this is the ability to attract new market participants, including

[41]For example, comments from buy-side industry representatives, particularly hedge funds, noted that the same-day (6 p.m.) deadline specified in the ISDA protocol did not make sufficient allowance for trading across time zones. A subsequent ISDA guidance note to the novation protocol requests (but does not require) parties to accept notices received the following business day.

[42]See Scott, Sbityakov, and Beinstein (2005) for more detail on the Delphi settlement protocol.

[43]See Blanco, Brennan, and Marsh (2005), who concluded that CDS spreads led changes in bond spreads. Zhu (2004) and Norden and Weber (2004) came to a similar conclusion. It is interesting that one of the data challenges in both cases was finding useful daily bond price data. For example, Blanco, Brennan, and Marsh (2005) started with 119 liquid CDS names, but they had to eliminate most because of insufficient bond price data. See also Chan-Lau and Kim (2005) and Neftci, Santos, and Lu (2006), whose empirical results suggest that for EM credits, the CDS market was the best source of price discovery.

other banks, willing and able to hold and trade credit. As noted above, this has occurred, particularly in the primary risk transfer markets, with different investor profiles attracted by the ability to increasingly tailor credit exposure, and thus better satisfy their own investment or risk management objectives. This diversity of participants enables buyers and sellers of credit to focus increasingly on the aspect of the intermediation process in which they may have a comparative advantage, such as banks' origination infrastructures and relationships, hedge funds providing price discovery and liquidity, and insurers and pension funds serving as longer-term holders of credit and seeking to better match their liability structures.

At the largest banks, the extension of credit has become much more dependent on market prices, rather than on traditional static lending limits related to a particular client, sector, or geographic region. Indeed, credit derivatives allow banks to preserve customer relationships, while risk managers may simultaneously adjust total or specific credit exposures (e.g., by buying protection to reduce concentration risk). In other words, these markets enable banks to optimize their credit portfolios according to a chosen risk management strategy, and to more proactively and gradually adjust credit exposures.

The discussion so far points to positive effects of derivative products on credit provision and on the efficiency of the financial system. An important question, raised by some academic researchers, is whether the ability to transfer risk may create incentives for banks to overextend credit and assume excessive credit risk. Others have raised questions about the potential for risk transfer to adversely affect financial stability by reducing incentives for banks to screen and monitor borrowers.[44] We will address the incentive issue first, and the potential for overextension of credit thereafter.

In the early days of the credit risk transfer market, investors and analysts expressed concern about information asymmetries and adverse selection possibilities. Indeed, in some of the early CDOs, banks were required by investors to retain some of the equity or "first loss" tranches for this reason.[45] As this market has evolved, such concerns have diminished. With increasing market depth and price transparency, as well as rating agency involvement and increased experience, investors are better able to independently price and monitor the corporate credits included in CDO portfolios today.[46] Indeed, even in the more structured portfolios, rating agency models and established indices (and subindex pricing) provide investors with the ability to monitor and hedge a variety of risks, often as well as the originating bank. A second, and very important, point is that the banks most active in these risk transfer markets must, for continued market access, preserve their market credibility, and therefore they are unlikely to seek a short-term gain with much greater long-term costs.

Ideally, an assessment of how credit derivatives influence financial stability, including the potential for the overextension of credit by banks, should be based on empirical analysis. However, current data are not sufficiently robust and, in practice, market forces may be expected to mitigate excessive credit extension. For example, banks that systematically misprice credit to borrowers will find it uneconomical to buy protection, due to higher premiums demanded in the credit derivative

[44]See Diamond (1984 and 1991) and Morrison (2005) on bank incentives to screen and monitor borrowers. See also Kiff, Michaud, and Mitchell (2003) for a general review of literature on factors affecting bank credit supply.

[45]Such early transactions were typically pools of loans (called collateralized loan obligations, or CLOs), and the banks were perceived to have an informational and monitoring advantage.

[46]Until recently, some banks and/or arrangers of structured products retained the equity tranches because of their perceived attractive rates of return. However, with the growth of hedge fund participation in these markets, the ability to transfer first loss tranches has significantly increased, and premium returns have declined.

markets, leading to poorer returns at the bank and/or higher borrowing costs passed through to customers, which in either case will act to limit the amount of credit extended. Of course, if banks elect to ignore such market information, they may develop poor credit portfolios. However, even in such an event, if supervisory surveillance and dialogue is enhanced through the use of such market information, regulators can encourage such institutions to address these credit issues through provisioning and improved risk management practices.

Given the newness of many of these markets, a lack of data prevents a direct test of the hypothesis that credit derivatives significantly influence aggregate credit extension (i.e., bond and loan issuance). However, since changes in CBS spreads lead changes in bond spreads, the latter may be used in statistical tests to examine two related propositions: (1) bond spread widening influences *subsequent* credit extensions, and (2) bond spread widening *decreases* the amount of credit extended. The results of such tests, based on data for U.S. nonfinancial corporations, show statistical support for both propositions, particularly during the 1990–2005 period when bond markets experienced significant growth and greater liquidity (Box 2.6). In particular, the results suggest that, taking account of both supply and demand factors underlying credit extension, both bank and bond markets reduce credit origination in response to market signals of deteriorating creditworthiness (e.g., spread widening). Interestingly, for the more recent period of 1995–2005, the results are stronger, and even the supply of bank credit to smaller borrowers (e.g., small and medium enterprises) became more sensitive to market prices.

As outlined above, the research literature shows that credit derivatives improve price discovery and enhance the efficiency of bond markets, and consequently may increase the influence of market prices on the aggregate extension of credit. While bond markets have improved credit market activity, credit derivatives appear to do so again. Indeed, discussions with market participants also indicate that credit derivatives already influence loan pricing at the largest banks, which should provide more informed credit decisions and reduce the potential for the overextension of credit.

Implications for Credit Cycles

Financial innovations, such as credit derivatives, and the increased role of market prices may also affect the dynamics of credit cycles.[47] The role of innovation and market behavior is an area of growing discussion and literature. However, robust data are still often lacking, so the conclusions should be viewed as tentative. Nevertheless, this is an increasingly important financial stability topic.

Before turning to a consideration of credit cycle dynamics, it is useful to compare credit cycles and economic cycles. U.S. data for the 1970–2005 period show that, adjusted for inflation, aggregate credit growth (bond and bank nonfinancial corporate borrowing) is generally correlated with real GDP growth, with aggregate credit appearing to lead GDP growth by approximately three quarters.[48] Bond issuance appears to lead GDP growth by seven quarters, while bank credit growth is much more contemporaneous with or even lagging economic growth (i.e., more procyclical). As such, bond markets appear more forward looking, or anticipatory, than bank lending, and the increasing influence of mar-

[47]Credit cycles can be defined with different metrics (e.g., credit quantity growth and spreads) and using different aggregates. Since the reference entities for credit derivatives are primarily nonfinancial corporations (62 percent), the volume of credit extended to these firms (i.e., bond and bank lending) will be the relevant measure for gauging credit cycle dynamics for this study.

[48]U.S. data from the Flow of Funds and National Accounts are used for illustrative purposes.

Box 2.6. Impact of Bond Spreads on Credit Extension

The first table (top right) reports the results of several statistical tests regarding the impact of credit spreads on bond and loan issuance using U.S. Flow of Funds data for the U.S. nonfarm nonfinancial sector. The first rows in the table use a Granger causality test to demonstrate that spread widening "Granger causes" (e.g., has a significant impact on subsequent) credit extensions. A Wald test is used to determine whether an empirical model of credit supply that takes account of several demand factors would support the hypothesis that spread widening decreases the supply of credit.

Both sets of test results suggest that changes in credit spreads have a statistically significant impact on bond issuance and bank loans to U.S. nonfinancial corporations. The Granger causality tests show that for the period 1970–2005, changes in a borrower's creditworthiness, as signaled by changes in bond credit spreads, have a statistically significant impact on *subsequent* bond issuance and bank loans. The statistically significant and negative sign on bond spreads in the model, which is an equilibrium relationship that includes both credit supply and company demand factors, provides support for a price mechanism that may restrain the overextension of credit when credit conditions worsen. Moreover, the strength of the influence of spreads on subsequent credit issuance was particularly statistically significant for the 1990–2005 period, and increasingly significant by both corporates and noncorporates (e.g., small and medium enterprises) for the most recent 10-year period, 1995–2005, when the use of credit derivatives expanded, bond markets deepened, and together provided a more liquid credit market.[1]

The Wald tests (see the second table below) are based on the following equilibrium relationship (combining supply and demand factors) for debt issuance:

$$\frac{D_t}{Y_t} = \alpha_0 + \alpha_1 \frac{I_t}{Y_t} + \alpha_2 RATE_t + \alpha_3 \frac{CF_t}{Y_t} + \sum_{i=0}^{7} \beta_i SPREAD_{t-i} + \varepsilon_t,$$

where D is net issuance (either bonds or bank loans); Y is GDP; I is business investment; $RATE$ represents real rate of interest or an internal hurdle rate against which investment projects are gauged (this measure is proxied by the nominal BBB corporate bond rate minus GDP deflator inflation); CF is the sum of cash flow and inventory valuation adjustment; and $SPREAD$ is the spread between BBB bonds and five-year treasury notes. All bond market and bank loan data were obtained for the nonfarm nonfinancial sector from the quarterly U.S. Flow of Funds database. The number of quarterly lags for $SPREAD$ was chosen based on the Akaike and Schwartz information criteria. The α coefficients were generally significant and had the correct sign, particularly for the post-1990 period. The inclusion of additional bank credit supply factors (e.g., bank capital) does not change the reported results.

[1]Net bond issuance to U.S. nonfarm nonfinancial corporations rose from approximately $50–$100 billion during 1985–95 to approximately $300 billion during 1998–2002, before reverting to a slower pace.

Granger Causality Tests

Null Hypothesis	1970–2005	1970–1979	1980–1989	1990–2005	1995–2005
SPREAD → Bonds	2.36**	1.98*	0.74	2.29**	3.59***
SPREAD → Bank loans	1.84*	0.63	0.47	2.37**	1.70

Note: "$X \rightarrow Y$" means the null hypothesis, X does not Granger cause Y. F-statistics are shown in the table. ***, **, and * indicate the rejection of null hypothesis at the 1 percent, 5 percent, and 10 percent levels, respectively.

Wald Coefficient Tests for Bond Spread Variables (H_0: $\sum\beta = 0$)

Dependent Variable	1970–2005	1970–1979	1980–1989	1990–2005	1995–2005
Bonds	−0.96**	−0.89	−0.50	−2.32**	−4.49***
Bank loans (corporate)	−0.33*	−0.14	0.64	−0.35*	−0.45*
Bank loans (noncorporate)	−0.06	−0.17	−0.01	−0.04	−0.16*

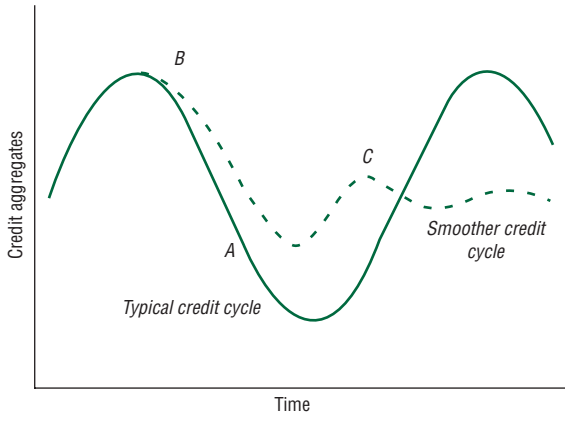
Note: Sum of bond spread coefficients (βs) are shown in the table. ***, **, and * indicate that the sum is significantly different from zero at the 1 percent, 5 percent, and 10 percent levels, respectively. They are also statistically negative based on comparisons between the estimated sums and their standard errors. Taking account of simultaneity using a two-stage estimator does not change these results.

ket prices on bank behavior may also cause banks to become more forward looking, and less procyclical.[49]

The growing importance of credit derivatives in setting the marginal price of credit, including bank loans, suggests that credit derivatives may influence credit markets even more than bonds. The increased transparency of credit pricing and credit quality that these markets provide may reduce the volatility of credit cycles. In particular, such market innovations and influences may induce more gradual, near-term credit portfolio adjustments, particularly among banks, compared with more procyclical behavior in bank-dominated financial systems. This marginal behavior (lending or borrowing) is important, and more relevant than aggregate or average measures of credit. Moreover, for the broader economy, such marginal adjustments and related smoothing of investment and consumption may affect the volatility of such cycles.[50] While market adjustments may occasionally also produce short and possibly sharp market corrections within certain asset classes (e.g., portfolio swaps in May 2005, or the high yield market in May/June 2004), the broader effect may be to dampen the historical large swings of credit cycles.

The potential impact on credit cycles can be considered by evaluating historical bank behavior. Figure 2.6 shows a "typical" credit cycle (solid line), in the absence of relatively developed credit derivative markets. In such cases, a turn in the credit cycle was typically only apparent with a significant lag, as banks

Figure 2.6. Credit Cycle Dynamics



[49]One example of anticipatory behavior is the effect that recent monetary policy approaches (including transparency and gradualism) have had on economic activity since 1980 in the United States. It contributed to sharply reduced inflation and volatility of GDP growth, resulting in less volatile economic cycles. The standard deviation of GDP growth declined from 2.7 percent during the 1980s to 1.5 percent during the period 1990–2005 (and to 1.3 percent in 1995–2005). See Rosenberg (2005) for a discussion of the impact of transparent monetary policy during the Greenspan era.

[50]See Dynan, Elmendorf, and Sichel (2005).

realized and reported increasing nonperforming loans and increased provisioning (point A). Indeed, the review process of a bank is generally much less frequent or exacting in comparison with market trading and pricing of corporate credit (including its mark-to-market discipline), available today for the largest corporate credits in the bond and derivative markets. Consequently, in such a system, a downturn in the credit cycle may be well advanced before adjustments are initiated. Moreover, as banks identify the deterioration of credit quality, they typically withdraw or withhold credit (and related liquidity), which, other things being equal, exacerbates the cyclical decline.

With the advent of deeper and more liquid bond markets, and growing credit derivative markets, banks and other market participants (including supervisors) may be able to identify credit turning points at a much earlier stage in the cycle (point B). Indeed, many bank and nonbank participants believe the current credit cycle has peaked, as typically first signaled by noninvestment-grade spread widening and various broad market and idiosyncratic event risks rising (e.g., bankruptcies rising, increasing LBO activity, moderating or declining corporate earnings growth, rising M&A activity, and increased dividends and share buybacks, etc.). Given this change in sentiment, and improved market information, banks (and other participants) may be expected to manage credit risk more proactively and in a more gradual manner.

Likewise, in the downturn of a credit cycle, new, different, and dedicated investor groups (e.g., dedicated credit funds) may be expected to purchase credit exposure well before the historical cycle bottoms. As such, with a broader and more diverse investor base, credit markets may deepen and liquidity should improve and, other things again being equal, the credit cycle may dampen over time (a move to the dotted line and point C). This suggests that changes in market pricing, increasingly first reflected in credit derivatives, may act to restrain the availability of credit in a cycle upswing, and to increase the availability of credit in the downswing, potentially smoothing and making the credit cycle less volatile. Of course, such benefits depend in large part on the existence of relatively liquid markets and diverse investor participation, as noted above. Indeed, without such diversity and related liquidity, changes in risk appetite tend to have a more pronounced and possibly more amplifying effect on these markets (e.g., through liquidity disruptions and price gapping). For this reason, the diversity of investors and the liquidity of markets are important preconditions for more stable markets and improved cycle dynamics.

Some evidence of the possible change in cycle dynamics may be found in the housing sector. Here, market liquidity and funding have increased with the greater use of securitization and, more recently, a variety of advanced credit derivative products. Securitization activity in this sector has helped to secure a steadier supply of mortgage finance over time, reducing the volatility of the provision of housing credit, and possibly contributed to moderating credit cycle dynamics and output loss.[51] The *World Economic Outlook* in 2003 noted that "bank-based financial systems tended to suffer larger output losses than market-based financial systems during housing price busts," reflecting the higher exposure of banks to real estate lending, and the importance of greater balance sheet

[51]Helbling and Terrones (2003a) and Hunt (2005) study the impact of housing price declines on output loss. Kodres (2004) notes the importance of the structure of mortgage markets on house price growth and volatility. Schnure (2005) discusses how the rise in securitization activity since the mid-1970s in the United States may have significantly reduced the cyclical variability (or dampened the credit cycle) in mortgage finance. There is also significant literature connecting financial market innovations and developments with economic growth (see Levine, 1996; and King and Levine, 1993).

liquidity and funding.[52] As the financial system becomes increasingly market-based, credit cycle dynamics may continue to change and economic benefits may broaden.

Separately, a large body of research suggests that securitization may also influence monetary policy transmission channels.[53] The advances in structured credit markets may have similar effects, possibly by altering the flow of credit in financial markets. This should be a topic for future research, as credit derivative markets continue to grow and provide more analytically useful data.

One line of existing research shows that securitization has deepened capital markets and increased liquidity, which makes credit flows less susceptible to exogenous shocks, including from changes in monetary policy.[54] There is also relevant literature on the credit channel.[55] Moreover, the structural and market changes providing broader dissemination of informed credit information, including the credit derivative markets, suggest that asset price signals may gain importance for regulatory, supervisory, and broader policy considerations.[56]

Conclusions and Policy Implications

Credit derivative and structured credit markets help to improve financial stability by facilitating the dispersion of credit risks. These markets allow banks, especially systemically important institutions, to shift credit risk to a broader set of investors. As a result, the vulnerability of these institutions, and of the broader banking system, to credit shocks should be reduced. Some observers, while acknowledging a banking sector gain, are concerned that such markets may have simply shifted credit concentrations elsewhere in the financial system. However, based on the data available, there is no evidence of increased credit concentrations among regulated entities, such as smaller or regional banks, insurance companies, pension funds, or mutual funds, as a result of these risk transfer markets. As such, future credit losses are likely to be more broadly distributed, and individual losses less likely to cause a policy concern for a particular sector.

However, credit derivative and structured credit markets do present new risks and vulnerabilities. In many respects, the financial stability gains noted above relate to the "primary" risk transfer market, where the seller of risk, often a bank, is transferring risk to a potentially better "warehouser" of risk. The ability to tailor and package increasingly specific risk has supported the growth of this risk transfer activity. However, these markets would be more complete, and financial stability enhanced, if a more liquid secondary market were to develop in a number of market segments. The potential for secondary market liquidity disruptions, often related to the homogeneity of market participants in a particular segment and to gaps between real and perceived liquidity, remains a stability concern. Some specific policy suggestions related to these and other issues raised in this chapter are set out below.

[52]Helbling and Terrones (2003b, p. 74).

[53]Estrella (2002) presents econometric evidence that securitization may have reduced the sensitivity of output to monetary policy and related interest rate changes. He concludes that securitization may have reduced the efficacy of monetary policy by influencing credit availability (i.e., dampening the credit channel). Loutskina and Strahan (2006) also present empirical evidence suggesting that securitization limits the Federal Reserve's ability to influence bank lending. See also Dynan, Elmendorf, and Sichel (2005) for a discussion of the impact of financial innovations on reducing output volatility.

[54]See Kolari, Fraser, and Anari (1998).

[55]See Bernanke and Gertler (1995).

[56]See Geithner (2006b) on the increasing importance of understanding the interaction of asset prices and market liquidity for monetary policy decisions.

Market Liquidity

The growing use of credit derivatives for the transfer of risk makes liquidity considerations in these leveraged markets important for financial stability. Liquidity in the "primary" risk transfer market has been growing in recent years, and appears increasingly reliable. However, certain products and market segments are particularly vulnerable to secondary market liquidity disruptions, which of course may also have implications for primary market activity. Supervisors and regulators must remain vigilant to the potential for such disruptions.

The challenges of managing liquidity risk are manifold. Measuring, monitoring, and managing liquidity risk should include increased dialogue between market participants and supervisors, including in the design of appropriate liquidity cushions at individual firms and within sectors. Stress-testing is essential for assessing a firm's ability to withstand liquidity disruptions, and it is important that both market participants and regulators use the Basel II (and pending Solvency II) framework to refine such practices. In-depth exchanges within and across sectors, such as through the work by the Joint Forum and proposed work by the IIF, are supportive of supervisory efforts to identify ex ante areas of potential liquidity weakness and sources of contagion. Further progress in this complex area would be welcome.

Dialogue and cooperation among public officials are key to successful coordination during a liquidity crisis, for which contingency plans should already be in place. Such cooperation may entail developing new indicators to monitor liquidity across sectors and asset classes, including to better identify the holders of specific types of credit risk. This does not require new or additional regulation, but more focused surveillance activities, including the need for supervisors to be better informed about the activities of unregulated market participants (e.g., hedge funds). In this regard, recent efforts in the United Kingdom and the United States are welcome and should continue.

As in other markets, policymakers should seek to encourage the participation of an increasingly diversified investor base in the structured credit markets. A well-functioning market (i.e., more resilient to shocks) often reflects different investment and trading strategies. As discussed in previous issues of the GFSR, a diverse investor base depends on a number of factors, including various important influences on market behavior, such as regulatory and prudential frameworks, accounting, rating agencies, and the broader market structure. Policymakers need to understand how initiatives such as Basel II, Solvency II, and fair value accounting may alter the behavior of key market participants, and therefore affect market liquidity and stability.

More specifically, policymakers need to develop or strengthen the institutional, legal, and regulatory infrastructures needed to attract a diverse and dedicated investor base, and to ensure the free and orderly flow of capital within and among markets. In addition, the reduction of market frictions and the consistent application of regulations will provide a more efficient market environment, while the alternative often contributes to more complex transactions and less liquid markets. For example, investors increasingly have the ability to seek returns from many different markets and asset classes, both large global markets and smaller local markets. In doing so, they prefer legal, tax, and regulatory clarity, where possible, as well as relatively established market infrastructures (e.g., trading and settlement systems). Under such conditions, investors generally are prepared to take a longer-term investment perspective, and thereby contribute to market liquidity and stability. However, without such clarity and infrastructure, investors are more likely to avoid such markets or to seek short-term arbitrage trading gains, often through highly structured or derivative transactions, which may act to limit broader market liquidity.

Underdeveloped securities markets (e.g., corporate bonds) in many parts of the world also lead market participants to use highly structured products to transfer risk and, equally important, to satisfy the investment and risk management objectives of different investors, including households. Since it may be very difficult to develop liquid markets in every country, policymakers should explore the potential for regional or global markets and infrastructures. Similarly, policymakers should carefully assess regulations that prevent local institutions (e.g., domestic pension funds) from participating more fully in global market activity. In particular, the risk of "external contagion" that these regulations often aim to prevent needs to be balanced with the risks and costs stemming from narrow local markets and related illiquidity.

Operational Risks

The rapid growth of credit derivative markets has raised concerns among industry representatives, regulators, and supervisors regarding the potential for operational failures to cause or amplify financial disturbances. The backlog of unconfirmed trades, resulting in part from underinvestment in back-office capacity by the major dealers, is being addressed in response to concerns expressed by the New York Federal Reserve Bank and the U.K. FSA. The delays in reassigning trades (novations) largely reflects the increased presence of hedge funds as active traders in these markets. In light of this, ISDA has proposed streamlining its novations protocol, and the industry has agreed to enforce these novations procedures. The industry and ISDA should be encouraged to pursue these efforts expeditiously in order to avoid potential disputes in the event of a default. Interestingly, these are two examples of a trend by regulators of asking the market to develop and to take the lead on solutions to issues highlighted by the authorities; a trend we welcome.

However, significant issues remain regarding the settlement process. With the benefit of the Delphi experience, industry representatives should push ahead with ongoing discussions to further improve and generalize a cash settlement process. Introducing settlement uncertainty is inconsistent with developing a broader investor base. The Delphi protocol was an important milestone, and provides a starting point for developing future settlement protocols, which may include making cash settlement the standard for credit derivative settlements, including single-name CDSs.

Credit Risk Dispersion

While structured credit products provide a wealth of market information, there remains a paucity of data available for public authorities to more quantitatively assess the degree of risk reduction among banks and to monitor where credit risk has gone. Pricing data are relatively easy to obtain, but measuring the degree and effectiveness of risk transfer continues to present statistical and methodological challenges, and may cause some analysts, researchers, and policymakers to underestimate the benefits of these markets. ISDA has been tracking outstanding notional amounts of credit derivatives for several years, the BIS has started a comprehensive "size-of-market" survey, and a few commercial firms provide information on portfolio swap transactions.[57] However, notional amounts are not sufficient to measure the economic risk transferred in the portfolio swap market, which now comprises about one-quarter of the credit derivative market. As outlined in Box 2.5, delta-adjusted volume is a better way to measure economic risk transfer for portfolio swaps, and to consider potential market liquidity vulnerabilities. However, such

[57]Creditflux collects arguably the most detailed portfolio swap data necessary to measure, with any reasonableness, economic risk transfer (see Box 2.5).

calculations require more detailed transaction data not currently collected by public authorities (including tranche-specific distribution data).

ISDA and the BIS, as well as national authorities, should be encouraged to improve and coordinate their collection of credit derivative data, for example, to include information on tranche structures for portfolio swaps. In this regard, the focus should be to obtain *better* data, rather than simply *more* data, along the lines discussed above. The Joint Forum recently made proposals on specific ways to improve the supervisory dialogue regarding credit derivative activity and counterparty exposures, including suggested qualitative and quantitative approaches for supervisory discussions and data collection. Such proposals include collecting better and disaggregated data on the credit risk profiles of different institutions and products, as well as information on credit risk management systems and procedures.[58]

Implications for Financial Supervision and Surveillance

Supervisors need to ensure that recipients of credit risk have the risk management systems and skills needed to manage such exposures, so that the benefits from risk dispersion are realized. This may be particularly relevant for second-tier banks and nonbank institutions, and should include better counterparty risk management.

Investors and supervisors need to understand that structured products and their credit ratings are likely to perform very differently from bonds through the credit cycle. The rating agencies have made efforts to explain the ratings for structured products and to educate investors. However, more could be done, and, in particular, the rating agencies should adopt a more differentiated ratings scale for structured credit products. For example, the agencies could use a different ratings scale, such as "SC-A," to signal the different risk profile of single A-rated structured credit products relative to bonds. This simple change would signal to all users the differing credit risks between these securities.

Likewise, policymakers and supervisory authorities (and rating agencies) should clarify the treatment of risk transfer techniques for nonbank institutions. The largest insurance companies have started to use these techniques to manage their risk exposures, which should be encouraged. However, such developments are being restrained by a lack of clarity regarding the regulatory and rating agency treatment of such transactions.[59] Ongoing international initiatives to promote more risk-based supervisory frameworks for insurers and pension funds should also be supported, as they encourage more proactive risk management practices by these institutions.

With regard to hedge funds, as discussed in previous issues of the GFSR, regulators must remain vigilant regarding risk management practices and counterparty exposures at the regulated banks and brokers, particularly concerning credit products. Hedge funds have contributed significantly to the growth of the credit derivative markets, and often provide important liquidity. But they are also active in the most illiquid parts of the market, where disruptions are most likely. During 2005, regulators in the United Kingdom and the United States, where hedge funds are most active, increased the supervisory dialogue and surveillance regarding bank and dealer counterparty risk management related to hedge funds. While these steps are welcome, enhanced monitoring of counterparty risk should become a higher priority for market participants and supervisors in all jurisdictions. The recommendations of the second Counterparty Risk Management Policy Group

[58]See Joint Forum (2005, Annex 4).
[59]Group of Thirty (2006).

provide a useful road map in this regard. The importance of hedge funds to these risk transfer markets also highlights the need for cooperation and exchange of information between regulators.[60]

Credit derivatives provide useful information for supervisors to monitor credit flows, credit quality, and concentrations across sectors and within institutions, and thus can contribute to more effective financial sector surveillance. Traditional bank credit aggregates are often not available in a timely or sufficiently disaggregated manner to inform surveillance activities. This would seem particularly true as financial systems become more market based. For example, even the supervision of smaller banks may be better informed by information obtained from credit derivative markets. In addition, market indicators should also be used to monitor potential weaknesses beyond the banking sector. For example, the new market for CDSs on ABSs may provide policymakers with early warning signals regarding higher-risk mortgages and, more generally, the health of consumers and the household sector (i.e., providing a "canary in the coal mine").

Policymakers and official institutions should seek to reduce frictions that inhibit the growth of markets and, more broadly, seek to improve the efficiency of financial markets. In Europe, a variety of structural frictions (legal, tax, etc.) were a primary reason for the emergence of synthetic products. In Germany, for example, banks found it difficult to execute "true sale" or direct securitizations.

In emerging markets, global investors often note that institutional shortcomings and frictions (e.g., transfer taxes, creditor rights, bankruptcy codes, and clearing and settlement systems), more than other considerations (e.g., currency risk), can impede direct investment in local credit markets, in turn limiting the potential stability gains from increased foreign investment and improved market liquidity. Therefore, as discussed further in Chapter III of this GFSR, efforts should be made to strengthen key aspects of local frameworks as well as underlying markets (e.g., broader product availability).

The IMF, in collaboration with other international financial institutions (IFIs) and in consultation with national authorities, will increasingly focus on these issues in the conduct of their financial sector surveillance. In particular, providing policymakers, supervisors, and regulators with more cross-country comparisons and microeconomic analysis should contribute to enhanced supervisory understanding of market developments, including these new risk transfer instruments and markets. Together with national authorities and other IFIs, the IMF will continue to monitor and evaluate these market developments from a global financial stability perspective, including the effectiveness of policies directed at systemic risk.

Credit Cycle Dynamics

As discussed above, the dynamics of credit cycles may be influenced by deeper, more efficient, and liquid credit markets. As credit derivatives make the pricing of credit risk more transparent, the ensuing proactive and potentially more gradual portfolio adjustments, particularly by banks, may help dampen the credit cycle. This implies that market surveillance also needs to adapt, and to better recognize how the flow of risks may change in response to financial innovations and structural developments. These innovations and developments should be encouraged, as the improved risk management focus they support may preclude larger and/or procyclical adjustments that can amplify cycles.

The development of structured credit markets warrants further research on how changes in the flow of credit from banks, and other

[60]See IMF (2004b and 2005).

lenders, may influence the transmission of monetary policy. Ultimately, monetary policymakers may need to increase their monitoring of asset markets to better understand credit flows, despite the often uncertain connections between asset price changes and underlying economic fundamentals.

Broader Financial and Economic Considerations

Credit derivative markets facilitate the continued evolution from a primarily bank-based financial system to a more market-based system. These instruments make more transparent the volatility inherent in credit, which was previously masked by bank balance sheets. By transferring and managing more credit risk in the capital markets, the banking system and the overall financial system may not only become more efficient, but also more stable. Of course, history has shown that this may not be a linear process. New challenges to financial stability and market vulnerabilities may arise. In the structured credit markets, we believe the risk of liquidity disturbances is material. Whether and how these new risks materialize, and the severity of their impact, will critically depend on the degree to which the diversity of market participants increases, the various structural frictions are reduced, and market surveillance is improved.

Liquidity may be the best financial stability cushion. However, efforts to develop and to deepen capital markets need not always lead to the development of national markets, but may argue for regional or global securities markets and infrastructures. Policymakers should continue to support the development of markets, including risk transfer markets, which will not only benefit economic and financial efficiency, but also contribute to further improve financial stability.

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