A PRIMER ON STRUCTURED FINANCE

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Abstract

Regulatory concerns about the impact of leveraged structured claims on financial stability in times of stress are frequently too sweeping and indistinct for a judicious assessment of how derivatives might propagate asset shocks across different capital market segments. This brief chapter defines structured finance in order to inform a more specific debate about possible regulatory challenges posed by complex forms of credit risk transfer.

Keywords: *structured finance, credit risk transfer, asset-backed securitization (ABS), securitization, mortgage-backed securitization (MBS), collateralized debt obligation (CDO), credit default swap (CDS), Pfandbrief, Islamic finance.*

JEL Classification: *D81, G15, M20.*

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1 INTRODUCTION

Given the increasing sophistication of financial products, the diversity of financial institutions, as well as the growing interdependence of financial markets, sources of systemic vulnerabilities are likely to be found in areas of financial innovation, where market forces and participants are left to their own devices and when incentive structures encourage greater risk taking in a benign economic environment but entail more adverse economic consequences when stress occurs. One case in point is the development of the structured finance market, which has benefited from the attractive proposition of greater risk diversification.

On the heels of prominent corporate downgrades in the U.S. in April 2005, high-profile bankruptcies in November 2005, and the initial jitters in the U.S. sub-prime mortgage market during the first quarter of 2007, the haircut unwinding of exposed *collateralized debt obligations* (CDOs) and other securitization transactions reverberated in mounting regulatory unease about current risk measurement standards of derivatives and the possible knock-on effects of the structured finance market on other investment classes in the first half of 2007. After the recent fallout of the U.S. subprime market, the fire sale of *residential asset-backed securities* (RMBS), and the demise of the asset-backed commercial paper (ABCP) market, investors and regulators are now beginning to worry about the systemic resilience of complex structured finance techniques (such as CDOs on ABS, customized single-tranche CDO, and hybrid CDOs with overlay structures) – especially against the background of tightening liquidity and greater dislocation in the correlation market. The drumbeat of warnings about the impact of leveraged structured claims on financial stability in times of stress, however, hardly extends beyond indistinct assessments of the mechanics of structured finance markets (see Box) and the ability of different structured finance products to propagate asset shocks across different capital market segments. This brief chapter defines structured finance in order to inform a more specific debate about the regulatory challenges posed by the assembly of asset exposures and credit risk transfer in complex structured finance transactions.

2 DEFINITION OF STRUCTURED FINANCE

Structured finance encompasses all advanced private and public financial arrangements that serve to efficiently refinance and hedge any profitable economic activity beyond the scope of conventional forms of on-balance sheet securities (debt, bonds, equity) at lower capital cost and agency costs from market impediments on liquidity. In particular, most structured investments (i) combine traditional asset classes with

[1] The *Committee on the Global Financial System* (2005) defines structured finance more narrowly based on three characteristics that tend to be associated more specifically with asset securitization (rather than the entire universe of structured finance: "(i) pooling of assets (either cash-based or synthetically created), tranching of liabilities that are backed by the asset pool [...], (ii) de-linking of the credit risk of the collateral asset pool from the credit risk of the originator, usually through the use of a finite-lived standalone *special purpose vehicle* (SPV)."

contingent claims, such as risk transfer derivatives and/or derivative claims on commodities, currencies or receivables from other reference assets, or (ii) replicate traditional asset classes through synthetication or new financial instruments. Structured finance is invoked by financial and non-financial institutions in both banking and capital markets if established forms of external finance are either (i) unavailable (or depleted) for a particular financing need, or (ii) traditional sources of funds are too expensive for what would otherwise be an unattractive investment based on the issuer's desired cost of capital.[1]

Structured finance offers issuers enormous flexibility to create securities with distinct risk-return profiles in terms of maturity structure, security design, and asset type, providing enhanced return at a customized degree of diversification commensurate to an individual investor's appetite for risk. Hence, structured finance contributes to a more complete capital market by offering any mean-variance trade-off along the efficient frontier of optimal diversification at lower transaction cost. However, the increasing complexity of the structured finance market, and the ever growing range of products being made available to investors, invariably create challenges in terms of efficient assembly, management and dissemination of information.

The premier form of structured finance is *capital market-based risk transfer* (except loan sales, asset swaps, and natural hedges through bond trading (see Figure 1)), whose two major asset classes, *asset securitization* (which is mostly used for funding purposes) and *credit derivative* transactions (as hedging instruments), permit issuers to devise almost an infinite number of ways to combine various asset classes in order to both transfer asset risk between banks, insurance companies, other money managers and non-financial investors in order to achieve greater transformation and diversification of risk.

Asset securitization describes the process and the result of converting a pool of designated financial assets into tradable liability and equity obligations as contingent claims backed by identifiable cash flows from the credit and payment performance of these asset exposures (Jobst, 2006a) (see Appendix, Figures 4-7). Securitization initially started as a way of depository institutions, non-bank finance companies and other corporations to explore new sources of asset funding either through moving assets off their balance sheet or raising cash by borrowing against balance sheet assets ("liquifying") without increasing the capital base *(capital optimization)* in order to reduce both economic cost of capital and regulatory minimum capital requirements *(regulatory and economic motive)*. Ambivalence in the regulatory definition of capital adequacy for credit risk and the quest for more efficient risk-adjusted refinancing have steered the financial industry towards large-scale loan securitization by means of *collateral loan obligations* (CLOs). Issuers value this type of loan securitization not only as a diversified refinancing tool, but also as an efficient structure of credit risk transfer.

Since its inception, securitization has gone a long way in advancing further objectives beyond being a regulatory arbitrage tool. It has developed into an efficient and flexible funding and capital management technique for both financial institutions and large corporations. Securitization registers as an alternative and

diversified market-based source of refinancing economic activity, which substitutes capital market-based finance for credit finance by sponsoring financial relationships without the lending and deposit-taking capabilities of banks *(disintermediation)*. The off-balance sheet treatment of securitization also serves to diversify asset exposures (especially interest rate risk and currency risk), since the cash flow proceeds from the securitized asset portfolio are partitioned and restructured into several tranches with varying risk sensitivity. The generation of securitized cash flows also represents an effective method of redistributing asset risks to investors and broader capital markets *(transformation and fragmentation of asset exposures)*.[2] The implicit risk transfer of securitization does not only help issuers improve their capital management, but also allows issuers to benefit from enhanced liquidity and more cost efficient terms of high-credit quality finance without increasing their on-balance sheet liabilities or compromising the profit-generating capacity of assets. However, securitization involves a complex structured finance technology, which commands significant initial investment of managerial and financial resources.

Investors in securitization have a wider choice of high-quality investments at their disposal, whose market valuation engenders greater overall efficiency and liquidity of capital markets. The tradability of securitized asset risk also facilitates the synthetic assembly and dynamic adjustment of asset portfolios via secondary markets according to investor preferences. As opposed to ordinary debt, a securitized contingent claim on a promised portfolio performance affords investors to quickly adjust their investment holdings at low transaction costs in response to changes in personal risk sensitivity, market sentiment and/or consumption preferences. However, securitization involves a complex structured finance technology, which commands significant initial investment of managerial and financial resources.

[2] Notwithstanding greater risk diversification within the financial system through asset securitization, in the same way, the structural complexity arising from multi-layered security designs, diverse amortization schedules and possible state-contingent funding of synthetic credit risk transfer, however, might also obfuscate actual riskiness of these investments and inhibit provident investment. Moreover, numerous counterparty links established in the commoditization of securitized asset risk and derivative claims also create systemic dependence susceptible to contagion.

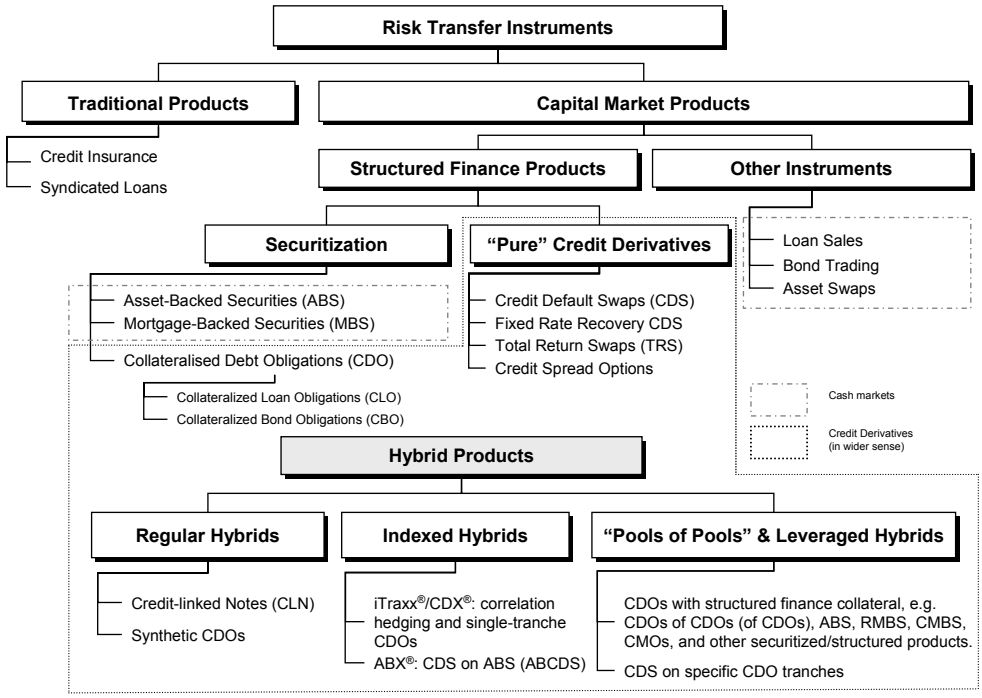

Figure 1. *Overview of credit risk transfer instruments.*

Derivatives in general are financial contracts on a pre-determined payoff structure of securities, indices, commodities or any other assets of varied maturities. Derivatives assume economic gains from both risk shifting and efficient price discovery[3] by providing hedging and low-cost arbitrage opportunities. Risk diversification improves the pricing of risk, increases stability at all levels of the financial system, and enhances general welfare. In addition to their capacity of eliminating or attenuating risk, derivatives also supplement cash markets as alternatives to trading underlying assets.

Credit derivatives are predicated on the isolation and transfer of credit risk as reference asset. As a common working principle, they involve the sale of contingent credit protection for pre-defined credit events and/or asset performance. In their basic concept, credit derivatives sever the link between the loan origination and associated credit risk, but leave the original borrower-creditor relationship intact. The protection buyer of a credit derivative hedges specific credit risk at the expense of periodic premium payments to the protection seller, who assumes the credit exposure of the underlying transaction.[4] The significance of credit derivatives

[3] Derivatives help "discover" the fair market price (spot and future) of certain assets or risks in instances of high transaction costs, poor liquidity due to the dispersion of markets, limited asset supply or the conglomeration of many risks into one whole asset.

[4] In a *cash-settled* CDS, the protection seller is required to make a settlement payment in the amount of the difference between the notional principal and the market price of the underlying bond or the reduced recovery value of the defaulted bank credit. Alternatively, in what has increasingly become the market norm, *physical settlement* CDSs oblige the protection seller to accept the reference asset (or any other eligible collateral asset, such as *cheapest-to-deliver* (CTD) bonds)

lies less in their market share next to other derivative instruments (e.g. interest rate and foreign exchange derivatives) but in their ability to supplement traditional ways of hedging credit-related exposures. *Credit Default Swaps* (CDSs) and *Total Return Swaps* (TRSs) are the most important forms of credit risk transfer in an ever-increasing array of credit derivatives. CDS and TRS respectively provide contingent and complete protection against credit events at the cost of a premium. A CDS is a non-funded instrument to transfer credit risk. The CDS buyer pays a periodic premium to seller. If a specified credit default event occurs (such as non-payment or restructuring), the buyer delivers (the cheapest of the) specified securities in return for the notional amount from the seller. A TRS exchanges the total economic performance of a specified asset against another cash flow. The buyer of a TRS is entitled to receive the total cash flow from the specified underlying asset (interest, fees, dividends, principal repayments or market value at termination) in return for a LIBOR-based floating payment. As opposed to a CDS, which provides insurance against credit event affecting the underlying, a TRS replaces the exposure to the underlying security altogether. Other, non-credit derivative based forms of credit risk transfer include credit insurance, syndicated loans, loan sales, bond trading and asset swaps.

Box 1: The lessons of Delphi case and recovery rate products

The economic fallout caused by the bankruptcy of Delphi did not result from inappropriate risk management and speculation, but reflected inefficiencies in the microstructure of derivative markets at the time of settlement (Micu and Upper, 2006). When doubts about Delphi's creditworthiness emerged, the prospect of a shortage of deliverable debt increased the settlement price (and the attendant average CDS recovery price) beyond the level that might have otherwise been justified by the expected repayment from debt resolution (implied by rating agencies' estimates of Delphi's ultimate recovery rate or settlement prices of comparable firms). This scenario of higher transaction costs deterred trading of physical delivery CDS contracts (for lack of demand), because protection buyers would have had to settle contracts on overpriced collateral, thereby discounting their recovery value implied by par value compensation through the CDS contract. Cash settled CDS contracts would not have implied such recovery risk.

Sellers of credit protection via CDS contracts are constantly exposed to recovery risk, while protection buyers are faced indirectly with recovery rate risk if the reference asset (or a surrogate cheapest-to-deliver (CTD) asset) trade above the fair market price suggested by the actual recovery rate due to limited asset diversity caused by liquidity-induced market risk or poor market depth.

Several products permit investors to hedge recovery risk separately from default risk in derivative contracts. Such products could serve as pricing benchmarks in the wake of a credit event, fostering a more efficient settlement process. As opposed to a plain vanilla CDS contract, where the protection seller is exposed to recovery rate risk upon default of the underlying reference asset, a fixed recovery rate CDS, for instance, eliminates the uncertainty on the recovery rate by fixing a specific recovery value over the maturity of the CDS contract. After a credit event, the protection buyer is entitled to a cash settlement equal to 100 minus the pre-specified, fixed recovery rate. Recovery CDS with a fixed recovery rate set to zero are referred to as zero recovery CDS.

against payment of their par value. Unlike credit insurance contracts, credit derivatives are negotiable and attract large secondary trading.

A recovery lock is a cash-neutral forward contract that fixes the recovery rate irrespective of the settlement price of the underlying reference asset. In practice, a recovery lock is structured by means of two trades on the same reference entity. Protection sellers hedge themselves against recovery rate risk of their long position in a plain vanilla CDS by purchasing protection through a fixed recovery CDS. If the implicit recovery rate of the conventional CDS contract concurs with the fixed recovery rate, the premium payments on the transactions wash out and net to zero. In this case, if the reference entity defaults, the protection buyer of the fixed recovery CDS delivers the defaulted debt to the recovery seller and receives compensation equal to 100 minus the pre-specified, fixed recovery rate, which, in turn, pays off the compensation claim under the issued plain vanilla CDS contract. If the premium payments of the two trades differ, e.g. the actual recovery of the underlying asset drops below the fixed recovery rate at the time of default, the protection buyer reinvests higher premium income from the short position of a plain vanilla contract into fixed recovery rate protection on a larger notional value.

In general, we distinguish between credit derivatives in the *narrower* and in a *wider sense* (Jobst, 2006b; Effenberger, 2003). In addition to *pure* credit derivatives, such as CDSs, TRSs, and *credit spread option*s, the broader classification of derivatives in a wider sense also includes *hybrid* and *securitization* products with constituent credit derivative elements, such as *traditional collateralized debt obligations* (CDOs) of bonds and loans, or other *partially funded* or *unfunded* structured finance products, e. g. *credit-linked notes* (CLNs) and *synthetic* CDOs (see Figure 1), which are essentially securitization transactions[5] for refinancing (through cash flow restructuring) and tranche-specific credit risk transfer[6] (though the sale of credit protection or the issuance of *leveraged super-senior* (LSS)[7] tranches). In these transactions the repayment of securitized debt depends on a defined credit event in a bilateral hedge (in the case of CLNs), the premium income generated from writing credit protection on certain reference assets, or the returns from investing (i.e. long position on credit risk) in single assets or diversified pooled assets (in the case of synthetic CDOs), which also includes securitization transactions of CDOs and/or *asset-backed securities* (ABSs) ("pools of pools"), newly formed CDS and

[5] This feature does not apply to plain vanilla *asset-backed securities* (ABS) and *mortgage-backed securities* (MBS).

[6] Although the transformation and fragmentation of credit risk through securitization brings greater diversification within the financial system, the structural complexity arising from multi-layered security designs, diverse amortization schedules and the state-contingent funding of synthetic credit risk transfer might obfuscate actual riskiness of these investments and inhibit provident investment. The tradability of credit risk facilitates the synthetic assembly and dynamic adjustment of credit portfolios via secondary markets, but numerous counterparty links established in the commoditization of securitized asset risk and wads of derivative claims also create systemic dependence susceptible to contagion. This prospect of leveraged investment in synthetic structures seems to be particularly troubling when investors take on more risks for yield during times of compressed spreads and rising default rates when credit cycles approach their turning-point. Moreover, the contingent liability of credit derivatives as credit protection of securitized assets requires the protection seller to put up liquidity only if a credit event occurs.

[7] "Market developments testify to 'structural substitution' in complex *hybrid* CDOs. After *CDO-squareds* ("CDOs of CDOs") led to the narrowing of mezzanine spreads in the CDO market, *leveraged super-senior tranches* with *marked-to-market* (MTM) loss- and spread-based triggers emerged in a significant number of synthetic CDOs. Most recently, investment banks with significant mezzanine ABS inventory also began to employ *leveraged super-senior tranches* in synthetic CDOs as an alternative method of hedging specific - and not diversified - mezzanine tranche exposure by offloading senior risk instead of selling credit protection or delta hedging. With the leveraged super-senior concept becoming exhausted, CDO managers are now introducing overlay structures that bring in other sources of risk, such as foreign exchange rates, inflation and commodity price linkages in order to juice up investor yields." (Jobst, 2005a). *Super-senior tranches* themselves are usually secured by a credit default swap as a means of improving the marketability of issued claims.

collateralized debt indices (e.g. the Dow Jones *iTraxx*® and the *iBoxx*® index),[8] and the composite *ABX*® indices of CDS on ABS (ABCDS).[9]

CDOs have been the fastest growing area of structured finance.[11] Since its inception in the late 1980s, the CDO market has rapidly evolved into a globally accepted structured finance technique, spanning the U.S., Europe and large parts of Asia. CDOs have gained significant prominence in 1996, when some U.S. banks started using CDOs as expedient risk-transfer mechanism. Since then, the annual issuance volume has grown tenfold over the last ten years – with little sign of impending moderation (see Figure 2). CDOs are investment vehicles that allow issuers to refinance the purchase of debt instruments by repackaging them into different slices of risk and maturity. While CDOs use the same structuring technology as ABS to convert a large, diversified pool of exposures into tradable commercial papers *(tranches)*, their underlying collateral pool typically includes a wider and more diverse range of heterogeneous reference assets, such as senior secured bank loans, high yield bonds and CDSs, as opposed to more homogenous titles, such as home equity loans and credit card receivables (Jobst, 2005d).

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[8] The introduction of CDS indices contributed to hedging patterns thanks to greater standardization. In the past, issuers would hedge unbalanced positions of customized CDOs through complex subordinated, multi-tranche structures ("transaction-based"), whose complexity inhibited transparent asset pricing. When the Dow Jones *iTraxx*® Europe index was created in June 2004 from the merger between two existing CDS indices, large issuers began to offer standard (single) CDO tranches on the *iTraxx*® index, which replicate the behavior of synthetic CDO claims on constituent names of the Dow Jones *iTraxx*® index. These standardized (synthetic) CDO claims on liquid indices now offer a base correlation measure ("CDO delta") with the actual equity prices of (underlying) reference assets and constitute a dynamic "market-based" hedge for issuers of bespoke and mostly privately transacted single-tranche transactions (arranged for single investors). Most recently, issuers also began to offer multi-tranche transactions with mezzanine tranches indexed to equity prices and tranche-specific CDS contracts on any retained CDO interest. See also Cousseran and Rahmouni (2005).

[9] The ABCDS market has broadened ABS trading from long-term, buy-and-hold activity to active secondary market trading and pricing of credit exposure to ABS portfolios. These CDS contracts are more complex that CDS on corporate names, as they must account for economic trigger events, such as temporary interest and principal shortfalls or rating downgrades, in addition to default and recovery risk. Since January 2006, ABX® indices on ABCDS have further facilitated trading. Each ABX® index series consist of cash-settled ABCDS on the largest and most liquid (investment-grade rated) tranches of ABS issues. A new series is created every six months ("vintage") and is subdivided into five sub-indices based on the credit rating (AAA, AA, A, BBB, and BBB-) of the 20 ABS tranches that comprise the series.

[11] The annual issuance volume worldwide has grown more than tenfold from U.S.$48.1 billion in 1997 to U.S$502.4 billion by the end of 2006. In 2006, one out of eight new CDO deals was synthetic (U.S.$428.3 billion cash, hybrid and market value CDOs vs. U.S.$60.2 billion funded synthetic CDOs), up from one out of twenty in 1997 (U.S.$45.5 billion cash CDOs vs. U.S.$2.7 billion funded synthetic CDOs). With new asset classes (i.e. collateral) being securitized in CDO transactions (including investment grade or high yield loans, investment grade or high yield bonds, non-CDS swaps, funds, insurance receivables, cash, and other assets), the market size of outstanding CDO tranches has exceeded U.S.$1 trillion by the end of 2005, which does not include privately placed transactions and unreported or unsold tranches of bespoke, single-tranche synthetic CDOs.

A CDO transaction is arranged and administered like a "managed fund" of designated reference assets, which offers investors diversified exposure to a *dynamic* portfolio of one or more asset classes from different issuers and/or industry sectors. CDO investors sell credit protection to issuers against default on a portion of underlying reference assets.[12] Managers of CDOs choose a certain degree of diversification for a pre-specified risk-return profile subject to limits and guidelines that are determined by the issuers, rating agencies and investors at the commencement of the transaction. The conventional security design of CDOs assumes a typical three-tier (subordinated) securitization structure of junior, mezzanine and senior tranches, which concentrates expected losses in a small first loss position as equity claim, which bears the majority of the credit exposure and is frequently covered by a junior CDS, shifting most unexpected risk to larger, more senior tranches, which display distinctly different risk profiles (Jobst, 2005b and 2005c). This risk sharing arrangement induces a leverage effect on constituent tranches, whose distinct risk-return profiles can be tailored to specific investment preferences.[13]

We distinguish among four main transaction structures of CDO issuance: cash flow, synthetic, hybrid and market value CDOs. While *cash flow CDOs* are structured to pay off liabilities with the cash generated from interest and principal payments of the underlying collateral assets, *synthetic CDOs* acquire credit protection from investors via CDSs (in return for a premium payment) in order to synthetically replicate the funding structure of cash flow CDOs (without the purchase of assets). Cash flow CDOs are commonly backed by a collateral of bonds and loans (whose legal title is transferred to the purchaser), whereas synthetic CDOs enlist wads of credit derivatives and various third-party guarantees to create partially funded and highly leverage investment from synthetic claims on the performance of designated credit exposures (Shepherd, 2005).

[12] Any risk that can be reliably statistically modeled can be transformed through a CDO. In practice, the ones that have been used so far are mature market bonds (both investment grade and high yield), mature market high yield loans, ABS (e.g. securities which are themselves repackaged obligations such as mortgages, auto loans, home equity loans, and credit card receivables), emerging market bonds, and other CDOs (to produce CDOs of CDOs, also called CDO^2). Recently, the trend has been toward the inclusion of more high-yield loans and ABS, and away from high yield bonds. When emerging market bonds are included in CDOs they are usually sovereign or quasi-sovereign bonds, and countries with credit ratings AA- and below are generally most sought after. If there are any residual interest rate or currency mismatches between the SPV's underlying risks and liabilities, the SPV is usually required to enter into interest rate or foreign exchange swaps to hedge those risks.

[13] Although investors should expect the same returns for similar credit risk exposure in plain vanilla corporate bonds and securitized debt (i.e. tranches) within a complex structured finance transaction, such as CDOs, these investment alternatives are valued differently in response to changes in the valuation of the underlying (reference) asset. Tranche subordination creates leveraged investment, so that the risk-return profile of investors differs from direct investment in the underlying portfolio. The lower the level of seniority the higher the ratio of expected losses per tranche (relative to a given tranche size) to expected portfolio losses (relative to a given portfolio size). Therefore, the seniority and thickness of constituent tranches according to a specific security design imply varying degrees of credit risk leverage of each constituent tranche. Since such subordination arrangement renders leveraged securitized debt highly sensitive to value changes of a precisely defined asset pool as underlying collateral, the evaluation of tranches at extreme quantiles of the loss distribution is essential. At the same time, efforts to diversify as much idiosyncratic risk as possible within a reference portfolio of securitized exposures make subordinated tranches (with substantial systematic risk exposure) highly vulnerable to extreme event scenarios associated with systemic shocks.

[14]Funded tranches require a cash deposit at the inception of the deal to collateralize portions of potential swap obligations. Synthetic CDOs straddle the indistinct boundary between securitization and credit derivatives, because their repayment to investors is conditional on premium income generated from credit protection sold on reference assets. *Hybrid CDOs* utilize the funding structures of both cash and synthetic CDOs. *Market value CDOs* support liabilities through the value of collateral.

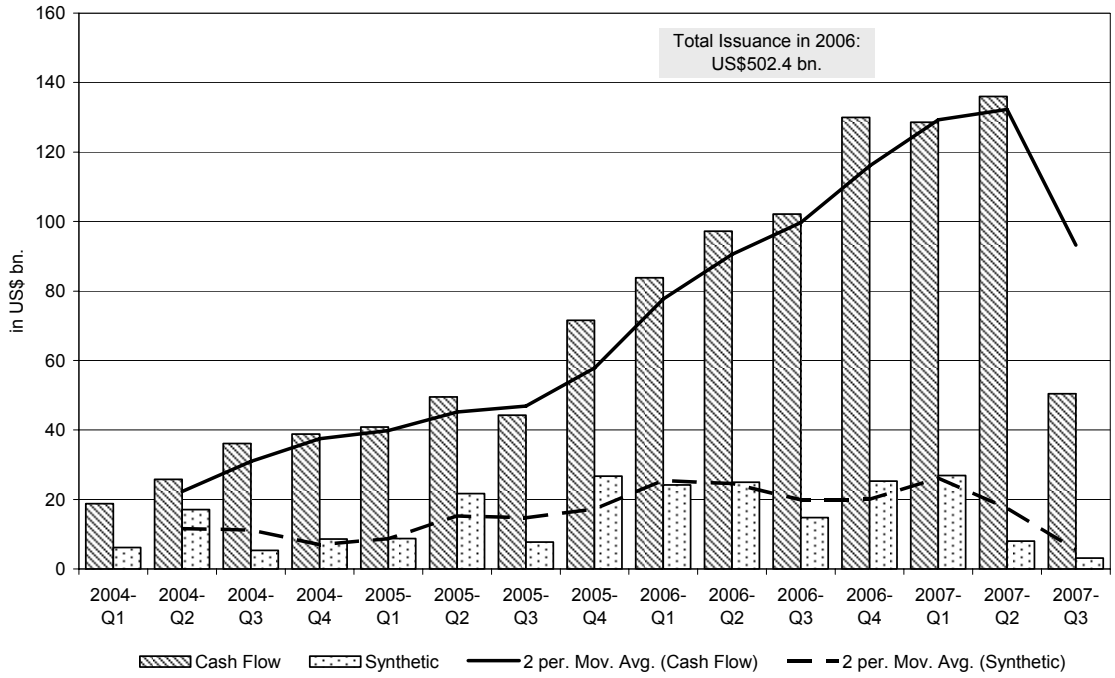

Figure 2. *Global issuance volume of CDO transactions* (2004-2007, by quarter, in U.S.$ billion). Unfunded synthetic tranches are not included. *Source:* Securities Industry and Financial Markets Association, Dealogic.

CDOs enable issuers to achieve a broad range of financial goals, which include the off-balance sheet treatment of securitized exposures, the reduction of minimum regulatory capital requirements, and access to alternative sources for asset funding and liquidity support. According to these diverse financial objectives, CDOs can also be categorized by the purpose of the transaction. We distinguish between *balance sheet* and *arbitrage* transactions as two broad categories. In balance sheet transactions issuers unload defined asset exposure to third parties in order to change their balance sheet composition or debt maturity structure, whereas in arbitrage transactions issuers act as active portfolio managers who acquire assets for arbitrage

[14] The burgeoning use of credit derivatives has triggered fundamental changes in credit markets and the way CDO transactions are structured and executed. Whereas the collateral and the counterparty risk in cash CDOs is reasonably well defined, synthetic CDOs rely on complex transaction structures supported by contingent provisions and intricate legal covenants to capture gains from spread differentials between referenced exposures and issued refinancing obligations.

purposes only.[15] CDOs structures invoke either balance sheet or arbitrage mechanisms to realize economic gains from either (i) the pricing mismatch between the high yield investment returns from collateral assets and lower financing costs of generally higher rated liabilities (i.e. CDO tranches) in *arbitrage CDOs*, or (ii) the removal of assets or the risk of assets off the balance sheet of the originator in *balance sheet CDOs*. Balance sheet CDOs invoke either a cash flow structure for a *true sale* (frequently to reduce regulatory capital requirements of financial institutions, among other reasons, similar to traditional ABS) or a *synthetic* structure by selling credit protection to the asset originator through CDS. The premium income is used to repay coupon and principal of outstanding debt tranches. While balance sheet CDOs are primarily backed by bank-originated, investment grade, commercial and industrial loans, arbitrage CDOs are typically supported by reference portfolios of high yield corporate bonds and/or loans. Arbitrage CDOs generate profit from the difference of funding costs and returns on securitized assets. The arbitrage gains are achieved either (i) by active trading of a dynamic portfolio in *market value structure*, where the portfolio manager focuses on the pool's prospects for appreciation and high yield, or (ii) or by buy-and-hold investment of assets with varying terms in a *cash flow* structure, where the portfolio manager essentially matches incoming cash flows from securitized assets with payment liabilities.

3 STRUCTURED FINANCE VS. CONVENTIONAL FINANCE

The flexible nature of structured finance straddles the indistinct boundary between traditional fixed income products, debentures and equity on one hand and derivative transactions on the other hand. Notwithstanding the ostensible difficulties of defining structured finance, a *functional* and *substantive* differentiation seems to be most instructive for guiding an informed demarcation between the most salient properties of structured and conventional forms of external finance. The following definition reflects such a proposition if we compare two financial arrangements:

a) Investment instruments are motivated by the *same or similar financial objective* from both the issuer's and the investor's point of view, but a *dissimilar legal and functional implementation* requires a *different valuation*.

b) Investment instruments are motivated by *same or similar financial objective* and are *substantively equivalent* (i.e. they share a close equilibrium price relation and the same investor pay-off profile), but differences *in legal form*, *transaction structure and/or security design* necessitate a different valuation.

In the first case, *pure credit derivatives* are clear examples of structured products, which allow very specific and capital-market priced credit risk transfer (see Figure 1). Credit insurance and syndicated loans share the same

[15] However, this normative distinction between *balance sheet transactions* and *arbitrage transactions* as discrete structural types is blurred in reality. In many cases issuers of balance sheet transactions could potentially enjoy as much "arbitrage profit"

financial objective; however, they do *not* constitute an arrangement to create a new risk-return profile from existing or future reference assets. In the same vein, *mortgage-backed securities* (MBSs) and *Pfandbrief*-style covered mortgage bonds represent different functional and legal methods of securitization with the same financial objective. Although both refinancing techniques convert homogenous pools of mortgage claims into negotiable securities, they represent two distinct forms of debt securities issued on the same type of underlying reference asset either off-balance sheet *(asset-backed securitization)*, on-balance sheet *("Pfandbrief-style" securitization)* or even through *synthetic securitization*.

The *Pfandbrief* is the most prominent deal structure for securitized mortgage loans in Europe, which matches the importance of MBS in the U.S. by issuance volume, trading activity and historical track record (see Box 2). In contrast to the U.S., where the market for MBS has had a longstanding tradition since the first half of the 1980s,[16] off-balance sheet securitization via MBS is a relatively recent development in Europe and has gained significance only over the last years, with issuance amounts being still relatively low compared to established on-balance sheet securitization via covered mortgage bonds or *Pfandbriefe*. The Pfandbrief market is the biggest segment of the euro-denominated private bond market and rivals in size the individual government bond markets in Europe (Mastroeni, 2005). However, ABS issues have recently caught up with Pfandbrief transactions as one of the largest fixed income markets (Jobst, 2006c). Whereas originators of Pfandbrief issues retain securitized assets on their balance sheet, issuers of MBSs sell assets to a separate legal entity (such as trust, fund and corporation), commonly referred to as a *special purpose vehicle* (SPV), which refinances the acquisition of the assets by issuing debt (e.g. bonds or commercial paper) or equity claims on these reference assets. The designated assets are considered securitized insofar as their cash performance serves to secure any repayment obligation to investors. Alternatively, *synthetic securitization* represents a compound form of structured finance, which amalgamates properties of both asset-backed securitization and credit derivatives in one coherent structure. Synthetic securitization does not involve the transfer of assets, but serves to hedge the credit risk to which the originator is exposed. The originator merely transfers the credit risk though the use of *funded* (e.g. credit-linked notes) or *unfunded* (e.g. credit default swaps) credit derivatives or guarantees, in which the counterparty agrees upon specific contractual covenants to cover a predetermined amount of losses.[17]

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from holding the equity tranche as first loss position as would an equity investor in securities sold in the open market or included in managed reference portfolios underlying arbitrage transactions.

[16] The first ABS issue in its modern form was completed by *Sperry Corporation*, which issued computer lease-backed notes in 1985.

[17] Thus, synthetic arrangements effectively sidestep possible legal constraints associated with different loan characteristics and jurisdictions, mainly because most or all of the securitized assets are never sold to capital market investors.

Box 2: The definition of *Pfandbrief* transactions

Although many European countries have already put in place legal frameworks for *Pfandbrief*-style products, the German *Pfandbrief* (literally "letter of pledge") is the eponym of this type of covered mortgage bond.[18] Although the creation of the first *Pfandbrief* instrument was attributed to an executive order of *Frederick II of Prussia* in 1769 (Skarabot, 2002), it was only when the *Mortgage Bank Law* was passed in 1899 that the *Pfandbrief* took its present form. The first legal guidance for the issuance of *Pfandbrief*-style products was actually adopted in France in 1852 with the *Loi sur l'obligation foncière et communale*. The oldest mortgage credit market can be traced to Denmark, when the Great Fire of 1789 created vast demand for housing finance in its wake. In Sweden, a mortgage market has existed at least since 1860 under the legal provisions of the more general *Law on Credit Companies*, but no specific mortgage bank law has been issued so far.

While the *Pfandbrief* is a classical on-balance sheet refinancing tool of mortgages and public loans with both origination and issuance completed by one and the same entity, MBS transactions are off-balance sheet transactions and involve at least one more party (besides the mortgage originator). *Pfandbriefe* are *asset-backed bonds* (ABB)[19] and serve primarily as funding instruments, whereas the *pay-through* characteristics of MBS issues are also employed for credit risk transfer and balance sheet restructuring, with the aim of efficient management of economic and regulatory capital. Originators of MBS sells contingent claims on asset cash flows in order to remove and legally segregated ("bankruptcy remote") reference portfolio of securitized assets from the balance sheet. In contrast, in a typical German *Pfandbrief* transaction, reference assets are "ring-fenced" on the balance sheet of government-licensed issuers and repayments to investors are independent from the repayment of securitized assets. Issuers of *Pfandbrief* deals are fully liable with their registered capital if reference assets fail to generate sufficient cash flows for the repayment of investors. Hence, this arrangement implies a double protection of investors against the solvency of the issuer and the insolvency of the debtors of the original assets. Given the value of this institutional guarantee depending on the issuer's financial strength, Pfandbrief transactions generally receive high ratings; however, Pfandbrief investors are not insulated from an *originator event* (insolvency and bankruptcy) of the issuer. In comparison, MBS transactions are devoid of any institutional guarantee and solely return cash flows generated from the pool performance of the designated reference portfolio. Issuers of MBS transactions compensate issuers for the higher asset exposure due to the lack of institutional protection by including various kinds of internal and external liquidity and credit support, such as bridge-over facilities, surety bonds, third-party guarantees, excess spreads, over-collateralization and reserve accounts. Finally, Pfandbrief issues are typically subject to stringent federal laws (requiring a weighted average loan-to-market (LTV) or appraised value of at least 60% as a statutory benchmark), whilst *private-label* MBS issues are free from these legal requirements, except in so-called *agency-MBS* in the U.S., where the quasi-government agencies *Fannie Mae* (FNMA), *Freddie Mac* (FHLMC) and *Ginnie Mae* (GNMA) provide institutional guarantees in return for certain restrictions imposed on mortgages eligible for purchase in MBS structures.

[18] Also Spain, Denmark and Sweden have established a long track record in the issuance of Pfandbrief-style investment products.

[19] An *asset-backed bond* (ABB) is a debt obligation collateralized by a reference portfolio of on-balance sheet assets of the originator. ABBs are over-collateralized as a form of credit enhancement, i.e. the value of securitized assets exceeds the notional value of issued debt obligations. As opposed to *pass-through* transactions, the cash flows from the reference portfolio are not dedicated to investors, who have no direct ownership rights to them. Frequently, the underlying reference portfolio is reconfigured, with a residual claim held by the issuer/originator. A *pass-through* payment structure conveys direct ownership of investors in a reference portfolio of off-balance sheet assets, which are similar in maturity and quality. The originator services the portfolio, makes the collections and passes them on, less servicing fee, to investors – without reconfiguration of the cash flows. A *pay-through bond* combines security features of both a pass-through and an ABB.

In general, Pfandbrief transactions represent a very secure and liquid asset class of fixed income instruments with an established track record and cyclical resilience. MBS issues are equally liquid (at least in the U.S. market) and feature an unchallenged degree of structural flexibility allowing for customized features and investor arrangements, such as variations to amortizing repayment (in contrast to bullet repayment structures of Pfandbrief issues).

In the second case, for instance, *Islamic finance* falls squarely within the domain of structured finance instrument whenever religious constraints require the replication of conventional interest-bearing assets through structural arrangements of two or more contingent claims. Islamic finance is limited to financial relations involving entrepreneurial investment, subject to the prohibition of (i) interest earnings *(riba)* and money lending, (ii) sinful activity *(haram)*,[20] such as direct or indirect association with lines of business involving alcohol, tobacco, pork products, firearms and gambling, and (iii) the speculative trade or exchange of money for debt *without* an underlying asset transfer *(gharar)*.[21] As opposed to conventional finance, where interest represents the contractible cost for funds over a pre-specified lending period, in Islamic finance, both financiers and borrowers to share the business risk (and returns) from investment in religiously acceptable services, trade or products in adherence to lawful activities *(halal)*, where profits are not guaranteed *ex ante*, but only accrue if the investment itself yields income. So any financial transaction assigns to investors clearly identifiable rights and obligations for which they are entitled to receive commensurate return.[22]

[20] Other, less relevant sinful activity under Islamic law in this context include hoarding, miserliness and extravagance.

[21] These distinctive features derive from two religious sources, which aim at an equitable system of distributive justice: (i) the *sharia'ah* (or *shariah*), which comprises the *qur'an* (literally, "the way") and the sayings and actions of the prophet *Mohammed* recorded in a collection of books know as the *sahih hadith*, and (ii) the *figh*, which represents Islamic jurisprudence based on a body of laws deducted from the *shariah* by Islamic scholars.

[22] While the elimination of interest is fundamental to Islamic finance, *shariah*-compliant investment behavior also aims to eliminate exploitation pursuant to Islamic law. Note also that Islamic law does not object to payment for the use of an asset. In fact, the earning of profits or returns from assets is encouraged.

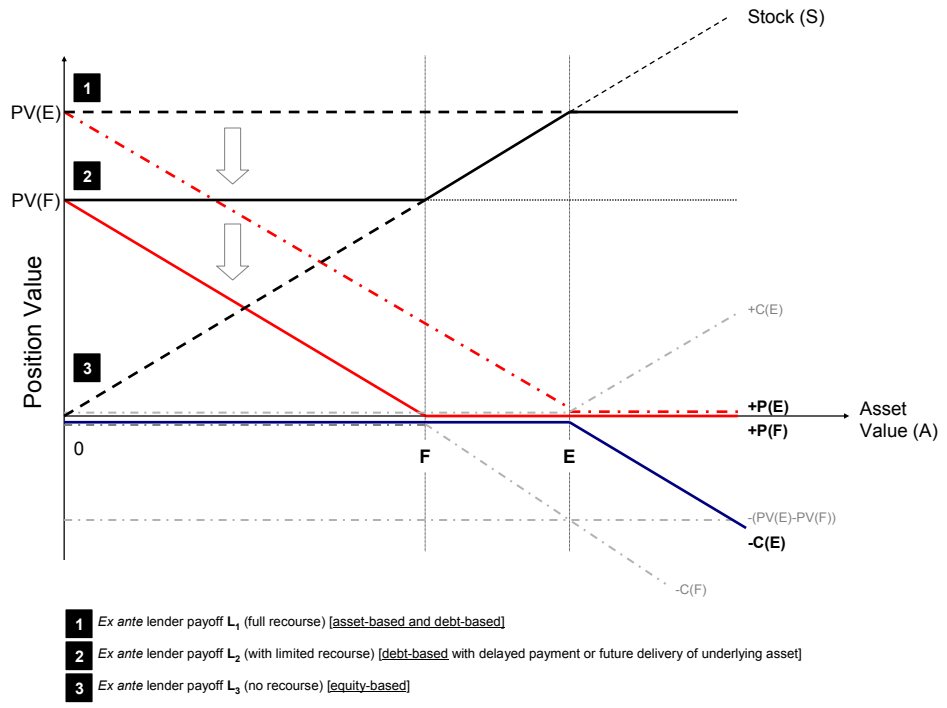

Figure 3. The pay-off profile under put-call parity of the three basic Islamic finance transactions.

In light of these moral impediments to both "passive" investment and interest as form of compensation, *shariah*-compliant lending in Islamic finance requires the replication of interest-bearing, conventional finance via structural arrangements of contingent claims. Although Islamic and conventional finance are *equivalent in terms of substance* and yield the same lender and investor pay-offs (i.e. equilibrium price equivalence) at the inception of the transaction, they differ in legal form and might require a different valuation due to dissimilar transaction structures and/or security design.

We distinguish between three basic forms of Islamic financing methods for both investment (e.g. plant, equipment, machines) and trade finance:[23] (i) *synthetic (mortgage) loans* (debt-based)[24] through a sale-repurchase agreement or back-to-back sale of borrower- or third party-held assets, (ii) *operating* or *finance leases* (asset-based)[25] through a lease-buyback agreement or the lease of third-party acquired assets conditional on future

[23] See Archer and Karim (2002) as well as Iqbal and Llewellyn (2002) for an in-depth analysis.

[24] Islamic debt instruments involve the transfer of either existing or future assets underlying *murabaha (or murabahah)* (cost-plus sale), *salam* (deferred delivery sale), *bai bithaman ajil* (BBA) (deferred payment sale), *istina (or istisna)* (pre-delivery, project finance) and *quard al-hasan* (benevolent loan) contracts, which create borrower indebtedness from the purchase and resale contract of an asset in lieu of interest payments. Interest payments are implicit in an installment sale with instantaneous or future title transfer for promised payment of agreed sales price in the future.

[25] In Islamic asset or quasi-debt instruments (*al-ijarah* leasing notes), the lender leases an asset to the borrower for a specified rent and term. The lessor (i.e. financier) acquires the asset either from the borrower or a third party (at the request of the borrower) and leases it to the borrower for an agreed sum of rental payable in installments according to an agreed schedule. The legal title of the asset remains with the financier throughout the tenure of the transaction, who bears all the risk associated with the ownership of the asset. The asset is returned to the borrower for the original sale

purchase of the assets by the borrower, and (iii) *profit-sharing contracts* (equity-based)[26] of future assets. As opposed to equity-based contracts, both debt- and asset-based contracts are initiated by a temporary transfer of existing assets from the borrower to the lender or the acquisition of third-party assets by the lender on behalf of the borrower.[27] These different forms of Islamic finance combine two or more contingent claims to replicate the risk-return trade-off of conventional lending contracts or equity investment without any contractual guarantee of investment return or payments by reference to an interest rate as time-dependent cost of funds (El Qorchi, 2005).

As opposed to conventional lending, Islamic finance substitutes a temporary transfer of an asset to the lender for a permanent transfer of funds to the borrower as a source of indebtedness. This arrangement constitutes entrepreneurial investment on part of the financier, who receives returns from direct participation in asset performance in the form of state-contingent payments according to an agreed schedule and amount.[28] The specific lending arrangement underlying each of type of Islamic finance represents a different form of a put-call parity[29]-based replication of interest income, which re-characterizes the rate of return of conventional investments in a religiously acceptable manner.

The three main types of Islamic finance are only distinct as to the attribution of economic benefits from the use of an existing or future asset owned by the lender (see Figure 3). In *asset-based* Islamic finance for investment or trade, the borrower leases from the lender one or more assets A with (stock/market) value S, which the lender acquired previously either from the borrower or a third party. The lender writes a call option C with strike price E to the borrower to acquire the asset after time T, subject to the promise (put option P) of full payment E of the "principal amount" plus an agreed premium in the form of rental payments over the investment period, which amounts to a present value of $PV(E)$ of risky debt at maturity. If the lender has full recourse (i.e. he retains ownership until maturity T, when the borrower can exercise the right to acquire the asset), also the put option has a strike price E, which ensures that the borrower's failure to fully repay entitles

price or the negotiated market price unless otherwise agreed (as opposed to debt-based contracts, which require a higher re-purchase price inclusive of quasi-interest payments). If the lessee does not exercise the option to buy the assets a pre-determined price at maturity, the lender will dispose of it in order to realize the salvage value.

[26] In Islamic profit-sharing contracts (*mudharaba* and *musharaka*), lenders and borrowers agree to share any gains of profitable projects based on the degree of funding or ownership of the asset by each party.

[27] In a debt-based *synthetic loan*, the borrower repurchase the assets from the lender at a higher price than the original sales price, whereas borrowers under a *lease-back agreement* repurchase the assets at the same price at the end of the transaction and pay quasi-interest in the form of leasing fees for the duration of the loan.

[28] The underlying asset transfer of Islamic lending arrangements provides collateralization until the lender relinquishes ownership at the maturity date. In equity-based Islamic investments lenders do not have any recourse unless pre-mature termination enables the lender to recover some investment funds from the salvage value of project assets.

[29] The relation between the put and call values of a European option on a non-dividend paying stock of a traded firm can be expressed as $PV(E)+C=S+P$. $PV(E)$ denotes the present value of a risky debt with a face value equal to exercise price E, which is continuously discounted by $exp(-rT)$ at an interest rate r over T number of years. In our case of a lending transaction, the share price S represents the asset value of the funded investment available for the repayment of the debt obligation at future value E.

the lender to sell the asset to compensate for the financial shortfall. This arrangement amounts a secured loan with maturity *T* and a fully collateralized principal amount, which is equivalent to the current purchase price of the desired asset. According to put-call parity the lender's position at maturity is *S-C(E)+P(E)=PV(E)*,[30] which equals the present value of the principal amount and interest of a conventional loan. In a more realistic depiction, the combination of a held put and a written call option on the same strike price does not represent a simple forward contract on the underlying asset, but a series of forward contracts over multiple rental payment dates, each of which obliging the holder to renew the call option of purchasing the asset (buyback) at maturity or allowing the lender to resell the asset at final maturity.[31]

In *debt-based* and *equity-based* Islamic finance, the payoff profiles are similar. In *debt-based* Islamic finance, borrower indebtedness from a sale-repurchase agreement of an asset with current value *PV(E)* implies a premium payment to the lender for the use of funds over the investment period *T*. As opposed to an *asset-based* arrangement, the lender relinquishes asset ownership right after inception, which reduces the option value of possible recourse (written put) to *P(F)*, so that *ex ante* lender payoff L_2 is now *S-C(E)+P(F)=PV(F)-(PV(E)-PV(F))-C(F)+C(E)*. In *equity-based* Islamic finance, the lender (i.e. investor) is fully repaid only if the investment project generates high enough returns to repay the initial investment amount and the premium payment in return for investment risk until maturity *T*. This arrangement precludes any recourse by the lender. If the investor owns 100% equity of investment *S*, *ex ante* lender payoff L_3 is *S-C(E)=PV(E)+P(E)*.

4 CONCLUSION

Against the background of rising regulatory concern about the evolution of derivative markets, we argue that a clear-cut definition of structured finance helps substantiate more viable debate about the resilience of credit risk transfer to financial shocks. Structured finance encompasses all advanced private and public financial arrangements that serve to efficiently refinance and hedge any profitable economic activity beyond the scope of conventional forms of on-balance sheet securities (debt, bonds and equity) in the effort to lower cost of capital and to mitigate agency costs of market impediments on liquidity. In particular, the distinction of the various methods of credit risk transfer through credit derivatives in a wider and narrower sense as well as securitization transactions illustrates the need for more comprehensive and judicious regulatory

[30] The lease payments by the borrower are received wash out in this representation.

[31] The call option is extendible in that the borrower has the right to renew the option to eventually acquire the asset by making the required rental payments or retiring any upcoming obligation according to the investment contract. The borrower pays a periodic premium for the call option to compensate the lender for the short position on the underlying asset until final repayment at maturity. The put option *+P(E)* represents a series of cash-neutral, risk-free hedges of the lender's credit risk exposure. In corporate finance, borrowers (i.e. managers) would pay debt investors (i.e. lenders) a spread over the risk-free return (implied in the coupon yield) as option premium of their put on default risk if the asset value is insufficient to existing debt *E* (strike price). As opposed to holders of risky corporate debt with payoff *PV(E)-P(E)*, financiers of such lending transactions own the underlying asset and hold a long put position on the firm value,

considerations. A good understanding of all these issues is incumbent on market participants as well as country officials charged with safeguarding financial stability and the sound operation of derivative markets. Given the increasing sophistication of financial products, the diversity of financial institutions, as well as the growing interdependence of financial markets, the sound regulatory oversight of this important segment of capital markets will depend on the expedient and tractable resolution of challenges arising from consistent credit risk management, risk mutualization, and prudential standards that guarantee market stability in crisis situations.

which reflects the lender's full recourse for each installment repayment during the term of the transaction if the asset value *S* falls below the promised repayment level *E*.

5 REFERENCES

Archer, S. and R. A. Karim (eds.) (2002). *Islamic Finance: Growth and Innovation*. London, Euromoney Books.

Committee on the Global Financial System (2005), "The Role of Ratings in Structured Finance: Issues and Implications," CGFS Publications No. 23 (January), Bank for International Settlements (BIS) (http://www.bis.org/publ/cgfs23.htm).

Cousseran, O. and I. Rahmouni (2005), "The CDO Market – Functioning and Implications in Terms of Financial Stability." Banque de France Financial Stability Review, No. 6 (June), 43-62.

Effenberger, D. (2003), "Frankfurt Voice: Credit Derivatives – Implications for Credit Markets," Deutsche Bank Research.

El Qorchi, M. (2005), "Islamic Finance Gears Up," Finance and Development (December), International Monetary Fund (IMF), 46-9.

Iqbal, M. and D. Llewellyn (eds.) (2002) *Islamic Banking and Finance: New Perspective on Profit-Sharing and Risk*. Cheltenham/U.K., Edward Elgar Publishing, Ltd.

Jobst, A. (2006a), "Sovereign Securitization in Emerging Markets," *Journal of Structured Finance*, Vol. 12, No. 3 (Winter), 2-13.

Jobst, A. (2006b), "Correlation, Price Discovery and Co-movement of ABS and Equity," *Derivatives Use, Trading & Regulation*, Vol. 12, No. 1-2, 60-101.

Jobst, A. (2006c), "European Securitization: A GARCH Model of Secondary Market Spreads," *Journal of Structured Finance*, Vol. 12, No. 1 (Spring), 55-80.

Jobst, A. (2005a), "Risk Management of CDOs During Times of Stress," *Derivatives Week* (28 November), Euromoney, London.

Jobst, A. (2005b), "Need for Vigilance by CDO Investors," *Financial Times*, Comments & Letters (4 November).

Jobst, A. (2005c), "Investors Must Heeds Those CDO Risks," *Financial Times*, Comments & Letters (19 April).

Jobst, A. (2005d), "Tranche Pricing in Subordinated Loan Securitization," *Journal of Structured Finance*, Vol. 11, No. 2 (Summer), 64-96.

Mastroeni, O. (2005), "Pfandbrief-style Products in Europe," Occasional Papers Series, European Central Bank, Frankfurt/Main.

Micu, M. and C. Upper (2006), "Derivative Markets," BIS Quarterly Review, Bank for International Settlements (BIS), 47.

Shepherd, B. (2005), "The Synthetic CDO Shell Game," *Investment Dealer's Digest* (16 May).

Skarabot, J. (2002), "Securitization and Special Purpose Vehicle Structures," Working Paper, Haas School of Business, University of California at Berkeley (April).

Tsui, E. (2005), "Asia Poised for Take-off in CDOs," *Financial Times*, Capital Markets (15 July).

6 APPENDIX

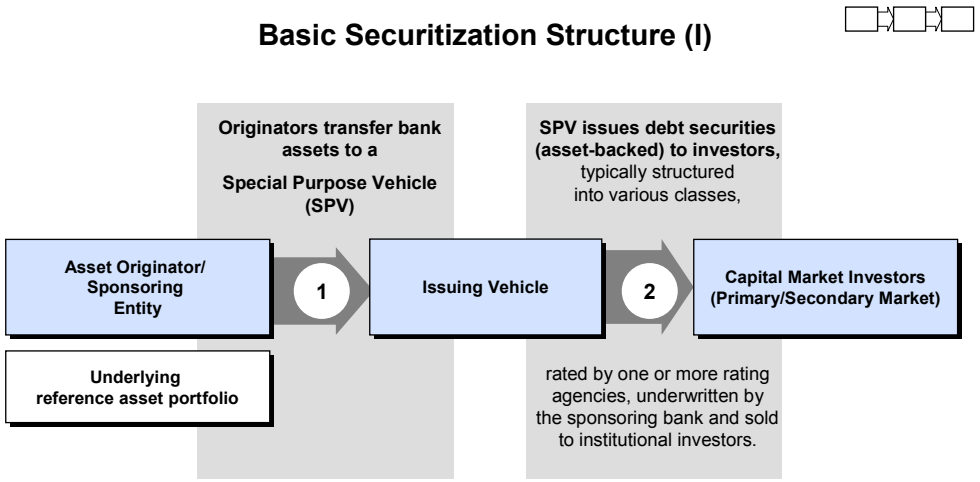

Figure 4. Overview of the basic securitization structure.

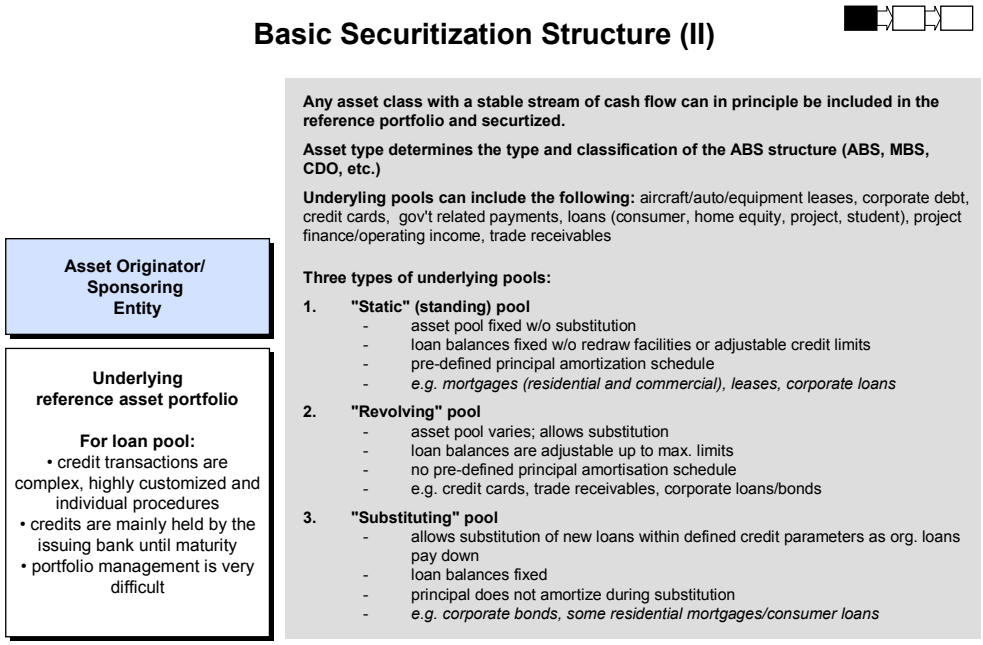

Figure 5. First step of the basic securitization structure.

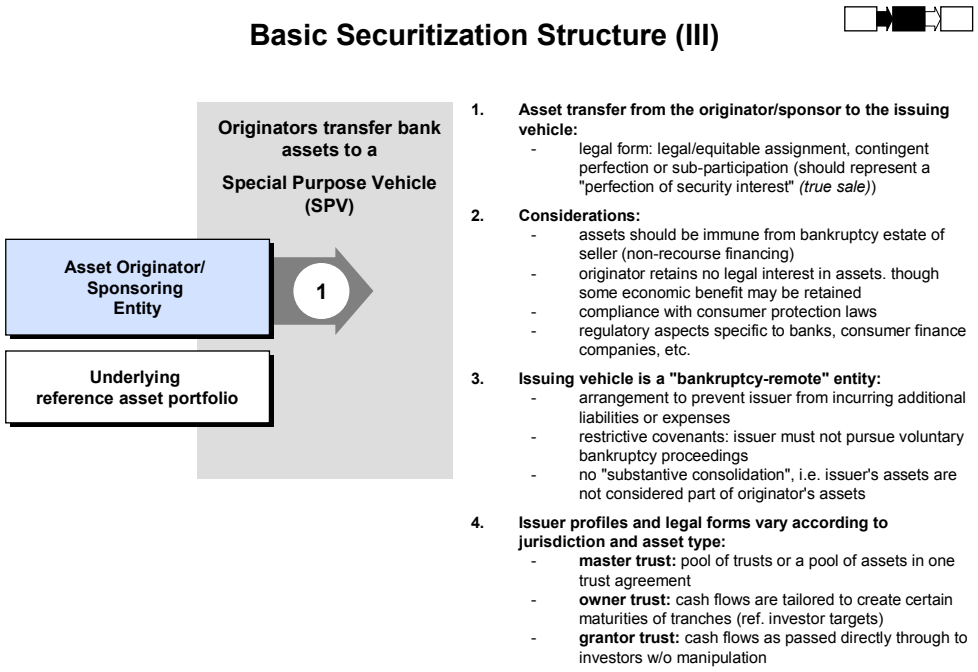

Figure 6. Second step of the basic securitization structure.

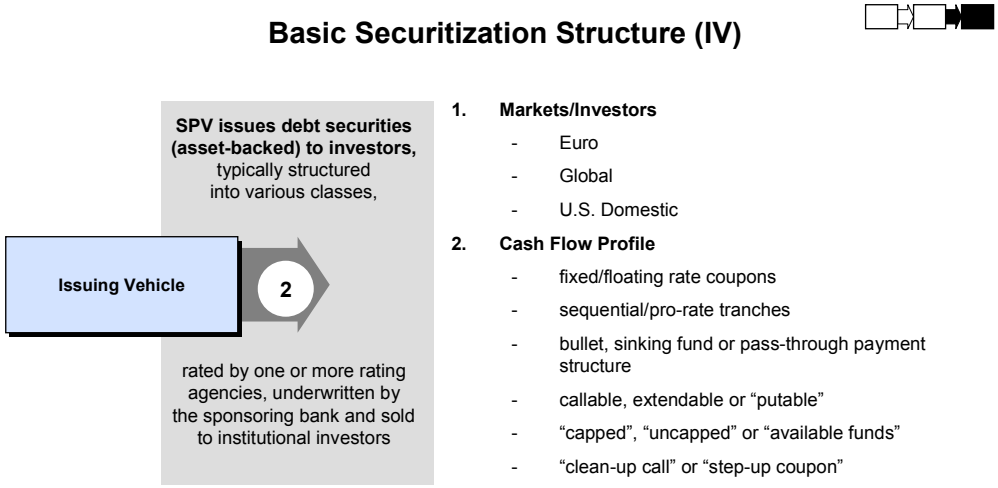

Figure 7. Third step of the basic securitization structure.