UNIVERSITY OF TAMPERE
Department of Economics and Accounting

STRUCTURING AND OFF-BALANCE SHEET FINANCING OF MORTGAGE CREDIT DERIVATIVES

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ABSTRACT

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This paper describes investment banking of mortgage credit derivatives in terms of structuring and off-balance sheet financing. The benefits and risks are also studied. The study describes the particular mechanism of structuring mortgage into mortgage credit derivatives as well as off-balance sheet financing of the mortgage credit derivatives is examined. Mortgage derivatives, such as an *asset-backed security* (ABS) and more complex *collateralized debt obligation* (CDO) structures among others are a part of the structured finance and have particular features. High-risk mortgage loans are attractive assets as a part of these derivatives since the loans offer better yields than prime class mortgage. On the other hand, the risks are bigger and the risks remain through structuring and off-balance financing. The mechanism of structuring mortgage credit derivatives is described. Structuring involves many market participants and financial intermediaries. Underlying assets of these credit derivatives are certain mortgage loans. Many benefits are evolved including new sources of external finance, credit risk transfer, improved liquidity, increased trading volume, better profits and a chance to straighten the financial supply chain. The benefits of structuring mortgage credit derivatives appear similar to common benefits of structured finance and securitization. Risks and disadvantages occur as well as the mechanism of structuring mortgage credit derivatives is subject to risks or disadvantages. The major risks or disadvantages are the lack of control, asymmetric information, the lack of transparency and disadvantages of credit risk transfer.

Off-balance sheet finance or financial activities outside of the balance sheet is understudied area although it has a salient role in mortgage derivatives banking. Off-balance sheet finance creates plenty of benefits that are a new source of external finance, improved profitability, new tools to attain new lines of business in the banking industry and a possibility to leverage. However, off-balance sheet finance is also a subject to increased risk in banking as it increases both risk of deposit, liquidity risk as well as risk of losses, it creates a possibility to leverage and off-balance sheet finance also increases financial risk. In addition, the significance of off-balance sheet finance is undisputable in the field of modern investment banking. Mortgage credit derivatives banking seems to offer benefits and expose risks or disadvantages similar to the aforementioned benefits and risks of structuring or off-balance sheet financing as such. Findings and conclusions are synthesis of previous research. As a whole, this study is an overview of mortgage credit derivatives banking, and there are many avenues for future research.

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1 INTRODUCTION

1.1 Background

In the background of this study is a subprime mortgage crisis that arose in the United States in July 2007 and evolved into a global financial crisis during 2008 (Ackermann 2008, 329-331). The subprime crisis surprised investment banks and market participants. The global financial crisis has an influence on every participant in the finance market and on global economy (Duff & Einig, 2009). The crisis started as certain high-risk mortgage derivatives lost the majority of their value (Krinsman 2007). High-risk mortgage in the background of mortgage credit derivatives were mostly subprime mortgage loans, and in the summer of 2007, the market for certain derivatives, *asset-backed securities* (ABSs), which were used to fund off-balance sheet investments, collapsed from $1200 billion to about two-thirds of that (Ackermann 2008, 331). Fundamentally, the 2007 crisis differs not from the earlier financial crises even if the cause of the current crisis is the real estate market. However, the big difference this time lies in pooled mortgage loans and securitization, that is, the structured finance market of mortgage credit derivatives. (Udell 2009, 117)

There are many possible causes that led to the 2007 subprime crisis. The important ones among the microeconomic systemic failures were

- Structured finance innovations,
- Securitization,
- Fundamental flaws in the rating agencies' business model,
- The procyclical behaviour of leverage of the financial system,
- Disintermediation,
- Competitive international de-regulation,
- Lack of transparency and
- Regulatory and supervisory failure in the U.S. mortgage market.

In addition, there are macroeconomic causes such as global liquidity creation by central banks and a global savings glut. (Buiter 2007)

From the mortgage market perspective, there exist several causes; the growth of the mortgage market in the U.S has been very rapid in the recent years and there has been a rapid increase in subprime mortgage loan delinquencies and foreclosure actions with an impact on the secondary mortgage loan market. As mentioned earlier, securitization and development of mortgage derivatives have played a major role. (Krinsman 2007, 14)

Investors were willing to invest in high-risk mortgage derivatives since the structured products appeared very attractive by offering higher yields with same risk premium as traditional securities (Ashcraft & Schuermann 2007). Derivatives, as a result of securitization, also offer benefits for financial market participants (Kendall 1996, 13). However, as a consequence of the subprime crisis it is axiomatic that mortgage credit derivative banking includes major problems and unexpected but still existing risks. The problems and risks have been widely unrecognized or understudied in academic research before the time of the crisis in the mortgage market.

In previous academic research, the benefits of mortgage credit derivative banking were emphasized during the 1990's (Kendall 1996) and some criticism arose in the beginning of the 2000's (Klee & Butler 2002). Nonetheless, real criticism evoked as a result of the subprime crisis (Ashcraft & Schuermann 2007; Buiter 2007; Krinsman 2007) and yet expands (Cheng & Neamtiu 2009, 108-109; Udell 2009; Fabozzi, Goodman, Li, Lucas & Zimmermann 2008, 295-318). Academic research of off-balance sheet financing is more fragmented (Ketz 2003; James, 1987).

Interestingly, the 2007 crisis was not the first crisis in the subprime market. In 1998-1999, many leading subprime lenders went out of business, due to using an ambiguous accounting technique called gain-on-sale to help report better business profitability. These firms booked the entire gain from a new subprime loan in the month the loan was originated, rather than over the term of the loan. Investors began to understand the vague process just as the 1998 liquidity crisis hit. As a consequence, the subprime lenders did not have capital, and these specialty finance subprime lenders went into bankruptcies or were merged with larger and better-capitalized firms. (Fabozzi, Goodman, Li, Lucas & Zimmermann 2008, 296)

An argument for this study is that high-risk mortgage credit derivatives banking played a key role in the 2007 crisis (Ackermann 2008, 331) and further in the background of 2008 global financial crisis (Duff & Einig, 2009). Fundaments of mortgage securities among other structured finance products as well as investment banking itself are very complex and raise many questions that need to be studied. The mortgage credit derivative banking may also offer benefits and includes risks or disadvantages that are very vital points to study. Without benefits, the investment banking of mortgage credit derivatives would not have became so successful among structured finance participants, and without risks, the global financial crisis would never have developed. Another argument for this study is the obscurity of off-balance sheet finance in the field of mortgage credit derivatives.

1.2 Aim and scope

The main purpose of this study is to describe the banking of mortgage credit derivatives. In order to reach this goal, the study

1. describes the mechanism of how high-risk mortgage loans are structured into mortgage credit derivatives,

2. describes off-balance sheet finance generally and as a part of credit derivative banking and,

3. in addition, the paper researches possible benefits and risks or disadvantages of structuring and off-balance financing as such, and also in terms of the mortgage credit derivatives banking.

The main area of interest is the secondary mortgage derivatives banking mainly in the U.S, although, modern investment banking is a global theme (Ackermann 2008). The role of government-sponsored mortgage lenders, such as Fannie Mae and Freddie Mac, is excluded. Finance markets have regulatory structures and regulatory agencies (Fabozzi, Modigliani, Jones & Ferri 2002, 31-41). Regulatory issues are not studied,

and the regulation of financial markets is excluded in this study. Nevertheless, the study assumes that finance market deregulation has assisted the evolvement of structured finance (see e.g. Buiter 2007).

The study does not examine current macroeconomic phenomena in a background of structured finance market. Macroeconomic factors certainly have influences on the structured finance market. However, the study assumes that the factors do not have an affect on the particular mechanism of structuring credit derivatives or off-balance financing them. A pure main theme is the business model of mortgage credit derivative investment banking. The theme is treated as a microeconomic financial phenomenon with an assumption of distinct boundaries. All macroeconomic connections are excluded as far this is possible. Financial and macroeconomic phenomena do have influences on e.g. derivative pricing but those issues are not examined. Modern finance theory approach in terms of modern portfolio theory, capital market theory, the arbitrage pricing theory and the capital-asset-pricing-model (CAPM) amongst others are also not presented herein.

High-risk mortgage loans and markets were prerequisites for the evolvement of the 2007 subprime crisis (Ackermann 2008). In the addition to well-known subprime loans there are other kind of high-risk mortgage loans, such as Alt-A and Jumbo class, in the mortgage market (Ashcraft & Schuermann 2007). The major element whether a particular mortgage loan is designated as prime or high-risk mortgage loan is credit risk. Also, the borrower's demographic characteristics, knowledge and financial sophistication are important in determining whether they end up with subprime mortgage loans. High-risk lending has particular features; interest rates and fees are typically costly to credit-impaired or otherwise higher-risk borrowers. High-risk borrowers are disproportionately minority and lower income, older, less educated, less financially sophisticated and less likely to search for the best interest rate when applying for a mortgage loan. (Lax, Manti, Raca & Zorn 2004, 534-535) However, this study aims particularly to describe what mortgage derivatives banking is like, rather than to research features of the certain underlying high-risk mortgage loans of mortgage credit derivatives. In lieu of the mort-

gage loans themselves, the study describes how mortgage loans were treated under mortgage credit derivatives investment banking.

1.3 Method

The research approach of this study is a conceptual analysis, and it is based on a literature review. A conceptual analysis is a particular research method of analysis and synthesis based on classification by Neilimo and Näsi in Finnish business economics. Fundamentally, a conceptual analysis is a theoretical approach which can have a descriptive or a normative nature. (Neilimo & Näsi 1980) A main contribution of this study is a conceptual analysis and synthesis of investment banking of mortgage credit derivatives. In the background of this study is an observation on the mortgage derivatives market crisis. Constructing reasoning and building up a synthesis is based on the analysis of previous research. Research material includes books, academic papers, articles, financial statements and studies containing key terminology.

1.4 Research frame and structure of the study

The research frame and the structure of the study are presented in Figure 1 on the next page. The study starts off with an overview on the background of phenomenon. The conceptual analysis of mortgage credit derivatives banking consists of three main themes that are structuring of mortgage credit derivatives, mortgage credit derivatives themselves and off-balance sheet finance in general as well as in the terms of the mortgage credit derivatives. Benefits and risks of main themes are also studied. Finally, synthesis and discussion rest on the preceding conceptual analysis of these three main themes.

As reflecting the research frame this paper is organized as shown in Figure 1. Chapter 1 is an introduction and provides background information related to research subject and the implement of this research. Chapter 2 studies structuring of mortgage credit derivatives. It describes structured finance, places mortgage credit derivatives into field of

structured finance, and describes securitization as an important financial tool within structured finance.

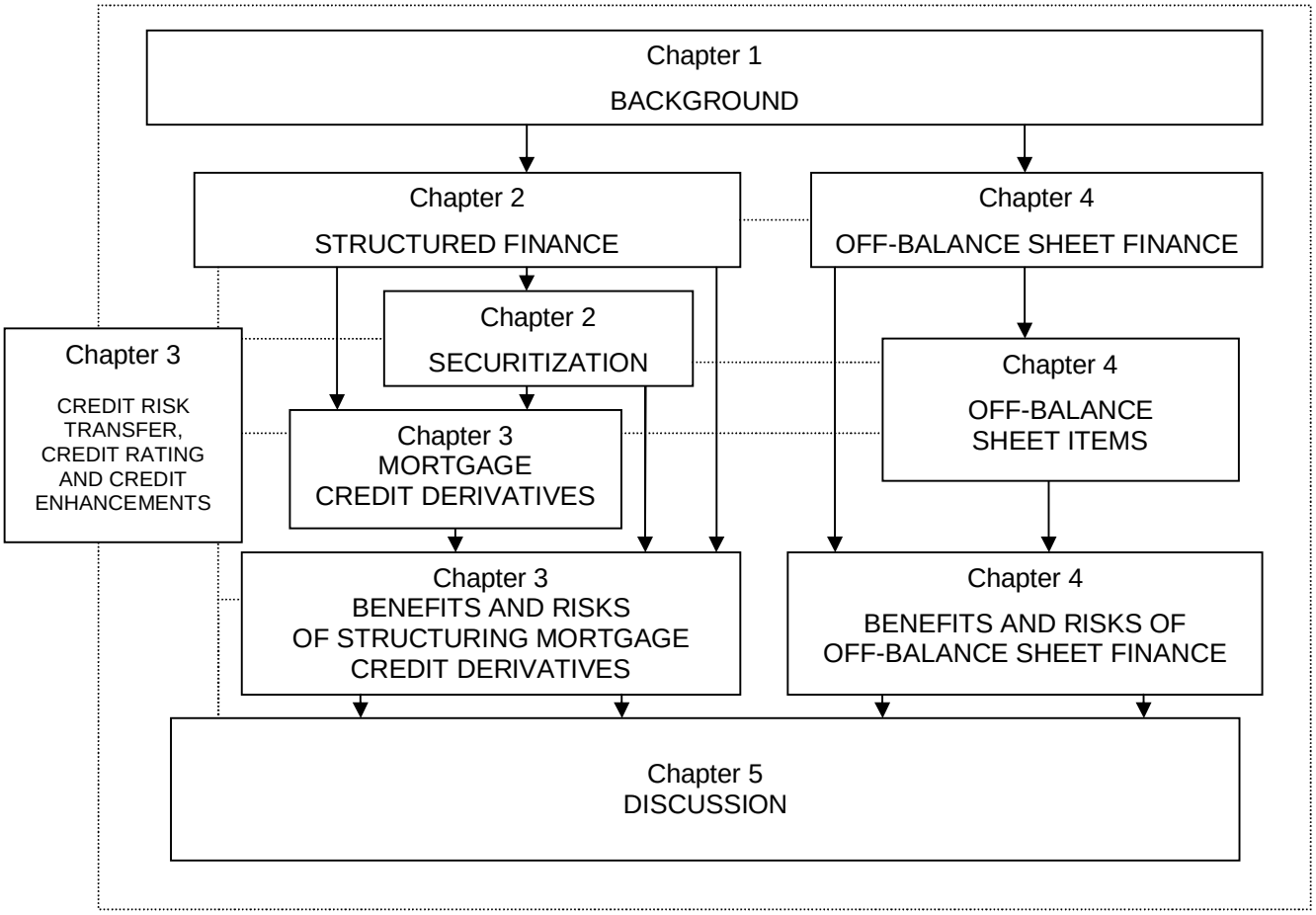

Figure 1. Research frame and the structure of the study

Conceptual analysis continues with Chapter 3 which examines common mortgage derivatives called an *asset-backed security* (ABS) and a *collateralized debt obligation* (CDO) structures as well as some other mortgage-related structured finance products or derivatives. A *collateralized debt obligation* is studied especially exclusively due to its essential relevance within mortgage credit derivatives market. Basically, credit derivatives are very illiquid; therefore credit ratings and credit enhancements have a vital supportive role to help to improve the liquidity (Fabozzi, Goodman, Li, Lucas & Zimmermann 2008; Ashcraft & Schuermann 2007). A certain position of the assistance is presented in Figure 1. The roles of credit rating agencies, credit ratings and credit enhancements are also studied in Chapter 3. Chapter 4 examines issues of off-balance

sheet finance. It examines how off-balance sheet finance is defined, and describes typical off-balance sheet items. Linked to every subtle, the study examines benefits and risks alongside main themes. Chapter 5 discusses and creates a synthesis based on the literature review and also focuses on benefits and risks as well as disadvantages of mortgage credit derivatives banking, whereas Chapter 6 concludes.

2 STRUCTURING MORTGAGE CREDIT DERIVATIVES

2.1 Structured finance

A time-related classification by Banks (1997, 6) shown in Figure 2, divides derivatives into three main category which are exchanged-traded derivatives, over-the-counter-products and structured products on the grounds of derivatives. The evolvement of derivatives includes two certain time periods. The first period is called *first-generation derivatives* (1970s-1980s) and the second period is called *second-generation derivatives* (1990s-2000s). Figure 3 presents the general classification of derivatives by Banks. (Banks 1997, 6-7)

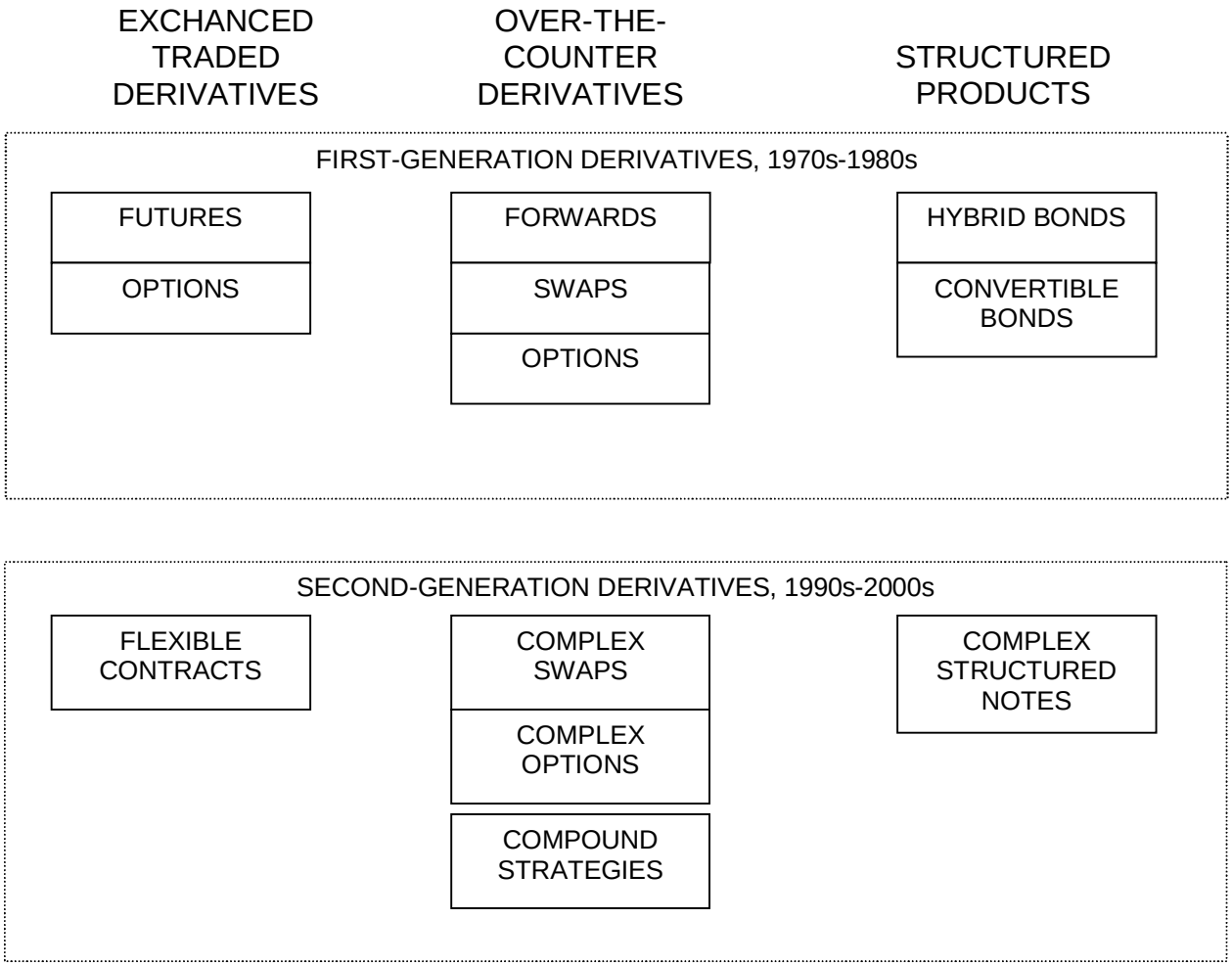

Figure 2. General classification of derivatives (Banks 2004, 6)

Within this framework, an essential observation is that the first-generation derivatives by Banks include certain types of derivatives that are generally and traditionally understood as derivatives. Futures, options and swaps have well-established definitions while second-generation derivatives, including mortgage credit derivatives, have several variants and somewhat ambiguous definitions (Ashcraft & Schuermann 2007; Blundell-Wignall 2007; see also Banks 1997). The mortgage credit derivatives fall into *complex structured notes* –class in Banks' classification. Thus, this particular field of second-generation derivatives is an object of this study.

Particular market participants exist in a structured finance market. Basically, there are market participants that sell financial products, participants that buy these, and participants that help to perform these financial transactions. Kendall (1996) categorized market participants as consumer-borrowers, originators, investors and investments banks (Kendall 1996, 13). This classification is far from comprehensive and extensive; there are other types of financial intermediaries as well; arrangers, third parties like swap counterparts, servicing banks, borrowers, asset managers and credit rating agencies (Ashcraft & Schuermann 2007, 8). Financial institutions or financial intermediaries are banks, insurance companies, pension funds, investments funds, brokers and asset managements and every market participant has its own role. (Duff & Einig 2009) However, interrelationships between market participants seem to construct a fragmented and layered market of networks, rather than an unambiguous classic marketplace with few participants (Duff & Einig 2009; Ashcraft & Schuermann 2007; Jobst 2006; Banks 1997).

Structured finance itself involves all advanced private and public financial arrangements that aim to refinance and hedge any profitable economic activity at lower capital and agency costs from market impediments on liquidity. The majorities of structured products combine traditional asset classes (debt, bonds and equity) with contingent claims or replicate traditional classes of asset through synthesizing or new financial instruments. Financial institutions invoke structured finance if established forms of external finance are unavailable for a particular financing need or the forms are too expensive for issuers. (Jobst 2006, 2)

The overview of risk transfer instruments or derivatives is presented in Figure 3. A transfer of risk is an attribute of derivatives while traditional assets do not hold the certain feature to transfer risk off from the underlying asset. Traditional finance includes fixed income products, debentures and equity while traditional credit derivatives are the other side of conventional finance. Credit insurances and syndicated loans are considered to be traditional credit derivatives. Traditional finance products in terms of equity and debt and fixed income products do not carry the feature of transfer risk. In contrast to traditional finance, structured products are a segment of risk transfer instruments. Structured finance has a very flexible nature that places it somewhere in between

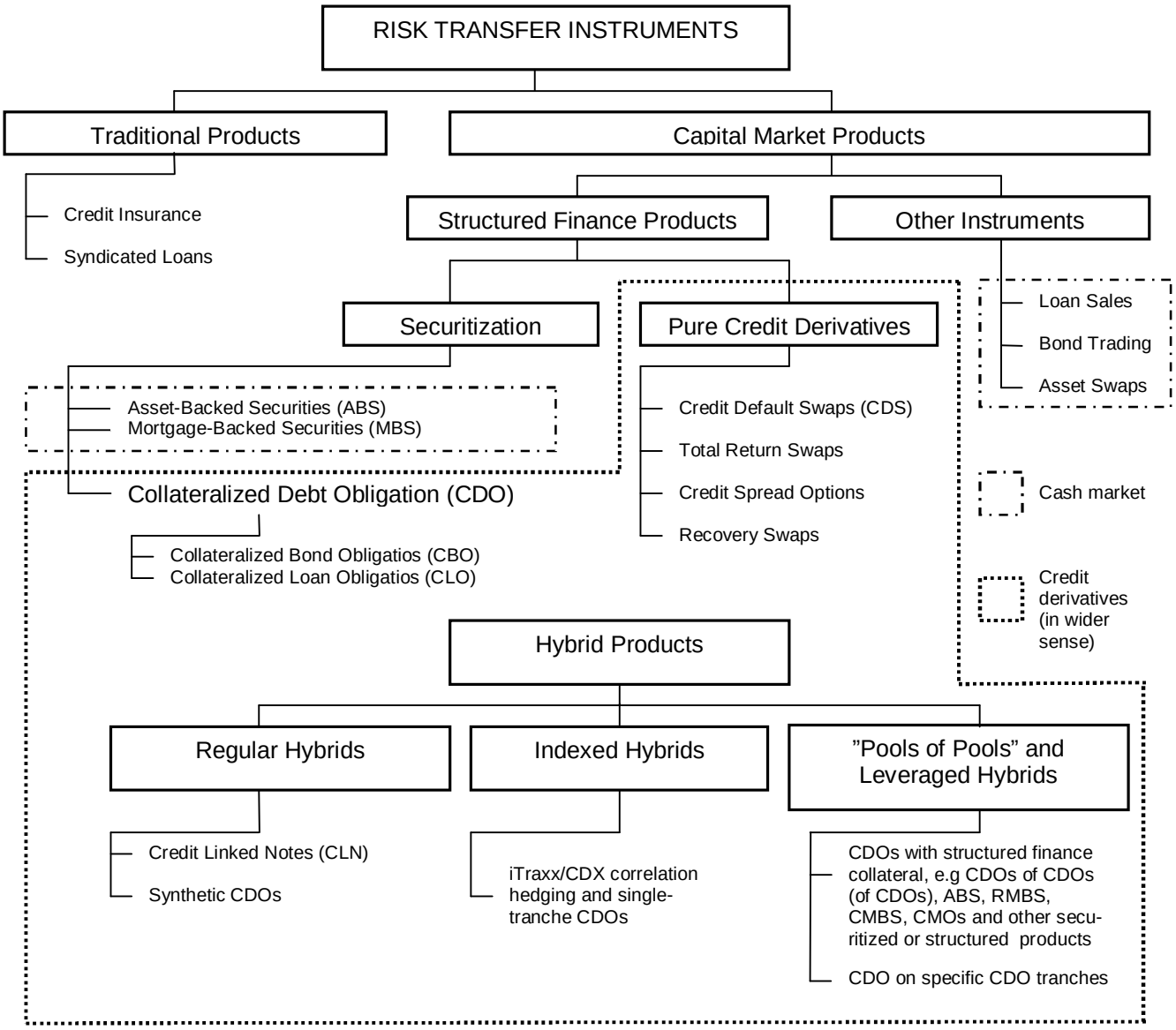

Figure 3. Overview of risk transfer instruments (Jobst 2006, 2)

traditional finance and traditional credit derivatives (‘other instruments’ in Fig. 3). The main characteristic of structured finance is capital-market based risk transfer. That is a feature the most structured finance instruments offer. Two major asset classes of structured finance, which are asset securitization and credit derivative transactions, allow issuers to combine assets in almost infinite ways to improve risk transfer and achieve greater transformation and diversification of risk. (Jobst 2006, 2)

Securitization assists to attain capital-market based finance instead of credit finance. It is a market-based source of refinancing economic activity instead of debt finance offered by intermediary credit lenders. A common and simple securitized structured finance product is asset-backed security (ABS). The ABS is a cash market derivative (small thin-lined box on left in Fig. 1) since it is backed by the direct cash flows from underlying assets. Credit derivatives can be distinguished in the narrower and in the wider sense. Pure credit derivates (see Fig. 1) are credit default swaps (CDSs), total return swaps and credit spread options whereas in a wider sense (big thin-lined box in Fig. 3) credit obligations include 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 (CDO backed by CDO tranches) In addition to pure credit derivatives, the wider classification of derivatives also includes hybrid and securitization products with constituent credit derivative elements that are not cash market derivative transactions anymore. (Jobst 2006, 2)

The classification of credit derivatives by Jobst creates the very large structured finance ‘family tree’ shown in Figure 1. Nevertheless, the credit derivatives in a wider sense can be thought of as ‘special cases’ of the broad CDO concept (Blundell-Wignall 2007, 32). Also, structured finance products are founded not on single collateralized asset. The optimal structured finance instruments that transfer credit risk are based on loan portfolios rather than individual loans and, in addition, these instruments have typically credit enhancement guarantees that aim to improve liquidity of the derivatives (Chiesa 2008, 475). Hence, credit enhancements are a typical feature of credit derivatives. Credit enhancements are also examined (see Chapter 3.5.2).

2.2 Securitization

Securitization is an important tool of the modern banking industry. Through securitization the illiquid financial assets on the balance sheet of a bank, financial institution or other corporate entity, are transformed into liquid securities which are traded in a secondary debt capital market (Fabozzi & Choudhry 2004, 3). By using securitization, it is possible to derive classic assets classes including equity, debt and bonds into financial derivatives. Finally, securitization creates new structure finance products and structured products markets and serves as a new source of external finance. (Jobst 2006; Klee & Butler 2002; Kendall 1996)

Securitization is a rather new financial innovation. It was first introduced in the United States domestic market in 1969, and it has arrived in Europe in the 1980's with dramatic growth (Fabozzi & Choudhry 2004, 3). Securitization of mortgage loans is considered to be a private market phenomenon, but a striking notice is that public sector was one of the first proponents of mortgage securitization (Swan 2009, 9). Securitization of mortgage loans grew notably in private banking during 2000's. By 2006, 75% of subprime loans and 91% of Alt-A mortgage loans were securitized as compared to 46% and 18% in 2001, respectively (Udell, 2009, 118).

Many academics have tried to define securitization. However, Klee and Butler (2002, 23) emphasize that there is no uniform definition of securitization. From their standpoint, securitization is a part of the ongoing change in financial market known as the elimination of intermediaries (banks, lenders, financial institutions) in the financial supply chain. Securitization enables a company to acquire reduced-cost financing through the removal of intermediaries that earlier operated between the company and the ultimate source of financing. In the other words, through securitization the company avoids transaction costs paid to middleman financing institutions. (Klee and Butler 2002, 23-24)

Kendall (1996) describes securitization as a process of packaging individual loans and other debt instruments. Then the package is converted into a security or securities, and the credit status or credit rating of the securities is enhanced to advance their sale to in-

vestors. The process converts illiquid individual loans or debt instruments that cannot be sold readily to investors into liquid and marketable securities. (Kendall 1996, 2)

Brealey and Myers (2003) found out that securitization can be used as a tool for structuring balance sheet items. Typically large banks have more demand for loans than they can satisfy and they may solve the problem by selling a portion of existing loans to other institutions. The banks can change a collection of non-marketable bank loans into marketable securities through securitization. Brealey and Myers present a clarifying example about securitization. In the Natwest example, the bank securitized one-sixth of its loan book from its balance sheet and then sold notes that promised to pay a portion of the cash that Natwest received from the package of loans. The notes provided a chance to share in a diversified portfolio of high-quality loans and came up very popular among investors. Through securitization, Natwest reduced its portfolio of balance sheet loans by removing the loans to off-balance sheet investments. (Brealey & Myers 2003, 868)

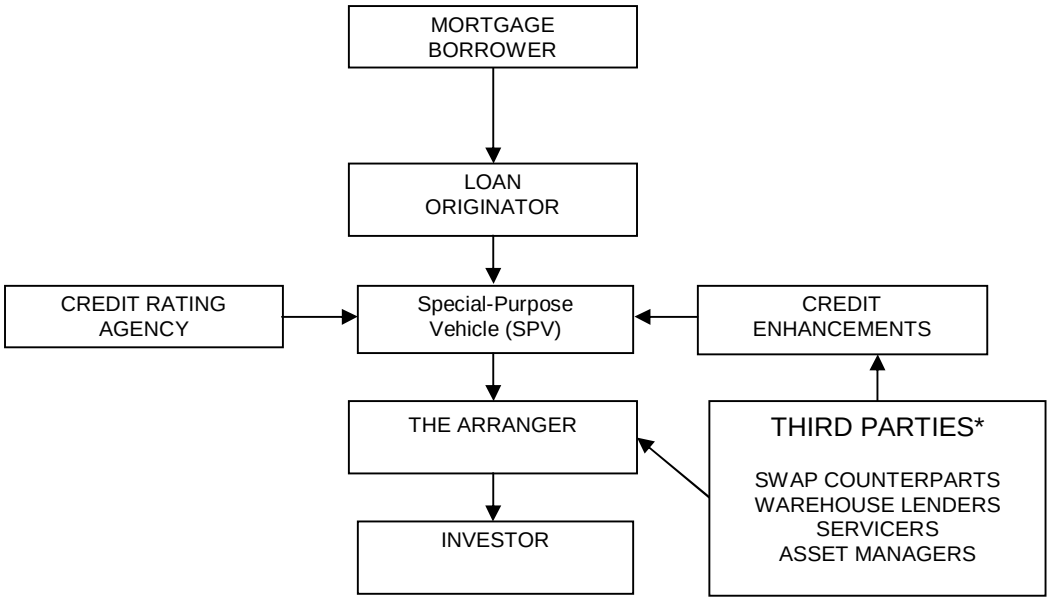

Figure 4. Securitization process (Kendall 1996, 3 with modifications, *see also Ashcraft & Schuermann 2007, 8)

The securitization process is organized in a particular mode. The originator identifies a pool of assets (pooling) to be securitized. Typically, the originator is a mortgage lending

bank. Then the originator or the arranging bank creates a subsidiary that is called a special purpose vehicle (SPV) [1]. The arranger is an intermediary financial institution. Following the creation of the SVP, the originator attempts to make the SPV as bankruptcy remote[2] as possible. After that, the originator transfers the pool of assets into the SPV or trust that issues asset-backed securities (ABS) or other credit derivatives to raise funds to pay the originator for the purchase of assets. (Klee & Butler 2002, 24)

The simplified securitization process involves participants that are presented in Figure 4 on the previous page. A financial institute (bank) can be any participant (the originator, the underwriter, the arranger or the investor) except for the credit rating agency. The loan originator makes the loans (pooling) and also may service them. The special-purpose entity (SPV) is created to purchase loans and to issue credit derivatives based on the purchased collateral loans. The SPV might be a subsidiary of the originator or of the investment bank (the arranger) that underwrites and distributes the securities. Third parties are also participating. Credit rating agencies are involved in the securitization process since ratings are important elements for all securities that are not backed by government. Credit enhancements are techniques that aim to offer more protection for investors against credit losses by improving protection of security. (Kendall 1996, 3-5) Also some other minor financial intermediaries are involved. Those and the role of credit ratings and credit rating agencies are examined later.

2.3 Benefits and risks of securitization

Securitization generates many benefits. Fundamentally, securitization seems to create benefits to every market participant. Kendall (1996, 13) presents benefits of the securitization to four securitization process participants. The participants are consumer-borrowers, originators, investors and investment banks.

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1. The SPV is a special purpose vehicle (also special purpose entity SPE or special investment vehicle SIV) designed specially for asset securitization as it serves as the purchaser of the identified assets. The main three functions of the SPV are
   1. It allows the originator's assets to be transform into liquid securities
   2. It protects the investors of the securitized assets from the SPV going bankrupt
   3. It protects the securitized assets from the originator's creditors (Klee & Butler 2002, 24)

2. If a mother company of the SPV goes into bankruptcy, it is possible that the SPV will not be involved in the bankruptcy (Klee & Butler 2002)

Table 1. shows benefits for every participant as securitization offers benefits to different participants of derivatives market. It increases liquidity, number of financial products, asset diversification, profits and yields. Securitization also offers continuous cash flows and reduces funding costs. For example, consumer-borrowers achieve lower costs of funds, competitive rates and terms. The originators gain better profits and are able to sell assets readily whereas the investors achieve higher yields and improve liquidity and diversification of security portfolio. The investment banks gain new financial products, continuous cash flows and bigger trading volume. (Kendall 1996, 13-14)

Table 1. Benefits of securitization (Kendall 1996, 13)

Benefits to consumers-borrowers	1. Lower cost of funds
	2. Increased buffet of credit forms
	3. Competitive rates and terms nationally and locally
	4. Funds available consistently
Benefits to originators	1. Ability to sell assets readily
	2. Profits on sales
	3. Increased servicing income
	4. More efficient use of capital
Benefits to investors	1. High yields on rated securities
	2. Liquidity
	3. Enhanced diversification
	4. Potential trading profits
Benefits to investment banks	1. New product lines
	2. Continuous flow of originations and fees
	3. Trading volume and profits
	4. Potential for innovation and market expansion

Furthermore, securitization allows borrowers to enter the capital market directly as companies willing to borrow can borrow from the finance market directly without assistance of financial intermediaries (Bodie, Kane & Marcus 2002, 19). Transfer of credit risk is also the one of the most important benefits of securitization. Papers such as those by Blundell-Wignall (2007), Jobst (2006) and Klee and Butler (2002) state that securitization and the growth of structured products promote credit risk transfer and allocation of risk. Securitization has also altered important factors of risk management in lending: loan originators have less incentive to undertake due diligence on borrower quality appropriateness of credit instruments as the repayment risk is transferred to someone else

(Blundell-Wignall 2007, 30). Moreover, using an SPV isolates the securitized assets from general financial risk of the originator and financial risk of the investors of the SPV's securitized assets is reduced (Klee & Butler 2002, 30).

Off-balance sheet treatment is the final benefit of securitization discussed here. Through securitization, the originating bank can remove the assets and liabilities from its balance sheet (Klee & Butler 2002, 29). This off-balance sheet treatment of securitization serves as a balance sheet restructuring tool of the originator by reducing both the economic cost of capital and the regulatory minimum requirements and by diversifying asset exposures (Jobst 2006, 3). In addition, off-balance sheet debt is significantly less important than balance sheet debt to a firm's credit ratings (Lim, Mann & Mihov 2003, 3).

Securitization gives rise to many challenges and also includes risks. In the background of challenges are the size, rapid growth and complexity of securitization (Thomas & Wang 2004, 2). Off-balance sheet treatment of securitized investments is also a subject of criticism (Ketz 2006, 53). In a case of securitizing mortgage, Ashcraft & Schuermann (2007, 8) offer an elegant and exhaustive overview that exposes the problematic mortgage securitization process. They started by arguing that the securitization process is subject to seven key frictions based on mostly information asymmetry, and the frictions may explain why the securitization of high-risk mortgage could generate bad outcomes. The key frictions as well as Ashcraft's and Schuermann's critical view on securitization are presented in Figure 5 with explanations. The seven types of frictions in the mortgage securitizing process are:

1. *Frictions between the mortgagor (the borrower) and the originator: Predatory lending*. The borrower might be financially unsophisticated e.g. the borrower might not know all of the financial options available to him. Moreover, the borrower might be unable to make a choice that is in his best interest. Considering a high-risk mortgage, the borrowers also have poor financial status: no income, no job and no assets. These frictions lead to the possibility of predatory lending meaning the lender convinces the borrower to borrow too much (or at unfair terms, e.g. introductory rates that rise rapidly).

In contrast, predatory borrowing means that the borrower convinces the lender to lend too much.

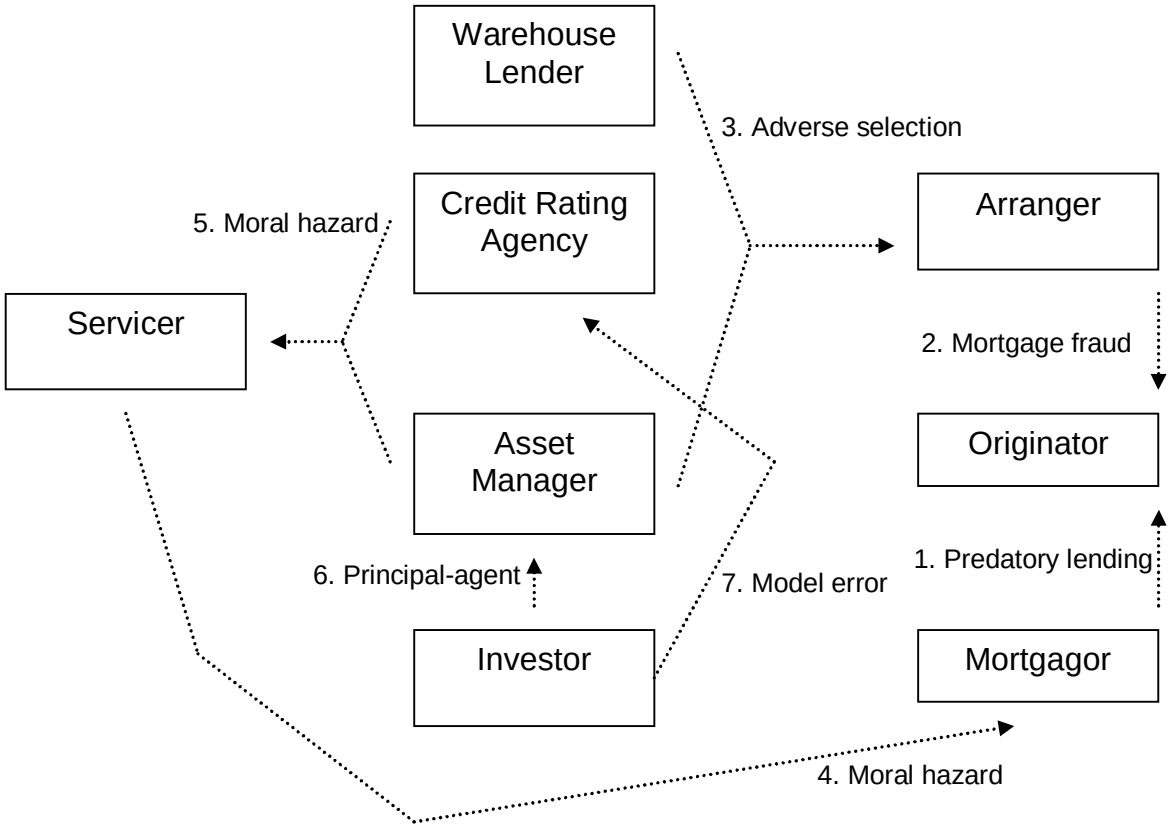

Figure 5. Key frictions of mortgage securitization process (Ashcraft & Schuermann 2007, 8)

2. *Frictions between the originator and the arranger: Predatory lending and borrowing*. The arranger is an intermediary and is responsible for conducting due diligence on the originator and for bringing together all the elements to close the deal. The arranger is also a possible creator of the SPV needed in the securitization process helping the originator to securitize mortgage loans. From the friction perspective, the originator has an information advantage over the arranger and can have the incentive to collaborate with the borrower or falsify the borrower's credit standing.

3. *Frictions between the arranger and third parties: Adverse selection*. The third parties are credit rating agencies, warehouse lenders and asset manager. There is information asymmetry between the arranger and the third parties. The arranger has more information about the quality of the mortgage loans and the arranger can securitize bad loans (the lemons) and keep good loans or securitize them elsewhere.

4. *Frictions between the servicer and the mortgagor (the borrower): Moral hazard*. The servicer has an incentive to work in the investors' best interest but faces the moral hazard problem. The borrower is only responsible for the underlying asset (the house) and has little incentive to expend effort or resources to maintain the property close to foreclosure. This increases the expenses to investors.

5. *Frictions between the servicer and third parties: Moral hazard*. The income of the servicer is increasing in the amount of time that the loan is serviced. Thus, the servicer prefers to keep the loan for as long as possible and has a strong incentive to modify the terms of the delinquent loan or delay foreclosure.

6. *Frictions between the asset manager and investor: Principal-agent*. The investor provides the funding for the mortgage-backed securities (MBS, same as ABS) but is not typically financially sophisticated enough. Therefore, the investor finds difficulties to formulate an investment strategy, conduct due diligence and find the best prices for trades. These are provided by the asset manager (agent) who may not perform enough in behalf of the investor (principal).

7. *Frictions between the investor and credit rating agency: Model error*. The rating agencies are paid for their opinion by the arranger, not by the investors. Such business model creates a potential conflict of interest. The rating opinion is performed using models that are susceptible to both honest and dishonest errors. (Ashcraft & Schuermann 2007, 8-17)

3 MORTGAGE CREDIT DERIVATIVES

3.1 Introduction

Basic features of mortgage credit derivatives and common mortgage credit derivatives are examined in this chapter. Also studied is how the liquidity of the credit derivatives is improved trough the use of particular expedients; credit ratings and credit enhancements.

Traditional credit derivatives are credit default swap (CDS), credit options, credit-linked notes (CLN) and total return swaps (TRS) (Jobst 2006; Fabozzi & Choudhry 2004, 178). These are widely used in credit derivatives market. However, typical forms of mortgage credit derivatives related to the current crisis are *asset backed security* (ABS) and *collateralized debt obligation* (CDO) structures. More specifically, CDO structures have a key role. Some other types of credit derivatives, including *credit default swaps* (CDS) and ABX have also salient role in mortgage credit derivative market. *Asset-backed securities* and *collateralized debt obligation* structures are major mortgage credit derivatives that are examined in this chapter. In addition, *credit default swaps* (CDS) and some more recently structured types of credit derivatives are also introduced.

Names and appellations of structured product are partly unformed. Many combinations of names of structured finance products as well as many abbreviations are used in the market. For example, Brueggeman and Fisher (2005, 522) present four credit derivatives whose underlying asset class consists of mortgage loans. The derivatives are

- Mortgage-backed bonds (MBBs)
- Mortgage-pass through securities (MPTs)
- Mortgage pay-through bonds (MPTBs), and
- Collateralized mortgage obligations (CMOs).

However, the first three are different forms of *asset-backed securities* (ABSs) (Blundell-Wignall 2007). In addition, the last one is the *collateralized debt obligation* (CDO) concept that will be examined later in the study. Names of the ABS-type mortgage derivatives indicate the collateral asset class of the structure. When it comes to the names of

structured products, it is emphasized that the actual function of derivative exceeds the name of the derivative in question. The abbreviations of ABS and CDO derivatives indicate the underlying derivative concept, in lieu of a particular derivative product unless it is clearly mentioned hereinafter.

3.2 Asset-backed security (ABS)

An asset-backed security (ABS) is a credit derivative that is created as a result of the securitization process. The collateral pool of an ABS typically includes different types of assets such as mortgage loans, credit card receivables, auto and equipment leases etc. On closer examination, an ABS is actually backed by cash flows from the underlying assets (see e.g. the classification by Jobst, 2006). The securities with mortgage loans on the asset side are called for example mortgage-backed security (MBS) or residential mortgage-backed security (RMBS). The underlying assets create ingoing cash flows. The liability side of the ABS consists of different debt classes (tranches) that are sold to investors. (Blundell-Wignall, 2007)

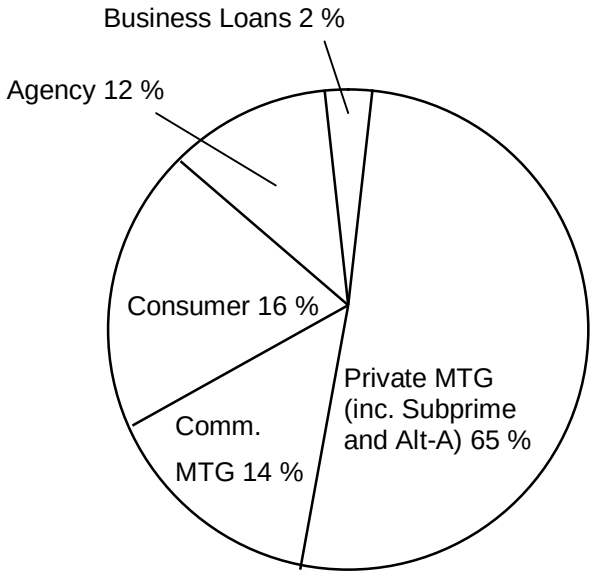

Figure 6. U.S Asset-backed securities market in June 2007, US ABS outstanding $4.2trl (Blundell-Wignall 2007, 33)

Figure 6 shows that the U.S. ABS market is dominated by ABS securities with underlying mortgage loans. Altogether 70% per cent of ABSs in U.S. had mortgage loans as

collateral in 2007. In addition, most of the collateral mortgage loans backed asset-backed securities are high-risk mortgage such as subprime and Alt-A. High-risk mortgage and MBSs are highly desirable to use as a collateral in other mortgage derivatives (CDOs) because they offer high yield spreads that offer cash streams to investors and the structure remains profitable. However, an asset-backed security itself functions equally despite the quality of underlying assets on its asset side. (Blundell-Wignall 2007, 33)

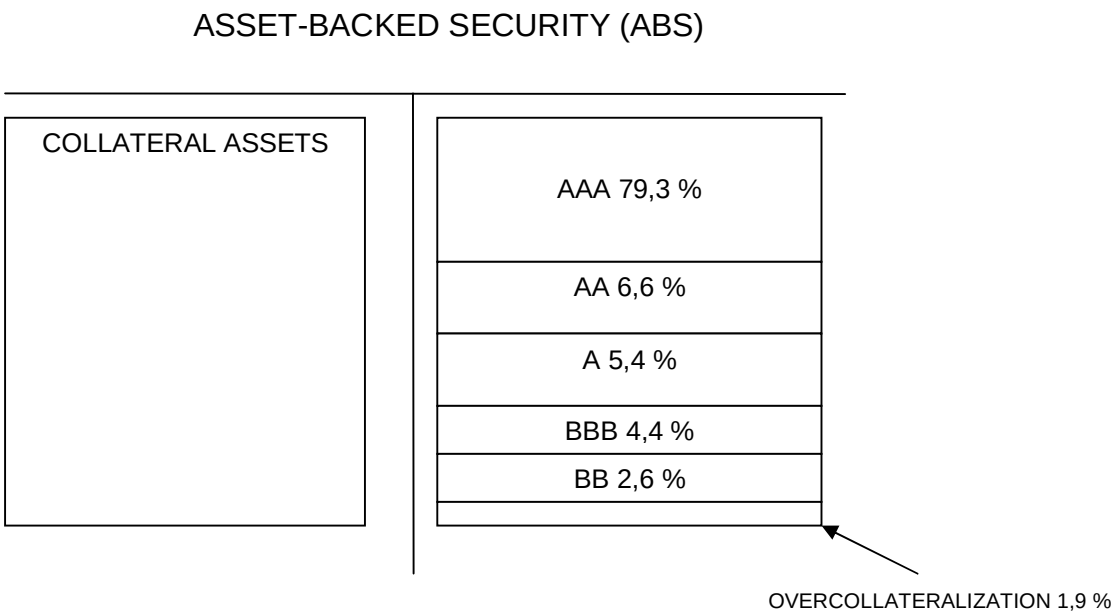

Figure 7. Typical capital structure of average high-risk mortgage ABS (Ashcraft & Schuermann 2007, 35, with modifications)

Figure 7 illustrates the typical capital structure of an average high-risk mortgage ABS. An ABS structure remains of balance sheet with asset and liability side. Figure 7 shows how the liability side of the structure is arranged into different debt tranches or different credit securities. Prospective investors can buy these tranches in credit derivative market. As a mortgage credit derivative, an ABS has quite simple structure. It is a cash market credit derivative, meaning that collateral assets on its asset side generate cash flows (see Jobst 2006). Debt tranches are issued against the cash flows from the underlying assets. As shown earlier in Figure 6, the majority of the underlying assets of the ABSs are mortgage. Overcollateralization is an equity piece owned by the issuer of the ABS. The particular structure is called a subordinated debt structure and serves as a

credit enhancement of the security. If underlying assets lose their ability to create cash flows, the over-collateralized tranche would be the first tranche that absorbs such losses. In the particular event, the debt trances purchased by the investors still yield. (Ashcraft & Schuermann 2007; Blundell-Wignall, 2007)

3.3 Collateralized debt obligation (CDO) structures

A *collateralized debt obligation* (CDO) is a credit derivative and CDOs are off-balance-sheet conduits (derivatives) of financial institutions. The CDO is a broad concept that has many different variants depending on their structure, the assets they invest in and how they are funded (Blundell-Wignall, 2007). The first CDO was created in 1987 as an advancement of securitization (Fabozzi, Goodman, Lucas & Manning 2007, 4). CDOs have been the fastest growing area of structured finance. Since its inception in the late 1980s the CDO market has rapidly evolved into a globally accepted structured finance technique in the U.S., Europe and large parts of Asia. CDOs gained significant prominence in 1996, when some U.S. banks started using CDOs as expedient risk-transfer mechanisms. Since then, the annual issuance volume has grown tenfold over the last 10 years with little sign of decreasing (Jobst 2006, 6) The latest development is a synthetic CDO that uses tranches of other credit derivatives in its construction and hence, it is called synthetic (Fabozzi, Goodman, Lucas & Manning 2007).

There are many similarities between other ABSs and CDO structures. The key difference is that the collateral pool in a CDO is actively managed by a collateral portfolio manager (Anson, Fabozzi, Choudhry & Chen 2004, 131-132) and the CDO's underlying collateral pool typically includes a wider and more diverse range of assets, such as senior secured bank loans and high yield bonds, as opposed to the more similar titles, such as mortgage loans and credit card receivables of ABS's collateral pool as the portfolio manager manages these assets (Jobst 2006, 6 & Anson, Fabozzi, Choudhry & Chen 2004, 131-132). However, a CDO uses the same structuring technology – securitization - as an ABS to convert a large, diversified pool of collateral assets into tradable commercial papers (tranches). The names of CDO structures have never been universally accepted, yet it seems that the underlying assets determine the name of the particu-

lar CDO structure. For example, a CDO comprising debt tranches of *asset-backed securities* on its assets side as collateral might be called ABS CDO. Fabozzi, Goodman, Lucas & Manning (2007, 6) emphasize that any CDO structure can be well described by focusing on its four important attributes which are assets, liabilities, purposes and credit structures. (Fabozzi, Goodman, Lucas & Manning 2007, 3-4) They also emphasize that CDOs are created for one of three purposes: balance sheet, arbitrage or origination.

1. *Balance sheet* means that the holder of CDO-able assets desire to either decrease its balance sheet, reduce required regulatory capital or reduce required economic capital, or achieve cheaper funding costs. The holder of the assets sells assets to the CDO.

2. Arbitrage. An asset manager wishes to gain assets under management and fees while investors wish to have the expertise of an asset manager. Assets are purchased in the market from many different sellers and put into the CDO. Thus, the CDO is a financial tool, along with funds, for an asset management firm to provide its services to investor. The crucial difference is that instead of all the investors sharing the fund's return in proportion to their investment, investors returns are determined by the seniority of the CDO tranches they purchase.

3. Origination. Banks and insurance companies wish to increase capital. For example, a large number of smaller-size banks issues unsecured obligations directly to the CDO. Simultaneously, the CDO issues its own liabilities. The bank capital notes are issued for the creation of the CDO as the CDO purchase them. (Fabozzi, Goodman, Lucas & Manning 2007, 6)

The classification of CDO structures is presented by Anson, Fabozzi, Choudhry and Moorad (2004) in Figure 6. CDOs are divided into three main types: balance sheet CDOs, arbitrage CDOs and synthetic CDOs. Balance sheet CDOs are reminiscent of traditional securities and they are created to remove assets from the balance sheet of the originator which is usually a bank to the off-balance sheet of the originator. This action aims to reduce regulatory capital requirements, increase return on capital or free up lending lines. An arbitrage CDO is created when the originator (bank or fund manager)

wishes to exploit yield difference between underlying assets and overlying notes (debt tranches) that the prospect investors can buy. The arbitrage CDO can be cash flow or market value arbitrage CDO. (Anson, Fabozzi, Choudhry & Chen 2004, 140)

The ongoing securitization technology has resulted in more complex structures. The synthetic CDO is one of latest improvements as it was introduced to meet different needs of the originators. Therefore, the transfer of credit risk is more important than funding considerations in the synthetic CDO structure. The credit risk of the assets is transferred by the sponsor or originator to the investors by using of credit derivatives instrument, typically *credit default swap* (CDS). Hence, the originator is a credit protection buyer and the investors are credit protection sellers. This credit protection is performed directly or via an SPV. By using a synthetic CDO, the underlying assets are not

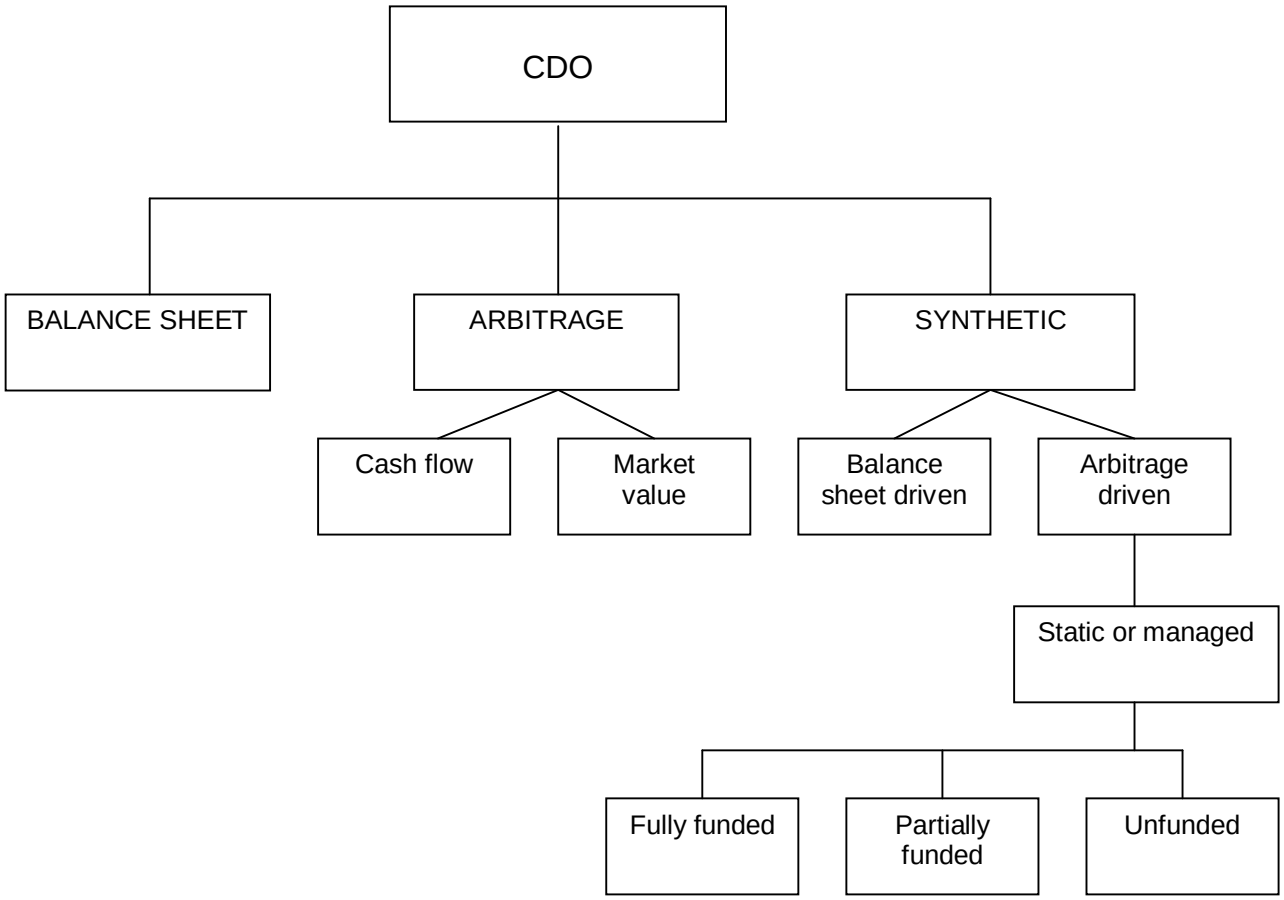

Figure 8. The CDO Family (Anson, Fabozzi, Choudhry and Moorad 2004, 134)

necessarily moved off the originators balance sheet, so the synthetic CDO approach is adopted whenever the primary objective is the transfer of credit risk rather than balance sheet funding. Funding prefers how the CDO is financed. (Anson, Fabozzi, Choudhry & Chen 2004, 140)

The structure of a *collateralized debt obligation* is also a balance sheet model with an asset side and a liability side. It is a broad concept of structures that buy ABS or other assets on the asset side and divide the credit risk by selling senior loan (AAA), mezzanine loans (AA to BB) and equity (unrated) on the liabilities side to earn the excess spread and fees for the originator. A high-risk mortgage is unrated equity. The investor can purchase a CDO tranche with principal and/or interest. The credit risk of CDO is typically transferred or insured somewhere else by means of e.g. *credit default swaps* in a case of the synthetic CDO. (Blundell-Wignall 2007, 31-32)

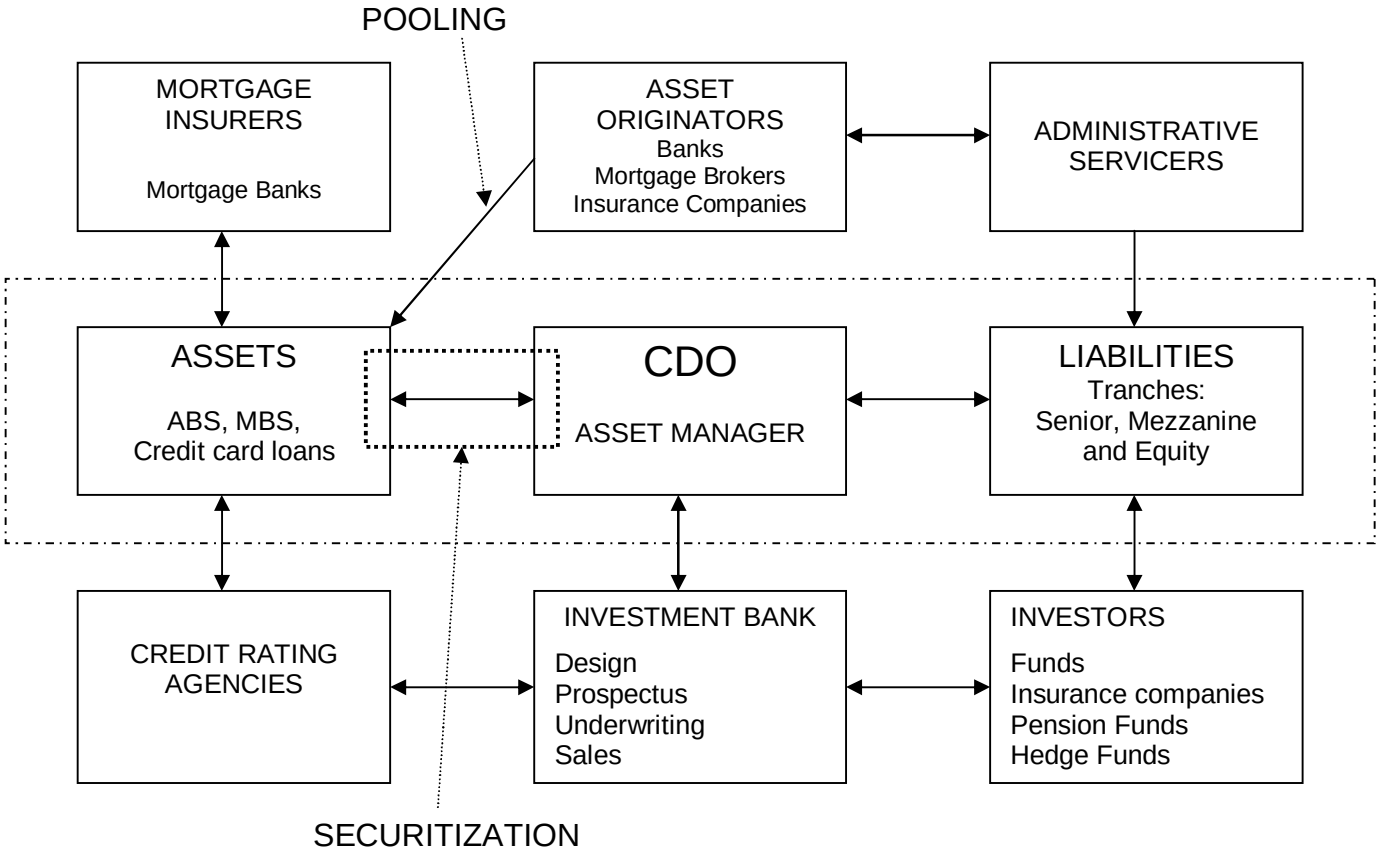

Figure 9. CDO Structure and main players (Blundell-Wignall 2007, 35 with modifications)

A common structure of the CDO and the main payers are presented in Figure 9. Mortgage and other assets from originators (top middle block) are pooled and securitized to create an ABS. These receive cash flows from collateral assets. Securitized assets are moved into the CDO structure ('Assets'). The CDO that issues liabilities of senior, mezzanine and equity in various tranches (right on the middle row) backed by ABSs and other assets on the asset side of the CDO structure. Subordinated debt structures or waterfall of seniority means that in the event that collateral assets of CDO become impaired or downgraded, income and principal payments are paid in following order: fees, senior debt, mezzanine debt and equity, also called junior debt. The excess spread – a credit enhancement - is the difference between the yield on assets compared to the fees and interest payments to the debt tranches. Servicing banks gain fees by administering the CDO structure and the credit ratings agencies do the ratings on the tranches. The rated CDO derivatives are sold with credit enhancements (see Chapter 3.5.2) and fees for the participants are involved everywhere in the process. (Blundell-Wignall 2007, 34-35)

There have already been mentioned several reasons why *collateralized debt obligations* among other credit derivatives are successful in the structure finance market. In addition to these, Bluhm (2003) names four main motivations for writing CDOs. They are

1. Spread arbitrage opportunities
2. Regulatory capital relief
3. Funding, and
4. Economic risk transfer.

Spread arbitrage opportunities mean that a total spread of credit risky instruments at the asset side of the transaction exceeds the total diversified spread to be paid to investors on the liability side of the structure. Such a mismatch typically creates a significant arbitrage potential. (Bluhm 2003, 6) However, this is also known as excess spread which is examined later more detailed as a credit enhancement (see Chapter 3.5.2).

There are many transactions that are motivated by spread arbitrage opportunities in the CDO market. A CDO structure might involve rating arbitrage: spread of CDO increases quickly and the corresponding rating does not react fast enough to reflect the increased

risk of the instrument. Regulatory capital relief can be explained through securitization. Securitization decreases the need of capital in a CDO structure. As 'opportunity costs' for capital relief, the originating bank pays interest to notes investors, a super senior swap premium, upfront costs (rating agencies, lawyers, structuring and underwriting costs) ongoing administration costs and possibly some other expenses. Profitability of CDO transactions are calculated by comparing full costs to the declined regulatory capital costs. Funding offers advantages through off-balance sheet treatment of CDOs. The advantage of funding for the originator is the receipt of payment and an opportunity to construct a balance sheet. Bluhm's fourth major motivation for writing CDOs is economic risk transfer. It means that especially credit risk is transferred to some other participant in the financial supply chain. (Bluhm 2003, 7)

Likewise, Jobst (2006) emphasizes that CDOs enable issuers to achieve a broad range of financial goals. These goals are the off-balance sheet treatment of securitized exposures, reduced minimum regulatory capital requirements and access to alternative sources for asset funding and liquidity support (Jobst 2006). The goals presented by Jobst seem to be closely related to Bluhm's motivations. Also, these motives or incentives are consistent with ones by Fabozzi, Goodman, Lucas & Manning (2007). Benefits of CDOs are also closely related to the general benefits of securitization (see Chapter 2.3).

3.4 Other types of mortgage credit derivatives

The latest developments have been rapid in the field of mortgage credit derivatives. There are other types of credit derivatives available than ABSs and CDOs. The emerging types of mortgage credit derivatives are *asset-backed credit default swaps* (ABCDS), *asset-backed credit default benchmark indices* or just ABX *indices* and *hybrid products* while *emerging CDO* products are *trust-preferred CDOs* and *commercial CDOs*. The whole mortgage credit derivative market appears fragmented and undetermined as well as ambiguous in terms of the newer mortgage credit derivatives.

After the latest development before subprime the 2007 crisis, CDO managers could take on subprime mortgage risk in three different forms, which are

1. Traditional cash tranches of subprime mortgage deals
2. Single-named credit default swaps that reference cash tranches
3. Indices of credit default swaps

First group of CDO transactions refers to the CDOs that use mortgage loans or mortgage ABS tranches on their collateralized assets. This is the early development, but, gradually, as the mortgage credit derivatives market has grown, more complex mortgage credit derivatives have evolved (Fabozzi, Goodman, Li, Lucas & Zimmermann 2008) To understand how the most complex mortgage credit derivatives are structured it is important to understand functioning of the credit derivatives that are used as a part of the complex mortgage credit derivatives. Simply, a CDO that uses ABS debt tranches on its structure as a collateralized assets is a ABS CDO and respectively, a CDO that uses debt tranches of other CDO is called 'CDO squared' (Fabozzi, Goodman, Lucas & Manning 2007, 42-43) or the CDO of the CDO (of the CDO) (Jobst 2006, 2). However, there are other CDOs that use a simple credit derivative called a *credit default swap* (CDS) on their structures.

A *credit default swap* (CDS) is the most popular and maybe the easiest way to transfer credit risk among all credit derivatives. It used to move credit exposure to credit protection seller. A *credit default swap* transaction consists of three main players that are reference entity or reference obligation, credit protection buyer and credit protection seller. Figure 10 shows a basic *credit default swap* transaction.

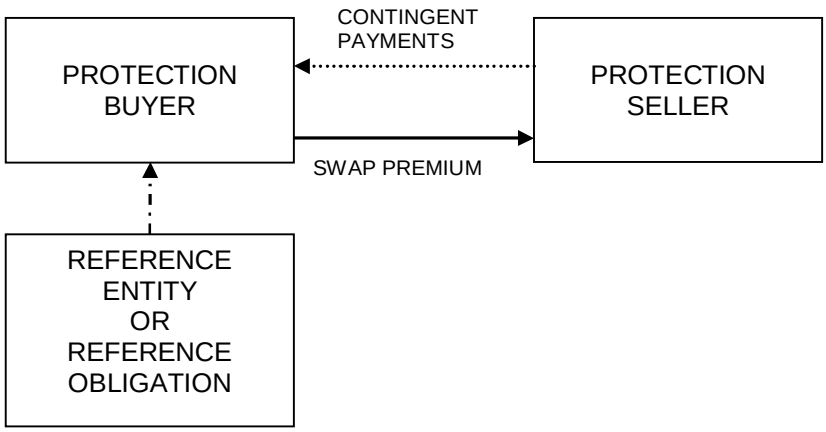

Figure 10. Credit default swap (Anson, Choudhry, Fabozzi & Moorad 2004)

Credit default swaps can be further divided into two types; single-name credit default swaps and basket swaps. A fundamental difference between single-name and basket swaps is the number of reference entities or obligations. A single-name credit default swap has only one reference entity while basket swap has more than one reference entity, typically four or five. (Anson, Choudhry, Fabozzi & Moorad 2004, 51)

Credit default swaps are very popular among CDOs. From mortgage credit derivatives perspective, *credit default swaps* have an important role as they defer credit risk further in mortgage credit derivative market. Some CDO structures are based on the use of *credit default swaps.* This is the second opportunity how CDO managers can create a CDO based on the use of mortgage. Now the CDO manager can take single-name CDSs that reference cash tranches of reference assets. The reference obligations (assets) are mortgage loans or tranches of mortgage ABSs. (Anson, Choudhry, Fabozzi & Moorad 2004, 51). Third opportunity to link mortgage and a CDO refers to the use of indices of the earlier mentioned *credit default swaps.* A bunch of credit default swaps that reference to mortgage loans or other mortgage derivatives are collected together and a resulting index - ABX - requires not funding. (Fabozzi, Goodman, Li, Lucas & Zimmermann 2008)

Hybrid assets refer to CDO assets that are comprised of ABS credit default swaps and asset-backed security tranches. The CDOs obtain 60-80% of their exposure by selling protection to ABS credit default swaps and remaining part of the exposure is earned by purchasing ABS tranches. Traditionally, collateral assets of a CDO have been fully *credit default swaps* or debt tranches of mortgage ABSs. (Fabozzi, Goodman, Lucas & Manning 2007, 99) A trust-preferred CDO is comprised of the deeply subordinate or unrated, thus very crappy, debt of banks, insurance companies and real estate investment trusts (REITs). A TruPS CDO exists in a niche, and credit rating agencies and regulatory bodies threat it as equity. Moreover, the collateral of a trust-preferred CDO is issued to be purchased by another CDO. (Fabozzi, Goodman, Lucas & Manning 2007, 141) Commercial Real Estate CDOs (CRE CDO) are CDOs backed by commercial real estate investments. The structure of a CRE CDO is similar to other CDOs, but collateral assets of CRE CDO differ from traditional collateral assets of CDOs. The prime differ-

ence is that underlying collateral of CRE CDO is physical and price-appreciating real estate properties. The collateral is the reason why CRE CDOs appear appealing among investors. (Fabozzi, Goodman, Lucas & Manning 2007, 205-213)

3.5 Improving the liquidity of mortgage credit derivatives

3.5.1 Credit risk rating

Mortgage derivatives as well as other credit derivatives need support to be sold in the derivative marketplace. Basically, credit derivatives on their own are illiquid securities compared to 'traditional' securities and asset classes, although, credit derivatives are more liquid that separate underlying loans. Thus, there is a need to upgrade the liquidity of credit derivatives in order to sell these. Two main ways are used to improve the liquidity of the credit derivatives; credit ratings and credit enhancements. (Jobst 2006, Baron 1996; Kendall 1996)

The major role of rating agencies such as Standard and Poor's (S&P), Moody's and Fitch Ratings is to assist investors in making of decisions. Rating agencies protect investors against unknowingly taking credit risk by rating derivatives. (Baron 1996, 82) To be sure, it is the derivative that receives the rating not the issuer (Ashcraft & Schuermann 2007, 41-42). A credit rating agency (CRA) is a financial intermediary, functioning as a third party and reducing information asymmetries between market participants by accurately assessing default probability (Duff & Einig 2009, 13). The important role is executed trough the use of benchmark credit ratings determining the appropriate credit risk and pricing for a certain derivative transaction and, also, credit rating agencies reduce the due diligence burden on investors (Deacon 2004, 13). In the U.S mortgage market there are government-sponsored enterprises (GSEs) that does not call for ratings, however, many investors such as insurance companies and pension funds need ratings to justify the purchase of the certain security (Kendall 1996, 4).

There are many general rating approaches that are tools for evaluating credit risk of different asset classes, securities or derivatives. Deacon (2004, 20) specifies seven rating approaches that are

1. Actuarial or portfolio basis,
2. Benchmarking,
3. Loan-by-loan analysis,
4. Single event,
5. Binomial expansion,
6. Monte Carlo, and
7. Weak link approaches.

The closer examination of the approaches is excluded from the study. However, each approach has its very own characteristics, but none of them is comprehensive and sufficient as such. In addition, the use of rating approaches appears not simple and clear. Four common problems occur with each type of approach. These problems of using rating approaches are (generally) time consuming, problematic statistical assumptions, approaches are complex and time consuming to calculate, and approaches are arbitrary in nature. (Deacon 2004, 19-20)

Added to previous classification by Deacon, there are other types of risks and features credit rating agencies consider while giving a credit rating to a certain derivative. The risks and features are eligibility criteria, liquidity risk, currency risk, true sale, and bankruptcy remoteness of SPV as well as taxation issues (Deacon 2004, 14). A procedure for obtaining a rating for a derivative is quite straightforward. The introduction of the proposed credit derivative structure involves presenting the originator company, a term sheet of an intended derivative structure and a data tape by the issuer of the proposed derivative. Typically, rating agencies want to see historical data of assets and also require some degree of due diligence that is carried out trough data verification and visits. During following discussions, the credit rating agencies give their preliminary rating analysis with indicative credit enhancement levels that will then be discussed and negotiated between the credit rating agencies, the arranger and the originator (see Figure 4). (Deacon 2004, 23-24)

Rating agencies have significantly improved success in derivatives and particularly among mortgage credit derivatives. Complex mortgage credit derivatives rely so heavily on the strength of credit enhancements that without credit rating, the derivatives would

be very illiquid. The rating offers a defined standard that investors understand and accept. Ratings also render securities more marketable because the investors require a lower yield on a rated security and therefore, the issuers of the securities have an incentive to seek ratings. However, the credit rating is a very precise and limited statement. The certain rating states that the payment will be made in accordance with the terms of obligation. The credit rating opines not on whether the investment is profitable or suitable for the investor. It is also important to distinguish between credit risk and other risks. Credit risk is the risk the investor is not paid the payment. In contrast, it depends on e.g. interest risk how much the investor is paid. (Baron 1996, 81-82)

New methodologies have also developed by credit rating agencies for evaluating mortgage credit derivatives such as CDOs. These credit rating models have developed under the shadow of the growing CDO market (de Servigny & Jobst 2006). Noteworthy, in the mid 1990's, the market for *collateralized debt obligation* was not yet developed to its prosperity, but an annual issuance of CDOs was 100 billion already as early as in 1998 (Fabozzi, Goodman, Lucas & Manning 2007, 39). However, as a credit derivative, a CDO is dependent on credit rating and credit enhancements as if other derivatives (Fabozzi, Goodman, Lucas & Manning 2007, 49). Thus, there has been a need for new rating methodologies.

The credit rating agencies hold a contradictory role as a part of the mortgage credit derivatives market. The two biggest credit rating agencies, Standard & Poors and Moody's, dominate the market of credit ratings. Credit rating agencies are paid by the issuers of credit derivatives, but Baron (1996, 82) emphasizes that the business model does not create a conflict of interest. Instead, he claims that the acceptance by investors creates a situation that the issuers will shift to those rating agencies in whose investors have greater confidence (Baron 1996, 82). In contrast, Ashcraft and Schuermann (2007) stated earlier that the friction between the investor and the credit rating agency is a subject to a possible conflict of interest. In addition, Cantor and Hamilton (2007, 3) argued that there are many differences in default rate calculation methodologies used by credit rating agencies. Also, Fender and Kiff (2004, 13) found out that the use of different modeling approaches may lead to different rating outcomes of CDO credit derivatives.

Credit rating agencies have faced criticism after 2007 subprime crisis. CRAs have been working together with banks, and the ratings of mortgage credit derivatives have been considered euphoric and the related errors large (Udell 2009, 119). There has also been a sharp decline of revenues in the structured finance market in 2008 at which credit rating agencies have responded by publishing their own internal initiatives to improve ratings quality and investors confidence (Duff & Einig 2009, 13).

To sum it up, the credit rating agencies are needed to improve confidence and liquidity of structured securities and therefore help them to achieve investors' acceptance. However, the credit rating agencies do not have any information advantages or special methodologies to gain additional information about the securities to be rated. The credit rating itself is a very limited statement of issuer's ability to make the payment and the role of the credit rating agencies also includes a possible conflict of interest. Credit rating agencies business models are subject to failure in terms of evaluating credit derivatives.

3.5.2 Credit enhancements

The issuer of derivative is able to use credit enhancements to improve the liquidity of the derivative. The underwriter (the arranger) is responsible for pricing and marketing the securities to investors. The investor has an important role as a buyer. The success of the securities is dependent on how they meet investors' funding requirements since investors are willing to buy securities that fit in their preferences. (Kendall 1996, 3-5) Credit enhancements are tools to achieve better liquidity and ability to meet investors' requirements.

Mortgage derivatives as well as other credit derivatives have these structural features – credit enhancements - that are designed to protect investors from credit losses on the underlying assets. In terms of mortgage credit derivatives, the forms of credit enhancement are subordination, excess spread, shifting interests, performance triggers, interest rate swaps (Fabozzi, Goodman, Li, Lucas & Zimmermann 2008; Ashcraft & Schuermann 2007; Kendall 1996, 3-5).

Subordination or subordinated debt structure is an important form of credit enhancement. The distribution of losses on the mortgage loan pool is typically arranged into different classes or tranches. Losses on the collateral assets (mortgage loans on ABS or loans/ABS tranches on CDO) are allocated firstly to the most junior debt tranche then mezzanine and lastly to senior debt. The most junior class is referred as an equity tranche and the most senior debt tranche is referred to AAA debt. The equity tranche or expcess spread is created through overcollateralization (O/C) and the issuer holds it as a buffer against first losses in lieu of selling it to investors. For example, assume an ABS backed by subprime mortgage loans. Overcollateralization means that principal balance of the mortgage loans exceeds the principal balance of all the debt issued by the underwriter of the ABS. Overcollateralization is used to reduce the exposure to losses on the collateral mortgage loans. A small part of the capital structure consists of mezzanine debt. This class of securities has several tranches with credit ratings that vary from AA to B. Junior and mezzanine debt trance securities pay the highest interest rates to investors. The largest part of mortgage credit derivatives is always funded by senior debt that absorbs best losses on collateral mortgage. (Ashcraft & Schuermann 34-36, 2007)

Excess spread is the difference between the average income payments from underlying assets compared to costs e.g. fees to the servicers, credit losses on mortgage loans and weighted average interest payments to debt securities issued by the SVP or trust. It is the equity tranche achieved by using overcollateralization. In particular, excess spread is the first line of defense for investors for credit losses because no debt tranche is reduced until credit losses on the mortgage reduce the excess spread to negative. (Ashcraft & Schuermann 37-38, 2007) Put in other words, express spread is cash inflows from underlying assets that exceed interest service requirements of liabilities (Anson, Choudhry, Fabozzi & Moorad 2004, 138) Shifting interests is the third form of protection. Senior debt investors are protected by the practice of shifting interests. It means that at first the senior debt is paid both interest and principal while mezzanine bondholders will only receive interest until the principal of senior debt is paid down. The amount of senior debt decreases and the amount of credit enhancement for senior debt increases over time because the amount of outstanding senior debt is relatively smaller compared to the amount of mezzanine debt. (Ashcraft & Schuermann 37-38, 2007)

The forth type of credit enhancement is performance triggers. In addition to protecting senior debt investors, the shifting interest mechanism adjusts subordination of the structure and serves as a trigger. Also, the release of o/c and pay-down of the mezzanine reduce the average maturity of the bonds and decrease the cost of securitization. The performance trigger event is defined as the certain date when a specific condition is met and the trigger described above is released to improve credit enhancement and profitability. The last form of enhancements is an interest rate swap. The interest rate of mortgage backed securities will not adjust for two or three years after origination. Hence the SVP or trust is exposed to the risk that interest rates increase in which case the cost of funding decreases faster than payments from mortgage loans on asset side. In order to avoid the risk, the SVP or trust issues an interest rate swap with a third-party called swap counterpart. The counterpart receives fixed payments in return of promising to pay adjustable-rate payments. (Ashcraft & Schuermann 37-38, 2007)

4 OFF-BALANCE SHEET FINANCE

4.1 Definition and development of off-balance sheet finance

Off-balance sheet finance is an important part of modern accounting and finance, especially in the field of investment banking (Ge 2006; Jagtiani & Khanthavit 1995; James 1987). However, off-balance sheet financing still remains broadly understudied. This study aims to examine off-balance sheet finance by defining off-balance sheet finance, studying typical off-balances sheet items and, finally, examining the possible benefits and risks of off-balance sheet finance.

Literature offers fragmentary and incomplete definitions of off-balance sheet finance. Generally, off-balance sheet finance might be described as financial activities outside of the balance sheet (Ketz 2003; Jagtiani & Khanthavit 1995; James 1987). However, some stricter definitions are available from different perspectives. For example, off-balance sheet finance is defined as a major category of corporate finance. Thus a change (increase) in the off-balance sheet asset can be viewed as capital investment and a change (increase) in the off-balance sheet liability can be viewed as a source of off-balance sheet financing. (Ge 2006, 4) This definition stresses off-balance sheet finance as a source of external finance and is similar to the definition by Jobst. The conventional classification of corporate finance separates sources of finance into three categories: debt, equity and cash-flow financing (Jobst 2006, 2). It stands to reason that off-balance sheet finance is a new source of corporate finance.

Off-balance sheet, abbreviated to OBS, banking or finance has increased dramatically from beginning of 1980's and further during 1990's and 2000's (James 1987, 2; Jagtiani & Khanthavit 1995, 1272). In the beginning the increase was explained by a use of letters of credit and commercial loan sales as well as derivatives (James 1987, 22). Indeed, the prosperity of off-balance sheet finance is based on OBS financial innovations as forward, swap and option transactions undertaken in foreign exchange, interest rate and equity markets (Fung & Sheng 2004, 525-526). Banking industry has implemented OBS finance methods very rapidly. For example, Jagtiani & Khanthavit 1995, 1272 found out

that in 1992, the notional amount of OBS derivatives was from 7.6 to 9.6 times the total assets at three big American banks[1]. The competitive conditions of the core or on-balance sheet business of banking have remained the same from 1980's to 2000's standing for that banking market in general is competitive but non-competitive in specific submarkets. This is an observation in the large UK banking industry. However, the competitive conditions outside of core competition, that is, in off-balance sheet circumstances appear unknown. (Matthews, Murinde & Zhao 2006) Does off-balance sheet finance offer circumstances of low competition and thus, possibilities to make new profits?

4.2 Off-balance sheet items

Off-balance sheet items are a heterogeneous group of assets or liabilities. There are no particular features that connect these items together except a common denominator that all off-balance sheet items are also fundamentally on-balance sheet items as such by pure nature. A broad and sound classification of off-balance sheet items interferes in literature. Based on a literature review (Jobst 2006, 2; Ketz 2003, 73-144; Banks 1997; Kendall 1996; James 1987, 21-23), off-balance sheet items can be categorized in a following way;

1. Letters of credit,
2. Operational and capital leases,
3. Pension liabilities,
4. Traditional derivatives,
5. Special-purpose vehicles (SPVs) and
6. Structured finance products including mortgage credit derivatives.

A letter of credit (L/C, LOC) is a common and simple agreement used specially in international trading in order to help foreign buyers to honor their agreement, whereas for a seller the letter of credit is a tool to avoid and control risk (Nelson 2000, 86-91). A formal name of letter of credit is a documentary credit or a documentary letter of credit (Hinkelman 2002, 124). A letter of credit is a method whereby an importer's bank

1 The data was collected by Sheshunoff Information Services Inc.

guarantees payments to the exporter if all documents are presented in exact conformity with the terms of the letter of credit (Nelson 2000, 91). L/C functions as a credit enhancement (Kendall 1996, 3-5) and it can be understood as a *loan against collateral* wherein the funds are placed in an escrow (third party) account. In the case of the letter of credit, the third party is a buyer's bank. (Nelson 2000, 91)

There are many types of letters of credit: *basic letters of credit* are a revocable letter of credit and irrevocable letter of credit that is unconfirmed or confirmed. *Special letters of credit* are standby letter of credit, revolving letter of credit, deferred payment letter of credit, red clause letter of credit, transferable letter of credit and back-to-back letter of credit. (Hinkelman 2002, 124-125) Regardless of the name of the specific letter of credit, the actual functioning of the L/C concept remains same as the terms vary between different types of letter of credit. Typical letter of credit variations concern e.g. amending or canceling the terms with or without the agreement of all parties while the pure nature of the letter of credit holds. (Nelson 2000, 91-93). The saliency of letter of credit –system is the concept of independence; banks obligation on the L/C is complete separate from the contractual obligations, also from the obligations between the buyer and the seller (Mann 2000, 406). As said, a letter of credit is a loan against collateral to the buyer (see Nelson 2000, 91). Nevertheless, the crucial observation is that the lender bank also conceives the letter of credit as a loan and, thus, has a possibility to earn trough the L/C transaction. From the banking and off-balance sheet finance perspective, there exist non-regulatory incentives linked to the use of letter of credit. The letter of credit has a common feature, together with other early off-balance sheet items such as commercial loan sales, to yield fee income without being put on the lending bank's balance sheet. Banks might have used these contingent liabilities to increase leverage and have kept them off-balance sheet as they do not meet traditional terms of lending. An alternative explanation for the use of letter of credit and such is that these off-balance sheet activities permit the bank to engage in otherwise unprofitable lending if performed through on balance sheet lending. (James 1987, 21)

Leases are divided into two main groups: operational leases and capital leases. Three main classes of leased assets are equipment, vehicles and real estate, which all have

grown strongly but real estate being the most potent. Under a financial lease, the lessor retains the title (ownership) over the leased assets, and the lessee bears operating risks of the assets. (Fabozzi & Choudhry 2004, 235) From an accounting perspective, recording a lease as a capital or financial lease makes it look like a purchase with debt financing (Ketz 2006, 84). In parenthesis, lease receivables (in lessor's accounting) might also be securitized in modern structured finance market as an underlying asset of an asset-backed derivative (Fabozzi & Choudhry 2004, 235). From an off-balance sheet finance perspective, the primary interest is how the lessee handles its leases. There has arisen criticism that too many leases are off of the lessee's balance sheet (Ketz 2003). When leases first evolved, they all were treated like operating leases today under off-balance sheet conditions. An argument was that the accounting for these operating leases involves only recognition of rental expense and the payment. This method appears acceptable if leases are over a short period of time, but under substantial time this accounting stretches credulity. Capital leases in substance are purchases of property, thus, long-term investments. Put in other words, the lease is a way to finance the purchase. While capital leases improve leverage of the lessee firm, corporate managers attempt to argue that their capital leases are operating leases for the purpose of hiding lease liabilities off the balance sheet. (Ketz 2006, 74-75) In conclusion, the use of operational leases in off-balance sheet conditions diminishes on-balance sheet liabilities.

Pension liabilities and other post-employment benefits are possible off-balance sheet items. The most pension liabilities appear not on the balance sheets, and they are a type of special-purpose entity even they are widely not considered as such. Figure 11 shows a basic pension plan. From an off-balance sheet perspective, pension plan serves as an off-balance sheet entity or special-purpose vehicle. (Ketz 2003, 103-104)

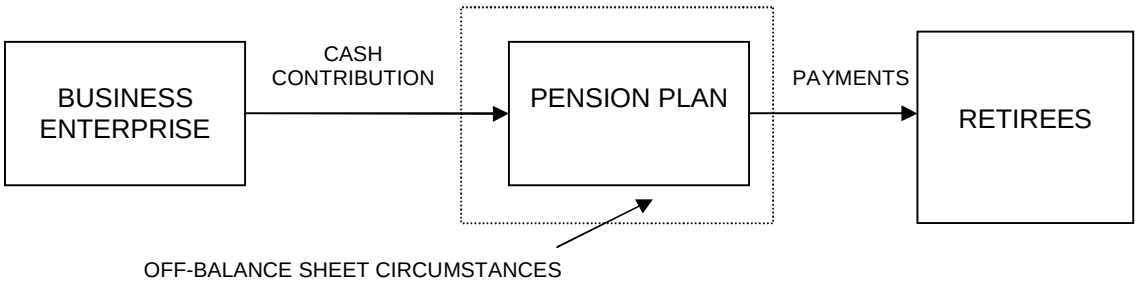

Figure 11 Basic pension plan (Ketz 2003, 103-104)

As examined earlier, special-purpose vehicles (SPVs) are subsidiaries of financial institutions. Typically the sponsor or the owner is a major commercial bank, asset manager, insurance company or a combination of these (Polizu 2007, 627). An SPV is designed to be a limited-purpose entity and functions as an issuer of credit derivatives (see Figure 4 and Klee & Butler 2002) This is a simplification since there are many variations of these off-balance sheet entities as Polizu (2007, 621-666) introduces a broad overview of them. From off-balance sheet perspective, all types of SPVs are treated similarly in this study although, they might have originally created for different purposes, for example, for different financing needs and needs of issuing of mortgage credit derivatives, such as CDO structures.

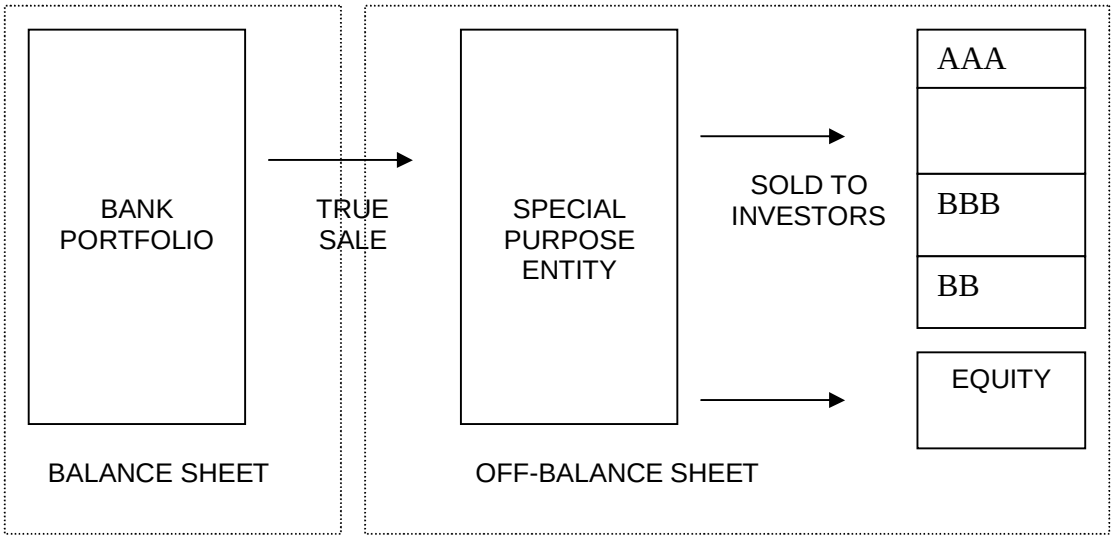

Figure 12. Special purpose entity (SPV) and off-balance sheet transaction (Polizu 2007, with modifications)

Figure 12 illustrates a simple example how SPV functions as an off-balance sheet entity. From off-balance sheet perspective, the bank has a balance sheet and outside of the balance sheet starts off-balance sheet circumstances. Dashed lines in Figure 12 distinguish balance sheet and off-balance sheet circumstances. True sale means that the bank sells real assets, like mortgage loans, to SPV which issues credit tranches investors can invest in, but this is not the main point. The bottom line is that SPV is an off-balance sheet entity by its pure nature and is not treated as a balance sheet investment of financial institutions.

The last off-balance sheet item is derivatives. As mentioned earlier, the growth of off-balance sheet finance is based on derivatives and mortgage credit derivatives are off-balance sheet investments among other derivatives. Mortgage credit derivatives market has growth lately; therefore it is assumed that mortgage credit derivatives play a bigger role as an off-balance sheet item. An interesting and clarifying approach is to examine the financial reports of an investment bank. For example, lets take a look how an investment bank with OBS derivatives has reported its OBS derivative transactions.

UBS is a Swiss investment bank group. In 2006, reporting of its off-balance sheet banking was a quite vague part of UBS's financial report. However, it is obvious that off-balance sheet finance has been widely implemented.

> UBS sponsors the creation of Special Purpose Entities (SPEs) that facilitate the securitization of acquired residential and commercial mortgage loans and related securities. We also securitize customers' debt obligations in transactions that involve SPEs which issue collateralized debt obligations. A typical securitization transaction of this kind would involve the transfer of assets into a trust or corporation in return for beneficial interests in the form of securities. Generally, the beneficial interests are sold to third parties shortly after securitization. We do not provide guarantees or other forms of credit support to these SPEs. Financial assets are no longer reported in our consolidated financial statements once their risks and rewards are transferred to a third party. (UBS 2006, 64)

The quote is a clarifying example how structural features of mortgage credit derivatives banking are fully adopted and performed in off-balance sheet circumstances. Derivatives transactions and off-balance sheet finance bind huge amounts of assets as well (UBS 2006, 62-64). UBS clearly stated that it is performing off-balance sheet finance as it mentioned how assets are first moved into SPE and further to third parties that include investors. This is a short example, but it illustrates how off-balance sheet finance of mortgage credit derivatives appears common within the investment banking business.

4.4 Benefits and risks of off-balance sheet finance

Benefits of off-balance sheet finance seem to be understudied. However, it is possible to describe generally the benefits of off-balance sheet finance. As mentioned earlier, off-balance sheet activities can be viewed as a new source of finance (Ge 2006, 4; Jobst 2006, 2). In finance markets, companies might face a situation that the forms of finance are either unavailable for a particular need of finance or too expensive for the firm (Jobst 2006, 2). Thus, a major benefit of off-balance sheet finance is that it serves as a new source of external finance. In addition, the use of securitization in off-balance sheet circumstances creates benefits (see Chapter 2.3).

A possible benefit of off-balance sheet finance is to serve as a new tool of modern banking and to attain new lines of business under tough competition. The banking industry has already declined and competitive conditions were difficult in the U.S in the beginning of the 1990's. Banks faced increased competition from 'non-bank alternatives' and banks responded by changing the way they conduct business by providing new services and by developing new products such as derivatives. These developments lead to the rising importance of off-balance sheet activities. (Boyd & Geltler, 1994) However, Boyd and Geltler (1994) emphasized strongly that the use of off-balance sheet activities did not mean that banking industry was moving into new lines of business and abandoning old ones. Besides, they argued that off-balance sheet finance is only superficial rather than a substantial change in banking at that time. Boyd and Geltler (1994) strongly cautioned against interpreting the banks' movement to off-balance sheet activities as an indication that the banks are moving into completely new lines of businesses (Boyd & Geltler 1994). Despite the fact, one can hold on to a contradictory opinion. Off-balance sheet finance does have superficial characteristics but new and distinct business models with OBS activities have developed. The growth of the mortgage credit derivatives market is a sound example.

Off-balance sheet activities improve profitability. As early as 1987, James (1987, 21) pointed out that a possible incentive for banks is better profitability achieved through letters of credit off-balance sheet transactions. Angbazo (1997) studied banks with off-balance sheet activities. He concludes that OBS activities improve profitability since

they permit banks to engage in activities that would be impossible - even restricted - to carry out with equity or debt financing. A significant relationship was found between interest-rate and liquidity risk and OBS activities that OBS activities increase risk. (Angbazo 1997, 76-82) Angbazo's findings are consistent with James's observation. Put in short, the benefits of off-balance sheet finance are a new way to attain new lines of business, to improve profitability and a possibility to increase bank's leverage.

Costs of off-balance sheet financing seem to play a minor role in the field of off-balance sheet banking. In the mid-1980s regulatory off-balance sheet circumstances were favorable for OBS activities, thus, banks had expanded to a potentially inefficient level of OBS activities. Off-balance sheet operations have been cheaper than on-balance sheet operations to implement. These circumstances changed as the risk-based capital (RBC) requirements in U.S were approved requiring banks to hold more capital to support their risky and OBS activities from the beginning of the 1990's. The introduction of these requirements means a structural change in the banking industry had effects on cost structures, efficient sizes and optimal product mixes. In terms of off-balance sheet finance, OBS activities cost much more after RBC than before. The new costs of off-balance sheet finance were regulatory taxes. Due to requirements, banks might have incentives to shrink while looking for the most efficient size. However, banks seemed to not adjust to production, scope or scale after the implementation of RBC requirements. An important finding is that some OBS activities have continued to grow even after the introduction of RBS requirements. Put in other words, even if OBS activities became costly, banks sought to use off-balance sheet financing. The regulatory tax may have been too small or the banks are in fact revenue efficient rather than cost efficient. (Jagitiani & Khanthavit 1996, 1272)

Off-balance sheet financing is subject to possible risks, as well. Some academics have strongly questioned prospects of fair and solid off-balance sheet financing (Ketz 2003). Nevertheless, investigating risks of off-balance sheet finance have lacked a systematic approach in literature. Off-balance sheet activities are subject to increased risk in banking. A significant relationship was found between interest-rate and liquidity risk and OBS activities that OBS activities increase risk (Angbazo 1997, 76-82). There is an ar-

gument that implies that off-balance sheet activities increase the risk of deposit. Since some early off-balance sheet items in the banking sector (letter of credit and certain loan sales) have no effect on capital requirements, they provide a way to increase leverage and risk of deposit (James 1987, 21). Off-balance sheet derivatives may affect risk in commercial loan portfolios by exposing banks to counterpart credit risk. This kind of credit risk consists of the probability of default (borrower risk) and the risk of loss (transaction risk). (Angbazo 1997, 76-82)

Off-balance sheet financing exposes its users to financial risk. Ketz (2003, 53) has engrossed himself in studying the hidden financial risk in terms of off-balance sheet financing. He states that there is a variety of accounting methods and techniques available by which corporate managers can give an illusion that the business entity possesses less debt that it actually has. Ketz divides available accounting techniques into to sets. The *First set* includes the equity method, lease accounting and pension accounting while the *second set* consists of securitization, SPE borrowings and synthetic leases. A remarkable insight is that the techniques of the first set can be taken into considerations by studying disclosures or footnotes of financial statements if adequate additional information is available. This process of taking the reported numbers and adjusting them is called *making analytical adjustments*. Ketz emphasizes that the key difference between the first and the second set is that making analytical adjustments is hard or impossible with second set items. Even if managers attempt to provide transparent and truthful disclosures, the information concerning SPEs rarely provides enough details. (Ketz 2003, 53)

While examining the second set described by Ketz, it is obvious that the techniques such as securitization and SPE borrowings are instruments of structured finance and, hence, tools that are typically used while structuring mortgage debt derivatives as studied earlier in this study. Ketz has a financial reporting approach. From that perspective, off-balance sheet financing has a minor role. From an investment banking perspective, it is obvious that off-balance sheet banking has a major role. Besides, securitization has helped to reconstruct structured finance. Thus, companies have more financial tools to formulate their financial reports.

5 DISCUSSION

5.1 Structuring of mortgage credit derivatives

Structured finance and credit derivatives are a wide area to study and challenging to understand by their pure nature. However, this study offers an overview in order to define mortgage credit derivative banking. A general perspective is the main approach in this study and the most important way to examine is to recognize key elements of structuring mortgage derivatives and to examine off-balance sheet finance. As a whole, the mechanism of structuring mortgage derivatives constitutes a well-defined financial submarket with many small and complicated features. The emerged completeness is a part of the structured finance market that has its very own characteristics. This study examined these features. Mortgage credit derivatives have many microscopic details, but these issues are not the main area of interest of this study. The aim of this study is to describe a whole picture.

Strong relationships can be found between the elements of structuring and off-balance sheet financing of mortgage credit derivatives. Mortgage loans – no matter if they are prime or high-risk – are the building materials of mortgage credit derivatives. It is obvious that pure mortgage loans are not purely deficient and guilty by themselves. An actual cause of problems and the current crisis is the mechanism of how high-risk mortgage loans are structured into credit derivatives and off-balance sheet treatment of those derivatives.

Mortgage credit derivative banking constitutes a broad business model of investment banks. A salient part of mortgage credit derivatives banking is structuring high-risk mortgage loans into securities or derivatives that create a particular mechanism. The other important part of mortgage credit derivative banking is off-balance sheet treatment of the structured mortgage credit derivatives outside of financial institutions' balance sheets. It is possible to describe how high-risk mortgage loans are structured into credit derivatives. It is also possible to research the benefits and risks of the mortgage credit derivative banking based on the literature review.

Figure 13 presents mechanism of structuring of mortgage loans into mortgage credit derivatives. The overview is a synthesis and an illustrative example that aims to clarify structuring process and to reflect issues of the literature review. The roles of market participants are examined later. Firstly, high-risk mortgage loans are pooled together and moved into a special purpose entity SPV (or trust) that is an off-balance sheet financial conduit and a manager of the mortgage credit derivative. Securitization is executed (Sec. in Figure 13). SPVs are excluded from the Figure 13 due to the lack of space and the mortgage credit derivatives are shown in lieu of the SPVs. Secondly, an asset-backed security (ABS) is issued by the SPV, and debt tranches issued by the ABS are purchased by investors in the derivative marketplace.

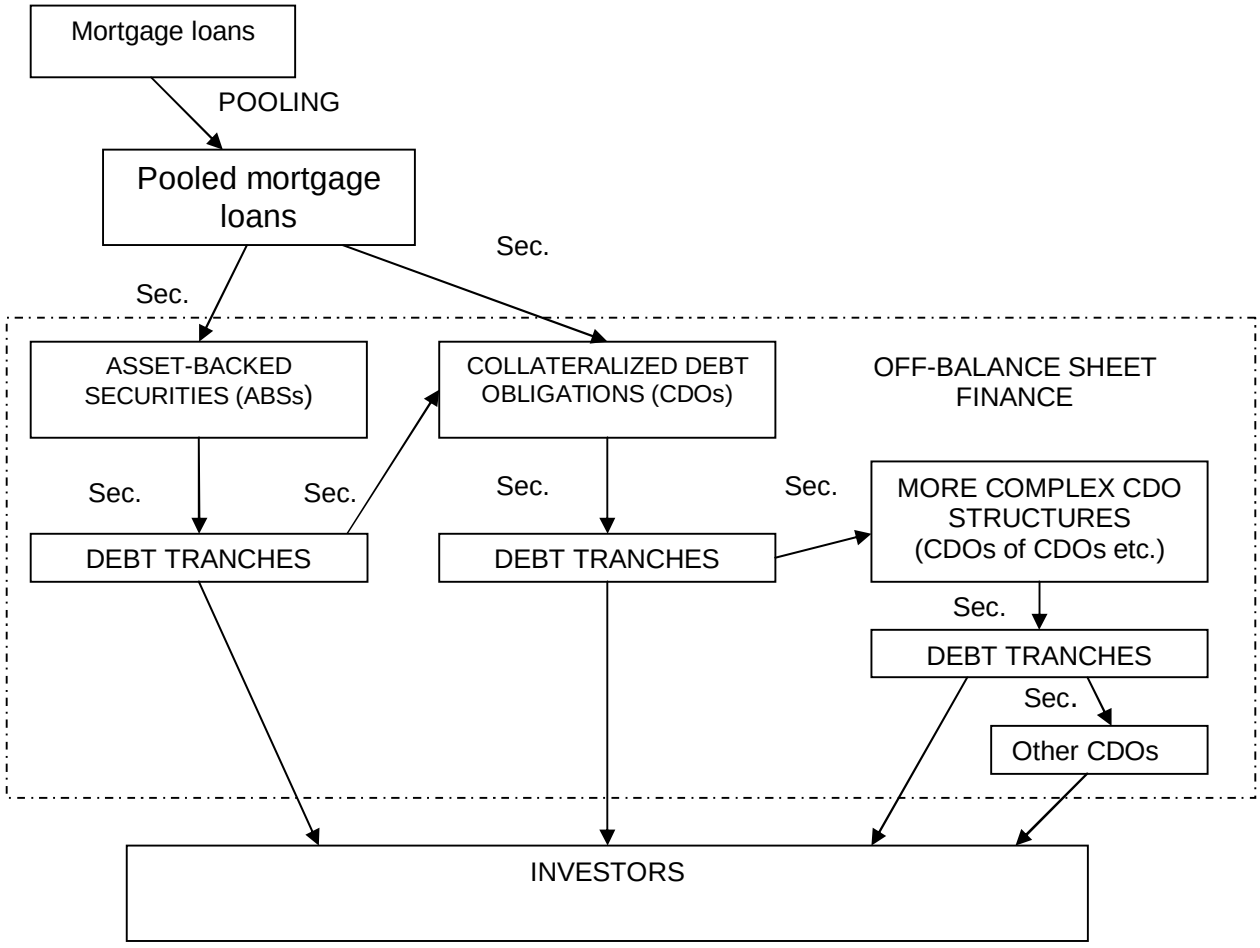

Figure 13. Mechanism of structuring of mortgage credit derivatives

The ABS is already an off-balance sheet financial derivate transaction. The remarkable notice is that the ABS is a cash market derivative (see Jobst 2006 and Chapter 2.1). Mortgage loans on its asset side create real cash flows when the mortgage borrowers pay interests and principals. Thereafter, the SPV as an issuer of CDO uses tranches of ABS as underlying assets or pooled mortgage loans again and issues debt tranches as new debt securities.

Thirdly, these CDO debt tranches are purchased by the third SPV in structured finance supply chain or by the investors. The third SPV builds up, for example, a synthetic CDO and issues CDO tranches backed by the debt from the first CDO. However, the securitization of ABS tranche is already a pure derivative transaction and a cash market transaction no more. In the case of ABS, the collateral assets are high-risk mortgage loans and other assets with a feature to yield well. On the other hand, risks are bigger. If the second SPV aims to issue a CDO, the collateral assets are securitized debt tranches from underlying ABS or *credit default swaps* referencing mortgage loans or mortgage credit tranches. Underlying mortgage loans are left behind and the use of non-transparent off-balance sheet finance generates ambiguous circumstances as for example Ashcraft & Schuermann described earlier. The complexity of structured finance exposes when participants of securitization process (Sec.) are applied into the Figure 13 (see Figure 4 on page 16).

Figure 14 on the next page shows the mortgage credit derivative market participants and the vital connections between the participants. This illustration is based on a previous literature review. A mechanism on the left describes how mortgage loans are carried through participants. All participants are involved in the mechanism regardless of what kind of mortgage derivative is structured. Downward arrows describe the continuous and variable flows of assets. Upwards arrows illustrate cash flows. Investors purchase debt securities and the seller (SPV or the underwriter) receives payment in exchange. Participants, shown on the right side in Figure 14, assist in structuring mortgage derivatives. The most important player in that field is the credit rating agency. The other third parties have more supportive but yet important roles in the process via credit enhancements and storing mortgage loans.

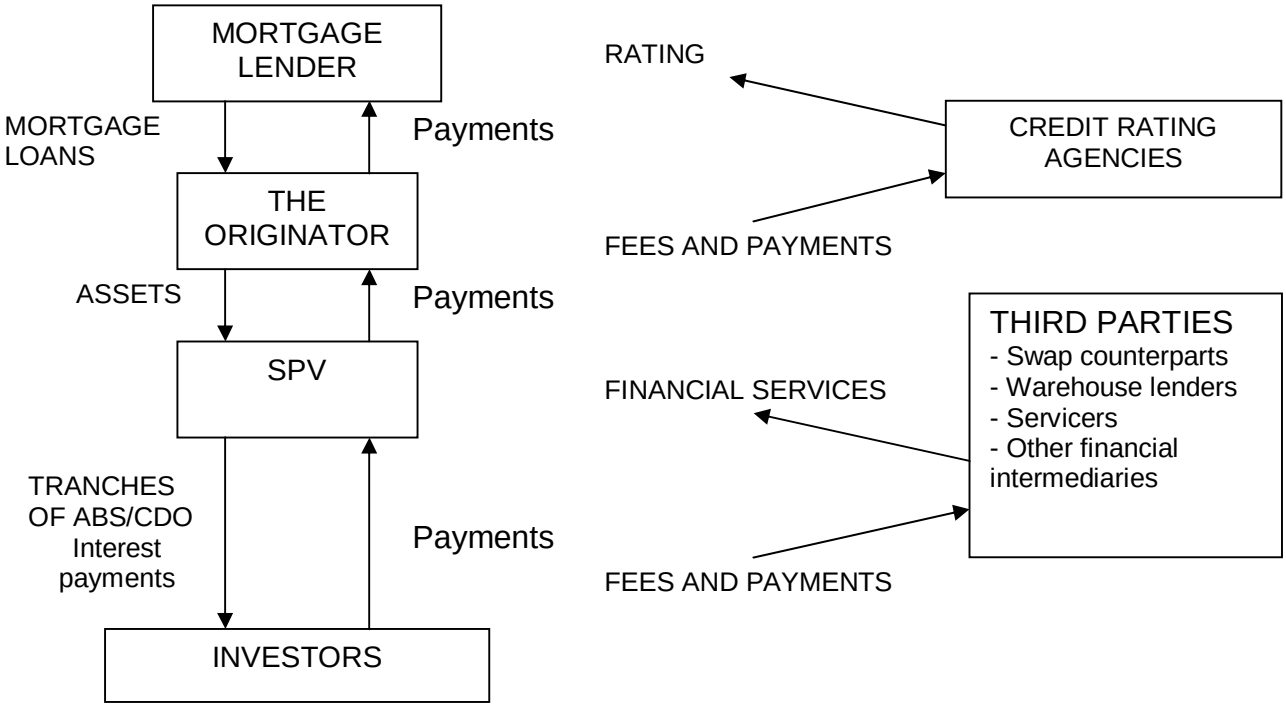

Figure 14. Main participants and cash flows of structuring mortgage credit derivatives

5.2 Benefits, risks and disadvantages of structuring mortgage derivatives

It is obvious that structured finance and mortgage credit derivatives offer plenty of benefits. First of all, structured finance offers (1) new forms of external finance needed in private and public financial arrangements. (2) The structuring transfer credit risk due to the pure nature of derivatives transactions as the asset's ability to yield and its risk is divided and derived in structured finance marketplace. Financial innovation, structuring and securitization offer (3) new financial products that (4) increase trading volume and (5) profits of investments banks. In addition, structuring and securitization (6) offer a chance to straighten the financial supply chain. Unnecessary "middleman"-financial institutions are removed from the financial supply chain and the remaining financial participants receive better profits and fees in expanded structured finance market.

Structured finance is a complex part of modern finance. There are many sophisticated and multidimensional mortgage credit derivatives, such as *asset-backed securities* and *collateralized debt obligations* amongst others, available. Structuring of mortgage credit derivatives is not an unbiased and unambiguous process. This study argues that the four major risks or disadvantages of structuring high-risk mortgage are: (1) lack of control, (2) asymmetrical information, (3) lack of transparency, and (4) disadvantages of credit risk transfer.

Firstly, the mortgage deriving mechanism seems to lack external control. Many market participants have particular roles in the structuring process. However, there is not a participant in the process that has a particular role to collect information and to improve market information transparency by sharing and controlling derivative transactions. It is emphasized here that finance markets do have a regulatory structure and regulatory agencies in different countries. Nevertheless, the particular mechanism of structuring mortgages lacks a certain control participant in terms of processing. The role of credit rating agencies does not include the monitoring of the whole process per se. Instead, the credit rating agencies are only needed to improve the liquidity of the securities. In addition, the independency of the credit agencies is strongly questioned. Credit rating agencies are paid by issuers of the rated derivatives that might cause a possible conflict of interest. This is consistent with observations by Ashcraft & Schuermann (2007).

Secondly, it is obvious that the frictions described earlier increase the information asymmetry of the mortgage credit derivatives market. The seller or the higher-level structured finance participant has an information advantage over the participant on the lower level. Based on the conceptual analysis, it is stated here that the originator or an SPV has an incentive to limit negative information and another incentive to emphasize positive details of information. From a finance market perspective, the originator or the SPV is a seller that wants to trade derivatives. Thus, the asymmetric information might advance the seller, and not the buyer. From a credit risk perspective, the originator or the SPV is willing to buy or sell credit protection. For example, the originator or the SPV is protection buyer and credit protection seller is the investor. Thereby, the investor

or the SPV might want to increase information asymmetry. They may not want to reveal all information relevant to a prospective derivative transaction.

Thirdly, the lack of transparency is closely related to asymmetric information. If all possible information is not available, the structured products are not transparent. So, as a consequence of asymmetric information structuring and off-balancing mortgage credit derivatives lack transparency. Structured finance markets themselves seem to promote the lack of transparency. This is also inconsistent with the efficient market hypothesis. Many derivative transactions are performed on after the other leading to decreasing knowledge of underlying assets. The mechanism of structuring mortgage derivatives does not support transparency. Modern derivative banking is a fragmented business.

Fourthly, the credit risk transfer is a common characteristic of structured finance market and products. In the case of mortgage credit derivatives as well as other derivatives the credit risk is only removed somewhere else in the marketplace with the help of derivative transactions. However, it is emphasized here that the credit risk still exists in the market and it does not disappear. If the structured market drops and credit derivatives lose value, one can assume that a certain type of loser will be investors that hold securities with the highest credit risks in those days. Thereby they would not be paid by the issuer of the derivatives, and the derivatives will turn illiquid and hard to sell or totally worthless. Alas, these happenings were undertaken in the course of time after the beginning of the subprime crises that evolved into global financial crisis.

The mortgage market has recently grown a lot, and increased mortgage borrowing brings new loans to the secondary debt market that improves trading volume. These loans are used as collateral part of mortgage derivatives such as asset-backed securities and other credit derivatives that are used as collateral assets of CDOs as examined in the Chapter 3. High-risk mortgages have been a very popular building material of mortgage derivatives since they offer higher yields than regular prime-class mortgages. Pooled mortgage loans are securitized into liquid asset-backed securities and others that are used as underlying assets of CDO derivatives and offering cash flows. High-risk mortgage derivatives such as CDOs yield well with reasonable risk premiums. Hence, the

derivatives have appeared really attractive among investors. However, high-risk mortgages in the background of these mortgage credit derivatives still include bigger risks than prime-class mortgages since underlying assets are riskier in the case of high-risk mortgages than prime class assets. As a whole, high-risk mortgage credit derivatives succeeded to give an illusion that in a certain level of risk, there is an arbitrage opportunity to gain better profits.

Credit enhancements are pleasant tools to protect somewhat-risky high-risk mortgage credit derivatives. The interest risk is transferred with help of interest rate swaps. Hence, the interest risk is not originator's concern anymore. The originator of the high-risk mortgage credit derivatives seems to anticipate that some of the mortgages will turn out worthless. The use of credit enhancements such as excess spread, subordinated debt structure and overcollateralization projects doubts. Subordinated debt structure as a credit enhancement offers extra protection especially to senior debt investors and aims to increase confidence of the security. The existence of the excess spread means that the originator wants to achieve extra protection against credit risk. In a way, a possible hidden message could be that the originator knows that high-risk mortgage loans are somehow bad loans, and it is safer to offer them additional protection and over-collateralize them in any event. If underlying mortgage loans preserve their values, they yield well and the derivative will be highly profitable. If they lose value, the security will *still* remain profitable since the structure has only drained its buffer achieved by the excess spread and the over-collateralization. The derivative would lose its value when the overcollateralized part has been lost and investors, starting from junior tranches, start to lose value of their investments. However, the over-collateralized security with an excess spread might appear to be a safer investment, and senior tranche investors have better confidence to buy the security than to buy an unrated security.

5.3 Off-balance sheet finance

Contrary to conceptualization of structuring credit derivatives, off-balance sheet finance is a difficult part of accounting and finance to study. Even the definition of off-balance sheet finance is unstable and ambiguous, and benefits and risks seem to be widely un-

derstudied. Of course, there are benefits and risks that off-balance sheet finance generates. Nevertheless, the previous academic research does not give firm explanations what these are. As an aim of the study this paper attempted to examine the risks and benefits of off-balance sheet finance but comprehensive answers are still lacking in one sense.

Off-balance sheet finance and activities have a major and essential role in the business model of mortgage credit derivatives banking, as well as in modern banking in general. Cash flows generated by the use off-balance sheet finance are significant (see e.g. Jagtiani & Khanthavit, 1995). Based on the conceptual analysis, this study states that operating with off-balance sheet items is fundamentally quite easy, even if off-balance sheet finance does not appear simple. Off-balance sheet finance is an area with fairly free accounting and finance operations. In the beginning and as a first sight, off-balance sheet finance appears a strange business. However, there is nothing outstandingly special with off-balance sheet finance. For example, structuring mortgage credit derivatives in terms of a SPV clarifies how simple an off-balance sheet management fundamentally can appear.

The ultimate role of off-balance sheet finance is still somehow unclear. Off-balance sheet finance is an area of low regulation and transparency for financial institutions and corporations. It might be too strict a judgment to state that all off-balance sheet activities are somehow obscure. Operational leases are a good example how an off-balance sheet item can meet the formal requirements of accounting. However, consistent with the conclusions by Ketz, it seems evident that mortgage credit derivatives and structured finance entities (SPVs) are ambiguous off-balance sheet items amongst others. In addition, off-balance sheet finance binds huge amounts of capital compared to reported on-balance sheet figures (Jagtiani & Khanthavit 1995, 1272). From a finance market perspective, there occur incentives to off-balance sheet financing.

5.4 Benefits and risks or disadvantages of off-balance sheet finance

Based on literature review, off-balance sheet finance creates plenty of benefits that are (1) a new source of external finance, (2) improving profitability, (3) new tools to attain

new lines of business in the banking industry and (4) a possibility to leverage. These benefits are observations from banking industry in the first place, but it is emphasized and extended here that the same benefits can supposedly be expected by all private or public corporations after adopting the principles of off-balance sheet finance.

Off-balance sheet finance also exposes to risks since the use of off-balance sheet finance is a (1) subject to increased risk in banking as it increases both risk of deposit, liquidity risk as well as risk of losses, (2) a possibility to leverage and (3) increases financial risk among others. These findings are based on literature review as well, meaning that the use of off-balance sheet finance shift risks off from the entity's balance sheet. However, these risks still exist.

5.5 Structuring and off-balance sheet financing of mortgage credit derivatives

This study aims particularly to describe banking of mortgage credit derivatives. It is obvious that off-balance sheet finance is needed to promote the special investment banking business by offering circumstances of low regulation and loose rules. Benefits and risks or disadvantages of structuring of mortgage credit derivatives are described earlier as well as quite corresponding attributes of off-balance sheet finance.

It is quite obvious that banking of mortgage credit derivatives is more beneficial in off-balance sheet circumstances. For example, off-balance sheet finance offers an opportunity to leverage that is definitely an interest of investment banks. A reasonable statement also is that the lack of transparency is partly a consequence of off-balance sheet finance as well as structuring process itself. Off-balance sheet finance moves risks away from the balance sheet and related events seem to increase the lack of transparency which is also a major risk and disadvantage of structuring of mortgage credit derivatives. From mortgage credit derivative banking perspective, the lack of transparency might be considered as a benefit, but from general or e.g. investor perspective, the lack of transparency of the banking is not a desired attribute.

Finance theories assume rationality. From that standpoint, this study questions all of the rationality of the investors that have invested in mortgage credit derivatives and rationality of structuring mortgage credit derivatives. The mechanism of structuring mortgage credit derivatives includes many characteristics that question the rationality of whole business model. Herein the findings by Ashcraft & Schuermann (2007) are highly appreciated. Rationality in terms of risk and return is a classic finance approach, but the structuring mechanism itself seems to lack rationality. A common mortgage credit derivative – let us assume CDO – is like a sight unseen. How much rationality is promoted if a prospect buyer wants to find out what is there? The unpleasant answer might be that not much while buying a high-risk mortgage credit derivative. Even if the prospective buyer would be interested in finding out, the structuring mechanism does not support transparency or symmetrical information. On the other hand, the use of off-balance sheet finance is completely rational; financial institutions want to perform business under the circumstances of low regulation and good business opportunities.

5.7 Significance of the results

The significance of the results is unquestioned. The aim of this study was to describe banking of mortgage credit derivatives. Structured finance itself is an ambiguous field of modern finance. Traditional finance is firmly defined while, in contrary, structured finance and derivatives with off-balance sheet finance are poorly defined and open to various interpretations. Many mortgage credit derivatives have odd characteristics and complicated ways to yield or make profit and to tolerate or take in risk. One important result of this study is the contradictory findings about the significance of off-balance sheet finance in terms of investment banking of credit derivatives and, respectively, weak familiarity with off-balance sheet finance issues in general. Knowledge and awareness of off-balance sheet finance should develop further.

5.8 Limitations

Some limitations fall on this paper. There are still many related issues that this study did not study or gave any credible answers to. A fragmented definition of off-balance sheet

finance surely is one that needs more studying. Structuring of mortgage credit derivatives and off-balancing them is an unsound business model of investment banks for sure, but this study does not speak out on what the ultimate motives beyond all investment banking of mortgage derivatives might have been. The particular banking business and mortgage credit derivatives have special features and details that can be studied in different and ample contexts including, for example, macroeconomic and political as well as regulatory dimensions.

6 CONCLUSIONS

This paper described the investment banking of mortgage credit derivatives as it described structuring and off-balance sheet financing of mortgage credit derivatives. The benefits and risks were studied along with structuring and off-balance sheet financing of mortgage credit derivatives.

The study described the mechanism of structuring high-risk mortgage into mortgage derivatives and off-balance sheet treatment of the mortgage derivatives. High-risk mortgage derivatives, including straightforward *asset-backed security* (ABS) and many types of more complex *collateralized debt obligation* (CDO) structures among other mortgage credit derivatives are a part of the structured finance and have particular features. The process of structuring mortgage involves many market participants that are financial institutions functioning as financial intermediaries. High-risk mortgage loans are attractive assets as a part of derivatives since the loans offer better yields than prime class mortgage. On the other hand, the risks are bigger and the risks remain through structuring and off-balancing.

Structuring and off-balancing of mortgage credit derivatives creates many benefits. These benefits are new sources of external finance, credit risk transfer, improved liquidity, increased trading volume and better profits as well as a chance to straighten the financial supply chain. The benefits of structuring mortgage credit derivatives appear similar to common benefits of structured finance and securitization. Risks and disadvantages occur as well. Based on the literature review this study states that the mechanism of structuring and off-balancing mortgage credit derivatives are subject to four key disadvantages. The major disadvantages are the lack of control, asymmetric information, the lack of transparency and disadvantages of credit risk transferring.

Conclusions with the biggest value are linked to off-balance sheet finance. Based on this study, the significance of off-balance sheet finance is undisputable in modern investment banking and - more universally - in modern accounting and finance. Off-balance sheet finance creates plenty of benefits that are a new source of external finance, im-

proved profitability, new tools to attain new lines of business in the banking industry and a possibility to leverage. However, off-balance sheet finance is a subject to increased risk in banking as it increases both risk of deposit, liquidity risk as well as risk of losses, it creates a possibility to leverage and off-balance sheet finance also increases financial risk. The investment banking of mortgage credit derivatives seem to offer benefits and expose risks or disadvantages similar to the aforementioned benefits and risks or disadvantages of structuring of off-balance sheet financing as such. However, banking of mortgage credit derivatives is a broad theme and off-balance sheet finance together with structuring mechanism are needed to perform the particular banking business. These findings are synthesis of previous research.

As a whole, this study is an overview of mortgage credit derivatives banking that consists of structuring mortgage credit derivatives and off-balance sheet financing of the derivatives. Many questions and issues remain yet unstudied, and there are many avenues for future research. The theme of mortgage credit derivatives banking might be successfully applied to other contexts. Possible issues include studying of off-balance sheet finance more narrowly, and studying prospects of attaching themes of off-balance sheet finance into teaching of accounting and finance. Other possible prospects of further study are other off-balance sheet issues, regulation of structured finance and further studying of structured finance derivatives transactions performed by mortgage market participants.

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