CANADIAN SOCIAL SCIENCE
Vol. **6**, No. **4**, **2010**, pp. 194-201

ISSN 1712-8056
www.cscanada.net
www.cscanada.org

Credit Derivatives and Commercial Banks' Risk Management

DERIVES DE CREDIT ET GESTION DES RISQUES DES BANQUES COMMERCIALES

HE Jing[1]

Abstract: This paper illustrates the value of credit derivatives with two examples. A commercial bank can use credit derivatives to manage the risk of its loan portfolio. However, credit derivatives pose risk management challenges of their own. This paper discusses five of these challenges. Credit derivatives can transform credit risk in intricate ways that may not be easy to understand. They can create counterparty credit risk that itself must be managed. Complex credit derivatives rely on complex models, leading to model risk. The settlement of a credit derivative contract following a default can have its own complications, creating settlement risk. For the credit derivatives market to continue its rapid growth, commercial banks must meet these risk management challenges.
Keywords: Credit Derivative; risk management

Résumé: Ce document illustre la valeur des dérivés de crédit avec deux exemples. Une banque commerciale peut utiliser des dérivés de crédit pour gérer le risque de son portefeuille de prêts. Toutefois, les dérivés de crédit représentent aussi des défis de gestion. Cet article examine cinq de ces défis. Les dérivés de crédit peut transformer le risque de crédit d'une façon complexe qui n'est pas facile à comprendre. Ils peuvent créer des risques de crédit de contrepartie qui doivent être gérés eux-mêmes. Les dérivés de crédit complexes reposent sur des modèles complexes, conduisant à un risque de modèle. Le règlement d'un contrat den dérivés de crédit suite à un défaut peut avoir ses propres complexités, créant le risque de règlement. Pour que le marché de dérivés de crédit puisse poursuivre sa croissance rapide, les banques commerciales doivent répondre à ces défis de gestion des risques. Pour que le marché de dérivés de crédit puisse continuer sa croissance rapide, les banques commerciales doivent faire face à ces défis de risques de gestion.
Mots-clés: dérivés de crédit; gestion des risques

[1] Wuhan University, 430072, China. E-mail: whujinghe@sina.com.
* Received 28 April, 2010; accepted 8 June, 2010

1. CREDIT DERIVATIVES ARE USEFUL FOR RISK MANAGEMENT

The growth of credit derivatives suggests that market participants find them useful for risk management. Figure 1 shows the growth trajectory for credit derivatives from two surveys of derivatives dealers: the ISDA Market Survey, which goes back to 2001, and the BIS Semiannual Derivatives Statistics, which goes back to 2004. The BIS survey is more accurate, because it adjusts for double counting of inter-dealer trades, but both show a similar pattern of rapid growth. Notional amounts of credit derivatives outstanding have roughly doubled each year for the past five years.

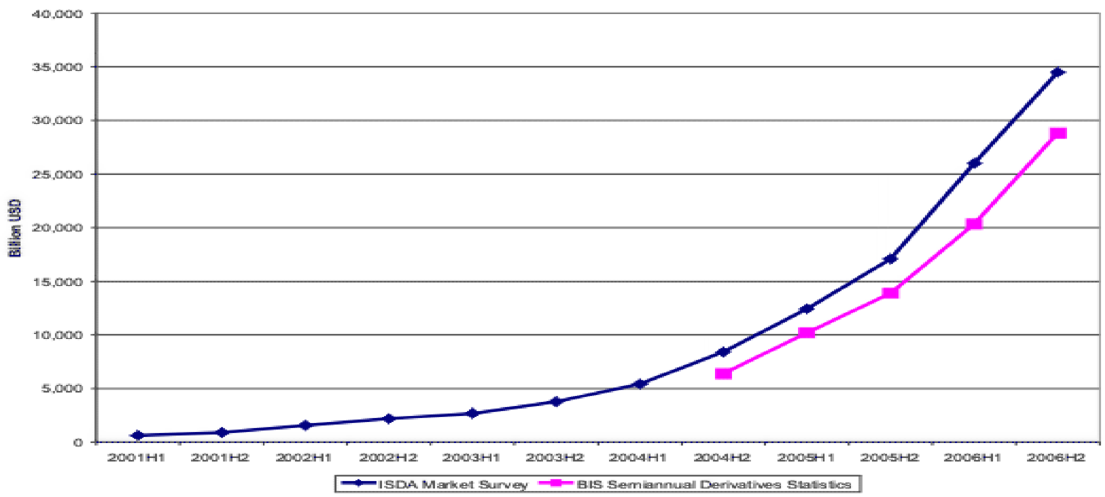

Figure 1: Notional amounts of credit derivatives outstanding

Credit derivatives have been used by a wide variety of market participants. No single data source provides definitive information on the activity of different types of market participants. But by combining several available data sources, a relatively clear picture emerges. I will refer to two data sources: the BIS Semiannual Derivative Statistics, the 2005 report on Credit Risk Transfer by the Joint Forum.

The most comprehensive data source is the BIS Semiannual Derivative Statistics (Bank for International Settlements, 2007). About 55 dealers contribute to this survey which breaks out credit derivative notional amounts by the type of counterparty. Table 1 shows this data for December 2006. The largest category is reporting dealers, reflecting the inter-dealer nature of the market. In any dealer market, dealers rely on inter-dealer trading to adjust their risk profile in response to trading flows from end-users. According to dealers, only 5 to 10 percent of their notional amount of derivatives represents hedges of their own credit exposures; the balance reflects inter-dealer trading and accommodation of customer demands (Joint Forum, 2005).

Table 1: BIS Semiannual Derivatives Statistics, December 2006 (notional amounts, $billions)

Type of counterparty	Dealer bought protection from counterparty	Dealer sold protection to counterparty	Total (adjusted for double counting)
Reporting dealers	16,044	16,165	16,104
Non-reporting banks and security firms	2,928	2,758	5,686
Other financial institutions	2,826	2,824	5,650
Non-financial institutions	561	530	1,091
Insurance and financial guaranty firms	211	95	306
Total	22,571	22,372	28,838

Source: Bank for International Settlements, 2007

Banks and security firms that are not reporting dealers make up one-fifth of the total. Some of this captures non-dealer banks investing on their own account in credit derivatives. Some likely captures banks acting as fiduciaries for private banking or high-net-worth investors. The category of "other financial institutions" includes hedge funds, pension funds, and special purpose vehicles and makes up another fifth of the total. Many structured credit products, including collateralized debt obligations (CDOs), make use of special purpose vehicles. Hedge funds are active traders but tend to maintain their positions for a short amount of time; their share of trading volume would likely be larger than their share of notional amounts outstanding. This category is the fastest-growing among the non-reporting dealer categories. Of course, it is unclear exactly how much risk transfer that data represents, given that notional amounts cannot be equated with risk.

Commercial banks use credit derivatives to tailor their credit risk exposure. Broadly speaking, they shed credit risk via credit derivatives. Banks have used credit derivatives and other means of credit risk transfer, such as securitizations, to shed risk in several areas of their credit portfolio, including large corporate loans, loans to smaller companies, and counterparty credit risk on over-the-counter (OTC) derivatives. Banks use single-name CDS to shed the credit risk of issuers to whom they have a large exposure. Banks can transfer the credit risk of a portfolio of exposures to investors via securitization transactions, such as collateralized loan obligations (CLOs).

Joint Forum (2005), reporting on interviews held in 2004 with about 60 market participants, found that the largest commercial banks had shed a material, but small, amount of credit risk via credit derivatives, mainly to their large, investment-grade corporate customers. The Joint Forum also reported that a number of commercial banks had scaled back their credit hedging activity.

However, these conclusions may no longer hold. The amount of credit risk shed by banks may be rising, and hedging has spread to categories of credit risk beyond investment-grade corporate loans. A number of banks, mainly European, have done large hedging transactions in the past couple of years. Table 2 reports several recent hedging transactions by large banks. These transactions are larger and more numerous than what had been reported at the time of the Joint Forum survey. In total, these transactions represent the equivalent of $88 billion notional amount of credit risk shed by eight large international banks over 2005-07. In many of these transactions, and in contrast to similar transactions in the late 1990s, the issuing bank sold off the first-loss equity tranche of the credit risk. The categories of credit risk shed include not only loans to large corporates, but also loans to small and medium-sized enterprises, loans to emerging markets, and counterparty exposure on derivatives. Most transactions in the table are synthetic, using credit derivatives to transfer risk off the balance sheet.

Table 2: Recent hedging transactions by large banks

Date	Bank	Name of deal	Cash or synthetic	Collateral	Amount
June 2005	ABN Amro	Amstel 2005	Synthetic	Corporate loans	EUR 10 bil
December 2005	ABN Amro	Smile 2005	Synthetic	Dutch SME loans	EUR 6.75 bil
November 2006	ABN Amro	Amstel 2006	Synthetic	Corporate loans	EUR 10 bil
December 2006	ABN Amro	Amstel SCO	Synthetic	Counterparty exposures on derivatives	EUR 7 bil
February 2007	ABN Amro	Smile Securitization 2007	Cash	Dutch SME loans	EUR 4.9 bil
December 2005	Barclays	Gracechurch Corporate Loans Series 2005-1	Synthetic	UK midsize corporates	GBP 5 bil
January 2007	Barclays	Gracechurch Corporate Loans 20071	Synthetic	UK SME loans	GBP 3.5 bil
February 2007	Credit Suisse	Clock Finance	Synthetic	Swiss SME loans	CHF 4.8 bil
July 2005	Deutsche Bank	GATE SME CLO	Synthetic	SME loans	EUR 1.5 bil
June 2006 / February 2007	Deutsche Bank	Craft EM CLO	Synthetic	Emerging market loans, bonds, and counterparty exposures	USD 500m/1 bil

To be continued

Continued

Date	Bank	Name of deal	Cash or synthetic	Collateral	Amount
February 2007	HSBC Trinkaus	HEAT 3	Cash	SME loans	EUR 314 mil
November 2005	HSBC	Metrix Funding	Cash	Corporate loans	GBP 2 bil
November 2006	HSBC	Metrix Securities	Synthetic	Corporate loans	GBP 2 bil
November 2006	Mizuho	N/A	Synthetic	Non-Japanese large corporate loans	JPY 560 bil
October 2006	SocGen	Atlas III	Synthetic	Corporate loans	EUR 2.8 bil
November 2006	UBS	N/A	Bilateral swap	High yield corporate loans	USD 600 mil

Source: Company and rating agency reports and financial press.
Note: SME = small and medium-sized enterprises.

Table 3 shows reported amounts of CDS hedging by the three largest U.S. commercial bank holding companies, as reported in their 2006 annual reports, and by one European bank, as reported in the financial press. Only U.S. banking organizations appear to disclose CDS hedging in their annual reports. For this admittedly small sample, the average percentage of credit risk hedged appears to be larger than what was reported by the Joint Forum.

Table 3: Hedging done with credit default swaps

Date	Bank	Credit exposure before hedging (billions)	Amount of hedging reported (billions)	Exposure hedged (percent)
Year end 2006	Bank of America	USD 618	USD 8	1
Year end 2006	Citigroup	USD 633	USD 93	15
Year end 2006	JP Morgan Chase	USD 631	USD 51	8
2006 Q1	Societe Generale	EUR 60	EUR 15	25

Source: for U.S. banks, 2006 annual reports; for Societe Generale, "Safety first," Risk, August 2006.

2. CREDIT DERIVATIVES POSE RISK MANAGEMENT CHALLENGES TO COMMERCIAL BANKS

The first half of this paper has shown how commercial banks use credit derivatives for managing credit risk. However, credit derivatives pose risk management challenges of their own. In the second half of the paper, I discuss four of these challenges.

2.1 Credit risk

One fundamental reality of credit derivatives is that they do not eliminate credit risk. They merely shift it around. As a result, when the credit cycle turns and default rates rise, someone, somewhere, will lose money. Consider Figure 2, which shows global speculative grade default rates since 1980. Clearly, no one should be surprised if when the credit cycle turns, the speculative grade default rate hits 10 percent, which is what it hit in 1990-91 and in 2001.

Although credit derivatives cannot eliminate losses from credit risk, they can transform credit risk in intricate ways that may not be easy to understand. This is not an issue with single name credit default swaps, where the exposure is nearly identical to that of a corporate bond, or with credit default swap indexes, where the exposure is nearly identical to that of a portfolio of corporate bonds. But where complex credit derivatives such as CDO tranches are concerned, it is a legitimate risk management issue.

Do market participants understand their exposures to credit risk that they have taken on with complex credit derivatives? Given the breadth of market participants who are active in the credit derivative market, there is no definitive way to answer this question.

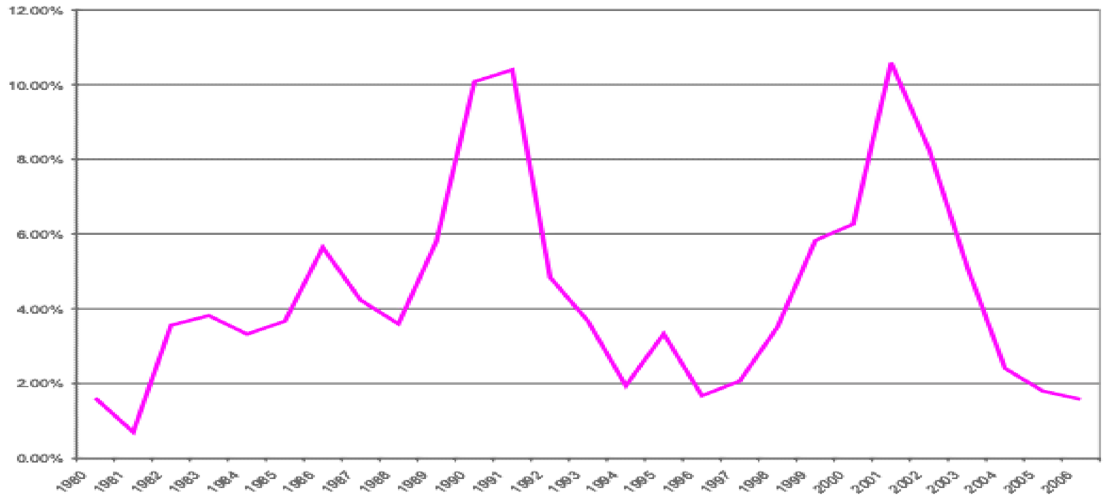

Figure 2: Speculative grade default rate

Source: Moody's Investors Service (2007), Exhibit 21.

However, we can point to evidence from the last credit cycle that some market participants did not fully understand the exposures they had from their participation in the credit derivatives market. In 2001, American Express "lost hundreds of millions of dollars on investments in collateralized debt obligations." The CEO of American Express was quoted as saying it "did not comprehend the risk" of its CDO holdings. The U.K. bank Abbey National was reported to have suffered "disastrous losses in its high-yield portfolio, including CDOs," and as a result, liquidated its wholesale credit portfolio, including selling off $8 billion of CDO tranches in 2003 (Lucas, Goodman and Fabozzi, 2006, p. 383). In both cases, the banks were reported to have retained first-loss tranches of CDOs they had underwritten. And first-loss tranches naturally contain a great deal of credit risk.

This brief review of the experience in the last credit cycle of 2001-02 reinforces the point that credit derivatives do not eliminate losses from credit risk. These lessons that I have reviewed here are certainly no secret to participants in the credit markets, many of whom had first-hand experience of living through that credit cycle.

Given the rapid growth of the credit derivatives market, it may be fortunate that one of the most widely used complex credit derivative structures, the CDO tranche, is a mature product has already been through a stressful credit cycle. This should contribute to financial stability during the next credit cycle, whenever that may come to pass.

Of course, new flavors of CDOs will always present new challenges. One relatively new product is a CDO using asset-backed securities for collateral instead of corporate debt. In 2006, 60 percent of CDO issuance used asset-backed securities as collateral (SIFMA, 2007b). These CDOs transfer the credit risk of asset-backed securities, primarily RMBS. Given the slowing growth of house prices in recent months, credit risk in the RMBS sector is likely to be increasing.

2.2 Counterparty risk

Counterparty risk is the risk that the counterparty to a credit derivative contract will default and not pay what is owned under the contract. For credit derivatives, as with other OTC derivatives, counterparty risk is an important risk that needs to be managed. Given the growing role of hedge funds in the credit derivatives market, counterparty risk is becoming even more prominent, since hedge funds generally are among a dealer's riskier counterparties.

In many cases, dealers use collateral to reduce counterparty risk. According to the 2006 ISDA Margin Survey, 63 percent of all counterparty risk exposure on credit derivatives is currently collateralized by large dealers. For hedge fund counterparties, a larger share is likely to be covered by collateral, since dealers nearly universally require hedge fund counterparties to post collateral to cover current credit exposures.

However, despite the widespread use of collateral and margin, there are some important risk management challenges associated with counterparty risk on credit derivatives. One challenge is simply measuring the exposures on complex credit derivatives. One of the key measures of counterparty risk is potential future exposure. Potential future exposure takes into account the possible future moves in credit spreads or future defaults that could create a larger credit exposure if the market moves in the dealer's favor. This potentially larger credit exposure is something that is already present in the current derivative contract and therefore should be measured like any other credit exposure.

Market participants are aware of the need to measure potential future exposure on complex credit derivatives, as well as the difficulties. As one article by a practitioner puts it, "unfortunately, models that can estimate [counterparty risk exposure] exactly are hard to build and calibrate" (Pugachevsky, 2006,). That article describes a technique to approximately measure counterparty risk exposure on synthetic CDO tranches, defining counterparty risk exposure as the amount that would be expected to be lost if the counterparty defaults in the future. In a stylized example of CDO tranches with a notional amount of $5 million, the article estimates the counterparty risk exposure to be around $50,000, or 1 percent of notional. Certainly that seems like a material amount of counterparty risk.

According to one estimate, there were $450 billion of synthetic CDO tranches and $1.7 trillion of credit index tranches traded in 2006. One percent of this roughly $2.2 trillion in notional amount would total $22 billion in counterparty risk exposure, the amount that dealers would collectively expect to lose if all their CDO counterparties simultaneously defaulted. If two-thirds of that is collateralized, dealers in aggregate would have roughly $7 billion in uncollateralized counterparty risk exposure currently in their portfolios, before accounting for hedging. These figures are certainly only a very rough approximation of the order of magnitude of the counterparty risk created by complex credit derivatives. In particular, the actual loss from counterparty default could well be larger than the expected loss. And of course, any counterparty credit exposure amount should be compared with a dealer's capital that is available to absorb potential losses. All told, it appears that counterparty risk should be a material concern of participants in the credit derivatives market.

2.3 Model risk

Complex credit derivatives require complex models for valuation and hedging. While a few complex credit derivatives, such as credit index tranches, are traded in liquid markets with some price transparency, most are not. Products without a liquid market are referred to as "mark-to-model." The risk of loss due to a flawed model is known as model risk.

Model risk materialized in the market for tranched credit derivatives in May 2005. Following the downgrade of General Motors to below-investment-grade status, the market prices of some credit index tranches moved in ways that would be considered as either extremely implausible or impossible, according to the way certain models were being used for valuation and risk management at that time. For example, in the first week of May 2005, the credit spread on the CDX.NA.IG index widened, signaling higher credit risk, but the spread on the 37 percent mezzanine tranche tightened, signaling lower credit risk. Market commentary attributed this to an imbalance of market liquidity in the mezzanine tranche market. There were also cases where the models themselves were not the problem, but models were being used in a way that gave false confidence about the effectiveness of hedging strategies.

In fairness to those who build models for a living, it has to be said that the flaws that were revealed by the May 2005 episode were not a surprise to many model builders. Even before May 2005, modelers were documenting the flaws of the standard model used for trenched credit products, the Gaussian copula model. As one paper published in 2004 noted, "Despite the popularity of the Gaussian copula model, there are clear and valid questions over its theoretical foundations" (Gregory and Laurent, 2004).

Of course, any model is only an approximation of reality, and model improvement must be a continuous process for products as new as tranched credit derivatives. In the two years since the May 2005 episode, there has been an explosion of research into alternatives to the Gaussian copula model. While eventually this research is likely to lead to better models and a reduced level of model risk for complex credit derivatives, there could be a long wait until that occurs. For the foreseeable future, those who trade complex credit derivatives will need to pay careful attention to measuring and managing their exposure to model risk.

2.4 Settlement risk

When an issuer defaults, credit derivatives that reference the issuer's debt must be settled. Traditionally, settlement in the CDS market was based on physical delivery by the protection buyer of the referenced issuer's debt securities in exchange for par. Physical settlement is the natural settlement mechanism when a CDS is used to hedge the credit risk of owning a bond. Cash settlement is less desirable in that situation, because the value of owning the bond of the defaulted issuer may diverge from the cash settlement price on a CDS, reducing the effectiveness of the hedge.

As the credit derivative market has grown, it is now common for the notional amount of CDS outstanding referencing a particular issuer to be larger than the face value of the issuer's bonds outstanding. In October 2005, Delphi Corporation defaulted with $2 billion of deliverable bonds and approximately $28 billion of credit derivatives outstanding. Because settlement must occur within a fixed time period after a default, a single bond can only be used (and re-used) for settlement of CDS so many times. The potential exists for an artificial scarcity of the bonds of defaulted issuers that are needed for CDS settlement, driving up the price of the bonds. In the worst case, if the protection buyer cannot obtain the bonds it needs to settle its contracts by the deadline, the contract expires worthless. This has the potential to affect the price of CDS in advance of a default, making CDS less useful as hedges and distorting the price signals that the CDS provides to the market.

Since the growth of the credit derivatives market shows no signs of slowing down, settlement risk is likely to continue to increase as long as physical settlement is the standard in CDS contracts. Market participants are certainly aware of the issue and are working on a solution. In the wake of the Delphi default, dealers rushed to organize a cash settlement auction in which more than 570 counterparties participated.

Although all participants in the credit derivatives market have a broad interest in seeing the market function well, their interests may diverge in a settlement situation when some are protection buyers, some are protection sellers, some would probably prefer physical settlement and some would prefer cash settlement. Getting market-wide agreement on an auction mechanism may not be easy, especially when the agreement is made after the default occurs. Moreover, the example of the European auctions of mobile-phone licenses reinforced the basic fact that differences in auction design can lead to vast differences in outcomes (Klemperer, 2002).

The auction mechanism that was used for the Delphi auction in November 2005 has been tweaked since then to discourage gaming and to encourage broader participation. In the most recent large default in the CDS market, Dura Automotive Systems in late 2006, the most recent auction mechanism was tested and seemed to work well. However, each auction is an ad hoc process that must be quickly agreed to following a default. Settlement risk will still be high until the auction settlement mechanism is incorporated into standard CDS documentation and is tested in actual defaults, including some in less benign market environments.

3. CONCLUSION

This paper has documented the striking growth of credit derivatives, from nearly nothing a decade ago to tens of billions of dollars in notional amounts outstanding at the end of last year. Driving this growth, commercial banks appear to find a variety of credit derivative products to be useful for their own risk management purposes. This paper discussed a number of the ways that credit derivatives can be useful for risk management. At the same time, credit derivatives are posing some significant risk management challenges. Many of these challenges reflect the immaturity of the credit derivatives market. For the credit derivatives market to develop and mature, market participants must address these risk management challenges.

REFERENCES

Bank for International Settlements, Monetary and Economic Department (2007). *OTC Derivatives Market Activity in the Second Half of 2006*, www.bis.org/publ/otc_hy0705.pdf.

Committee on the Global Financial System (2005). *The Role of Ratings in Structured Finance: Issues and Implications*, www.bis.org/publ/cgfs23.pdf.

Fitch Ratings. (2006). *Global Credit Derivatives Survey: Indices Dominate Growth as Banks' Risk Position Shifts*, *September 21*.

Gibson, Michael S. (2004). Understanding the risk of synthetic CDOs. *Finance and Economics Discussion Series 2004-36*. Board of Governors of the Federal Reserve System, www.federalreserve.gov/pubs/feds/2004/200436/200436pap.pdf.

Gregory, Jon and Jean-Paul Laurent (2004). In the core of correlation. *Risk*, *October*.

International Monetary Fund (2005). *Global Financial Stability Report*, September 2005, http://www.imf.org/External/Pubs/FT/GFSR/2005/02/index.htm.

Joint Forum (2005). *Credit Risk Transfer*, www.bis.org/publ/joint13.pdf.

Klemperer, Paul. (2002). How (not) to run auctions: The European 3G telecom auctions. *European Economic Review, Vol. 46 (4-5)*, pp. 829-845.

Lucas, Douglas J., Laurie S. Goodman, and Frank J. Fabozzi (2006). *Collateralized Debt Obligations: Structures and Analysis*, 2nd ed. Hoboken, N.J.: John Wiley & Sons.

Moody's Investors Service (2007). *Corporate Default and Recovery Rates, 1920-2006*.

Pugachevsky, Dmitry (2006). Pricing counterparty risk in unfunded synthetic CDO tranches. in Michael Pykhtin, ed., *Counterparty Credit Risk Modeling* (London: Risk Books), pp. 371-394.