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MARMARA ÜNİVERSİTESİ
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CONVENTIONAL AND SYNTHETIC ASSET SECURITIZATIONS IN THE EU: AN ANALYSIS OF SOVEREIGN CREDIT DEFAULT SWAP SPREADS AS A TOOL FOR MEASURING CONVERGENCE TO EU

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Onaylayan:

Prof. Dr. Burak SALTOĞLU	Danışman	
Yrd. Doç. Dr. Sadullah ÇELİK	Jüri Üyesi	
Yrd. Doç. Dr. İmre ERSOY	Jüri Üyesi	
Doç. Dr. Ahmet Faruk AYSAN	Jüri Üyesi	
Prof. Dr. Targan ÜNAL	Jüri Üyesi	

Onay Tarihi
Prof. Dr. Muzaffer DARTAN
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Ad augusta per angusta, ad astra per aspera…

To high places by narrow roads, to the stars through difficulty…

ABSTRACT

The first aim of this study is to analyze the impact securitization, an asset funding technique that involves the issuance of structured claims on the cash flow performance of a designated pool of underlying receivables, has had in funding the borrowings of Eastern European countries and their convergence to the EU. The empirical part of the thesis seeks to establish the relationship between EU convergence and its effect on credit default swap spreads, a type of credit derivative instrument used in synthetic securitizations. EU convergence is measured by using the CDS spreads of Poland, Bulgaria and Turkey from the mid-2002 to 2009 to search for a cointegration relationship between the spreads of each country and those of Germany. The cointegration relation is established in Poland, and with a structural break in the Bulgarian cases, but not in Turkey. A very important finding is that there are two possible structural breaks in the Bulgarian case, one coinciding with the signing of the Bulgarian accession treaty to the EU in 2005 and the other with the subprime crisis in end-2007. Then, the thesis concerns itself with the fallout from the subprime crisis and the consequent Eastern European credit crisis and seeks to establish whether the convergence trend has been broken. Finally, the policy aspects of this outcome regarding Turkey's prospects for EU membership are discussed in light of the new global and EU situation following the subprime crisis.

ÖZET

Bu çalışmanın ilk amacı belirli bir alacaklar havuzunun nakit akış performansına dayalı yapılandırılmış bir varlık fonlama tekniği olan menkul kıymetleştirmenin AB ile yakınsama sürecine girmiş Doğu Avrupa ülkelerinin borçlanmasında kullanılmasını analiz etmektir. Tezin ampirik kısmında AB yakınsamasının bu ülkelerin kredi iflas takas aralıklarının üzerindeki etkileri ölçülmektedir. Kredi iflas takası, bir nevi kredi türev enstrümanı olup ağırlıklı olarak sentetik menkul kıymetleştirmelerde kullanılmaktadır. AB yakınsaması ölçülürken kredi iflas takası aralıklarının Polonya, Bulgaristan ve Türkiye için 2002'den 2009'a kadar analiz edilerek Almanya ile koentegrasyon ilişkisi oluşup oluşmadığına bakılmaktadır. Koentegrasyon ilişkisi Polonya için tespit edilmekte, Bulgaristan ile yapısal kırılmalı bir koentegrasyon bulunmakta ancak Türkiye için herhangi bir koentegrasyona rastlanmamaktadır. Bulgaristan için bulunan yapısal kırılma noktalarının AB giriş anlaşmasının imzalandığı tarih olan 2005 ve subprime krizinin başlangıcı olan 2007 olması önemli bulgular olarak göze çarpmaktadır. Ayrıca tezde subprime krizi sonrasında bu yakınsamanın bozulup bozulmadığı incelenmektedir. Son olarak Türkiye'nin kriz sonrası oluşan global koşullarda AB üyeliği perspektifi ve politika alternatifleri ele alınmaktadır.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF ABBREVIATIONS USED

ABCP	Asset Backed Commercial Paper
ABS	Asset Backed Securities
ADF	Augmented Dickey Fuller
AIG	American Insurance Group
BISTRO	Broad Index Secured Trust Offering
CBO	Collateralized Bond Obligation
CCA	Cash Collateral Account
CDO	Collateralized Debt Obligations
CDS	Credit Default Swap
CLN	Credit Linked Note
CLO	Collateralized Loan Obligation
CMO	Collateralized Mortgage Obligation
CMBS	Collateralized Mortgage Backed Security
CP	Commercial Paper
CSO	Collateralized Synthetic Obligations
EC	European Commission
EEA	European Economic Area
EEC	European Economic Community
EMU	European Monetary Union
ESF	European Securitisation Forum
ERM	Exchange Rate Mechanism
EIB	European Investment Bank
EU	European Union
FHA	Federal Housing Administration
FHLMC	Federal Home Loan Mortgage Association
FNMA	Federal National Mortgage Association
GNMA	Government National Mortgage Association
GSE	Government Sponsored Entity
HUD	Housing and Urban Development
IMF	International Monetary Fund
IO	Interest Only
IRS	Interest Rate Swap

ISDA	International Swaps and Derivatives Association
İMKB	İstanbul Menkul Kıymetler Borsası
LIBOR	London Interbank Offered Rate
LOC	Letter of Credit
LTCM	Long Term Capital Management
MBS	Mortgage Backed Securities
NASDAQ	National Association of Securities Dealers Automated Quotations
OTC	Over the Counter
REMIC	Real Estate Mortgage Investment Conduit
RMBS	Residential Mortgage Baked Securities
SCF	Sociétés de Crédit Foncier
SPE	Special Purpose Entity
SPV	Special Purpose Vehicle
TRS	Total Return Swap
UCITS	Undertakings for Collective Investments in Transferable Securities
VaR	Value at Risk

1. INTRODUCION

Securitization is a relatively new concept in modern financial markets. The first modern securitization, which was a mortgage-backed security, does not date back further than 40 years. As with most modern financial market innovations of the 20th century, it was first introduced in the USA but quickly crossed the Atlantic and established itself in Europe, especially in Germany where the 1990s saw the *Pfandbriefe* market really take off. Other securitizations followed mortgage-backed securities (MBS) and soon securitizations became one of the fastest growing segments of the financial markets sector in the EU.

This study concerns itself first with the structure and process of securitizations in the USA and the EU, the consequent state of affairs and markets that has followed three decades of securitizations, the last of which has witnessed full blossom into maturity of the "conventional" as well as the introduction of the more exotic "synthetic" securitizations, and the positive and negative effects it has had on the markets. The empirical part of the study first aims to establish the usefulness and power of newly created tools such as credit default swaps, building blocks of synthetic securitizations, in explaining the convergence of candidate countries into the norms of the European Union by conducting a cointegration analysis between the CDS spreads of accession countries such as Poland, Bulgaria and Turkey with those of an EU-founding member state, Germany. The expectation is that as a country gets closer to EU norms, its credit-riskiness along with its CDS spread should not only diminish but converge to that of an established EU sovereign such as Germany. This cointegration relation is observed for Poland and Bulgaria until 2007. However, after the subprime crisis and the ensuing Eastern European credit crunch, a different picture begins to emerge which is quite contarary to earlier observed trend of convergence. In fact, following this crisis, the whole convergence of Eastern Europe into the EU is put into question as non-EU member states such as Turkey are found to be more resilient compared to the new EU members.

In order to understand the concept of securitizations, it is introduced in more detail in the second chapter where the definitions and history of securitizations are followed by the theoretical ideas behind the need for securitizations. Then, the general securitization processes are drawn and the types and benefits of securitizations are laid out in full. Finally, the more detailed analysis of the process of securitization is carried out by going into more detail about who gets involved in the process, what the expected cash flows are, how enhancement of credit is assured and what role the rating agencies play in the whole process. The benefits and potential risks that securitization poses are also dwelt upon.

The second chapter then deals with, in much more depth, assessing conventional and synthetic securitizations. For conventional securitizations, each type of transaction is laid out in full detail by explaining their procedures and mechanics. For synthetic securitizations, the concept and functioning of credit derivatives, an integral part of the whole study, are fully scrutinized and their variations are analyzed. For both conventional and synthetic securitizations, the chapter also deals with the consequent market structure and regulatory implications of each type of transaction. The roles that credit derivatives and synthetic securitization play in creating leverage and off-balance sheet risks are also mentioned here.

The target of the third chapter is to identify the structure of the securitizations market in the EU and Turkey. The structure of the chapter is formed to first deal with the relations between the EU and Turkey. This is in order to gather the necessary information needed to determine how much impact the current functioning methods of the conventional asset-backed securities (ABS) market or possible market innovations such as synthetic securitization would have on the financial markets of Turkey. After providing a historical perspective of relations, Turkey's efforts in adopting the *acquis communautaire*, especially regarding chapter 3 of the *acquis*, "right of establishment and freedom to provide services"; chapter 4, "free movement of capital" and chapter 9, "Financial Services", are dwelt upon. Afterwards, an overview of the EU market is drawn by using survey methods as well as utilizing statistical and market data. Then a more in-depth analysis is carried out by giving data about each EU member country

where securitization markets are in full swing. The example of the German *Pfandbriefe* market, an especially pertinent and successful segment of the EU securitization market is given more importance and a closer scrutiny. For Western European countries, the establishment of home markets for funding is found to be the main difference with Eastern Europe, whereas the principal divergence with the US is established as the use of less synthetic, less leveraged and more on-balance sheet securitization.

After the crisis of 2001, Turkey and especially Turkish financial markets which took the strongest blow have been recovering since 2004. The fall in inflation and the consequent drop in interest rates coupled with prospects of EU membership have done wonders for the Turkish economy in such a short period of time. Faced with rising real estate and property prices stemming from financial institutions' willingness to lend long-dated house loans, the government felt the time was ripe to introduce a new mortgage law. Thus, given these circumstances, the aim of the second part of the third chapter is to analyze the potential and prospects of the securitizations market in Turkey. Starting from the state of the bond market to the brief (and rather unsuccessful) history of ABSs in Turkey, then going over the boom of house loans granted by banks and the means of hedging them and finally examining the legal and regulatory implications of ABSs in Turkey, the chapter aims to establish the ground over which the new Turkish securitizations market will be played out.

The fourth chapter analyzes the changes to the playing field of securitization after the subprime crisis in the US and the ensuing credit crunch. First the evolution of the subprime crisis is detailed. The role that rating agencies and their models played in creating the crisis is discussed. The spillover of the subprime crisis into Europe and its devastating effects on the Eastern European countries is analyzed. It is established that this is a crisis of securitization worsened by the use of leverage in the form of credit derivatives and synthetic securitizations. The more a country was leveraged by securitization, the worse the effects of the crisis were. In this respect Turkey was lucky in that it was a latecomer to these markets.

The fifth chapter is the analytical part of the thesis. Firstly, an empirical work is intended to establish the explanatory power of the CDS market in determining the

degree of convergence for an EU candidate country. CDSs are credit derivatives used as building blocks in synthetic securitization transactions. They are off-balance sheet swap contracts which pay a premium to the seller while giving the buyer the right to sell, at notional value, to the seller of the contract, a reference security of the entity whose CDS is being traded in case of the default of that entity. Naturally, the higher the likelihood of the entity in question, including a sovereign country, defaulting, the higher the CDS spread. It is the hypothesis that EU convergence should make a country more credit-worthy and less likely to default. EU convergence is measured by using the CDS spreads of Poland, Bulgaria and Turkey from the mid-2002 to 2009, and checking to see if there exists a cointegration relationship between the spreads of each respective country and those of Germany, an EU founding member state. The thesis is that as a country nears EU-accession, possibly starting from at most few years before actual accession, the cointegration relationship should start. The thesis is proven valid for Poland, which became a member in 2004, under a conventional cointegration analysis; however, it doesn't hold true for Bulgaria or Turkey. Then a cointegration analysis with a structural break is carried out to see if there has been a structural break between Germany CDS spreads and those of Turkey and especially Bulgaria, which became a member in the beginning of 2007. This analysis reveals that there exists a cointegration relation with structural breaks between Germany and Bulgaria. There are two possible dates for the structural break and they are both very meaningful. The first possible structural break happens in 2005, the date when Bulgarian accession treaty to the EU was ratified. The second possible structural break occurs in end of 2007, when the subprime crisis started to have a major effect on world markets. A meaningful cointegration relation with a structural break cannot be found between Germany and Turkey between the years 2002-2009, proving that EU-convergence for Turkey in CDS spreads could not be claimed.

Starting from 2007, the world entered into an ever worsening credit crisis which started in the US in the subprime sector but quickly spilled over into the whole securitization market. The Eastern European new members of the EU, whose spreads had collapsed to near Western EU member levels were the worst affected by this crisis. After establishing that 2007 is a structural break for new EU member Bulgaria, the

analysis is further widened to the 2007-2009 era, when the subprime crisis and the ensuing Eastern European credit crunch became full-blown crises. Even though the numbers are fairly new, by using a combination of graphical analysis, dynamic correlations and Z-score studies, it is established that the crisis has affected these countries more than Turkey. In fact, it is found that not being an EU member has positively affected Turkey in so much as the backwardness of its securitization markets has limited the use of leverage on the bank balance sheets. This can be observed from the performance of Turkey CDS spreads compared to Eastern EU members.

In the conclusion, the impact of the changing landscape in the financial arena is discussed. Even though the findings are new, since it is observed that being an EU member has not helped most Eastern European countries, the whole benefit assumption of Turkish EU accession is put into question. Especially following the unwillingness of the EU in coming up with a fiscal package and helping Eastern European countries, and the problems associated with easy borrowing seen in the new EU member states following the collapse of their credit spreads after 2006 has created real concerns about not only the economic advantages to Turkey of becoming a member, but also the future of the EU itself. Also of great importance is the debate surrounding the use of leverage creating off-balance sheet sources of funding like securitization especially in developing countries which are extremely dependent on foreign borrowing to finance their huge current account deficits. To this end, the main finding regarding Turkey is that the relative backwardness of the Turkish markets seems to have helped it weather the crisis relatively better so far. This will undoubtedly have a great impact in the future of EU-Turkey relations when the main motive for Turkey behind the EU membership process, that of economic integration with the EU and the wealth it will bring is put in doubt. The world has changed after the credit crunch, and in this new world, the survival of securitization markets is closely linked with the survival of the new EU member states and in fact, the cohesion of the EU itself.

2. BASICS OF SECURITIZATION

2.1. Securitization Fundamentals

2.1.1. Definition of Securitization

Securitization is a method of raising capital from individual and institutional investors by partial or complete segregation of a specific set of cash flows from financial assets, such as mortgage loans or credit card receivables, and the transformation of these cash flows into securities, which are in turn sold to these investors.[1] These assets, which were not readily marketable before, are thus converted into securities that can be placed and traded in the capital markets. The proceeds derived from the sale of these securities can then be used to fund new mortgage loans or other types of loans to the public. From the perspective of credit originators, this market enables them to transfer some of the risks of ownership to parties more willing or able to manage them. By doing so, originators can access the funding markets at debt ratings higher than their overall corporate ratings, which generally gives them access to broader funding sources at more favorable rates. By removing the assets and supporting debt from their balance sheets, they are able to save some of the costs of on-balance-sheet financing and manage potential asset-liability mismatches and credit concentrations. The growth of securitization has meant a lower cost of financing for individuals and families and a broader range of investment options for the investment community.

2.1.2. History of Securitization

Mortgage-backed securities were being issued by the Danish about 200 years ago, giving an historical reference.[2] The modern form of asset securitization, like so many financial innovations in this century, originated in the US during the 1970s. In this decade, the US government supported mortgage-backed securities (MBS) issued by

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[1] For a foundational discussion of the role of organizational law in facilitating asset partitioning, including mention of securitization, see Hansmann H. et al. (2002) "Legal Entities, Asset Partitioning, and the Evolution of Organizations" URL:
http://www.law.harvard.edu/programs/olin_center/corporate_governance/papers/Hansmann_Paper.pdf
[2] Davidson, Andrew et al. (2003) **Securitization: Structuring and Investment Analysis**, Wiley Finance, p. 465

"Ginnie Mae" (Government National Mortgage Association), "Fannie Mae" (Federal National Mortgage Association) and "Freddie Mac" (Federal Home Loan Mortgage Corporation).[3]

The practice of securitization originated with the sale of securities backed by residential mortgages, but a wide variety of assets have been securitized including lease, auto loan and credit card receivables, commercial mortgages, equipment leases, franchise fees and even state lottery winnings.[4]

Asset securitization began with the structured financing of mortgage pools in the 1970s.[5] For decades before that, banks were essentially portfolio lenders; they held loans until they matured or were paid off. These loans were funded principally by deposits, and sometimes by debt, which was a direct obligation of the bank (rather than a claim on specific assets). But after World War II, depository institutions simply could not keep pace with the rising demand for housing credit. Banks, as well as other financial intermediaries sensing a market opportunity, sought ways of increasing the sources of mortgage funding. To attract investors, investment bankers eventually developed an investment vehicle that isolated defined mortgage pools, segmented the credit risk, and structured the cash flows from the underlying loans. Although it took several years to develop efficient mortgage securitization structures, loan originators quickly realized the process was readily transferable to other types of loans as well. Since the mid 1980s, better technology and more sophisticated investors have combined to make asset securitization one of the fastest growing activities in the capital markets. The growth rate of nearly every type of securitized asset has been remarkable, as have been the increase in the types of companies using securitization and the expansion of the investor base. The business of a credit intermediary has so changed that few banks,

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[3] Schwarcz, Steven L. (2002) **Structured Finance: A Guide to the Principles of Asset Securitization**, 3rd ed. New York: Practicing Law Institute, p. 3

[4] Clark, Kim, "On the Frontier of Creative Finance" **Fortune,** April 28, 1997. URL: http://www.fortune.com/fortune/articles/0,15114,378546,00.html

[5] Kendall, Leon T. (2000) "Modern Origins of Securitization." In: Leon T. Kendall and Michael J. Fishman (Eds). **A Primer on Securitization**, MIT Press, p. 6

thrifts, or finance companies could afford to view themselves exclusively as portfolio lenders.[6]

Market Evolution

The market for mortgage-backed securities was boosted by the government agencies that stood behind these securities. To facilitate the securitization of non-mortgage assets, businesses substituted private credit enhancements. First, they overcollateralized pools of assets; shortly thereafter, they improved third-party and structural enhancements. In 1985, securitization techniques that had been developed in the mortgage market were applied for the first time to a class of non-mortgage assets, namely automobile loans. A pool of assets second only to mortgages, auto loans were a good match for structured finance; their maturities, considerably shorter than those of mortgages, made the timing of cash flows more predictable, and their long statistical histories of performance gave investors confidence.

The first significant bank credit card sale came to market in 1986 with a private placement of $50 million of bank card outstanding. This transaction demonstrated to investors that, if the yields were high enough, loan pools could support asset sales with higher expected losses and administrative costs than was true within the mortgage market.[7] Sales of this type, with no contractual obligation by the seller to provide recourse, allowed banks to receive sales treatment for accounting and regulatory purposes (easing balance sheet and capital constraints), while at the same time letting them retain origination and servicing fees. After the success of this initial transaction, investors grew to accept credit card receivables as collateral, and banks developed structures to normalize the cash flows. The next growth phase of securitization will likely involve non-consumer assets. Most retail lending is readily "securitizable" because cash flows are predictable. Today, formula-driven credit scoring and credit monitoring techniques are widely used for such loans, and most retail programs produce fairly homogeneous loan portfolios. Commercial financing presents a greater challenge.

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[6] Ibid., p. 7-17.
[7] Brensel, Leland C. (2000) "Securitization's Role in Housing Finance: The Special Contribtion of Government Sponsored Entities." Leon T. Kendall and Michael J. Fishman (Eds), **A Primer on Securitization,** MIT Press, p. 20-25

Because a portfolio of commercial loans is typically less homogeneous than a retail portfolio, someone seeking to invest in them must often know much more about each individual credit, and the simpler tools for measuring and managing portfolio risk are less effective. Nonetheless, investment bankers and asset originators have proven extremely innovative at structuring cash flows and credit enhancements. Evidence of this can be seen in the market for securitized commercial real estate mortgages. Commercial real estate is one of the fastest-growing types of non-consumer assets in the securitization markets, which fund approximately 10 percent of commercial mortgage debt.[8]

2.1.3. Theoretical Approach to Securitization

The theoretical approach to securitization can be sub-divided into two parts: The theory of securitization for banks and the theory of securitization for corporations. There are three major explanations for why financial institutions use securitization in the literature: signaling, avoiding under-investment and using comparative advantage.

Signaling. Greenbaum and Thakor[9] have developed a signaling model to explain how projects suffering from informational asymmetries can be financed through securitizations. In these projects, borrowers know the risks of their own projects and banks have screening technologies that allow them to learn those risks. Borrowers signal the risks of their projects by selecting proportionate insurance coverage. Competitive banks optimally securitize their best assets. The securitized assets have differing levels of insurance coverage with the safer projects having more insurance. Banks securitize less, the more their funding is subsidized by regulatory protection. Banks securitize more, the greater the regulatory burden they bear. From this model, one would predict that financial institutions would securitize their best assets and that the degree of securitization would be a decreasing function of regulatory subsidies and an increasing function of regulatory burdens.

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[8] Ranieri, Lewis S. (1998) "The Origins of Securitization, Sources of Its Growth and Its Future Potential" Leon T. Kendall and Michael J. Fishman (Eds), **A Primer on Securitization**, MIT Press, p. 6
[9] Greenbaum, Stuart and Thakor, Anjan (1987). "Bank Funding Models: Securitization versus Deposits" **Journal of Banking and Finance**, 11 (3), p. 379-401.

Avoiding Underinvestment. Using optimal risk allocation models, Benveniste and Berger[10] and James[11] show that securitization can improve risk sharing and increase project funding by avoiding an under-investment problem. In their models, securitization allows banks to issue debt claims senior to those of depositors (and deposit insurers). The risks borne by depositors can be reduced, in some cases (depending on the risk aversion of the bank and nature of deposit insurance) as new funds flow to projects that, in the absence of securitization, would not be funded because they would transfer wealth from equity holders to depositors. This is an optimal risk allocation result (the securitization buyers are risk averse) under fluctuating rate, fairly priced deposits (or, equivalently, actuarially priced deposit insurance). If the deposit rates (insurance) were insensitive to changing risk, however, there would be a transfer of wealth from depositor (or deposit insurers) to equity holders. Securitization, as modeled here, is a function of regulatory constraints on secured lending. Regulatory constraints give incentives to moral hazard that may cause unsecured lenders' or deposit guarantors' losses.

Using Comparative Advantage. Banks provide collections of services to issuers, investors and those in need of financial information. The literature seldom addresses why a given bank provides a particular blend of services. Casual analysis leads to the conjecture that if a bank has a comparative advantage in supplying a service, it will indeed supply the service. Some models provide insights as to how those comparative advantages may arise. Millon and Thakor's[12] model of banks as coalitions of information gathering agents whose certification is needed by issuers is directly applicable to the role of rating agencies in securitizations (although not the securitization process itself). They model an explicit comparative advantage of the information gathering agents as an ability to share information within the coalition. In a

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[10] James, Christopher (1988) "Loan Sales and Standby Letters of Credit" **Journal of Monetary Economics**, No.22, p. 395-422.
[11] Benveniste, L.M. and Berger, A.N. (1987) "Securitization with Recourse" **Journal of Banking and Finance**, 11, p. 403-424.
[12] Millon, M. and Thakor, Anjan (1985). "Moral Hazard and Information Sharing: A Model of Financial Information Gathering Agencies**" The Journal of Finance**, Vol. 40:5, p. 1403-1422.

related model, Ramakrishnan and Thakor's[13] information producers' comparative advantage comes from their ability to costlessly monitor each other in coalitions. Either way, banks as so modeled have comparative advantages in information production, independent of other functions.

The theory of securitizations for corporations, while incorporating the theory for financial institutions, nevertheless entails agency cost theories as well as asymmetry of information:

The theory of the agency cost of free cash-flow. The firm has two options as regards the cash-flows from an asset: It can either wait for the payments to trickle at regular intervals determined before or it can securitize the assets and receive the cash-flow upfront. The theory of the agency cost of free cash-flow stipulates that the latter is the better strategy for the firm as it minimizes the risks associated with monitoring the management's use of the cash.[14]

Hidden-Information Theory of Asset Securitizations. As Hill[15] has suggested, asset securitization may be a means of avoiding a market premium on general security issues. Securitized assets are often cash flows such as receivables with a risk that is more easily assessed than the risk of general assets of the firm, such as physical assets or intangibles such as good will or growth opportunities within a market. Informational asymmetries may therefore arise regarding the returns on the general assets of the firm when investors are equally informed about the prospective returns on assets such as receivables.

2.1.4. General Securitization Concepts

Acquisition of assets for securitization involves three basic activities: Origination, Servicing and Funding. Earlier, the role of an institution was bundled. It performed the activities of origination, servicing and funding, thereby undertaking all the risks

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[13] Ramakrishnan, Ram and Thakor, Anjan (1984). "Information reliability and a theory of financial intermediation" **Review of Economic Studies**, No. 51, p. 415-432.

[14] Jensen, Michael C. (1986) "Agency Cost of Free Cash Flow, Corporate Finance and Takeovers." **American Economic Review** Vol. 76, p. 323-329.

[15] Hill, Claire A. (1996) "Securitization: A Low-Cost Sweetener for Lemons" **Washington University Law Quarterly** 74, p. 1061-1126.

accompanying each activity. With the introduction of asset securitization, the three activities became unbundled. Depending on its resources an institution started to take up one or more of these activities. This led to specialization, increased efficiency and risk allocation.

Figure 1: Bundling versus Unbundling[16]
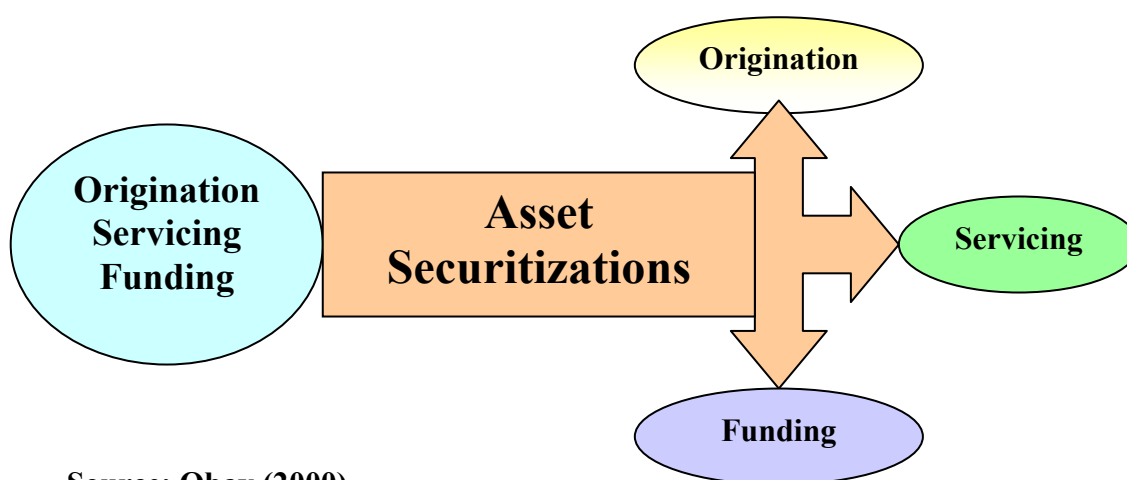
Source: Obay (2000)

Origination refers to the process of creating the assets that act as the collateral for the asset-backed securities. This is an activity taken up usually by financial institutions and banks in the normal course of their operations and also by certain institutions that specialize in the activity for the purpose of securitization. More than one institution may generate the loans in the pool. The origination business involves advertising, cross-selling of depositors and establishment of banking relations with the dealers. It also involves credit evaluation.[17]

Servicing involves a host of activities like sending payment notices, reminding borrowers when payments are overdue, recording prepayments, keeping records of underlying-asset balances, administering escrow accounts and sending out tax information and initiating foreclosure proceedings. Servicers are paid servicing fees for their efforts. Additionally, they are entitled to keep late-payment penalties, foreclosure

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[16] Obay, Lamia (2000), **Financial Innovation in the Banking Industry: The Case of Asset Securitization**, Garland Publishing Inc., p. 28-30.
[17] Davidson, p. 9

penalties and other penalty fees. The specific types and amounts of fees that a servicer is entitled to receive are set forth in a servicing agreement between the originator and the servicer.[18]

Funding is the process of bringing forth cash available for the assets an originator creates. Those with the financial resources opt to fund the assets (loans) that are to be securitized. The entities involved in funding need not have origination or servicing capabilities. Financial institutions, insurance companies, large banks or large corporations can invest in funding activities.[19]

2.1.5. Benefits of Securitization

The evolution of securitization is not surprising given the benefits that it offers to each of the major parties in the transaction.

Securitization improves returns on capital by converting an on-balance-sheet lending business into an off-balance-sheet fee income stream that is less capital intensive. Depending on the type of structure used, securitization may also lower borrowing costs, release additional capital for expansion or reinvestment purposes, and improve asset/liability and credit risk management.[20]

Securitized assets offer a combination of attractive yields (compared with other instruments of similar quality), increasing secondary market liquidity, and generally more protection by way of collateral overages and/or guarantees by entities with high and stable credit ratings. They also offer a measure of flexibility because their payment streams can be structured to meet investors' particular requirements. Most important, structural credit enhancements and diversified asset pools free investors of the need to

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[18] Jacob, P. David et al. (1997) **The Handbook of Commercial Mortgage-Backed Securities**, 2nd ed., Frank J. Fabozzi Associates, p. 91, 218-224.

[19] Stone, C. A. and Zissu, A. (2005) **The Securitization Markets Handbook: Structures and Dynamics of Mortgage- and Asset-Backed Securities** Bloomberg Professional Library, p. 12.

[20] Kendall, Leon T. (2000) "Securitization: A New Era in American Finance" Leon T. Kendall and Michael J. Fishman (Eds), **A Primer on Securitization,** MIT Press, p. 13.

obtain a detailed understanding of the underlying loans. This has been the single largest factor in the growth of the structured finance market.[21]

Borrowers benefit from the increasing availability of credit on terms that lenders may not have provided had they kept the loans on their balance sheets. For example, because a market exists for mortgage-backed securities, lenders can now extend fixed rate debt, which many consumers prefer over variable rate debt, without overexposing themselves to interest rate risk. Credit card lenders can originate very large loan pools for a diverse customer base at lower rates than if they had to fund the loans on their balance sheet. Nationwide competition among credit originators, coupled with strong investor appetite for the securities, has significantly expanded both the availability of credit and the pool of cardholders over the past decade.[22]

2.1.5.1. Typical Benefits for Banks

Foremost among the benefits obtained from securitization for banks is liquidity. When illiquid assets such as mortgages are repackaged and sold as securities they gain liquidity. Furthermore, risks carried by bank are transferred to the investor of the security. Following this process, diversification opportunities are increased for the bank. As a result of this operation, capital adequacy ratio for banks is improved when loans are sold as repackaged securities. As an additional benefit, inventories of financial assets of banks may be financed at a lower rate. Last but not least, banks can avoid the interest rate risk and default risks associated with carrying assets in the books.[23]

2.1.5.2. Typical Benefits for Corporations

Typical benefits obtained from securitization for corporates are many. First and foremost, ratios such as return on equity and return on assets are improved for

[21] Kochern, Neil (2000) "Securitization from the Investor View Meeting Investor Needs with Products and Price" Leon T. Kendall and Michael J. Fishman (Eds), **A Primer on Securitization**, MIT Press, p. 103-117.
[22] Kendall, Leon (2000) "Securitization: A New Era in American Finance", Leon T. Kendall and Michael J. Fishman (Eds), **A Primer on Securitization**, MIT Press, p. 13
[23] Gallati, Reto (2003) **Risk Management and Capital Adequacy,** Mc.Graw-Hill Professional, p. 248

corporations.[24] Firms can obtain cheaper funding by securitization as the asset-backed securities are usually over collateralized and cash flows of firms are improved by securitization. Firms may also transfer the risks associated with carrying the assets to the investors of the securities. In order to do this, they pass over their assets into an entity called SPV (Special Purpose Vehicle) where the role of the equity holders is minimized to holding the cash flow rights, and the entity can securitize these assets, thereby establishing a substantially cheaper bankruptcy restructuring procedure.[25]

2.1.6.   Risks of Securitization

It is clear that securitization is a great invention of modern finance that has been very successful and beneficial to a number of parties who have utilized it. However, there are also some potential risks associated with it as well. The principal risk associated with securitization, especially its off-balance, SPV-driven variant is that it allows risks to be transferred to entities that are beyond the scope and jurisdiction of regulatory bodies. Thus, the balance sheet of institutions that offload such risks to SPVs seem to be clean, yet the potential damage a downturn may cause to these assets may be still pertinent, albeit in a non-observable fashion. In fact, as shall be discussed later on, when the subprime crisis blew up in the U.S. in 2007, many banks who had used SPVs to create monstrous securitized assets had to honor their obligations to these vehicles and write off billions of dollars of losses for items that had not even appeared on their balance sheets, and of which investors to these companies did not even know existed.[26]

Another problem with securitization is that it opens up the Pandora's Box of marking-to-market. Securitizing an asset, by definition, requires turning it into a tradable security, therefore it is transformed from a non-marketable, illiquid asset such as a loan to a tradable and marketable asset such as a note. Therefore, the illusion of illiquidity is removed and measuring its return in internal rate of return of the

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[24] Johnson, Shane A. (2001)   "To Securitize or Not." **Accessing Capital Markets through Securitization,** Fabozzi, Frank J. ed. John Wiley and Sons. p. 65.
[25] Skarabot, Jure (2001) "Asset Securitization and Optimal Asset Structure of the Firm", **EFMA** Meeting paper, p. 3. URL: http://papers.ssrn.com/sol3/papers.cfm?abstract_id=263088
[26] Alan P. Murray (2001) "Has Securitization Increased Risk to the Financial System" **Business Economics**, FindArticles Website, p. 4. URL: http://findarticles.com/p/articles/mi_m1094/is_1_36/ai_71712043

investment is no longer applicable. The securitized assets are part of the market now, and with every downturn, caprice and whim of the market, trillions of dollars worth of assets may lose substantial amounts of their value.[27] As was witnessed in the US subprime crisis, the vicious circle of mark-to-market losses that triggers more sell offs and further mark-to-market losses, until, one day the institutions holding the assets are either bankrupt or nationalized has become possible.

Last but not least, securitization creates more credit. At first this may not be so obvious. Under the normal securitization process where securitized products are merely sold from institutions to investors, there is merely a disintermediation process, not "creation" of credit.[28] In fact, the only institutions that can create credit are the central banks. However, when banks either fund direct investors such as hedge funds by borrowing from the central banks and passing on the credit, use these securitized assets as collateral to borrow from the central banks, or even create more risk by using credit derivatives to transform synthetic securitizations (discussed in section 2.4), credit is multiplied, along with potential profit and loss. The use of easy credit to leverage financial institutions' assets was, in fact, one of the main reasons for the subprime crisis.

2.2. Process of Securitization

2.2.1. Mechanics of Securitization

The participants of a securitization are the asset seller, asset servicer, the investors, the trustee (also known as the special purpose vehicle – SPV), the rating agency, the underwriter, the accountants and the lawyers. To better understand the participants and what they do it is best to give an example.

Visualize an entity having a receivable as one major asset, for example a housing finance company or a leasing company. Suppose the company has already created this receivable (i.e. it has a contractual right to collect this receivable). This means the company's working capital is tied in the receivables. Securitization will

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[27] Kaufman, Henry. (1999) "Protecting Against the Next Financial Crisis." **Business Economics**. Vol. 34 No. 3, p. 56-64.
[28] Alan, p. 2.

unlock this working capital and make it free for further asset creation. In this sense, asset securitization is a means of financing, or rather refinancing. The company in question is known as the asset seller.

The company will select the receivables to be securitized and such selected receivables will be transferred to a bankruptcy-remote special purpose conduit, which is usually called either a Special Purpose Vehicle (SPV) or Special Purpose Entity (SPE). The SPV is either created by the company or is a specialized company that offers services of SPV management. The sole purpose of this SPV is the holding of these receivables, and therefore, as it has no commercial activities of its own, it is deemed to be extremely unlikely to go bankrupt, hence the above-mentioned phrase "bankruptcy-remote".[29]

The SPV issues certificates indicating the money-value of the beneficial interest in the pool of receivables or alternatively the SPV may issue debt instruments which pay off on stipulated dates the payment for such debt securities to come out of the sums received by the SPV. Such notes, known as Asset-backed securities (ABS) are then purchased by investors who receive their payments. The financial institutions that facilitate in the issuance of such ABS either by trying to sell them to investors on a best-effort case or sometimes by guaranteeing to buy   them if others don't, is known as the underwriter. An underwriter or placement agent (the "underwriter") generally serves as an intermediary between an issuer and investors in an ABS offering. The underwriter provides guidance on structuring the transaction in an efficient and cost-effective manner, which includes devising one or more classes, or "tranches", of ABS that are sold to investors in the public and private markets. In this fashion, the cash flows generated by underlying financial assets may be allocated to different tranches of debt securities, which may exhibit different credit, payment, coupon, maturity and other investment characteristics, to meet the needs and preferences of individual investors.

While the SPV holds the receivables, investors acquire a beneficial right therein because they have paid for the present value of the receivables. The present

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[29] Singer, Daniel. (2001) "Securitization Basics.", **Accessing Capital Markets Through Securitizations**. Fabozzi, Frank J. ed. John Wiley and Sons, p. 7-9.

value is computed at the rate of return the company wants to offer to the investors. This rate of return is naturally lower than the inherent rate of return of the receivables because this is the spread or the profit of the originator company.

Figure 2: SPV Cash Flows[30]
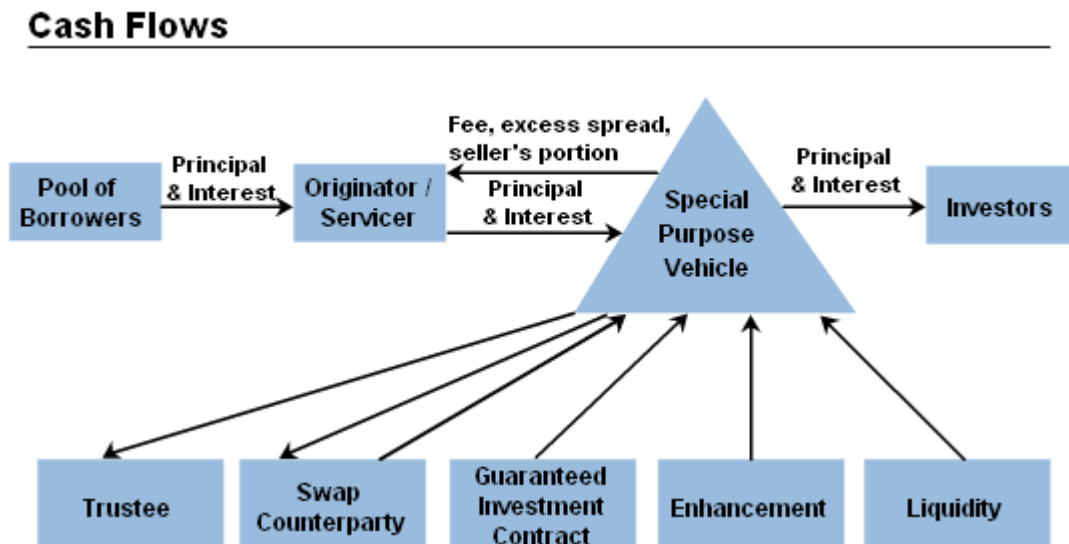
Source: Choudry (2004)

Rating these SPVs is the job of the rating agencies. Among the rating agencies are Moody's, S&P, Fitch IBCA and Duff & Phelps. In securitizations, the Rating Agencies frequently are active players that view the transaction and assign a rating according to the quality of the issuer and the predicted future likelihood of default. In many instances they require structural changes, dictate some of the required opinions and mandate changes in servicing procedures.[31]

2.2.2. Credit Enhancement

A distinctive feature of virtually all ABS is that they are credit-enhanced, unlike conventional corporate bonds, which are usually unsecured. Credit enhancement occurs when a security's credit quality is raised above that of the sponsor's unsecured debt or that of the underlying asset pool. A variety of internal and/or external credit

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[30] Choudry, Moorad (2004**) Structured Credit Products: Credit Derivatives & Synthetic Securitization**. John Wiley & Sons (Asia) Pte Ltd*.,* p. 240-245.
[31] Baron, Neil D. "The Role of Rating Agencies in the Securitization Process." In: Leon T. Kendall and Michael J. Fishman (Eds), **A Primer on Securitization** MIT Press, p. 81-91.

supports are employed to increase the likelihood that investors will receive the cash flows to which they are entitled.[32]

2.2.2.1.   Objectives

The main objective of credit enhancement is to increase the credit quality of the asset pool to the desired level.

2.2.2.2.   Fundamentals of Credit Enhancement

ABSs are distinctive from most other securities in that they are credit-enhanced, whereas regular bonds are not. Credit enhancement is the process whereby the credit worthiness, measured by the credit rating of that entity, is enhanced above that of the sponsor's unsecured debt or that of the asset pool. Credit enhancement occurs either externally or internally.

2.2.2.3.   Internal Credit Enhancement

Subordination A popular type of internal credit support is the senior/subordinated (or A/B) structure, which is technically a form of "overcollateralization." It is characterized by a senior (or A) class of securities and one or more subordinated (B, C, etc.) classes that function as the protective layers for the A tranche. If a loan in the pool defaults, any loss thus incurred is absorbed by the subordinated securities. The A tranche is unaffected unless losses exceed the amount of the subordinated tranches. The senior securities are the portion of the ABS issue that is typically rated triple-A, while the lower-quality (but presumably higher-yielding) subordinated classes receive a lower rating or are unrated.

Overcollateralization In this case, the face amount of the financial asset pool is larger than the security it backs.

Yield Spread (Excess Servicing) Excess servicing, which is the first defense against losses, comprises the difference between the coupon on the underlying assets

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[32] ESF Website, **European Securitization; A Resource Guide**, p. 2.
URL:http://www.europeansecuritisation.com/

and the security coupon. In some ABS structures, excess servicing may be applied to outstanding classes as principal.

Excess Spread is the net amount of interest payments from the underlying assets after bondholders and expenses have been paid. The monthly excess spread is used to cover current-period losses, and may be paid into a reserve fund to increase credit enhancement.

Reserve Fund is the separate fund created by the issuer to reimburse the trust for losses up to the amount of the reserve. It is often used in combination with other types of enhancement.[33]

2.2.2.4.   External Credit Enhancement

In addition to internal credit supports, some ABS use external credit enhancement from a third party.

Surety Bonds A surety bond is an insurance policy provided by a rated insurance company to reimburse the ABS for any losses incurred. Often the insurer provides its guarantees only to securities already of at least investment-grade quality (that is, BBB/Baa or equivalent). Usually this requires one or more levels of credit enhancement that will cover losses before the insurance policy. An insured ABS is rated equal to the claims-paying rating of the insurance company, typically triple-A, because the insurance company guarantees the timely payment of principal and interest on the security.[34]

Third-Party or Parental Guarantees A third party, e.g., a rated insurance company, or the parent company of the seller/servicer, promises to reimburse a trust for losses up to a stated maximum dollar amount. It can also agree to advance principal and interest as necessary and buy back defaulted loans.[35]

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[33] Singer, (2001) "Securitization Basics", p. 17-18.
[34] Obay, p. 21.
[35] Stone, p. 48.

Letters of Credit (LOCs) are issued by financial institutions, typically banks that are paid a fee to stand by with cash to reimburse the trust for any losses actually incurred, up to the required credit enhancement amount. These first three forms of external credit enhancement expose the investor to "third-party risk," where the ABS rating will be dependent on the creditworthiness of the institution providing the enhancement. If the institution is downgraded, then the ABS may also be downgraded.[36]

Cash Collateral Account (CCA) In this case, the issuer borrows the required credit- enhancement amount, usually from a commercial bank, and then invests that amount in the highest-rated short-term (one-month) commercial paper. Since this is an actual deposit of cash -- unlike an LOC, which represents a pledge of cash, a downgrade of the CCA provider would not result in a downgrade of the transaction.[37]

Collateral Invested Amount is similar to a subordinated tranche and is either purchased on a negotiated basis by a single third-party credit enhancer or securitized as private placement and sold to several investors.[38]

2.2.3. Rating Agency Processes

Prior to the issuance of debt ratings for a proposed ABS, the rating agencies perform some analyses. First, they analyze the transaction legal structure to ensure the isolation of the SPV.

They then review the collateral (including the examination of historic data to determine the performance variables that affect transaction credit risk over time) and examine the disclosure and contractually binding documents for a securitization including conveyance of assets to the SPV, as well as the method of bond payment and termination and payment allocation to the security holders

The next step for rating agencies is the analysis of historical asset performance. To this end, first base case expectations for collateral performance from historical data,

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[36] Obay, p. 85, 96.
[37] Kothari, Vinod (2006) **Securitization: The Financial Instrument of Future,** John Wiley & Sons (Asia), p. 122.
[38] Davidson, p. 370.

industry norms and economic fundamentals are established and then stress cases are typically run to the first dollar loss to understand the sensitivity of underlying asset to severity of default. In doing so usually, model cash flows under base case and high stress case scenarios to determine loss coverage are run in order to assess risk factors such as geographic concentrations and economic condition.

The rating agencies also review the originator's operations and management and develop issuer-specific profile in the following areas: financial and corporate overview of originator and servicer; discussion of strategic plan and servicer's historical performance; due diligence focusing on underwriting, credit, systems, collections, loss mitigation, sales and marketing and finally servicer analysis including periodic operational and fundamental review. Sufficient servicing fees are required to ensure servicer performance and effective transfer in the event of servicer default.[39]

2.2.4. Legal, Regulatory, Tax and Accounting Issues

Rules applicable to securitization transactions differ widely among various jurisdictions and are subject to ongoing modification and revision. Nevertheless, it is possible to offer some generalized guidance, in overview fashion, concerning some of the most significant legal, regulatory, tax, accounting and similar issues that need to be addressed when structuring and executing a securitization. At the outset, it is necessary in structuring a securitization transaction to deal with legal, regulatory and tax rules that may affect the sale, assignment or other conveyance of assets by originators to securitization vehicles. These rules may address, for example, the basic legal framework for creating, transferring and perfecting ownership interests in the assets; restrictions on the types or terms of financial assets that may be transferred for purposes of securitization; obligor notification or consent requirements and/or the need to obtain specific regulatory approval prior to transferring the assets; and taxation and gain-recognition events that may be triggered by the transfer of assets to a securitization vehicle. In addition, it is generally important for there to exist various types of default, foreclosure and/or repossession remedies that may be exercised at the individual asset level by the servicer or other administrator of the securitization transaction. As

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[39] Baron, p. 81-91.

discussed above, a central legal issue that must be addressed in virtually all securitization transactions is the isolation of transferred assets from the financial fortunes of the related originator or any of its affiliates. This requires conforming the transfer to the bankruptcy or insolvency legal regime of the particular jurisdiction, generally by effecting the transfer as a "true sale", and building structural protections into the special-purpose entity to render it "bankruptcy remote."[40]

Another important set of issues relates to the legal framework governing the creation, maintenance and operation of special-purpose entities employed in securitization transactions. The most basic prerequisite is for the governing legal framework to permit the issuance by special-purpose entities of securities evidencing ownership or beneficial interests in pooled financial assets, rather than a general claim against the entity itself. Different jurisdictions may have different securities, tax and other laws that limit an issuer's flexibility in this regard. In addition, it is generally desirable or necessary to prevent or limit taxes on the income of the special-purpose entities; to avoid burdensome licensing or other regulatory requirements that might otherwise apply to such entities; to comply with various securities or investment laws that apply to the securities issued by various types of special-purpose entities to finance their purchase of the underlying assets; and to comply with bank and other financial institution regulatory restrictions that arise in connection with transfers of assets for purposes of securitization. Relevant securities, banking and other laws also need to be consulted in order to determine whether and under what circumstances it is possible for securitization vehicles to issue multiple tranches of debt with varying payment priorities, maturities and other characteristics. On the investment side, legal investment laws applicable to pension funds, insurance companies, banks and financial institutions, and other institutional investors may restrict their participation in the ABS markets. Such restrictions may deal with the levels of permissible foreign currency exposure, requirements for currency matching, limitations on the type of assets in which investments may be made or limits on the amount or concentrations of those investments.

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[40] Blum, Len and DiAngelo, Chris (1999) "Finance Company Transactional Due Diligence" **Issuer Perspectives on Securitization,** Fabozzi, Frank J. ed., John Wiley & Sons, Inc., p. 57

Finally, depending upon the originator's objectives, the balance sheet effects and accounting treatment and consequences of a particular securitization will require in-depth investigation, and will frequently influence the ultimate structure of the transaction. As with legal, regulatory and tax systems, there is tremendous diversity among the accounting rules of different jurisdictions. [41] The most important issues to be confronted in this regard include structuring asset sales in a manner that achieves non-recourse sale treatment, and asset derecognition for balance sheet purposes.

2.3. CONVENTIONAL ASSET SECURITIZATIONS

2.3.1. Asset Backed Securities (ABS)

Asset-backed securities are securities which are based on pools of underlying assets. These assets are usually illiquid and private in nature. A securitization occurs to make these assets available for investment to a much broader range of investors. The "pooling" of assets makes the securitization large enough to be economical and to diversify the qualities of the underlying assets. A special purpose trust or instrument is set up which takes title to the assets and the cash flows are "passed through" to the investors in the form of an asset-backed security. The types of assets that can be "securitized" range from residential mortgages to trade receivables and even music royalties. The asset-backed security usually qualifies for a top rating and enables the issuing company or bank to raise funds at a very attractive rate, while freeing up capital and retaining customer relationships and servicing revenues.[42] The issuance increased through 2000 to 2006, reaching a peak of $892 billion in 2006. As can be observed from the following graph, the ABS issuance has been decreasing since 2006 and it reached to even below 2000 levels by the end of 2008.[43]

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[41] FASB, Statement No. 140 (2000) "Accounting for transfers and servicing of financial assets and extinguishments of liabilities—a replacement of FASB Statement No. 125", p. 3-5. URL: http://72.3.243.42/articles&reports/studyst140.pdf
[42] Kane, Mary E. (2001) "An Introduction to the Asset Backed Securities Market." Hayre, Lakhbir ed. **Salomon Smith Barney Guide to Mortgage-Backed Securities,**. John Wiley and Sons, p. 69-70.
[43] JP Morgan (2009), "Global ABS/CDO Weekly Maket Snapshot", p. 22. URL: https://mm.jpmorgan.com/servlet/UserDocsHelperServlet?action=openpdf&docId=MMRC-499605-1

Figure 3: ABS Issuance By Year (Billions of Dollars)[44]
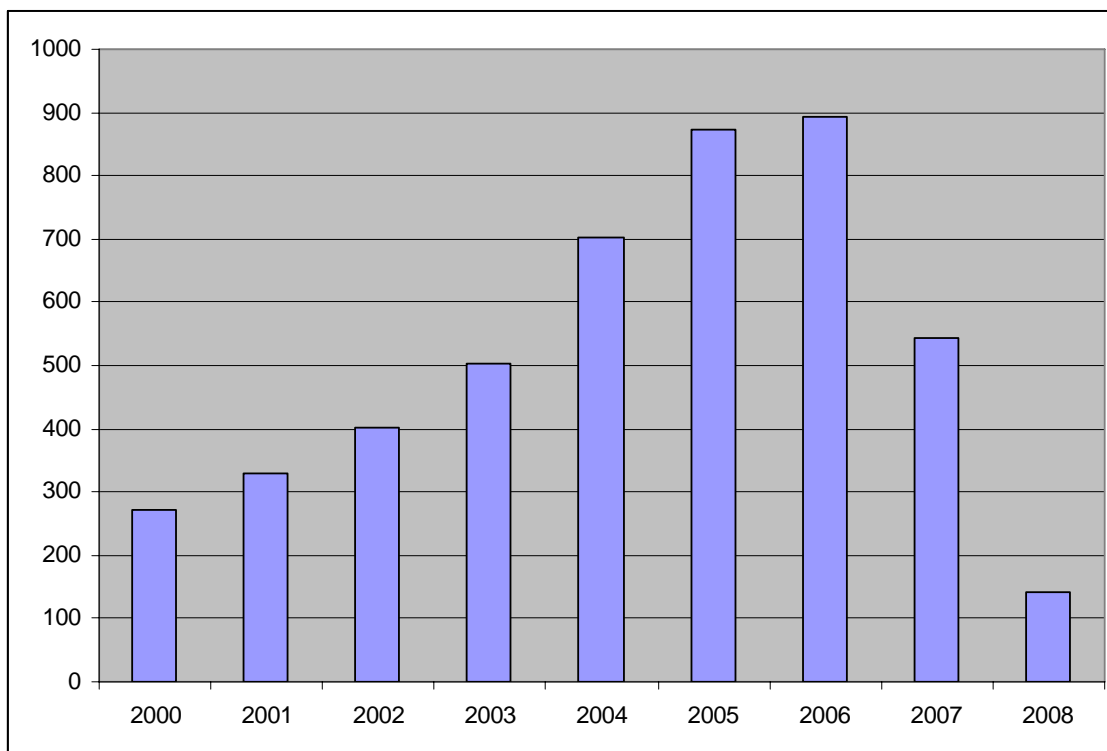
Source: JP Morgan

As of end-2008, the ABS market was made up of $9.6 trillion in tradable securities.[45] Over 72 percent of these assets, or $6.9 trillion, were mortgage-based, including mortgage-backed securities, collateralized mortgage obligations, and real estate mortgage investment conduits.[46] Government-sponsored secondary market lenders, such as Fannie Mae, Ginnie Mae, and Freddie Mac, issue the majority of MBS. Almost $2.6 trillion, or about 27 percent of the securitized asset market, is composed of asset-backed securities that are not collateralized by first mortgage assets. The underlying assets of these securities include student loans, vehicle loans and credit cards. Approximately 40 percent, or $1 trillion, of this $2.6 trillion market was composed of credit card loans.[47] Unlike most of the underlying asset types in the ABS

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[44] Ibid.

[45] ESF Website, "ESF Securitisation Data Report Q4: 2008" (2008), p. 7. URL:
http://www.europeansecuritisation.com/Market_Standard/ESF_Data_Report_Q4_2008.pdf

[46] Kane., p. 12-13

[47]DiMartino. P. and Kane, Mary E. (2001) "A Fresh Look at the Credit Card Subordinate Class." In: Hayre, Lakhbir ed. **Salomon Smith Barney Guide to Mortgage-Backed Securities,** John Wiley and Sons. p. 643-656.

market, credit card loans do not have a fixed payment amount or amortization period. Mortgages, auto loans, student loans, and home equity loans typically have a pre-determined term (e.g., five years, 10 years, 30 years) over which a stipulated loan amount is spread for the purpose of calculating monthly payments. Credit card loans, however, can be paid down or added to as customers' desire as long as they make a minimum monthly payment (typically 2 percent of the balance) and stay within their assigned credit limit. Credit card ABS, therefore, are unusual among other types of ABS in that the securities' underlying assets can completely "turn over" every few months (e.g., the balances of customers who are paying off their accounts can be replenished by customers who are building balances through purchases and balance transfers).[48]

Figure 4: Composition of the ABS Markets in the USA (2007)[49]
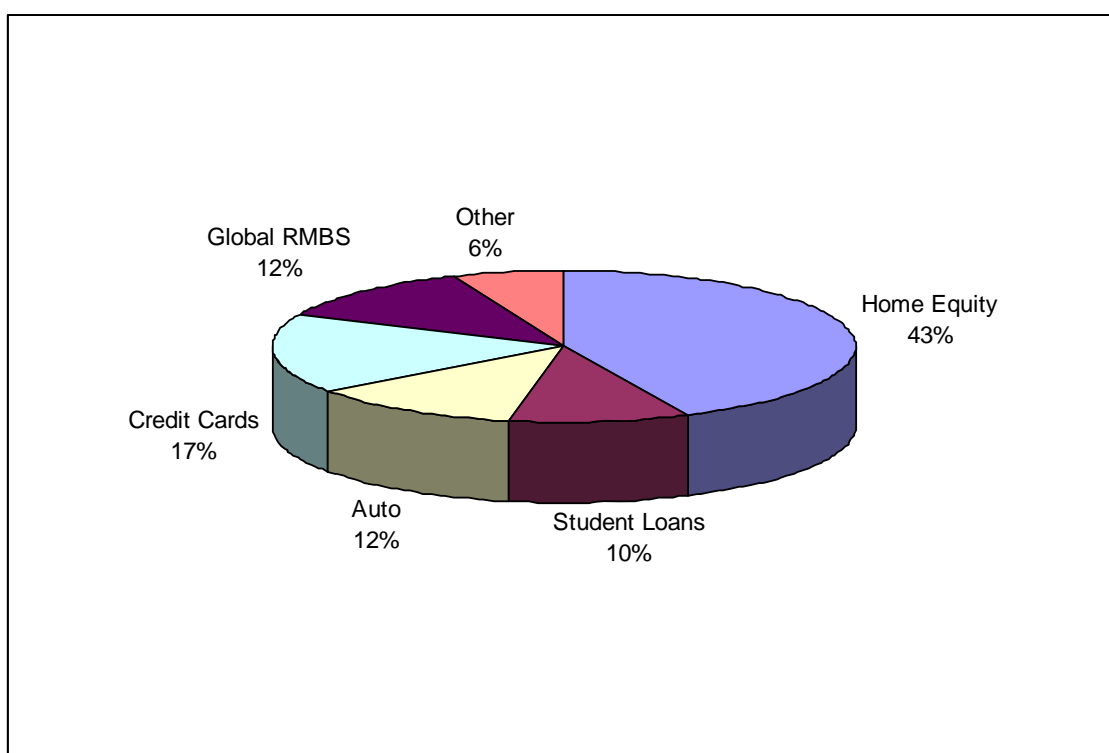
Source: JP Morgan

The ABS market is mainly divided between regular Asset backed securities (ABS) which typically include credit card securities, asset backed commercial papers,

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[48] Ibid.
[49] JP Morgan (2009), "Global ABS/CDO Weekly Market Snapshot", Morgan Markets Website, p. 22. URL: JP Morgan Website, URL:
https://mm.jpmorgan.com/servlet/UserDocsHelperServlet?action=openpdf&docId=MMRC-499605-1

lease-backed securities, trade receivables and auto-loan securities, mortgage based loans (MBS) and collateralized debt obligations (CDO). Mortgage Securities represent an ownership interest in mortgage loans made by financial institutions (savings and loans, commercial banks, mortgage companies) to finance the borrower's purchase of a home or other real estate. When these loans are pooled by issuers for sale to investors, mortgage securities are created. As the underlying mortgage loans are paid off by the homeowners, investors receive payments of interest and principal.

The most basic mortgage securities, known as "pass-through" securities represent a direct ownership interest in a pool of mortgage loans with each security entitled to a pro-rata share of the cash flow from the pool of mortgage loans.[50] Pass-through securities represent a direct ownership interest in a pool of mortgage loans with each security entitled to a pro-rata share of the cash flow. A pass-through security is created when one or more holders of assets such as (mortgage loans, auto loans, credit card receivables and other assets) form a collection (pool) of assets. A pool may consist of several thousand or only a few assets. Shares or participation certificates in the pool are sold. The cash flow of the pass-through security depends on the cash flow of the underlying pool of assets and the monthly cash flow is distributed on a pro-rata basis. In this case the owner of the asset acts only as a service agent. Sometimes, as is the case in the US, legal title to the assets is given to a trustee who only holds the trust property to protect it. The trustee does not have substantial managerial power. Pass-through securities have the same credit risk of the assets backing it, in addition, to prepayment risk from the pool of mortgage loans.

As for "Pay-through" securities, it can be backed by a pool of assets as the case for pass-through or can be backed by a pool of "pass-through" securities instead of directly using the assets. Pay-through securities are divided into different bond classes, called tranches, so as to create securities that have different cash flow and maturities and have the different exposure to pre-payment risk while having the same credit risk as being backed by the same assets. These mortgage securities can be pooled again to create collaterals for another type of mortgage security known as a Collateralized

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[50] Hayre, Lakhbir (2001) "Agency Collateralized Mortgage Obligations (CMOs)." Hayre, Lakhbir ed. **Salomon Smith Barney Guide to Mortgage-Backed Securities**, John Wiley and Sons, p. 13-15.

Mortgage Obligation (CMO), again a "Pay-through" security which is a more complex type than "Pass-through".[51] This type allows cash flows to be directed, so that different classes of securities with different maturities and coupons can be created.

2.3.1.1.   Asset Backed Commercial Paper Securitizations

Asset Backed Commercial Paper (ABCP) is short-term debt, generally limited to a tenor of no more than 270 days and issued either on an interest-bearing or discount basis. The proceeds of ABCP issuance are primarily used to obtain interests in various assets. Some common assets financed through ABCP conduits include trade receivables, consumer debt receivables, auto and equipment loans and leases, and collateralized debt obligations. Such financings may take the form of a traditional asset purchase or a secured loan. Often, transactions entered into by conduits represent the acquisition of undivided interests in revolving pools of assets, as opposed to individual asset purchases. ABCP conduits may also invest in securities, including asset- and mortgaged-backed securities, corporate and government bonds, and commercial paper (CP) issued by other entities. Some ABCP conduits may also make unsecured corporate loans. Repayment of ABCP is generally dependent on the collections received from the asset interests contained in the program's underlying asset portfolio and the issuance of new CP. Additionally, ABCP conduits can draw on liquidity facilities to repay maturing CP. However, new CP issuance and liquidity fundings are usually conditioned upon the continued satisfactory performance of the assets financed through the original issuance of the maturing CP.

The term "ABCP conduit" is typically used when referring to the CP issuing vehicle of an ABCP program. Conduits are usually nominally capitalized special purpose vehicles (SPVs), owned by management companies independent from the sponsor and structured to be bankruptcy remote.[52] Bankruptcy remoteness is accomplished by limiting the scope of a conduit's business activities, restricting the liabilities a conduit may incur, and requiring nonpetition clauses in the agreements executed by the key parties and sellers to the program. Typically, ABCP conduits

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[51] Ibid., p. 367-369.
[52] Stone, p. 155-156.

contract with various agents to obtain services in connection with the administration and operation of a program. Typical agents involved in an ABCP program are the administrative agent, the issuing and paying agent, the collateral agent, the referral agent, and the manager.[53]

In conduits, there is no scheduled amortization of assets and liabilities since the additional issuance of CP may be used to, and in most cases is expected to, maintain the conduit's investment in assets. Credit and Liquidity Support of credit enhancement on a transaction-specific and programwide level to protect against losses occurring in the underlying asset portfolios. Credit enhancement may exist in various forms and is generally sized based on the type and credit quality of the underlying assets. Although credit enhancement is sized to ensure that the credit quality of the underlying transaction is commensurate with the credit rating of the CP issued by the conduit, if losses exceed the amount of credit enhancement, the conduit may be unable to repay maturing ABCP in full. ABCP programs are also structured with liquidity facilities to assist in the timely repayment of CP for reasons generally not associated with the credit risks of the underlying assets. These reasons include risks associated with asset servicers or cash flow timing mismatches between the underlying asset portfolio and CP repayment obligations. Liquidity facilities may also serve as alternative funding sources in the event a conduit is unable to issue new CP to repay maturing CP or to acquire additional asset interests under a committed transaction.[54]

2.3.1.2.   Automobile Loan Securitizations

Auto loan securitization is the process of issuing structured securities against auto loan receivables held as collateral. Auto asset-backed securities (ABS) represent one of the largest and most mature sectors of the ABS market. Auto loans were among the first non-mortgage assets to be securitized. The first auto loan securitization was done in 1985, merely two months after the first ever asset securitization transaction.[55] Auto loan backed securities are generally seen as stable, short average-life investments for banks, money managers and other investors. They have some advantages over other

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[53] Ibid.
[54] Stone, p. 12-15.
[55] Bransel, p. 20-25.

asset-backed securities such as excellent liquidity, high credit quality, relatively simple cash flows and predictable prepayments.

Credit criteria are generally applied as a formalized credit-scoring model but can be modeled more informally if need be. Most criteria include factors relating to a potential borrower such as length of time at residence, employment and length of time at the job, sources of income, credit history, income to debt ratio, type of automobile purchased and down payment amount. If an auto loan becomes delinquent, servicers apply standard collection procedures that include vehicle repossessions.[56]

Auto loan backed securities are structured both as pass-throughs and pay-throughs. In the pass-through structure, payments of principal and interest flow through the trust to certificate holders on a pro rata basis. In the pay-through structure, the special purpose vehicle allocates cash flows sequentially to note holders and certificate holders.

2.3.1.3.   Credit Card Securitizations

Credit card receivables are pools of largely unsecured obligations owed by individuals to the issuer of the card, generally a bank or finance company under the auspices of the Master Card or Visa associations. This is one of the first sectors to develop in the ABS market, and is amongst the most liquid products. Market share of credit cards has hovered around 40% of the U.S. ABS market s of the end of 2007.[57]

Credit cards can be broadly divided into two categories: General Purpose Credit Cards and Revolving or Private Label Cards. General purpose credit cards can be used to make purchases, where cards are generally accepted. In the United States these cards are offered by five networks: American Express, Diners Club, MasterCard, NOVUS and Visa. Private label cards are issued by retailers for use in affiliated outlets,

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[56] Raynes, Sylvain and Rutledge, Ann (2003) "Automobile Receivable Securitizations" **The Analysis of Structured Securities: Precise Risk Measurement and Capital Allocation,** Oxford University Press, p. 223-226.

[57] JP Morgan (2009), "Global ABS/CDO Weekly Market Snapshot", Morgan Markets Website, URL: JP Morgan Website, p. 22. URL:
https://mm.jpmorgan.com/servlet/UserDocsHelperServlet?action=openpdf&docId=MMRC-499605-1

such as Sears and Macy's.[58] Their usage is directly related to the sale activity of the retailer. An individual retailer's principal repayment rates may differ according to the various repayment programs it offers. In the event of a retailer's bankruptcy, the private label cardholders may not feel compelled to pay their unpaid balance.[59]

Credit card receivables arise through purchases of services or merchandise, or cash advances via credit placed on the card. Card companies generally bill clients monthly and customers are not charged an interest rate if they repay the balance in full within a defined grace period following billing. An interest rate applies on the outstanding balance should the client choose to revolve the account (revolving credit), with a small monthly principal and interest payment typically required.

At some point, credit card companies are supposed to receive some amount from their cardholders. This amount can be securitized and the company will be able to free the capital and improve their asset liability management. Because of the nature of the underlying asset, i.e. credit cards receivables, credit card receivable securitization uses structures that have very short payback periods, so that, when the receivables are paid off, the amount is utilized for replenishment by acquiring fresh receivables rather than for amortization of the investment.

A credit-card trust is created via the transfer and sale of assets to a bankruptcy remote subsidiary, which deposits the assets into a trust.[60] The structure of the transaction protects the investor from the insolvency or bankruptcy of the seller. The property of the trust includes a portfolio of credit card receivables that arise from time to time pursuant to a group of designated accounts. A credit card pool, unlike an amortizing asset pool, is a revolving pool of assets. Repayments may be replaced by new charges and the credit limit may continually be utilized to the maximum limit. The credit card securitization mirrors the revolving nature of the underlying asset pool. Each month, receivables are repaid and new charges replace repayments thereby enabling the issuer to maintain a level pool balance (assuming active utilization of the accounts in the receivables pool). Prior to the securitization maturity, the structure ceases to revolve

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[58] Davidson, p. 368.
[59] Ibid., p. 367.
[60] Ibid., p. 369.

and begins to accumulate monthly repayments in a designated account to repay investors in a single payment called a soft bullet payment.[61]

2.3.1.4.   Trade Receivable Securitizations

Trade receivables were among the first assets to be securitized in the ABS market. The number of these transactions has grown at a steady rate ever since and, on a North American basis, outstandings totaled over $90 billion as of 2003.[62] To date, the majority of all trade receivables transactions that have been executed have been funded through multi-seller commercial paper conduits, in part reflecting a matching of the funding time frame with that of the asset life. Although most of the recent attention in the ABS market is directed towards newer public transactions such as CMBS, credit card ABS, and autobacked ABS, the scope of the trade receivables market is very significant. By the end of December 2003, a significant portion of the largest industrial companies in North America had engaged in trade receivables transactions, the vast majority of which are major household names. While this asset class is not likely to witness high rates of growth, it is expected to continue to be a steady component of the funding strategy of a wide variety of companies across all industries.

There are numerous advantages associated with trade receivable securities. The vast majority of trade receivables transactions involve investment-grade sellers that are experienced administrators of receivables portfolios. Assets of this nature usually experience very low loss rates and there is fast receivable turnover which limits the duration of the exposure of the asset. However, there are also some challenges. Obligor and/or geographic concentrations exist in most trade receivables transactions. The revolving nature of most trade receivables transactions requires reliance on the seller's business practices and credit and collection policies. Also, the assets involved are unsecured assets.[63]

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[61] Ibid., p. 369-372.
[62] JP Morgan (2004), "Global ABS/CDO Market Snapshot" URL:
http://www.securitization.net/pdf/JPMorgan/jp_absweekly_8Apr04.pdf
[63] Morrison, Kenneth P. (2001) "Observations on Effecting Your First Asset-Backed Securities Offering" **Accessing Capital Markets through Securitization**, Fabozzi, Frank J. ed. John Wiley and Sons. p.41-62.

In order to mitigate the risks and challenges involved with trade receivable securitization, some issues have been raised. Risks such as losses, obligor concentration, dilution, and interest costs can be addressed with structural limits, reserves, and indemnities established through the analysis of historical portfolio performance metrics and by utilizing dynamic reserving methodologies. Reserves are structured to adjust to reflect the change in performance of the related inputs such as losses, dilutions, or interest costs. The unsecured nature of the receivables and the exposure to the seller's credit and collection policies are mitigated by some of the key strengths of trade receivables transactions: fast turnover, strong seller creditworthiness, and low absolute loss rates. Fast turnover means short exposure to poor portfolio performance, for example, deteriorating asset value in an increasing loss scenario. Combined with portfolio performance metrics that are intended to be triggered early in the portfolio decline, the fast turnover should result in the repayment of outstanding funding prior to the collectible value of the assets supporting the transaction being less than that of the funding used to purchase them.

2.3.2. Mortgage Backed Securities (MBS)

A mortgage is a loan secured by some specified real estate property in which the borrower is obligated to make a predetermined set of payments.[64] As can be seen from the following figure, mortgages can be divided into three main categories. These categories are residential, non-residential and other.

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[64] Fabozzi, Frank; Bhattacharya, Anand and Berliner, William S. (2007) **Mortgage-Backed Securities: Products, Structuring and Analytical Techniques,** John Wiley and Sons, p. 3-4.

Figure 5: Types of Mortgage Backed Securities
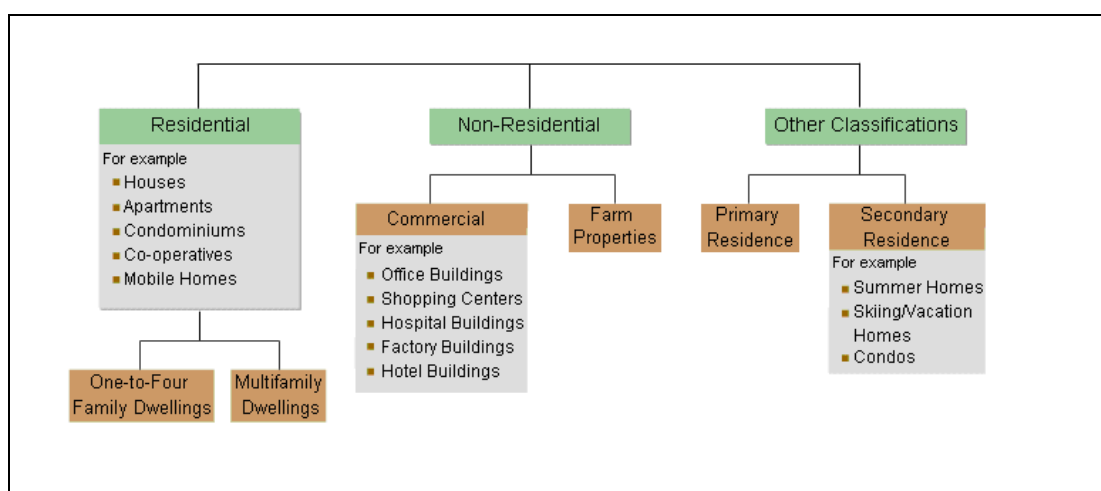
Source: PIMCO[65]

Mortgage Backed Securities (MBS) are products that use pools of mortgages as collateral for the issuance of securities. Mortgage securities can be of the following types: Mortgage Pass-Throughs, Collateralized Mortgage Obligations (CMOs) and Real Estate Mortgage Investment Conduits (REMICS) or Mortgage-backed Bonds.

Mortgage pass-throughs are proportionate ownership in mortgage pools. The mortgages are typically placed in a trust, thus removing the assets from the balance sheet of the issuer. A certificate of ownership is sold to the investor. There are some very typical differences between mortgage loans and mortgage pass-throughs. First, servicing fees and guarantee fees are involved in mortgage pass throughs, but not in mortgage loans. Secondly, mortgage pass throughs provide credit risk diversification as they are backed by a pool of loans. This is not so with a single mortgage loan. Thirdly, Risk Weights for the two are different for capital adequacy. Risk weight for mortgage loans is generally 50% while for mortgage pass throughs it could be 0%, 20%, 50% or 100% depending on issuer and type of loan. Last but not least, liquidity is less for loans and more for the security.[66]

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[65] PIMCO Website "Mortgage-Backed Securities" URL:
http://www.pimco.com/LeftNav/Bond+Basics/2007/Mortgage+Backed+Securities.htm
[66] Hayre, Lakhbir. (2001) "A Concise Guide to Mortgage-Backed Securities." Hayre, Lakhbir ed. **Salomon Smith Barney Guide to Mortgage-Backed Securities,** John Wiley and Sons, p. 9-69.

Collateralized Mortgage Obligations (CMOs) and Real Estate Mortgage Investment Conduit (REMICs) securities represent ownership interests in specified cash flows arising from underlying pools of mortgages or mortgage securities. CMOs and REMICs involve the creation, by the issuer, of a single-purpose entity designed to hold mortgage collateral and funnel payments of principal and interest from borrowers to investors. Unlike pass-through securities which entail a pro rata share of ownership of all underlying mortgage cash flows, CMOs and REMICs convey ownership only of cash flows assigned to specific classes based on established principal distribution rules.[67]

2.3.2.1. Residential MBS

Residential Mortgage Backed Securities (RMBS) are products that use pools of residential mortgages as collateral for the issuance of securities. The issuers primarily act as a conduit for the investors by collecting and proportionally distributing monthly cash flows generated by homeowners making payments on their home mortgage loans.[68] Residential Mortgage Securities can be divided on the basis of the organization issuing them, either as agency securities or private label securities. Agency securities are mortgage securities issued and/or guaranteed by one of the three government-sponsored agencies (GSEs). There are three federally sponsored agencies in the United States: Government National Mortgage Association (GNMA), nicknamed "Ginnie Mae", Federal National Mortgage Association (FNMA), dubbed "Fannie Mae" and Federal Home Loan Mortgage Corporation (FHLMC), also called "Freddie Mac".[69]

The Government National Mortgage Association (GNMA) was created in 1968. It is a wholly-owned U.S. Government Corporation within Department of Housing and Urban Development (HUD). Mortgage loans insured or guaranteed only by the Federal Housing Administration (FHA), the Veterans Administration (VA) or the Farmers Home Administration qualify for inclusion in a GNMA program. GNMA guarantees mortgage securities issued by banks, thrifts, and mortgage bankers, which

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[67] Ibid.
[68] Hu, Joseph (2001) **Basics of Mortgage-Backed Securities**, Frank J. Fabozzi Associates, p. 97.
[69] Ibid., p. 9-21.

participate in GNMA programs. GNMA-guaranteed mortgage securities are guaranteed by U.S. Government as to full and timely payment of principal and interest.[70]

Federal National Mortgage Association (FNMA) was created as a government agency in 1938. It was reorganized in 1968; now FNMA is privately owned and its stock trades on New York Stock Exchange (NYSE). FNMA is subject to general oversight of HUD. The U.S. Government does not back the guarantees for FNMA; however, because of the strong financial condition of this agency, credit rating agencies had assigned "AAA" rating to its issues.[71]

Federal Home Loan Mortgage Corporation (FHLMC) is a privately owned corporation. It is subject to the general oversight of HUD. The U.S. Government does not back the guarantees for FHLMC; however, because of the strong financial condition of the agency, credit rating agencies had assigned "AAA" rating to its issues.[72]

Subprime Crisis and Federal Conservatorship:

Due to the effects of the subprime crisis, the government sponsored entities FNMA and FHLMC had become unviable, about to declare bankruptcy in September 2008. The credit rating agencies had already decreased the ratings of FNMA and FHLMC near to junk status.[73] The Federal Government of the United States acted to prevent collapse of these institutions and the panic it would spread over the entire financial system and placed these GSEs under conservatorship.[74]

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[70] Ginnie Mae Website, "About Ginnie Mae", URL:
http://www.ginniemae.gov/about/about.asp?Section=About
[71] Fannie Mae Website, "About Fannie Mae", URL:
http://www.fanniemae.com/aboutfm/index.jhtml;jsessionid=3EBCCOVSJTNMTJ2FQSISFGA?p=About+Fannie+Mae
[72] Freddie Mac Website, "Company Profile", URL:
http://www.freddiemac.com/corporate/company_profile/faqs/
[73] Associated Press (2008) "Freddie Mac Courts Investors, Buffett Passes" **International Herald Tribune**, 22 August 2008.
[74] Lockhart, James B., III (2008). "Statement of FHFA Director James B. Lockhart" Federal Housing Finance Agency Website URL: http://www.ofheo.gov/newsroom.aspx?ID=456&q1=0&q2=0.

2.3.2.2. Commercial MBS

Commercial Mortgage Backed Securitization is the process of issuing a structured security backed by the cash flows of a mortgage or pool of mortgages on commercial real estate and may take a variety of different structural and legal forms. The structure of a commercial mortgage security (not the underlying loans) is quite similar to that of its single-family, residential counterpart. Principal and interest payments on underlying loans, after the deduction of servicing expenses, are paid to the certificate holders. The cash flow allocation can be either a pass-through or a pay-through structure. As in residential securities, excess interest payments are bundled and sold as Interest Only (IO) certificates. [75]

Commercial mortgages are backed by income-producing properties, such as office buildings, retail shopping centers, multifamily apartments, industrial/warehouse properties, and hotels. The typical commercial mortgage is a balloon loan, with a 30-year amortization schedule and a balloon payment due after ten years.[76]

Figure 6: CMBS Transaction Process[77]
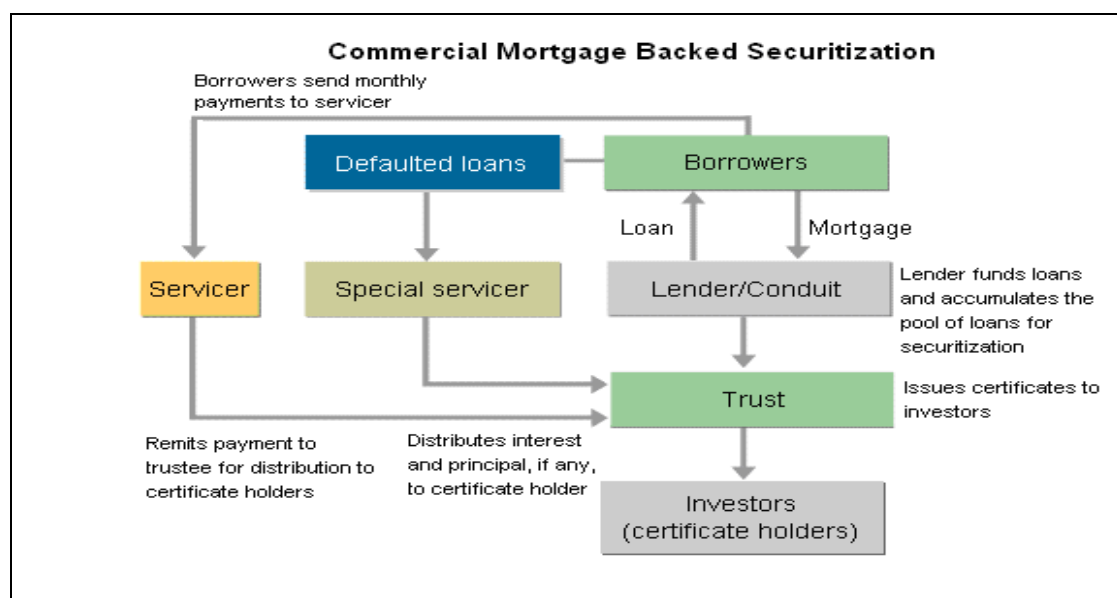
Source: Wheeler (2001)

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[75] Jacob, p. 73-92.

[76] Ibid., p. 275-285.

[77] Wheeler, Darrell (2001) "A Guide to Commercial Mortgage-Backed Securities", Hayre, Lakhbir ed. **Salomon Smith Barney Guide to Mortgage-Backed Securities,**. John Wiley and Sons, p. 401-406

Most fixed-rate commercial loans have very strong call protection (or lock-out) on prepayments for several years and then a prepayment penalty or defeasance for many more years. The mortgage loan may be structured to offer prepayment flexibility via three mechanisms that are designed to maintain the collateral pool's cash flow or to compensate the investors for lost payment: Yield Maintenance, Defeasance and Declining Fee. Yield Maintenance penalty is designed to compensate the lender for early retirement of principal. If prevailing interest rates are lower than when the loan was originated, prepayment will cause the investor to reinvest at a lower rate and lose interest income. The yield maintenance penalty calculates the present value of this lost income, and imposes this amount as a prepayment disincentive to the borrower and protection to the investor.[78] Defeasance is when the borrower must purchase a portfolio of Treasuries or Treasury equivalents, which replicate future cash flows of the mortgage to defease future payments. The replacement of mortgages with Treasuries improves the credit quality of the deal.[79] Finally a declining fee is proportional to the remaining balance; for example, a "5-4-3-2-1" schedule means that the penalty is equal to 5% of the outstanding loan balance in the first year of the penalty period, 4% during the second year, and so on. In the recent transactions, prepayment restrictions on most CMBS have relied heavily on defeasance with many recent CMBS pools having all loans locked out until three months prior to maturity only permitting mortgage prepayments via defeasance. Restrictions on prepayments usually end about three to six months before the balloon date, referred to as the free or open period. The objective is to give the borrower some time to refinance the loan and hence make the balloon payment.

The borrowing on larger mortgages (more than $1 million) is usually structured as a Special Purpose Entity (SPE) to insulate the property's cash flows from the parent company. The SPE is usually restricted via covenants to exclusively own and operate the property and prevent it from incurring further liabilities. Often, on larger loans (more than $2 million), the SPE will have a special legal opinion stating that it is independent of its parent's operating activities (bankruptcy remote) in an effort to

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[78] Ibid., p. 147-157.
[79] Ibid., p. 100.

prevent the loan from being involved in any bankruptcy proceeding that might evolve from a future troubled parent company. The loan may also have an independent director as an additional safeguard to prevent fraudulent bankruptcy filings by the SPE.

Commercial mortgages usually require the borrower to fund an escrow account with one month's payment of debt service, as well as ongoing reserves for real estate taxes and property insurance. On many commercial tenanted mortgage loans there may also be an escrow reserve amount for future releasing costs such as tenant inducement payments or leasing commissions. The borrower is required to provide annual financial statements and tenant rent rolls to enable the servicer to monitor property performance. The servicer usually uses these statements to recalculate the loan's debt service and makes that information available to certificate holders.[80]

Monthly mortgage debt service payments for CMBS are collected and aggregated by a "master servicer." On a set monthly date, this master servicer remits the payments to the trustee which makes the monthly payments to the certificate holders. If a loan defaults, certificate holders are insulated from possible short-term cash flow shortfall by the master servicer, which is obligated to make bond principal and interest advances to the trustee and pay property taxes and insurance payments to the extent that such advances are recoverable from the underlying mortgage obligation.[81] The "special servicer" is a separate entity from the master servicer and is responsible for loan collections on defaulted loans. Any loan that has been in default for more than 60 days is usually transferred to the special servicer, which has an obligation to work out the loan with the objective of maximizing "the net present value of the proceeds realized from the loan." The special servicer is often an entity related to the subordinate certificate investor, providing an additional motivation to minimize the loan's losses. The special servicer usually has extensive commercial real estate expertise, enabling it to evaluate whether to foreclose and liquidate the loan or to restructure the loan and thereby return it to the master servicer.

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[80] Ibid., p. 221.
[81] Hu, p. 106-108.

The agreement and mechanics of how cash flows of CMBS transaction are handled are outlined in a pooling and servicing agreement between the issuer, servicer, special servicer and trustee. This agreement is intended to make the process of conversion of mortgage's cash flow to bond cash flow very mechanical and is summarized in the prospectus.

2.3.3. Collateralized Debt Obligations (CDO)

A Collateralized Debt Obligation (CDO) is a securitization in which a diversified portfolio of securities is transferred to a SPV which in turn issues tranches of debt securities (notes) of different seniority and equity to fund the purchase of the portfolio. The investments in the CDO are funded through the issuance of several classes of securities. The repayment of these securities is linked to the performance of the underlying securities that serve as collateral for the CDO liabilities. [82]

In structuring a CDO, first a special purpose vehicle (SPV) is established. Then the SPV purchases a portfolio of assets (bonds or loans) from the seller.[83] The SPV funds the purchase through the issuance of multiple tranches of securities into Senior, Mezzanine and equity. The underlying collateral's cash flows are then used to pay interest and principal on the issued securities. [84]

CDOs issue multiple classes of equity and debt that are tranched with respect to risk of bankruptcy and timing of repayment. The equity tranche, sometimes called junior subordinated notes, preferred stock or income notes, is the lowest tranche in the CDOs capital structure. The equity tranche sustains the risk of payment delays and credit losses first, in order to make debt tranches less credit-risky. It receives whatever cash flows are left after the satisfaction of debt tranche claims.[85] The following chart shows a typical CDO structure.

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[82] Das, Satyajit (2005) **Credit Derivatives: CDOs and Structured Credit Products**, John Wiley & Sons (Asia) Pte Ltd,, p. 306-309.
[83] Deacon, John (2004) **Global Securitization and CDOs**, John Wiley & Sons Ltd., p. 43-46
[84] Rule, David (2001), **The Credit Derivatives Market: its development and possible implications for financial stability**, Bank of England, p. 120. URL:
http://www.bankofengland.co.uk/publications/fsr/2001/fsr10art3.pdf
[85] Ibid. p. 13-14.

Figure 7: Structuring a CDO[86]

Source: McDermott (2001)

Figure 8: Typical CDO Tranching and Ratings
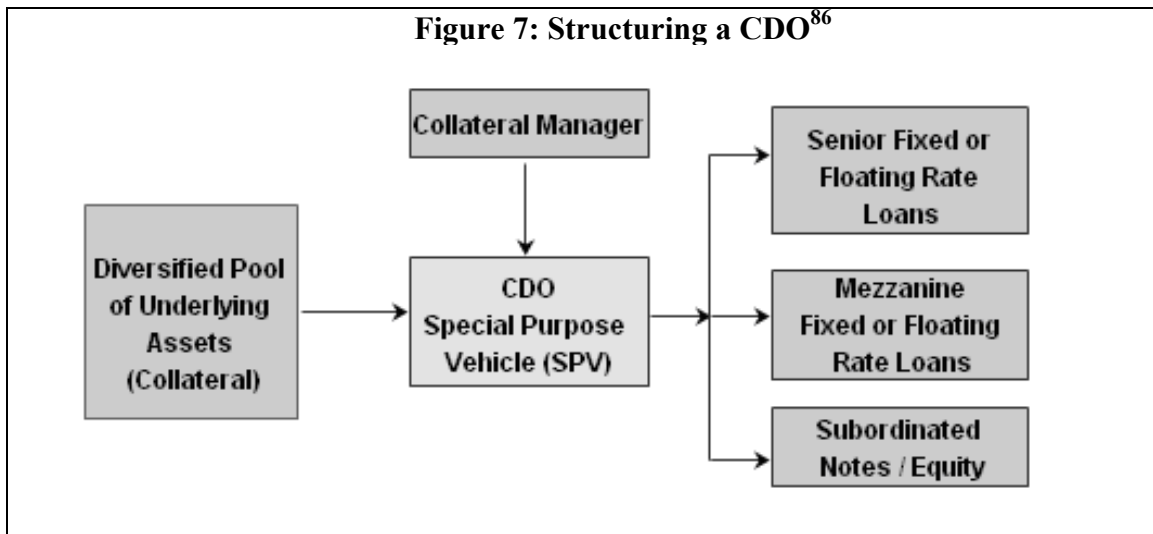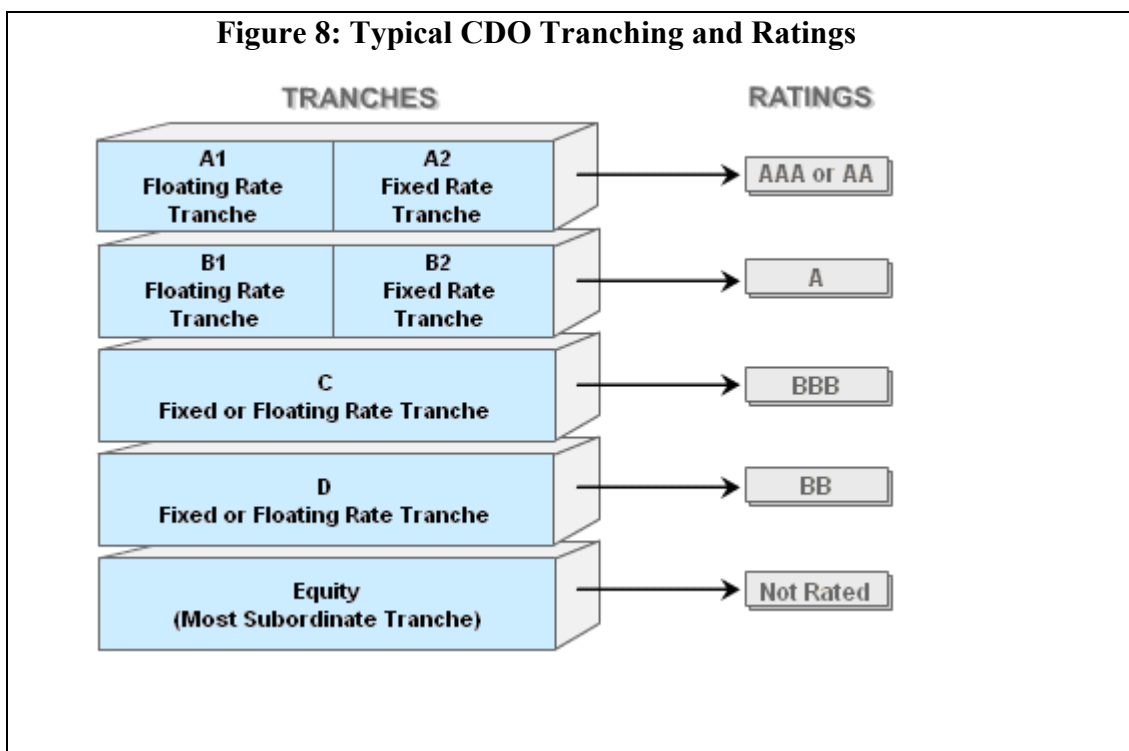
Source: Credit Magazine, 2004[87]

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[86] McDermott, Glen (2001) "The ABCs of CDO Equity" Hayre, Lakhbir ed. **Salomon Smith Barney Guide to Mortgage-Backed Securities,**. John Wiley and Sons, p. 665.
[87] Credit Magazine Website (2004), "CDO Credit Ratings", URL: http://www.creditmag.com/public/showPage.html?page=168502

2.3.3.1. Collateralized Bond (CBO) and Loan Obligations (CLO)

CBOs and CLOs are variations of CDOs. The principal difference between them is that of the collateral. In CBOs the underlying collateral consists of high yield securities while in CLOs the underlying collateral consists of bank loans.[88] While the criteria for CBO and CLO transactions share similarities, loan assets have features that can make the analysis more complicated than that of bond assets. Certain credit, legal, and cash flow analysis of CLOs differ from those of CBOs due to a number of factors.[89]

First, the loan type and loan documentation can affect the degree to which rights and obligations can be transferred from the sponsor to the transferee. Also, loan terms vary widely, such as different amortization schedules, payment dates, rate indices, index reset dates, tenors, and so on, which impact the cash flow analysis. The lack of uniformity in the manner in which rights and obligations are transferred also results in a lack of standardized documentation for these transactions. Therefore, loan documents require a more detailed legal review. Furthermore, loan portfolios can be restructured to accommodate the diminished or declining repayment capacity of borrowers. Last but not least, markets for bank loans are less liquid than bond markets. This increases the risk of not being able to purchase eligible loans during the ramp-up and revolving periods, as well as not being able to sell defaulted loans.[90]

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[88] Das, p. 307.
[89] Lucas et al. (2006) Collateralized **Debt Obligations: Structures and Analysis,** John Wiley & Sons, p. 5
[90] Ibid.

Figure 9: CBO Structure[91]
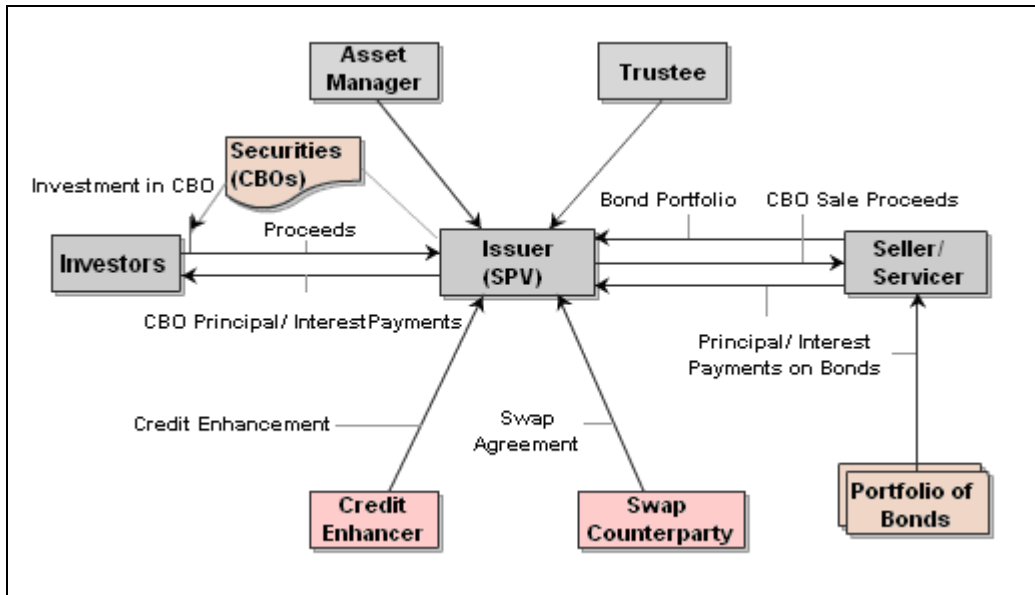
Source: Lucas (2006)

Figure 10: CLO Structure[92]
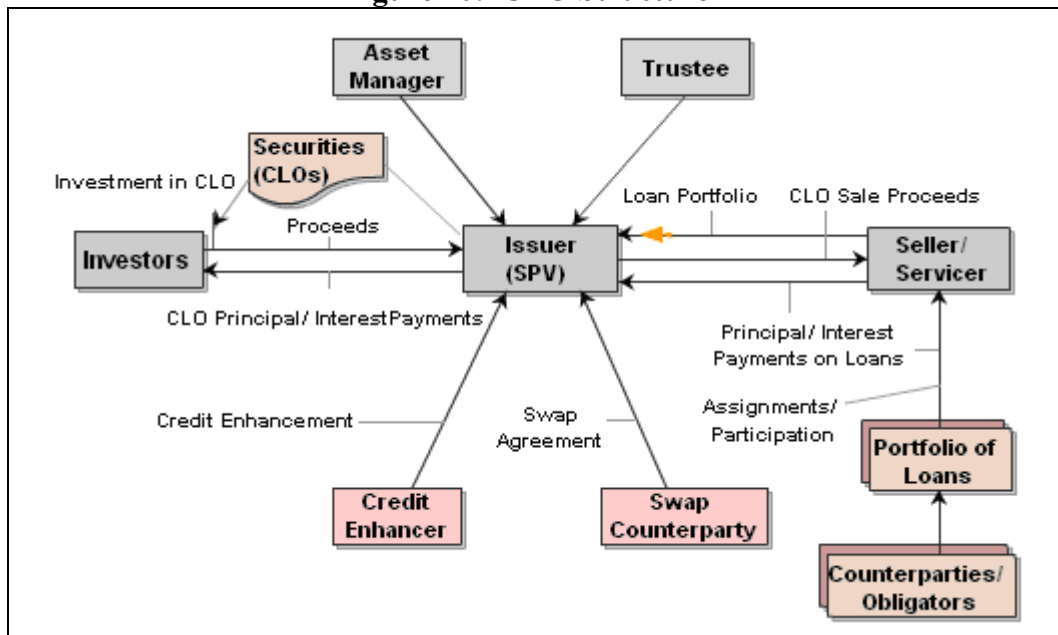
Source: Tavakoli (2001)

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[91] Lucas et al., p. 412.
[92] Tavakoli, Janet M. (2001) **Credit derivatives & Synthetic Structures: A Guide to Instruments and Applications,** 2nd ed. John Wiley & Sons, Inc., p. 212.

2.4. SYNTHETIC ASSET SECURITIZATIONS

The synthetic asset securitization is the replica of the cash securitization structures described above from a cash flow perspective, but which differs in its composition process. Whereas cash securitizations require the actual physical transfer of some form of collateral from the originator into the SPV used in the process to be used as asset backing, the synthetic securitization uses financial contracts known as credit derivatives to mimic the performance of the above-mentioned assets. In order to fully grasp the process know as synthetic securitization, it is therefore essential to get to know these financial contracts known as credit derivatives, their different types and usage in financial markets.

2.4.1. Development of Credit Derivatives

Credit derivatives are bilateral financial contracts that isolate specific aspects of credit risk from an underlying instrument and transfer that risk between two parties. In so doing, credit derivatives separate the ownership and management of credit risk from other qualitative and quantitative aspects of ownership of financial assets. Thus, credit derivatives share one of the key features of historically successful derivatives products, which is the potential to achieve efficiency gains through a process of market completion. By separating specific aspects of credit risk from other risks, credit derivatives allow even the most illiquid credit exposures to be transferred from portfolios that have but don't want the risk to those that want but don't have that risk, even when the underlying asset itself could not have been transferred in the same way.[93]

Credit derivatives trading growth in the latter part of the 1990s and early 2000s has continued strongly.[94] Until recently, credit remained one of the major components of business risk for which no tailored risk-management products existed. Credit risk management for the loan portfolio manager meant a strategy of portfolio diversification backed by line limits, with an occasional sale of positions in the secondary market.

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[93] Bomfim, Antulio N. (2005) **Understanding Credit Derivatives and Related Instruments,** Elsevier Academic Press, p. 3-5.

[94] Choudhry, Moorad (2004) **An Introduction to Credit Derivatives**, Elsevier Butterworth-Heinemann, p. 2-3.

Derivatives users relied on purchasing insurance, letters of credit, or guarantees, or negotiating collateralized mark-to-market credit enhancement provisions in Master Agreements. Corporates either carried open exposures to key customers' accounts receivable or purchased insurance, where available, from factors. Yet these strategies are inefficient, largely because they do not separate the management of credit risk from the asset with which that risk is associated. For example, consider a corporate bond, which represents a bundle of risks, including perhaps duration, convexity, callability , and credit risk (constituting both the risk of default and the risk of volatility in credit spreads). If the only way to adjust credit risk is to buy or sell that bond, and consequently affect positioning across the entire bundle of risks, there is a clear inefficiency. Fixed income derivatives introduced the ability to manage duration, convexity, and callability independently of bond positions; credit derivatives complete the process by allowing the independent management of default or credit spread risk.

2.4.2. Variations of Credit Derivatives

The most highly structured credit derivatives transactions can be assembled by combining three main building blocks: credit default swaps (CDSs), credit options and total return swaps (TRSs). Using these credit derivative building blocks, one can create synthetic securitizations called synthetic credit linked notes (CLNs) and collateralized debt obligations (or synthetic CDOs also known as collateralized synthetic obligations or CSOs).

2.4.2.1.   Credit Default Swaps

The credit swap or ("Credit Default Swap") illustrated in Figure 11 below is a bilateral financial contract in which one counterparty (the protection buyer) pays a periodic fee, typically expressed in basis points per annum, paid on the notional amount, in return for a contingent payment by the protection seller following a credit event with respect to a reference entity.[95] The definitions of a credit event, the relevant obligations and the settlement mechanism used to determine the contingent payment are flexible and determined by negotiation between the counterparties at the inception of the

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[95] Deacon, p. 158-159.

transaction. Since 1991, the International Swaps and Derivatives Association (ISDA) has made available a standardized letter confirmation allowing dealers to transact credit swaps under the umbrella of an ISDA Master Agreement. The standardized confirmation allows the parties to specify the precise terms of the transaction from a number of defined alternatives. In 2002, ISDA published revised credit swap documentation[96], with the objective to further standardize the terms when appropriate, and provide a greater clarity of choices when standardization is not appropriate (see Table 1). The evolution of increasingly standardized terms in the credit derivatives market has been a major development because it has reduced legal uncertainty that, at east in the early stages, hampered the market's growth. This uncertainty originally arose because credit derivatives, unlike many other derivatives, are frequently triggered by a defined (and fairly unlikely) event rather than a defined price or rate move, making the importance of watertight legal documentation for such transactions commensurately greater.

Figure 11 : Credit Default Swap (CDS) Chart
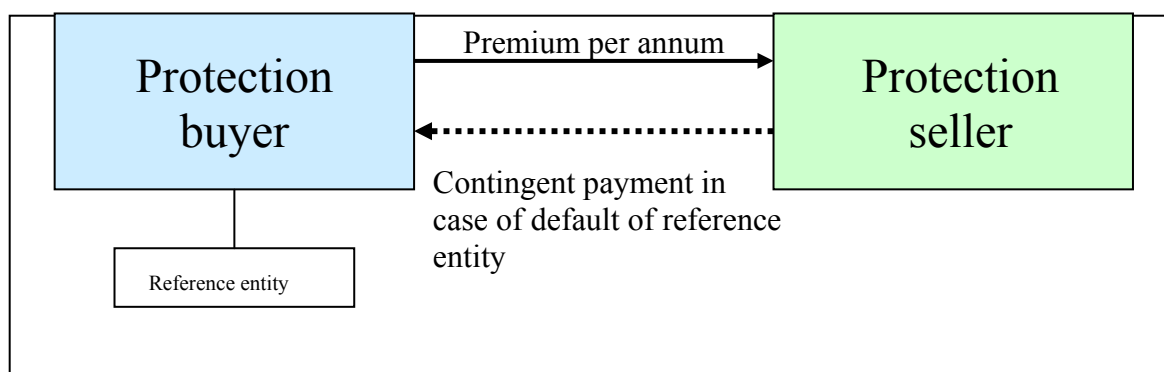
Source: Own Figure

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[96] International Swaps and Derivatives Association, Inc. (ISDA) web site, "2002 ISDA Master Agreement Protocol", URL: http://www.isda.org/2002masterprot/2002masterprot.html

Table 1: ISDA 2002 Master Agreement Protocol Outline[97]

- ISDA MASTER AGREEMENT
  - 1. INTERPRETATION
    - (A) DEFINITIONS
    - (B) INCONSISTENCY
    - (C) SINGLE AGREEMENT
  - 2. OBLIGATIONS
    - (A) GENERAL CONDITIONS
    - (B) CHANGE OF ACCOUNT
    - (C) NETTING
    - (D) DEFAULT INTEREST; OTHER AMOUNTS
  - 3. REPRESENTATIONS
    - (A) BASIC REPRESENTATIONS
    - (B) ABSENCE OF CERTAIN EVENTS
    - (C) ABSENCE OF LITIGATION
    - (D) ACCURACY OF SPECIFIED INFORMATION
  - 4. AGREEMENTS
    - (A) FURNISH SPECIFIED INFORMATION
    - (B) MAINTAIN AUTHORISATIONS
    - (C) COMPLY WITH LAWS
  - 5. EVENTS OF DEFAULT AND TERMINATION EVENTS
    - (A) EVENTS OF DEFAULT
    - (B) TERMINATION EVENTS
    - (C) EVENT OF DEFAULT AND ILLEGALITY
  - 6. EARLY TERMINATION
    - (A) RIGHT TO TERMINATE FOLLOWING EVENT OF DEFAULT
    - (B) RIGHT TO TERMINATE FOLLOWING TERMINATION EVENT
    - (C) EFFECT OF DESIGNATION
    - (D) CALCULATIONS
    - (E) PAYMENTS ON EARLY TERMINATION
  - 7. TRANSFER
  - 8. MISCELLANEOUS
    - (A) ENTIRE AGREEMENT
    - (B) AMENDMENTS
    - (C) SURVIVAL OF OBLIGATIONS
    - (D) REMEDIES CUMULATIVE
    - (E) COUNTERPARTS AND CONFIRMATIONS
    - (F) NO WAIVER OF RIGHTS
    - (G) HEADINGS
  - 9. EXPENSES
  - 10. NOTICES
    - (A) EFFECTIVENESS
    - (B) CHANGE OF ADDRESSES
  - 11. GOVERNING LAW AND JURISDICTION
    - (A) GOVERNING LAW
    - (B) JURISDICTION
    - (C) WAIVER OF IMMUNITIES
  - 12. DEFINITIONS
- ISDA SCHEDULE TO THE MASTER AGREEMENT
  - PART 1. TERMINATION PROVISIONS
  - PART 2. AGREEMENT TO DELIVER DOCUMENTS
  - PART 3. MISCELLANEOUS
  - PART 4. OTHER PROVISIONS

Source: InterestRateSwaps.info Website

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[97] InterestRateSwaps.info Website. URL:http://www.interestrateswaps.info/ISDA%20Schedule.pdf
For an updated study of the ISDA 2003 definitions, please consult: Harding, Paul C. (2004) **A Practical Guide to the 2003 ISDA Credit Derivatives Definitions,** Euromoney Institutional Investors Plc.

A Credit Event is most commonly defined as the occurrence of a failure to meet payment obligations when due (after giving effect to the Grace Period, if any, and only if the failure to pay is above the payment requirement specified at inception); a bankruptcy (for non-sovereign entities) or Moratorium (for sovereign entities only); a repudiation; material adverse restructuring of debt or an obligation acceleration or obligation default.[98] While obligations are generally defined as borrowed money, the spectrum of obligations goes from one specific bond or loan to payment or repayment of money, depending on whether the counterparties want to mirror the risks of direct ownership of an asset or rather transfer macro exposure to the Reference entity.

The contingent payment can be effected by a **cash settlement mechanism** designed to mirror the loss incurred by creditors of the reference entity following a credit event. This payment is calculated as the fall in price of the reference obligation below par at some pre-designated point in time after the credit event. Typically, the price change will be determined through the calculation agent by reference to a poll of price quotations obtained from dealers for the reference obligation on the valuation date. Since most debt obligations become due and payable in the event of default, plain vanilla loans and bonds will trade at the same dollar price following a default, reflecting the market's estimate of recovery value, irrespective of maturity or coupon. Alternatively, counterparties can fix the contingent payment as a predetermined sum, known as a "binary" settlement. The other settlement method is for the protection buyer to make **physical delivery** of a portfolio of specified deliverable obligations in return for payment of their face amount. Deliverable obligations may be the reference obligation or one of a broad class of obligations meeting certain specifications, such as any senior unsecured claim against the reference entity. The physical settlement option is not always available since credit swaps are often used to hedge exposures to assets that are not readily transferable or to create short positions for users who do not own a deliverable obligation.[99]

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[98] Harding, Paul C. (2004) **A Practical Guide to the 2003 ISDA Credit Derivatives Definitions** Euromoney Institutional Investors Plc., p. 106-117.
[99] Ibid., p. 96-106.

Credit Default Swaps are known as credit default options if the fee is paid upfront, which may be the case for very short dated structures. If the fee is paid over time, the agreement is more likely to be called a swap. Unless two counterparties are actually swapping and exchanging the credit default risk of two different credits, the former structure is called a credit default option.[100]

2.4.2.1.1. Sovereign Credit Default Swaps

As Credit Default Swaps (CDS) are credit derivatives used as building blocks in synthetic securitization transactions, they can be used to bet on the default probability of sovereign countries, just like corporations. Similar to other types of CDS, sovereign CDS are off-balance sheet swap contracts which pay a premium to the seller while giving the buyer the right to sell, at notional value, to the seller of the contract, a reference security of the sovereign whose CDS is being traded in case of its default.[101] Naturally, the higher the likelihood of the country in question defaulting, the higher the CDS spread gets. In the empirical part of this paper in Chapter 5, it is intended to carry out an analysis of cointegration between sovereign CDS spreads of Eastern European countries and German sovereign CDS spreads; therefore, it is important to understand the market for sovereign CDS.

The price paid by a buyer of protection, the CDS spread, is intended to compensate the seller for the risk of loss taken on by concluding the contract. As this risk depends on the probability that the reference entity will default, the spread is significantly affected by how great the market perceives this probability to be. If the market believes that the risk of default has increased, the CDS spread widens. In order to use CDS spreads for credit assessment of a counterparty, there must be a liquid market for CDS with the counterparty as the reference entity. The market for sovereign CDS is one of the most liquid markets.[102] Furthermore, as there are many market players with risks associated with Eastern European currency or corporate risk,

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[100] Tavakoli, p. 77-82.
[101] Deacon, p. 158-159.
[102] Harrington, Shannon D. "Credit Default Swaps on Germany, Spain are Most Traded" Bloomberg Website, URL:
http://www.bloomberg.com/apps/news?pid=20601085&sid=aZYSaaTg9xJg&refer=europe

purchasing sovereign CDS in times of crisis as a hedge against more illiquid currency or corporate risk is utilized as a strategy by these investors. This makes the CDS market quite liquid; furthermore, it creates a proxy whereby the riskiness of many factors associated with these countries can be measured all at once. A further advantage of CDS markets is that they can react very quickly to information and changing market conditions. This becomes helpful when evaluating the affect of large crises in a relatively short span of time. The effect on CDS spreads under such a scenario can be readily visible.

In the empirical analysis of Chapter 5, it is the hypothesis that EU convergence should make a country more credit-worthy and less likely to default. EU convergence is measured by using the CDS spreads of Poland, Bulgaria and Turkey from the 2002 to 2009, and checking to see if there exists a cointegration relationship between the spreads of each respective country and those of Germany, an EU founding member state.

2.4.2.2. Credit Options

Credit options are put or call options on the price of either (a) a floating rate note, bond, or loan or (b) an "asset swap" package, which consists of a credit-risky instrument with any payment characteristics and a corresponding derivative contract that exchanges the cash flows of that instrument for a floating rate cash flow stream. In the case of (a), the credit put (or call) option grants the option buyer the right, but not the obligation, to sell to (or buy from) the option seller a specified floating rate reference asset at a pre-specified price (the "strike price"). Settlement may be on a cash or physical basis.[103]

The more complex example of a credit option on an asset swap package described in (b) is illustrated in Figure 11. Here, the put buyer pays a premium for the right to sell to the put seller a specified reference asset and simultaneously enter into a swap in which the put seller pays the coupons on the reference asset and receives three-

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[103] Deacon, p. 23-28.

or six-month LIBOR plus a predetermined spread (the "strike spread"). The put seller makes an up-front payment of par for this combined package upon exercise.

Figure 12: Credit Put Option on an Asset Swap Package Example
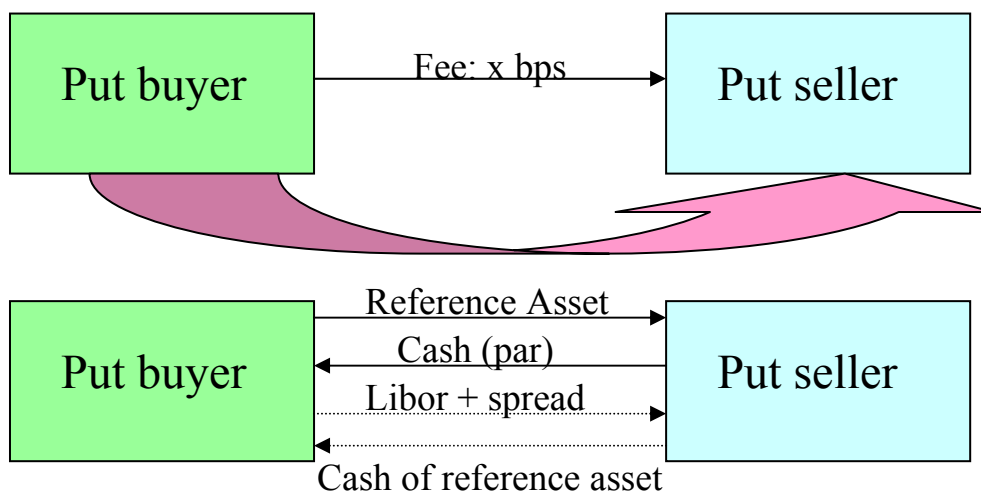
Credit options may be American, European, or multi-European style. They may be structured to survive a credit event of the issuer or guarantor of the reference asset (in which case both default risk and credit spread risk are transferred between the parties), or to knock out upon a credit event, in which case only credit spread risk changes hands.

As with other options, the credit option premium is sensitive to the volatility of the underlying market price (in this case driven primarily by credit spreads rather than the outright level of yields, since the underlying instrument is a floating rate asset or asset swap package), and the extent to which the strike spread is "in" or "out of" the money relative to the applicable current forward credit spread curve. Hence the premium is greater for more volatile credits, and for tighter strike spreads in the case of puts and wider strike spreads in the case of calls. Note that the extent to which a strike spread on a one-year credit option on a five-year asset is in or out of the money will depend upon the implied five-year credit spread in one year's time (or the "one by five

year" credit spread), which in turn would have to be backed out from current one- and six-year spot credit spreads.[104]

2.4.2.3. Total Return Swaps

A total rate of return swap ("Total Return Swap" or "TR Swap") is also a bilateral financial contract designed to transfer credit risk between parties, but a TR Swap is importantly distinct from a credit swap in that it exchanges the total economic performance of a specified asset for another cash flow. That is, payments between the parties to a TR Swap are based upon changes in the market valuation of a specific credit instrument, irrespective of whether a credit event has occurred. Specifically, as illustrated in Figure 12, one counterparty (the "TR Payer") pays to the other (the "TR Receiver") the total return of a specified asset, the reference obligation. "Total return" comprises the sum of interest, fees, and any change-in- value payments with respect to the reference obligation. The change-in-value payment is equal to any appreciation (positive) or depreciation (negative) in the market value of the reference obligation, as usually determined on the basis of a poll of reference dealers. A net depreciation in value (negative total return) results in a payment to the TR Payer. Change-in-value payments may be made at maturity or on a periodic interim basis. As an alternative to cash settlement of the change-in-value payment, TR Swaps can allow for physical delivery of the reference obligation at maturity by the TR Payer in return for a payment of the reference obligation's initial value by the TR Receiver. Maturity of the TR Swap is not required to match that of the reference obligation, and in practice rarely does. In return, the TR receiver typically makes a regular floating payment of LIBOR plus a spread. [105]

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[104] Banks, Erik (2006) **Synthetic and Structured Assets**, John Wiley & Sons Ltd., p. 239-240.
[105] Das, p. 7-11.

Figure 13: Total Return Swap
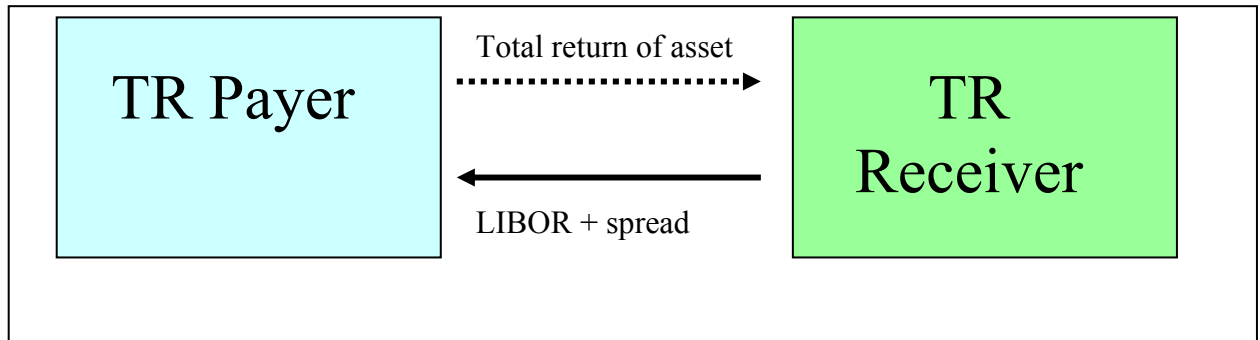
Source: Own Figure

When entering into a TR Swap on an asset residing in its portfolio, the TR payer has effectively removed all economic exposure to the underlying asset. This risk transfer is effected with confidentiality and without the need for a cash sale. Typically, the TR Payer retains the servicing and voting rights to the underlying asset, although occasionally certain rights may be passed through to the TR receiver under the terms of the swap. The TR receiver has exposure to the underlying asset without the initial outlay required to purchase it. The economics of a TR swap resemble a synthetic secured financing of a purchase of the reference obligation provided by the TR Payer to the TR Receiver. This analogy does, however, ignore the important issues of counterparty credit risk and the value of aspects of control over the reference obligation, such as voting rights if they remain with the TR payer.

Consequently, a key determinant of pricing of the "financing" spread on a TR swap is the cost to the TR Payer of financing (and servicing) the reference obligation on its own balance sheet, which has, in effect, been "lent" to the TR Receiver for the term of the transaction. Counterparties with high funding levels can make use of other lower-cost balance sheets through TR Swaps, thereby facilitating investment in assets that diversify the portfolio of the user away from more affordable but riskier assets.

Because the maturity of a TR swap does not have to match the maturity of the underlying asset, the TR receiver in a swap with maturity less than that of the underlying asset may benefit from the positive carry associated with being able to roll forward short-term synthetic financing of a longer-term investment. The TR payer may

benefit from being able to purchase protection for a limited period without having to liquidate the asset permanently. At the maturity of a TR swap whose term is less than that of the reference obligation, the TR payer essentially has the option to reinvest in that asset (by continuing to own it) or to sell it at the market price. At his time, the TR payer has no exposure to the market price since a lower price will lead to a higher payment by the TR receiver under the TR swap.

Other applications of TR swaps include making new asset classes accessible to investors for whom administrative complexity or lending group restrictions imposed by borrowers have traditionally presented barriers to entry. Recently insurance companies and levered fund managers have made use of TR swaps to access bank loan markets in this way.[106]

2.4.3. Synthetic Securitization Structures

Since 1997, credit derivatives have entered the mainstream of global structured finance as tools in a number of large, high profile securitizations of assets that cannot as easily be managed using more traditional techniques. By combining credit derivatives with traditional securitization tools in collateralized loan obligations (CLOs) or mortgage backed securitizations (MBSs), for example, structures can be tailored to meet specific balance sheet management goals with much greater efficiency. Specifically, credit derivatives have assisted banks in reducing economic and/or regulatory capital, preserving a low funding-cost advantage, and maintaining borrower and market confidentiality.

As alternatives to traditional securitization, transactions have been and are being developed that make use of credit derivatives to transfer the economic risk but not the legal ownership of the underlying assets. Credit derivatives can be used to achieve the same or similar regulatory capital benefits of a traditional securitization by transferring the credit risk on the underlying portfolio. However, as privately negotiated confidential transactions, credit derivatives afford the originating bank the ability to avoid the legal and structural risks of assignments or participations and maintain both

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[106] Ibid., p. 15-18

market and customer confidentiality. Thus, credit derivatives are stimulating the rapidly growing asset-backed securitization market by stripping out and repackaging credit exposures from the vast pool of risks that do not naturally lend themselves to securitization, either because the risks are unfunded (off-balance sheet), because they are not intrinsically transferable, or because their sale would be complicated by relationship concerns. In so doing, by enhancing liquidity and bringing new forms of credit risk to the capital markets, credit derivatives enable both buyers and sellers of risk to benefit from the associated efficiency gains. Now we may look at the fundamental synthetic securitization structures created by using credit derivative building blocks: Credit Linked Notes (CLNs) and Collateralized Synthetic Obligations (synthetic CDOs or CSOs).[107]

2.4.3.1. Credit-linked Note

Unlike credit swaps, credit-linked notes are funded balance sheet assets that offer synthetic credit exposure to a reference entity in a structure designed to resemble a synthetic corporate bond or loan.[108] Credit-linked notes are frequently issued by special purpose vehicles (corporations or trusts) that hold some form of collateral securities financed through the issuance of notes or certificates to the investor. The investor receives a coupon and par redemption, provided there has been no credit event of the reference entity. The vehicle enters into a credit swap with a third party in which it sells default protection in return for a premium that subsidizes the coupon to compensate the investor for the reference entity default risk.[109]

The investor assumes credit risk of both the reference entity and the underlying collateral securities. In the event that the reference entity defaults, the underlying collateral is liquidated and the investor receives the proceeds only after the credit swap counterparty is paid the contingent payment. If the underlying collateral defaults, the investor is exposed to its recovery regardless of the performance of the reference entity. This additional risk is recognized by the fact that the yield on the credit-linked note is

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[107] Ibid. p. 463-467 and p. 635-638.
[108] Nelken, Israel (1999) **Implementing Credit Derivatives: Strategies and Techniques for Using Credit Derivatives in Risk Management,**. McGraw-Hill, p. 43-44.
[109] Das (2005), p. 239

higher than that of the underlying collateral and the premium on the credit swap individually.[110]

In order to tailor the cash flows of the credit-linked note it may be necessary to make use of an interest rate or cross-currency swap. At inception, this swap would be on-market, but as markets move, the swap may move into or out of the money. The investor takes the swap counterparty credit risk accordingly. Credit-linked notes may also be issued by a corporation or financial institution. In this case the investor assumes risk to both the issuer and the reference entity to which principal redemption is linked.[111]

This basic arrangement is illustrated in Figure 13. The transaction between the protection buyer and the CLN issuer is a CDS transaction. The issuer sells CLNs to the Investor and uses the cash to buy 'AAA' rated bonds. As a result the buyer's direct exposure to the reference credit is passed to the investor via the CDS and CLN. The investor therefore has synthetic exposure to the reference credit. Sometimes, the CLN issuer may use a special purpose vehicle instead of retaining the bonds exposure on its balance sheet. In other transactions, the CLN issuer, especially when it is a market-making institution in CDS markets, may choose to internalize the CDS transaction, making the structure a little simpler. In the case of a default of reference entity, the investor bears the loss, receiving investment minus losses incurred on the reference entity. Thus, risk is transferred from CLN issuer to investor.[112]

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[110] Ibid. p. 45-47.
[111] Das, p. 69-93.
[112] Choudry, p. 115-142.

Figure 14: Credit Linked Note[113]

RISK

AAA Bonds — Return → CLN Issuer ← Proceeds — Investor

CLN Issuer — Proceeds ⟶ AAA Bonds

CLN Issuer — CLN → Investor

Contingent Payment ↓ / Fee ↑ — Protection Buyer

Synthetic Exposure ↑ — Reference Credit
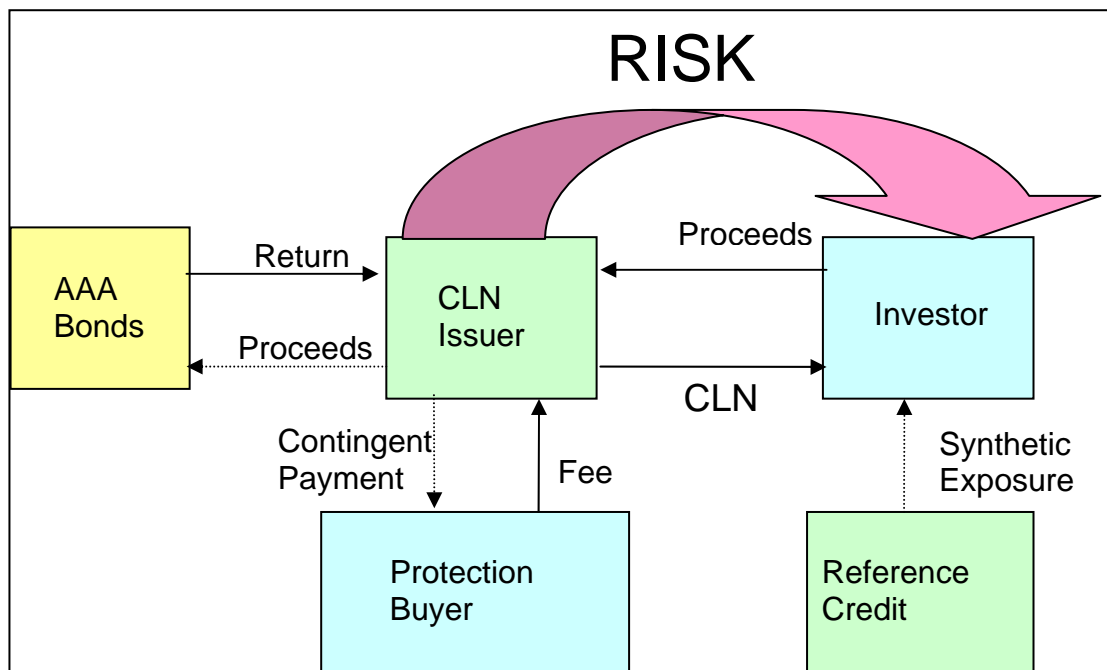
Source: Choudry (2004)

2.4.3.2. Synthetic Collateralized Obligations (CSOs)

Synthetic CDOs utilize credit derivatives to transfer credit risk related to a portfolio of reference assets. In a synthetic CDO, the sponsoring institution transfers the total return profile or default risk of a reference portfolio via a credit derivative agreement. Correspondingly, the SPV issues one or more tranches of securities with repayment contingent upon the actual loss experience relative to expectations. Proceeds may be held by the SPV and invested in highly rated, liquid collateral, or the funds may be passed through to the sponsor as an investment in a credit-linked note.[114]

Synthetic arbitrage CDOs replicate a leveraged exposure to a reference portfolio of assets, most frequently syndicated loans or bonds. In a typical structure, an SPV enters into a series of total return swaps (TRS) on a portfolio of credits that is diversified by obligor and industry. In accordance with the terms of the TRS, the SPV receives the total realized return on the reference portfolio and pays the sponsoring bank the LIBOR plus a spread. The SPV, in turn, issues a combination of notes and equity,

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[113] Ibid.
[114] Ibid., p. 452.

which serve to fund the first loss exposure to the reference portfolio. The reference portfolio is funded on-balance sheet by the sponsoring institution. The TRS generally is marked-to-market on a periodic basis, and these structures may be subject to one or more market value triggers. These structures invest the proceeds from the note and equity issuance in high quality, liquid "eligible" collateral, which generally earns a rate approximating LIBOR and serves to defray the coupon on the notes. This collateral is pledged on a primary basis to cover losses, if necessary. Provided losses do not exceed expectations, commensurate with the assigned rating, the collateral is available at maturity to repay the obligations.[115]

Synthetic structures, which can be structured using either a CDS or a credit-linked note, allow banks to achieve risk/regulatory capital relief at lower all-in funding and administrative costs when compared with fully cash-funded CDOs. In synthetic structures involving a CDS, the issuing bank establishes an SPV and enters into a CDS that references a portfolio of loans, bonds, commitments, or other credit instruments. The bank normally will retain a relatively small first loss piece that serves to align its interests with the noteholders. The SPV issues one or more tranches of notes whose ultimate performance is linked to the actual default and recovery experience of the reference portfolio. Any losses arising from defaults are allocated to the noteholders, according to their priority in the capital structure. Note proceeds are invested in high-quality, liquid collateral. This eligible collateral is pledged, on first priority basis, to the sponsor in order to satisfy loss claims under the CDS during the transaction's life and, secondarily, to the investors for repayment of the notes at maturity. The bank is able to achieve maximum regulatory capital relief through the combination of the synthetic CDO, as well as through a super senior CDS transacted with an OECD bank. The super senior CDS is sized to provide credit protection for the balance of the reference portfolio in excess of the most senior tranche of the synthetic CDO.[116]

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[115] Deacon, p. 151-171.
[116] Banks, p. 135-140.

Figure 15: Synthetic Arbitrage CDOs using Total Return Swaps Figure
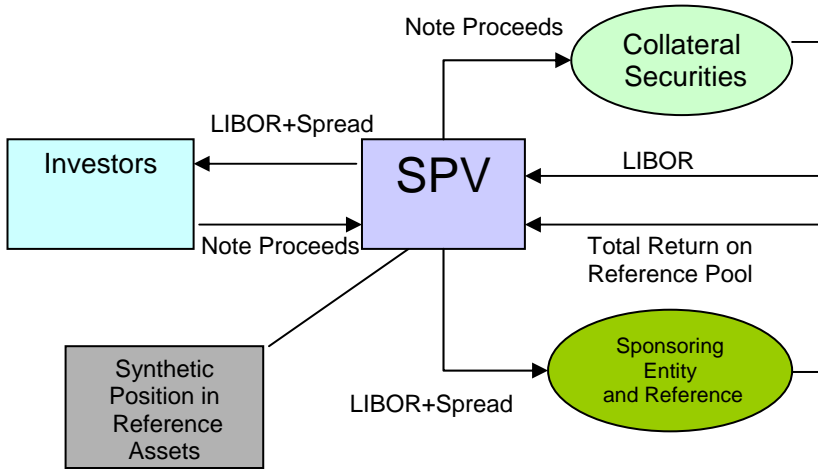
Source: Deacon (2004)

Figure 16: Synthetic Structures involving Credit Default Swaps
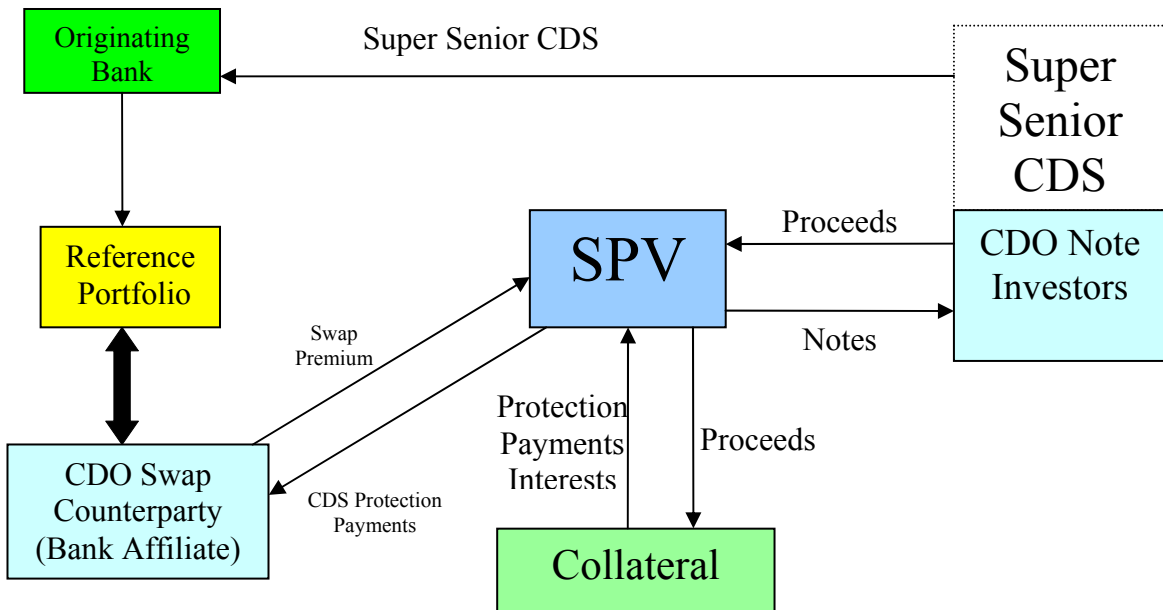
Source: Banks (2006)

Table 2: Synthetic Securitization Case Study

BISTRO: the first synthetic securitization[117]

Since late 1997, the market has seen several innovative structures which have exploited the unfunded, off-balance sheet nature of credit derivatives (as opposed to funded CLNs) to allow a bank to purchase the credit protection necessary to mimic the regulatory capital treatment of a traditional securitization while preserving its competitive funding advantage. Such structures have the advantage of being equally applicable to the exposure of both drawn and undrawn loans. This type of structure is exemplified by a transaction known as BISTRO (*Broad Index Secured Trust Offering)*, a J.P. Morgan proprietary product. The product was designed to remove a portfolio of corporate loans held by J.P. Morgan.

In this structure, JP Morgan entered into credit default swap contracts with BISTRO, a special purpose vehicle. J.P. Morgan bought protection from BISTRO SPV and BISTRO SPV sold protection to J.P Morgan on a portfolio of $9.7 billion corporate loans held by J.P. Morgan. BISTRO SPV issued $700 mio. notes in two tranches and with the proceeds of this note bought government securities. With the proceeds from the government securities and the CDS contracts, BISTRO SPV paid the coupons on the notes issued. If any credit events (i.e. defaults on loan portfolio) were to occur, this would be borne by BISTRO and paid out by the sale of the government securities purchased by the SPV.

In a critical departure from the traditional securitization model, the BISTRO SPV issued a substantial smaller note notional, and had substantially less collateral, than the notional amount of the reference portfolio. For instance, the note issued for the $9.7 billion worth covered less than the first 10% of losses in this particular portfolio, leaving the most senior risk position unfunded. The transaction was structured so that, assuming the portfolio had a reasonable amount of diversification and investment grade-average credit quality, the risk of loss exceeding the amount of BISTRO securities sold was, at most, remote, or in rating agency terms, better than AAA. Furthermore, because of the leveraged nature of the deal, the investors received a higher return on the note than a similar rated instrument would normally yield. Thus, the deal became a "win-win" transaction for both the bank and the investors.

Source: Choudry (2004)

2.4.4. Market Participants, Composition and Liquidity

The credit derivatives market has changed substantially since its early days in the late 1990s, moving from a small and highly esoteric market to a more mainstream

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[117] Choudry, p. 291-293.

market with standardized products. Initially driven by the hedging needs of bank loan managers, it has since broadened its base of users to include insurance companies, hedge funds and asset managers. According to an International Swaps and Derivatives Association (ISDA) survey, the total market outstanding notional across all derivatives products was calculated to be $596 trillion in 2007.[118] A more recent study conducted by the Bank for International Settlements (BIS) estimates that the size of the global derivatives market including currency and interest rate products reached $684 trillion by the second half of 2008.[119] CDS trades, on the other hand, saw their peak at $62 trillion before falling to $54 trillion by mid-2008.[120] Furthermore, the range of products, although still concentrated on single name CDSs and synthetic CDOs, now cover new issues such as full index trades, tranched equity-linked products and swaptions.

Figure 17: Size of Global Derivatives Markets[121] (Trillions of Dollars)

	2001	2002	2003	2004	2005	2006	2007	2008
Total Derivatives	70.1	106.0	149.5	196.2	235.8	388.7	454.5	683.0
Credit Derivatives	0.9	4.6	7.2	12.6	22.6	41.6	72.2	65.0
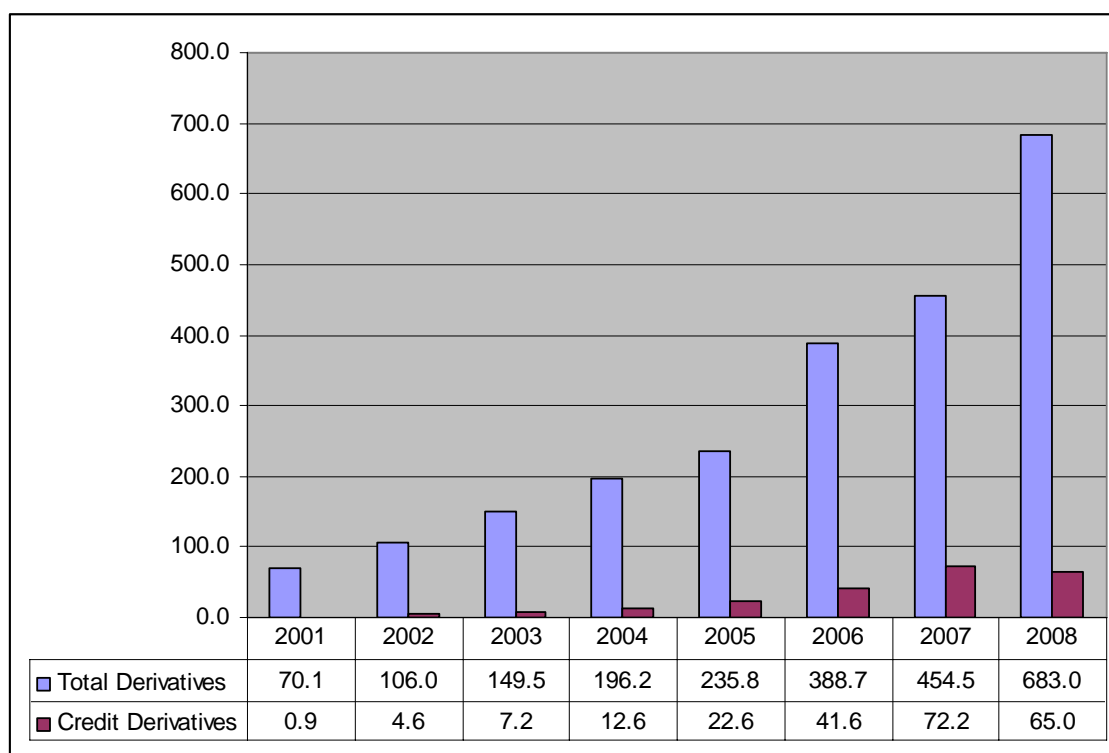
Source: ISDA, BIS

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[118] Ibid

[119] BIS (2008), "OTC Derivatives market activity in the first half of 2008", Bank for International Settlements Website, p. 6. URL: http://www.bis.org/publ/otc_hy0811.pdf

[120] ISDA (2008), "ISDA Market Survey", p. 1. URL: http://www.isda.org/statistics/pdf/ISDA-Market-Survey-historical-data.pdf

[121] Ibid.

The base of users for credit derivatives has been broadening steadily over the last few years as shown by a breakdown of the market by end-users in Figure 18. Banks and securities firms still remain the largest users of credit derivatives with nearly 81% share.[122] This is mainly because of their substantial use of CDS as hedging tools for their loan books, and their active participation in synthetic securitizations. The hedging activity driven by the issuance of synthetic CDOs has for the first time satisfied the demand to buy protection coming from bank loan hedgers. Insurance companies have joined the market, mainly by investing in investment-grade CDO tranches.

Figure 18: Breakdown of Credit Derivatives by End Users (2008)
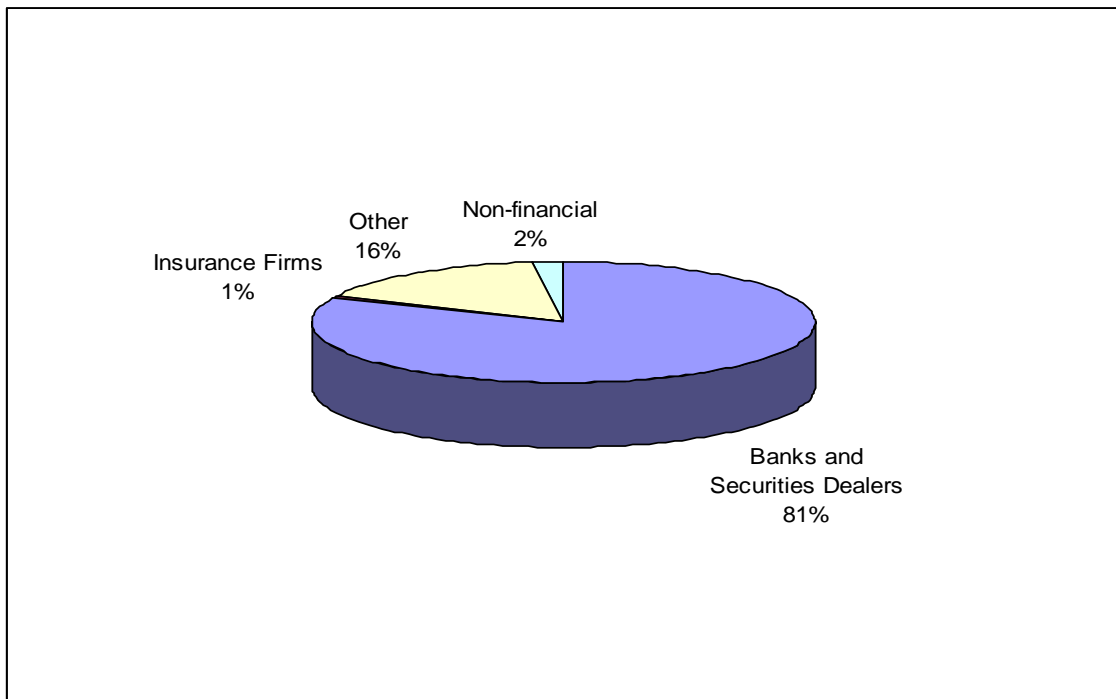
Source: BIS

Single name CDS remain the most used instrument in the credit derivatives world with 71% of market outstanding notional, as shown in Figure 19.[123] This shows that the credit default market has become more mainstream, focusing on the liquid standard contracts. This growth in CDS has been driven by hedging demand generated

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[122] Ibid.
[123] Ibid.

by synthetic CDO positions, and by hedge funds using credit derivatives as a way to exploit capital structure arbitrage opportunities.[124]

Figure 19: Types of Global OTC Credit Derivatives Used (2008)
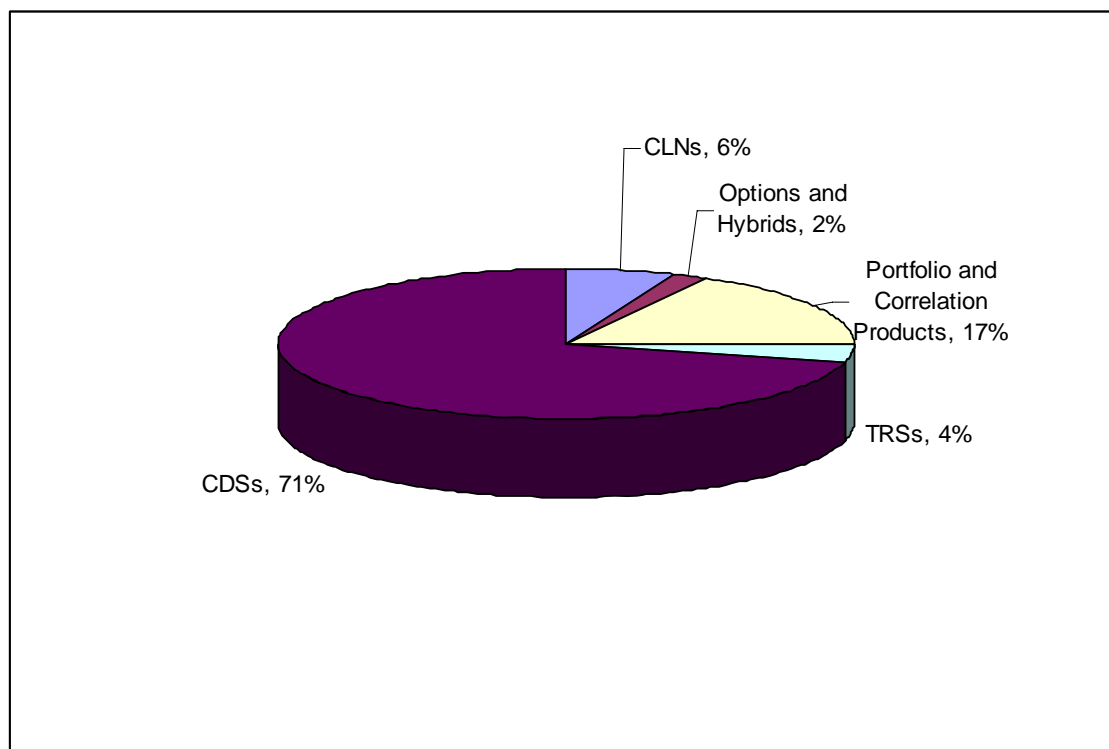
Source: BIS

2.4.5. Motives for Synthetic Securitization

As mentioned above combining aspects of traditional cash securitization with credit derivatives results in synthetic securitizations. The motives behind such structures can be multiple as mentioned below:

Credit lines: Traditional securitizations require the actual taking of a cash-based position in an underlying asset. Because of the limitations in credit lines or due to ratings of a reference asset, this may not be a viable option for some investors. However, because synthetic transactions utilize credit derivatives, and as these transactions are governed by ISDA agreements, which are in turn supported by Credit

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[124] Ibid.

Support Annexes that mitigate credit risk, it is a much more readily usable type of transaction that can be used by such investors.[125]

Legal, Regulatory or Fiscal Restrictions: In some jurisdictions, legal and regulatory bodies may prevent the taking of a cash position in a certain physical asset.[126] There may also be some tax implications of a cash position. Under such circumstances, it may be a better way to take these positions using credit derivatives.

Funding issues: The purchase of a cash asset backed security requires that it be funded via the investor, and the funding cost of the investor may include a spread over LIBOR. However, when the position is taken using credit derivatives, the position is unfunded, and this may imply a better spread for the investor than the actual physical position. For instance, a Turkish bank investing in the securitization deal of a Russian Bank's credit card securitization may receive LIBOR + 100 for 2 years but because its funding cost is LIBOR + 50, it may only make a spread of 50 bps. However, if the same bank were to take the same position using a synthetic CDO, or its spread would be a net 100 bps. In essence, synthetic securitization splits the funding and risk transfer sides of the securitization process.[127] It also has the added advantage of minimizing reinvestment problems for the originator because as the asset is not sold to the investor, the originator does not receive the entire funding of the entire portfolio as would be the case in a cash transaction, and thereby does not face any reinvestment issues.[128]

Balance sheet issues: Cash securitization most of the time requires the actual separation of the assets used as collateral in the issuance of the Asset Backed Security; and, thereby results in the actual diminishing of the balance sheet size. As balance sheet growth is one of the advertised claims and source of pride for financial institutions such as banks, this may have some undesirable consequences for them. However, synthetic securitization solves this problem as it transfers the risk but not necessarily the actual

[125] Choudry, p. 47-49.
[126] Nolan, A (2006) "Treatment of Securitization and Credit Derivatives Activities of Banking Institutions" p. 3-6. URL :http://www.goodwinprocter.com/GetFile.aspx?aliaspath=%2FFiles%2FPublications%2Fnolan_sweetbasel_2_05_pdf
[127] Kothari, p. 526.
[128] İbid.

assets involved in the securitization process.[129] Also, because the banks retain the actual assets of their clients on their balance sheets, they are better able to maintain their banking relationships as well.[130]

Efficiency and speed: Usually, a synthetic structure can be placed on the market much quicker than the cash transaction. Furthermore, the use of credit derivatives allows the issuers to create more efficient structures, as legal and other transactions fees are lower and wide ranges of products more readily available.[131]

Capital relief: Under Basel regulations, all corporate loans that Banks give receive the 100% risk weighting irrespective of their risk or yield. Some corporates with higher ratings naturally yield lower than higher risk credit, yet they have the same regulatory capital requirements. Banks may wish to transfer such low-yielding corporate debt from their portfolios by a synthetic CDO transaction.[132]

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[129] Ibid., p. 465.
[130] Choudry, p. 264.
[131] Ibid., p. 265.
[132] Ibid., p. 260.

3. SECURITIZATIONS IN THE EU AND TURKEY

3.1. EU-TURKEY RELATIONS

3.1.1. Contractual relations and the main steps towards the EU

Turkey has had a long association with the project of European integration. It made its first application to join what was then the European Economic Community (EEC) in July 1959. The EEC's response to this first application was to propose the creation of an association between the EEC and Turkey until such time as circumstances permitted Turkey's accession. This association came into being with the signing of the Ankara Agreement in September 1963.[133] This Agreement envisaged the progressive establishment of a customs union, which would bring the two sides closer together in economic and trade matters.

The Ankara Agreement was supplemented by an additional protocol signed in November 1970, which set out a timetable for the abolition of tariffs and quotas on goods circulating between Turkey and the EEC.

There was a temporary freeze in Turkish- EEC relations as a result of the military intervention in government in 1980. However, following the multiparty elections of 1983, relations were re-established and Turkey applied for full membership in 1987. The European Commission's Opinion on Turkish membership, endorsed by the European Council in February 1990, confirmed Turkey's eligibility for membership yet deferred an in-depth analysis of its application until the emergence of a more favorable environment. On 5 February 1990 the Council adopted the general content of the Commission opinion and asked it to make detailed proposals developing the ideas expressed in the opinion on the need to strengthen EC-Turkey relations.

On 7 June 1990 the Commission adopted a set of proposals (the "Matutes Package") including completion of the customs union, the resumption and

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[133] Arıkan, Harun (2006) "The EU-Turkey Association: A Flawed Instrument" **Turkey and the EU: An Awkward Candidate for EU Membership?** Ashgate Publishing Ltd., p. 1.

intensification of financial cooperation, the promotion of industrial and technological cooperation and the strengthening of political and cultural ties. The Council did not approve this package due to Greek objections.[134]

Mutual trade between Turkey and the EU has been a key factor in EU- Turkey relations. The customs union between Turkey and the EU was established in 1995. On 6 March 1995 the EC-Turkey Association Council decided to move onto the final stage of the customs union and resume financial cooperation. The Council also decided to step up cooperation in several sectors, to strengthen institutional cooperation and to intensify political dialogue. On 13 December 1995 Parliament gave its assent to the customs union. The Decision on the final phase of customs union came into force on 31 December 1995; on the institutional front, it set up a consultation body, the Customs Union Joint Committee. Since then, the European Community's (EU-25) share in Turkey's foreign trade has continued to increase to the extent that Turkey is now the EU's 7th biggest trading partner (up from 9th in 1990). It is also now the 13th biggest exporter to the EU (up from 17th in 1990). In the first nine months of 2004, the proportion of Turkish exports destined for the EU increased to 54.87%. At the same time, the proportion of Turkey's imports that came from the EU climbed to 50.62%. Turkey's share in total EU exports has climbed since the financial crisis in 2001 to 3.95 % in 2004, while its   share in total EU imports was 3.01%.[135]

On 15 July 1996 the General Affairs Council adopted the Regulation on the MEDA program for 12 Mediterranean countries, including Turkey. Following a meeting of the Conference of Presidents on 28 November 1996, a specific procedure was adopted by which Parliament gives its opinion on the projects the Commission wished to finance under the MEDA program (of which ECU 375 million for Turkey over the period 1996-99). Despite this procedure, by the end of 1997 commitments came to ECU 103 million. ECU 272 million is programmed for the period 1998-99.[136]

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[134] EU-Turkey Communication Platform "History of Relations Between Turkey and the European Union" URL: http://www.turkishembassy.com/II/O/Turkey_EU.htm
[135] European Commission Website "EU-Turkey Relations" URL: http://ec.europa.eu/enlargement/candidate-countries/turkey/eu_turkey_relations_en.htm
[136] EU-Turkey Communication Platform "History of Relations Between Turkey and the European Union" URL: http://www.turkishembassy.com/II/O/Turkey_EU.htm

In the wake of the informal Foreign Affairs Council in Apeldoorn (16 March 1997), the European Union, speaking at the meeting of the EC-Turkey Association Council on 29 April 1997, reaffirmed Turkey's eligibility for membership of the European Union. At the same time, the European Union also said that Turkey's application would be judged on the same criteria as the other applicant countries, and the Commission was called on to draw up a communication on the future development of relations between the European Union and Turkey, in the context of the customs union.[137]

Agenda 2000 considered that "the European Union should continue to support Turkey's efforts to resolve its problems and to forge closer links with the EU" and it referred on this point to the communication on the further development of relations with Turkey adopted by the Commission on 15 July 1997. This communication proposed a series of measures designed to consolidate the customs union and to extend it to new fields (services and agriculture) and to step up cooperation in several sectors (environment, energy, telecommunications etc), some of which come under the second and third pillars. The Commission also proposed helping Turkey in its efforts to improve the human rights situation. In this connection the Commission prepared a preliminary draft program proposing cooperation with the Turkish authorities and NGOs to support the Turkish authorities' efforts to increase respect for human rights and the rule of law.

The Luxembourg European Council of December 1997 confirmed at the highest level "Turkey's eligibility for accession to the European Union".[138] The Heads of State and Government also decided to draw up a strategy to prepare Turkey "for accession by bringing it closer to the European Union in every field. This strategy should consist in development of the possibilities afforded by the Ankara Agreement, intensification of the Customs Union, implementation of financial cooperation, approximation of laws and adoption of the Union acquis; participation, to be decided

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[137] Lake, Michael and Cox, Pat (2005) **The EU and Turkey: A Glittering Prize or a Millstone?** Federal Trust for Education and Research, p. 9.
[138] European Council Website, 12-13 December Luxembourg Summit Declaration URL: http://ue.eu.int/ueDocs/cms_Data/docs/pressData/en/ec/032a0008.htm

case by case, in certain programs and certain agencies…"[139] In addition, the European Council listed a number of principles, which will allow strengthening ties with Turkey. The European Council also indicated that Turkey would be invited to participate in the European Conference on the same basis as the other applicant countries.[140]

As requested by the Luxembourg European Council, the Commission adopted on 4 March 1998 the initial operational proposals of the "European Strategy for Turkey".[141] At the Helsinki European Council of December 1999 Turkey was officially recognized as a candidate state on an equal footing with other candidate states.[142] This marked the beginning of a pre-accession strategy for Turkey designed to stimulate and support its reform process through financial assistance and other forms of cooperation. Turkey also drew up a National Plan for the Adoption of the Acquis, which outlined the government's own strategy for the harmonization of its legislation with that of the EU.[143]

The European Council adopted a revised Accession Partnership in May 2003. The purpose of the Accession Partnership was to assist the Turkish authorities in their efforts to meet the accession criteria, with particular emphasis on the political criteria. It covered in detail the priorities for accession preparations, in particular implementation of the acquis, and forms the basis for pre-accession assistance from Community funds.[144]

A revised National Program for the Adoption of the Acquis was adopted in July 2003. Both the Accession Partnership and the National Program for the Adoption of the Acquis are revised on regular basis to take account of progress made and to allow for new priorities to be set.

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[139] Ibid.

[140] Arıkan, p. 75.

[141] Archive of European Integration (2005), "European Strategy for Turkey" URL: http://aei.pitt.edu/4356/

[142] European Council Website, "10-11 December Helsinki Summit Declaration", URL: http://ue.eu.int/ueDocs/cms_Data/docs/pressdata/en/ec/ACFA4C.htm

[143] Öniş, Ziya (2003) "Domestic Politicsd, International Norms and Challenges to the State: Turkey-EU Relations in the post-Helsinki Era" **Turkey and the European Union**. Rubin, Barry and Çarkoğlu, Ali ed., Frank Cass & Co. Ltd., p. 13.

[144] Devlet Planlama Teşkilatı Website, p. 40-44. URL: www.dpt.gov.tr/DocObjects/Download/2489/2003%20Accession%20Partnership%20Turkey.pdf

On 17 December 2004, the European Council defined the perspective for the opening of accession negotiations with Turkey. On 3 October 2005, membership negotiations were opened with Turkey, which has been an associate member of the EU since 1963 and an official candidate since 1999. On June 17, The European heads of state and government confirmed the historic decision of 17 December 2004 by the European Council. On 29 June, the Commission presented its negotiating framework to Ankara, and after a full day of intense negotiations the EU-25's foreign ministers finalized the document on 3 October.

The chapters of the acquis started being opened in 2005. So far, 12 chapters have been opened, 1 completed while 8 remain frozen. Ongoing problems regarding the Cyprus question, and opposition from some Western European EU members, most notably France, have stalled the progress. Nevertheless, the accession process has not been derailed so far, as Turkey's alignment with the Acquis continues.[145]

3.1.2. EU assistance

Turkey is the beneficiary of a dedicated pre-accession financial assistance instrument to help it meet the criteria for EU membership. The European Council adopted this in December 2001. Prior to this, Turkey was a beneficiary of the MEDA program, which is the principal financial instrument for the implementation of the Euro-Mediterranean Partnership. EU pre-accession assistance provides support for institution building, investment to strengthen the regulatory infrastructure needed to ensure compliance with the acquis, and investment in economic and social cohesion. Accreditation for decentralized implementation of the programs was granted at the end of 2003.[146]

Around €1.15 billion of EU financing is currently being managed in Turkey for projects committed between 1996 and 2004 inclusive. The budgetary allocation for 2005 is 300 million €, and for 2006, 500 million €. From 2007 Turkey, along with other

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[145] Secreteriat General for EU Affairs Website, "Turkey's Program for Alignment with the Acquis 2007-2013", URL: http://www.abgs.gov.tr/index.php?p=6&l=2
[146] EU-Turkey Communication Platform "History of Relations Between Turkey and the European Union" URL: http://www.turkishembassy.com/II/O/Turkey_EU.htm

candidate and potential candidate countries, will be a beneficiary of the IPA instrument.[147] It is expected that the average annual allocation for Turkey in the period 2007-2013 will be in excess of €1 billion.[148]

The priorities for the 2005 financial program included supporting the implementation of the Copenhagen political criteria, including some closely-related subjects in the sector of Justice, Freedom and Security, supporting economic and social cohesion by targeting the poorest regions in Turkey, promoting the implementation of the acquis related to the customs union, the internal market, agriculture, environment, and promoting political and social dialogue between the EU and Turkey.

Overall, the impact of EU assistance to Turkey is increasingly positive. The EU has provided significant resources in a number of important areas such as basic education, training, environmental infrastructure and economic adjustment. EU assistance is not the only source of financial support for helping Turkey to meet its Accession Partnership priorities. The country is also a major beneficiary of assistance from the European Investment Bank (EIB), with Turkey receiving EIB loans worth €1,955 million from 1992 to 2002. The Commission also cooperates extensively with the World Bank, which is particularly active in Turkey, occasionally co-financing projects. Discussions between the World Bank and Commission have taken place at all levels concerning the development of the former's Country Assistance Strategy 2004-2006.[149]

3.1.2.1. Expected Impact of Negotiations on Turkey's Financial Markets

Financial sector reform has been one of the main challenges in structural adaptation to the European Union. In the EU´s New Member States, initially foreigners were allowed in only for greenfield operations (via new licenses) and via minority

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[147] EC Website "Commission Decision C (2007)1835 of 30/04/2007 on a MIPD 2007-2009 for Turkey", p. 1-2. URL: http://ec.europa.eu/enlargement/pdf/mipd_turkey_2007_2009_en.pdf
[148] Avrupa Birliği Genel Sekreterliği (2008), "Framework Agreement", p.17. URL: http://www.euturkey.org.tr/files/Duyurular/IPA_TR_FWA_3_June_2008_final.pdf
[149] EIB (2005), "Towards a New Strategy for the EIB Group", p.10. URL: http://www.eib.org/attachments/strategies/strategy_cg2005_en.pdf

stakes in course of privatization. However, in all EU accession countries, majority foreign ownership was allowed after major banking and economic crises. There is recent evidence that foreign ownership of the banking sector did indeed improve economic growth and restructuring in the new member states.[150] This evidence is based on large-scale majority ownership. There are clear benefits attributed to foreign owners (improving efficiency in intermediation, introducing hard budget constraints, improving risk management and corporate governance, providing fresh money) which can only be implemented upon majority ownership.

Most banks in the EU´s New Member States and Accession Countries have been privatized with foreign strategic investors. EU accession perspective has contributed to a rush-in of investors expecting high growth rates and growing consumer markets. Banking systems had become unstable due to the lack of hard budget constrains and ordinary risk intermediation. The malfunctioning of the banking system, among others, resulted in financial and economic crisis in these countries. As initial trials to improve the banking situation via minority foreign involvement only were not successful, majority foreign ownership became the accepted solution.

Turkey has also suffered form major economic and financial crisis, most recently in 200/01. Since then, substantial reforms were implemented the Turkish economy grew steadily. In 2005 and 2006, a number of foreign investments, mostly from European banks, in the Turkish banking sector took place. Turkey is pursuing a different approach concerning foreign investors compared to other Accession Countries. Turkish bank owners rather prefer to form strategic partnerships and joint ventures with their foreign partners and retain a controlling share. The formal beginning of negotiations to join the EU has actually been a starting point for more foreign investments. However, it should also be noted that the joint venture and corporate governance literature streams basically argue that hindered by limited market access (i.e. restricted to joint ventures and minority foreign ownership); foreign owners can exert only mildly positive effects on economic development and growth.

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[150] Saccomanni, F. (2003), "Speech by Fabrizio Saccomanni", URL:
http://www.ebrd.com/new/speeches/other/030328.htm

Turkey's financial markets are underdeveloped compared to the EU average. By the end of 2004, the total bank assets size compared to the GDP stood at a mere 60% which is less than the EU average.[151] Chapters 4 "Free Movement of Capital" and 9 "Financial Services" are expected to bring changes to the current landscape of Turkish Capital Markets.[152]

3.2. Securitization in the EU

3.2.1. Overview of the European Securitization Market

Securitization made its debut on US agency mortgage-backed markets in the late 1960s. Some twenty years later, US finance companies originating non-mortgage assets (namely, auto loans and credit cards) adopted the technique as an off-balance sheet funding mechanism, in turn launching the asset-backed market. The most apparent difference between this newer asset-backed securitization (ABS) market and the agency mortgage market was the concept of credit. Unlike the agency mortgage-backed securitization (MBS) market in the US, investors in auto loan and credit card securitization did not benefit from government guarantees (explicit or otherwise). Instead, investors were taking exposure to credit, or more precisely, to structured credit.

The asset-backed market has since grown to become one of the most prominent fixed income sectors in the US, with total outstanding issuance at US$9.6 trillion.[153] Auto loans and credit cards remain major asset classes, joined since the days of the market's inception by home equity loans, student loans and equipment leases (among others). Meanwhile, the US agency MBS market has evolved into the second largest US fixed income sector, just behind the Treasury market in terms of outstanding issuance with US agency MBS outstanding totaling $5 trillion.[154] Securitization is also responsible for the creation of the commercial mortgage-backed market and the

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[151] Steinherr et al. (2004) "The Turkish Banking Sector Challenges and Outlook in Transition to EU Membership" CEPS Working papers No. 4, p. 9-10.
URL:http://jmp.iku.edu.tr/The%20Turkish%20Banking%20Sector-CEPS%20Paper-Aug.%202004.pdf
[152] European Union Portal, "Turkey, Adoption of the Community Acquis", "URL:
http://europa.eu/scadplus/leg/en/lvb/e01113.htm
[153] ESF Website, "ESF Securitisation Data Report Q4: 2008" (2008), p. 6. URL:
http://www.europeansecuritisation.com/Market_Standard/ESF_Data_Report_Q4_2008.pdf
[154] Ibid.

collateralized debt obligation market, two very familiar segments of the US bond markets.

Europe lagged behind the US in developing a securitization market. The European market stemmed from the odd residential mortgage or consumer loan securitization in the early 1990s. France and the UK were leaders in this embryonic market. (There was no agency-like market catalyst in Europe – the market began, and remains, a structured credit market).

Much has changed in the past ten years. The European securitization market has experienced spectacular growth, making it one of the fastest growing segments of the European bond markets. Like its US cousin, the European securitization market is no longer a peripheral bond market, but rather a core segment of the European capital markets. It is estimated that the outstanding size of the European securitization market is around EUR 1.7 trillion.[155]

The European market differs from the US in many respects. For one, the European market is defined as an 'undivided' structured finance market, encompassing all asset classes (ABS, MBS, CMBS, CDOs, etc). The asset class profile of the European market is also fundamentally different to that of the US, with residential mortgages being the dominant asset class in Europe. (Auto loan issuance has been relatively low, and supply of the European credit card ABS market is near negligible). The US market is arguably more predictable and mature, while the European market has employed securitization more liberally. Aside from the traditional users of this financing technique, such as banks and finance companies, European corporates and public sector entities have also embraced securitization.

Indeed, one of the more notable trends to take hold in the European securitization market is the use of securitization by certain corporates not belonging to the more traditional users, such as property managers and captive finance subsidiaries of auto manufacturers. These corporates are unconventional in the sense that they are not programmatic (repeat) securitizes. Instead, they tap the securitization market

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[155] Ibid.

opportunistically. Total issuance of corporate-related ABS reached just over €15 billion in 2008, representing about 21 per cent of the overall supply in the securitization market.

After 2000, issuance in Europe started picking up heavily. In the last quarter of 2008, issuance in the European securitization market reached its highest total ever and with a record €368 billion issued. New issue securitized debt totaled €711 billion for the year, nearly twice the volume in 2007, and surpassing the record set in 2006. Through the first six months of the year, issuance totaled €148.7 billion, 18.3 percent higher than the same period a year ago. The European Central Bank's accommodation was the driving force in maintaining the current interest rate environment which led to the higher issuance volumes in the quarter.

Issuance in the mortgage-backed securities (MBS) sector totaled €590 billion in 2008, almost 92 percent increase from €307 billion issued in 2007. On a linked quarter basis, issuance in the fourth quarter of 2008 also rose substantially, totaling €307 billion, almost 3 times an improvement over the €108 billion issued in the third quarter, and more than the total issued in the first three quarters of 2008. European non-mortgage asset-backed securities (ABS) issuance volume reached €73 billion during the first six months of the year, slightly above the €57 billion issued a year ago. ABS issuance surged to €38.6 in the final quarter, bring year total to €73 billion from the total €34.4 billion issued in the first three quarters of the year.[156]

[156] ESF (2008), "ESF Data Report Q4:2008", p. 3, URL:
http://www.europeansecuritisation.com/Market_Standard/ESF_Data_Report_Q4_2008.pdf

Figure 20: European Securitizations by Country(2008)
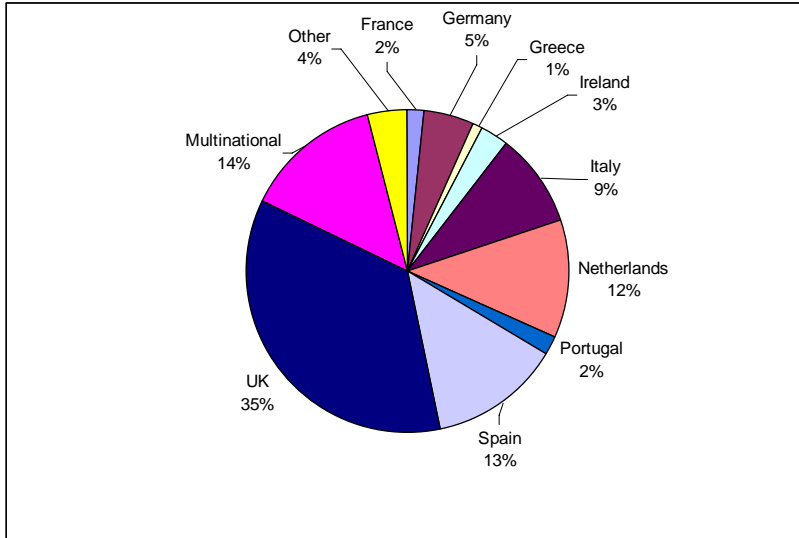
Source: ESF Data Report, 2008

Figure 21: European Securitizations, Collateral Type (2008)
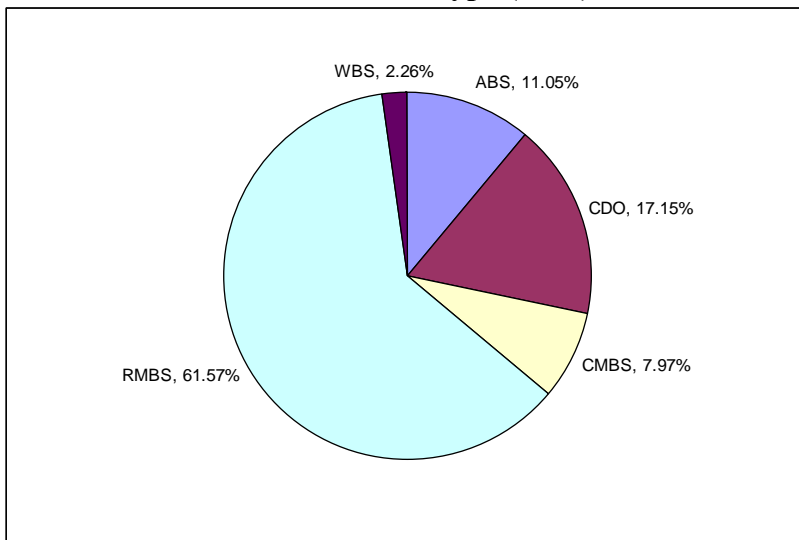
Source: ESF Data Report, 2008

Table 3: Outstandings by Collateral State (2008)

Country of Origin	Outstanding (Billions of Euro)
Austria	3.2
Belgium	41.4
Denmark	7.3
France	26.9
Germany	87.3
Greece	21.2
Ireland	48.8
Italy	161.3
Netherlands	202.5
Portugal	35.2
Russia	5.1
Spain	229.2
Sweden	0.7
Turkey	2.9
UK	615.5
Multinational	241
Total	1737.5

Source: ESF Data Report, 2008

3.2.2. *Pfandbriefe* Markets

A special sector of ABS in Europe is the so-called "*Pfandbriefe*" market. *Pfandbriefe* are covered bonds obtained through a process of securitization. This can be defined as the technique of converting a credit claim or a pool of claims into negotiable securities. The *Pfandbrief* bond market is the biggest segment of the Euro-denominated private bond market in Europe and rivals in size the individual European government bond markets. The fact that it developed mainly in a single country as a purely domestic product until the mid-1990s obscured the strong growth of this market segment, regarded as illiquid and arcane by international investors. Following the strong development in issuance of, in particular, the German "Jumbo", a number of jurisdictions in Europe (including many eastern European countries) have now established the regulatory framework for *Pfandbrief*-style products or are preparing to do so in the near future. This note describes the nature and the main characteristics of *Pfandbrief*-style products in a number of European countries and concentrates the analysis in particular on Jumbo products, which were launched within a relatively short period of time in Germany, France, Spain and Luxembourg. The existing differences in the national jurisdictions, and the fact that their further harmonization in the near future is unlikely, should not prevent a successful establishment of the *Pfandbrief* as an asset class in its own right, both within and outside the European Union. In this respect, the application of Article 22(4) of the EU UCITS Directive, which sets out criteria for defining a common class of assets, could provide the basis for ensuring a minimum level of homogeneity of this type of assets.[157]

3.2.2.1. Germany

Pfandbrief is a general term encompassing *Hypotheken-Pfandbriefe* and *Öffentliche Pfandbriefe*. The former are issued to fund loans which are secured by first ranking residential and commercial mortgages or land charges; the latter are issued to fund loans to the public sector (e.g. federal government, regional governments,

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[157] AGPB – Association of German Mortgage Banks – Euromoney (2000), **The Pfandbrief: a European Perspective,**. Euromoney Publications. p. 3-22.

municipals and other agencies). Public *Pfandbriefe* amount for about 80% of the outstanding amount, mortgage *Pfandbriefe* for the remaining 20%, reflecting the difficulty involved in pooling the necessary EUR 500 million in mortgage loans, within a short time, whereas this is far easier in the case of public sector loans. The collateral of all outstanding *Öffentliche Pfandbriefe* and *Hypotheken-Pfandbriefe* of any mortgage bank must be kept in two separate pools. Investor protection is guaranteed at two levels: through the very clear legislation defining which institutions are privileged by law to issue *Pfandbriefe*; and through the conservative guidelines determining the quality and size of the collateral backing. The total volume of all *Pfandbriefe* of a mortgage bank in circulation may not exceed 60 times the amount of its own capital. Loans eligible as pool collateral may not count for more than 60% of their value, regardless of the type of loan. The Federal Banking Supervisory Authority *(Bundesaufsichtsamt für das Kreditwesen - BAKred)* ensures that the issuers' activities comply with these regulations. They have a 10% solvency risk weighting and qualify for Eurosystem repo operations.

In the case of German *Pfandbriefe* there are no special purpose vehicles but there is segregation into separate asset pools in the issuing bank's books of the loans collateralizing *Hypotheken-Pfandbriefe* (mortgage loans) and of those collateralizing *Öffentliche Pfandbriefe* (public loans). If the issuing bank goes into liquidation, *Pfandbriefe* holders will not suffer any untimely repayments or redemption (in fact, no defaults have been recorded for *Pfandbriefe* in the last 100 years).[158]

3.2.2.2.   France

In France, these securities are called *obligations foncières* and are backed by mortgages and public sector loans, located anywhere in the EEA. They are issued by *Sociétés de Crédit Foncier* (SCFs), whose sole purpose is to make mortgage and public loans and refinance then through obligations foncières. SCFs are normally owned by the parent bank, which acts as the servicer of the loan. Real estate collateral is marked to market. There is an effective "bankruptcy remoteness" as holders of obligations foncières rank ahead of all other creditors. SCFs are supervised by a professional

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[158] Ibid.

auditor, who reports to the Banking Commission. There are detailed disclosure requirements on asset quality, prepayments and interest rate sensitivity of the collateral pools. Obligations foncières must be listed on at least two exchanges and have at least two ratings.[159]

3.2.2.3.   Spain

These securities, locally called, *cédulas hipotecarias* can be backed only by mortgage loans and not by public sector loans. They are collateralized by the issuing entity's entire mortgage pool rather than by a specific pool of mortgage assets. Holders of cédulas hipotecarias enjoy a privileged status and have priority over the mortgage book of the issuer in the event of bankruptcy. Only the State or the issuer's employees have higher priority over the proceeds arising from liquidation in case of bankruptcy. Early amortization is not possible. Mortgage valuation is subject to conservative valuation rules (70% loan-to-value ratio) and mortgage certificates can be issued only up to 90% of an individual issuer's eligible mortgages ("overcollateralization"). The principle of matching maturities is not covered in Spanish law, which gives Spanish institutions some leeway for taking on interest rate risk arising from maturity transformation.[160]

3.2.2.4.   Denmark

Denmark is a pioneer country in terms of mortgages and the first mortgages were introduced in Denmark over 200 years ago[161] In Denmark, *Realkreditobligationer* are these mortgage bonds are issued by recognized mortgage institutions, which are responsible for 90% of mortgage bond issuance. The relevant laws are currently evolving, and these bonds may come to resemble *Pfandbriefe* more closely. At present mortgage bonds are backed only by mortgage loan collateral and are not insulated from the bankruptcy of their issuers.[162]

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[159] Ibid.
[160] Ibid.
[161] Davidson, p. 465
[162] Ibid.

3.2.2.5.   Luxembourg

In Luxembourg, *Pfandbrief*-style products are called *lettres de gage*. At present three institutions have the specialized issuing license required for issuing these bonds; the first few issues are on the market. The establishing law of 21 November 1997 is closely modeled on the German precedents. The backing collateral for *lettres de gage publiques* is public sector loans, and for *lettres de gage hypothécaires* is mortgage loans. As in Germany, there must be separate public sector and mortgage asset pools. There is a requirement for an independent trustee. A register of the collateral assets must be kept. There are requirements with regard to substitution collateral, which is limited to 20% of all collateral. There are set rules for valuing mortgage property. The loan-to-value ratio is up to 60% of the mortgageable value. Collateral from all OECD countries is eligible to back lettres de gage. They have a 10% solvency risk weighting and qualify for Eurosystem repo operations.[163]

3.2.2.6.   Central and Eastern European Countries

In the Czech Republic, there are only mortgage bonds. These have priority in the event of the bankruptcy of the issuer. Licenses to issue these bonds are limited. There are no set rules for valuing mortgageable property. The loan-to-value ratio is up to 60% of the market value. There is no requirement for a register of the collateral assets to be kept: "independent evidence" of their existence suffices. There is no requirement for an independent trustee. There are requirements in regard to substitution of collateral, which is limited to 10% of all collateral.[164]

In Hungary, there are public sector and mortgage bonds. These have priority in the event of the bankruptcy of the issuer. There is a requirement for an independent trustee. There are set rules for valuing mortgageable property. The loan-to-value ratio is up to 60% of the market value. There are requirements in regard to substitution of

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[163] Langerbein, M Schulte (2001) "The European Covered Bond Family and the Luxembourg Pfandbrief," **Fixed Income Market Review**, Luxembourg. p. 352-368.
[164] Andrews, Gandy, Heberlein and Lockerbie (2000) **German Pfandbriefe and analogous funding instruments elsewhere in Europe,** Fitch IBCA. p. 1-6.

collateral, which is limited to 20% of all collateral. A register of the collateral must be kept.[165]

In Latvia, these bonds called *kilu zime* have priority in the event of the bankruptcy of the issuer. Licenses to issue these bonds are limited. There is no requirement for an independent trustee. A register of the collateral assets must be kept. There are requirements in regard to substitution of collateral, which is limited to 20% of all collateral. There are set rules for valuing mortgageable property. The loan-to-value ratio is up to 60% of the market value.[166]

In Poland, the largest of these markets, there are public sector and mortgage bonds. These have priority in the event of the bankruptcy of the issuer. There are specialized mortgage bond-issuing institutions. There is a requirement for an independent trustee. There are set rules for valuing mortgageable property. A register of the collateral assets must be kept. There are requirements in regard to substitution of collateral, which is limited to 10% of all collateral. The loan-to-value ratio is up to 60% of mortgageable value.[167]

In Slovakia, there are public sector and mortgage bonds. These have priority in the event of the bankruptcy of the issuer. Licenses to issue these bonds are limited. There is a requirement for an independent trustee. There are set rules for valuing mortgageable property. A register of collateral assets must be kept. There are requirements in regard to substitution of collateral, which is limited to 10% of all collateral. The loan-to-value ratio is up to 60% of mortgageable value.[168]

3.2.3. Covered Bonds vs. ABS: The Resilience of *Pfandbriefe*

As discussed above, *Pfandbriefe* are a type of covered bonds. The main differences between ABS and *Pfandbriefe* are covered in Table 4.

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[165] Ibid.
[166] Ibid.
[167] Ibid.
[168] Ibid.

Table 4

Comparison between *Pfandbriefe* and asset-backed securities (ABS)		
	Pfandbriefe	ABS
Level of standardization	Very high for Jumbos: this makes the bonds very transparent to the investors and favors liquidity in general. Relatively low for traditional *Pfandbriefe*.	None: the main feature of ABS is their flexibility in relation to issuers' and investors' needs.
Nature of securities	*Pfandbriefe* are bank securities, where the debtor is the issuer bank. The security is guaranteed by underlying public sector or mortgage loans.	ABSs are issued by SPVs based on loans that are transferred from their originator; the risk is also taken off the balance sheet of the originator.
Bankruptcy remoteness	*Pfandbriefe* are guaranteed by the whole amount of mortgage or public loans issued by the bank (there is a continuous turnover of the loans underlying the *Pfandbrief*).	ABSs are guaranteed by specific pools of assets, which represent only part of the assets of the originator bank.

Source: Fitch IBCA[169]

Pfandbriefe style products are mainly used in Germany and France. These covered bonds have proven much more resilient during the subprime crisis. In fact, there has not been a single default in *Pfandbriefe* products for the last 238 years. There are some particularities that make *Pfandbriefe*-style products a safe haven in times of crisis. [170] The superiority of covered bonds comes mainly from three aspects: on vs. off-balance sheet items, leverage and local funding.

The first particularity of on-balance sheet accounting is a main difference vis-à-vis the securitization in the US where predominantly SPVs are used. This creates the illusion that such ABSs are not the risk of the issuing bank. Yet the subprime crisis has proven otherwise. Many banks in the US had become liable for losses incurred under the SPVs due to legal and contractual obligations, and this rendered some of them

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[169] Ibid.
[170] Hagen, Louis (2008) "A Safe Haven From The Subprime Crisis" **The Atlantic Times**, January 2008

bankrupt or at best partially or fully nationalized. On the other hand, while some European banks also were in dire straits due to the subprime crisis, this was not because of *Pfandbriefe* style products on their balance sheets but actual exposure to subprime ABS or Eastern European securitized credit. [171]

Another important factor in determining why the US-type ABSs have caused a major crisis is leverage. American institutions that carried out securitizations did so by using leverage and multiplying their risks. The leverage came from either utilizing credit derivatives or creating synthetic securitizations. When creating synthetic securitizations, most investment banks kept the equity portion of the CDOs, and thus were the first in line for potential losses. As long as there was no major crisis or disruption in market mechanics this was a highly profitable strategy, but when the "music stopped" the banks found themselves with no equity to cover the losses. [172]

The third issue is local funding sources. This was not an issue for American ABSs but in Eastern European markets, most funding came from Western European banks in the form of purchase of local banks, syndications or funding of securitized assets. There was hardly any local funding and the huge current account deficits of Eastern European countries further exacerbated the funding shortfall just as the subprime crisis struck. The result was a huge depreciation in the value of most Eastern European countries and a major credit crunch.

The crisis in subprime is still being played out, but a major difference between Eastern and Western Europe can be seen. Although Western European banks have suffered major losses due to subprime and Eastern European exposure, they have not had any losses arising from local securitized products.[173] Euro has appreciated in a major fashion versus Eastern European currencies. One of the best indicators of the resilience of *Pfandbriefe* style products is the swap spreads of German *Pfandbriefe* versus UK structured covered bonds as seen in Figure 22. It has also been estimated that

[171] Andrews, Gandy, Heberlein and Lockerbie.
[172] Deng, Sheran (2008) "SIVs, Bank Leverage and Subprime Mortgage Crisis", p.3-6. .SSRN Website, URL: http://ssrn.com/abstract=1319431
[173] Jones, Sam (2008) "How Pfandbriefe Saved the Day" **Financial Times**, URL: http://ftalphaville.ft.com/blog/2008/04/04/12063/how-pfandbriefe-saved-the-day/

risks of default and credit risks under a *Pfandbrief* are strikingly lower compared with Triple-A rated CDOs and MBSs. According to one model calculation, the interest markup for MBS ought to be 4.2 times greater than for *Pfandbriefe* to make up for the higher risk. In the case of CDOs, the corresponding interest markup should be 3.8 times higher.[174] The crisis has proven that in order for securitization to work, the issues of leverage, on vs. off balance sheet exposure and local funding issues must be resolved and not abused to create potential problems for the future.

Figure 22: Swap Spreads of Jumbo *Pfandbrief* vs. Covered Bonds[175]
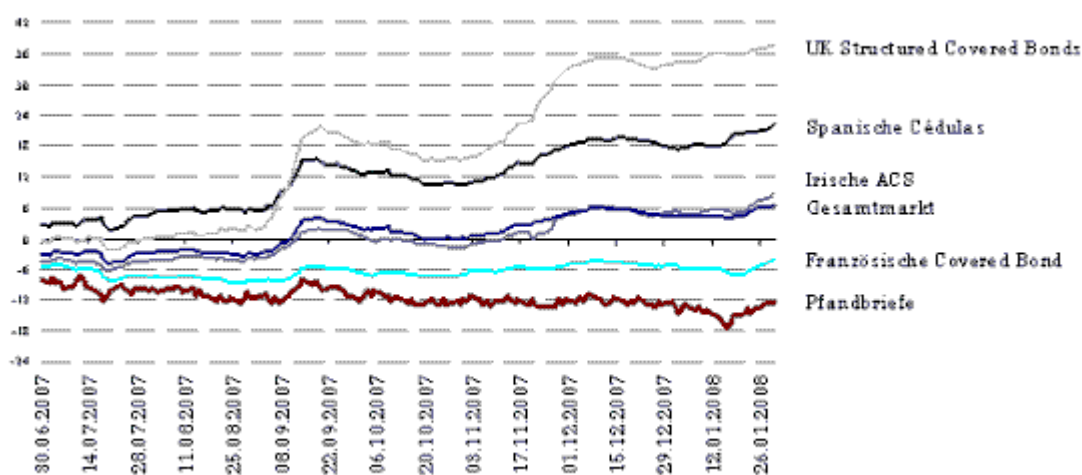
Source: AGPB

3.2.4. Accounting, Legal and Regulatory Issues

Legal, regulatory, tax and accounting rules applicable to securitization transactions differ widely among various European jurisdictions and are subject to ongoing modification and revision. In certain common law jurisdictions, such as the United Kingdom, different types of securitization structures have been able to evolve relatively free of legal restrictions, as long as they are not expressly prohibited by existing statutes. In other jurisdictions characterized by civil legal codes (for example,

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[174] Finanz Betrieb Website, "Spürbare Belebung am Pfandbriefmarkt - vdp beobachtet zu Jahresbeginn zunehmende Emissionsaktivität" URL: http://www.finanz-betrieb.de/psfb/fn/fb/SH/0/sfn/bp/cn/doc/bstruc//bt/0/p1/5/strucid/5/ID/320138/index.html

[175] Association of German Pfandbrief Banks Website, "Pfandbrief- A Reliable Funding Source and a Sought-after Investment", URL: http://www.pfandbrief.org/d/internet.nsf/tindex/en_basics.htm

France, Germany and Spain), specific laws must be adopted in order for the securitization market to develop.[176] Nevertheless, it is possible to offer some generalized guidance concerning some of the most significant legal, regulatory, tax, accounting and similar issues that need to be addressed when structuring and executing a securitization transaction in Europe.

At the outset, it is necessary in structuring a securitization transaction to deal with legal, regulatory and tax rules that may affect the sale, assignment or other conveyance of assets by originators to securitization vehicles. These rules may address, for example, the basic legal framework for creating, transferring and perfecting ownership interests in the assets; restrictions on the types or terms of financial assets that may be transferred for purposes of securitization; obligor notification or consent requirements and/or the need to obtain specific regulatory approval prior to transferring the assets; and taxation and gain-recognition events that may be triggered by the transfer of assets to a securitization vehicle. In addition, it is generally important for there to exist various types of default, foreclosure and/or repossession remedies that may be exercised at the individual asset level by the servicer or other administrator of the securitization transaction. [177]

As discussed above, a central legal issue that must be addressed in virtually all securitization transactions is the isolation of transferred assets from the financial fortunes of the related originator or any of its affiliates. This requires conformation of the transfer to the bankruptcy or insolvency legal regime of the particular jurisdiction, generally by affecting the transfer as a "true sale," and building structural protections into the special-purpose entity to render it "bankruptcy remote."

Another important set of issues relates to the legal framework governing the creation, maintenance and operation of special-purpose entities employed in securitization transactions. The most basic prerequisite is for the governing legal framework to permit the issuance by special-purpose entities of securities evidencing

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[176] For an exhaustive work on the goal of creating a homogenous European securitization market, please consult European Securitization Forum publication "A Framework for European Securitization", 2002 .

[177] Graziadei et al. Ed. (2005) **Commercial Trusts in European Private Law,**. Cambridge University Press, p. 505-530.

ownership or beneficial interests in pooled financial assets, rather than a general claim against the entity itself. Different European jurisdictions may have different securities, tax and other laws that limit an issuer's flexibility in this regard. In addition, it is generally desirable or necessary to prevent or limit taxes on the income of the special-purpose entities; to avoid burdensome licensing or other regulatory requirements that might otherwise apply to such entities; to comply with various securities or investment laws that apply to the securities issued by various types of special-purpose entities to finance their purchase of the underlying assets; and to comply with bank and other financial institution regulatory restrictions that arise in connection with transfers of assets for purposes of securitization.[178]

Relevant securities, banking and other laws also need to be consulted in order to determine whether and under what circumstances it is possible for securitization vehicles to issue multiple tranches of debt with varying payment priorities, maturities and other characteristics. On the investment side, legal investment laws applicable to pension funds, insurance companies, banks and financial institutions, and other institutional investors may restrict their participation in the ABS markets. Such restrictions may deal with the levels of permissible foreign currency exposure, requirements for currency matching, limitations on the type of assets in which investments may be made or limits on the amount or concentrations of those investments.

Finally, depending upon the originator's objectives, the balance sheet effects and accounting treatment and consequences of a particular securitization will require in-depth investigation, and will frequently influence the ultimate structure of the transaction. As with legal, regulatory and tax systems, there is tremendous diversity among the accounting rules of different European jurisdictions. The most important issues to be confronted in this regard include structuring asset sales in a manner that achieves non-recourse sale treatment and asset derecognition for balance sheet purposes.[179]

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[178] Ibid.
[179] Ibid.

3.3. Securitization in Turkey

3.3.1. Security Markets in Turkey: From Crowding Out to Bringing In

Until the 1980s, fixed income markets in Turkey were not very well established. The main reason for this was the legacy of Ottoman era debt, the so-called "Düyun-u Umumiye" (Public Debts), and its history of foreign intervention in the Ottoman Empire. As a result, the young Republic of Turkey was left to pick up the bill for most of the Ottoman debts, and the difficulties and hardships associated with the paying up of this debt has resulted in the ruling class of Turkey to abstain from most borrowing, especially foreign borrowing on a large scale.[180] After the 1980s, a large scale balance of payment problem has led to the so called "24 January decisions" to be taken in order to liberalize the economy. The necessary funding for the structural reforms undertaken due to the wishes of the IMF and the World Bank has been partly supplied via foreign and domestic borrowings undertaken by the Treasury of Turkey.

The necessary regulatory background of public debt issuance has been laid out between 1983 and 1985. Following Decree No. 188 dated 14/12/1983 and Decree No. 232 dated 18/6/1984, the responsibility of managing cash and debt positions have been passed onto the Undersecretariat of the Treasury from the Ministry of Finances.[181] In 1989, Regulation No. 32 insured that foreign investors could start investing in Turkey, opening the door to easy borrowing and so called "hot money" pouring into the country. In 1991, the İMKB Bonds and Bills market was established.[182]

Beginning from mid-1980s and especially during the lost decade and many crises of the 1990s, the debt to GDP ratio of the country increased from 21% in 1986 to a staggering 85% in 2001.[183] This era is known as the era of "crowding out" because public debt issuance killed off financing of many companies and 60% of banks' assets were government securities. The crisis of 2001 was the nail on the coffin of Turkish

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[180]Özen A. and Özpençe Ö. (2006) "Osmanlı İmparatorluğu'nda ve Türkiye Cumhuriyeti'nde Borçlanma Politikaları ve Sonuçları" URL: http://www.mevzuatdergisi.com/2006/04a/03.htm
[181] Saatçi, M.Y. (2007) "Türkiye'de Kamu Borç Yonetimi, Süreci ve Tarihsel Gelişimi" Bütçe Dünyası, Vol. 3, No. 27, p. 63-65.
[182] İMKB Website, "İMKB'nin Kuruluşundan İtibaren Önemli Gelişmeler", URL: http://www.imkb.gov.tr/genel/gelismeler.htm
[183] Saatçi, p. 71.

debt markets, and two liquidity crises where overnight borrowing rates jumped to 2,000%[184] caused the downfall of many Turkish banks who had invested in such securities.

After the subsequent tidying up of market and a successfully completed IMF program requiring a religiously adhered to primary surplus target of over 5% attained over many years, Turkey was finally able to bring its Debt to GDP ratio to below Maastricht Criteria levels of 58%.[185] After this level was attained, and following the beginning of the EU-Turkey negotiations for full membership, confidence in Turkish markets grew after 2006. Especially after 6 zeroes were removed from the lira and the "New Turkish Lira" was announced, foreign banks started issuing medium-term notes of up to 10 years for the first time in Turkish Lira. Subsequently, after many local banks were bought over by foreign, mainly European banks[186], Turkish banks were able to borrow long term from foreign counterparties in Turkish Lira for the first time. They started giving mortgage loans up to 10 years and seriously considered securitization in TL as a means of financing these loans also for the very first time. Following the drop in long-term interest rates to low 10% levels and the adoption of the new mortgage loan in Turkey in 2007, it seemed as if the period for "crowding in" had finally come.

3.3.2. History of Securitization in Turkey

Securitization is not new to Turkey. In the last 10 years the major banks in the republic of Turkey have securitized international credit card receivables, export receivables, checks and travelers' checks remittances, electronic remittance payments (generated primarily from Turkish workers in Germany), and diversified payments in the international financial markets. These future-flow transactions have provided long-term, lower-cost hard currency financing to banks in Turkey. Turkish banks with high-quality assets but lower ratings from credit rating agencies have been able to get cheaper funds through securitization than by borrowing from the money markets. The

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[184] Saltoğlu, Burak and Danielsson, Jon (2003) "Anatomy of a Market Crash: A Market Microstructure Analysis of the Turkish Overnight Liquidity Crisis", EFA 2003 Annual Conference Paper, p. 2, URL: http://papers.ssrn.com/sol3/papers.cfm?abstract_id=424924
[185] Saatçi, p. 71.
[186] TBB Bankacılık ve Araştırmalar Grubu (2005) "Türkiye'de Yabancı Bankalar", p. 22, **Bankacılar Dergisi**, No. 52.

major banks involved in international asset securitization have become more liquid, thus reducing risk and cost.

Under Turkish law, Turkish banks are the originators of transferred receivables. On the initial closing date of a transaction the originator sells and assigns the transferred receivables to a special purpose vehicle (SPV) incorporated outside Turkey.[187]

3.3.3. Legal and Fiscal Issues of Securitization in Turkey

Under Turkish law, a 'true sale' is recognized as the assignment of existing and future receivables, provided that the assignor makes such an assignment to the assignee without recourse to the assignor. However, in the event of the assignor's insolvency, bankruptcy or non-performance, the assignee has recourse against the assignor. This does not affect the validity of the true sale.

Thus, the originator's true sale of transferred receivables to the SPV results in a transfer. This effectively removes the assets in question from the originator's estate, putting them beyond the reach of the originator's third-party creditors or its receiver, liquidator, administrator or trustee in bankruptcy.

Under Article 163 of the Code of Obligations (Law 818), an assignment is valid provided that the assignor and assignee conclude a written agreement for it. Giving notice to a debtor does not affect the agreement's validity, while the absence of such notice releases a debtor from its obligations where it pays the assignor directly.

The same legal requirements apply to a true sale of both existing and future receivables. If a Turkish bank faces financial difficulties, the Banking Supervisory Board will either transfer its management and shares to the Savings Deposit Insurance Fund or cancel its banking license by declaring insolvency. If transferred to the Savings Deposit Insurance Fund, the bank is considered solvent and continues all its banking activities in accordance with its license. However, if its banking license is cancelled,

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[187] Ossa, Felipe. (2006) "Asset Securitization Report" URL:
http://www.securitization.net/news/article.asp?id=283&aid=5589

liquidation ensues. Thus, a true sale of transferred receivables would include future receivables arising after the originator's management and shares had been transferred to the Savings Deposit Insurance Fund, but not after the commencement of insolvency, bankruptcy or receivership proceedings. The originator cannot generate further receivables if its banking license is cancelled. If a banking license is going to be cancelled, the originator's creditors cannot challenge the originator's receivables or receivables incurred until this has been done. However, upon cancellation no receivables are incurred, as the originator is unable to perform any activities to generate receivables.

Furthermore, cash from those receivables credited to the SPV account cannot be challenged by the originator's creditors, trustee or receiver in bankruptcy.

Even if the transaction is structured as a present sale, making it immune to claims from creditors or a receiver, liquidator or trustee in bankruptcy, there is no risk that it could be reclassified as a transaction in which the originator retains an interest in future receivables because an assignment of future receivables would be recognized as a true sale. If the originator's banking license is cancelled as a result of financial difficulties or insolvency, it cannot re-acquire requisition amounts. All amounts owed from the sale of the receivables become due and payable and must be registered as an unsecured claim with its liquidators. In addition, neither the originator nor its affiliates may continue to service the transferred receivables or act as collection agents during the period following the sale once its license is cancelled.

The SPV's payment to the originator is regarded as a consideration made against the true sale. The SPV, trust, insurance company, certificate holders and trustee are not subject to Turkish taxes, or deemed to be licensed or to have permanent representation in Turkey. The transaction is treated as a current sale of all current and future receivables by the originator to the SPV.

The assignment of receivables by the originator to the SPV or the taking of any additional steps to enforce or perfect such assignment is subject to stamp duty at 0.75 per cent (payable from the date of introduction of all relevant agreements and

documents) court charges imposed pursuant to the Law on Charges (Law 492) – that is, 5.4 per cent of the amount in question (one-quarter of which is payable at the commencement of any suit or action and the remainder upon judgment), court charges payable in connection with any appeal and attorneys' fees payable in accordance with the tariff in force at the time of filing a lawsuit, as published in the Official Gazette, together with the other court expenses.[188]

3.3.4. New Mortgage law in Turkey

On Feb. 21, 2007, the Turkish parliament approved a draft law proposing numerous changes to laws regarding foreclosure, consumer protection, capital markets, and taxation. The law has a two-fold purpose: to promote and increase mortgage lending to individuals and to create a secondary market for the originators to sell part of the risk to the market.[189]

The legal changes provide the framework required to establish an institutional housing finance system, which should encourage both the origination and refinancing of residential mortgage loans, including through the use of covered bonds and securitization techniques. It is anticipated that this new law will create a platform for the development of a regulated mortgage market and, potentially, a market for all existing-asset transactions.

Turkish law was already familiar with the concept of securitization and recognized the true sale of assets to isolate the securitized pool from the originator's insolvency risk. This allowed Turkish banks to transfer the right to receive cash flows from offshore receivables to securitization vehicles in the future flow transactions.

The new law introduces housing finance funds as domestic bankruptcy-remote securitization vehicles. Housing finance funds' assets will be protected against the originator's bankruptcy and may only be used as security for the issued notes until

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[188] The information in section 3.3.3 has been summarized from: Pekin & Pekin "Turkey: Asset-Backed Securitization in Turkey" URL: http://www.mondaq.com/article.asp?articleid=59338
[189] Ministry of Finance of the Republic of Turkey (2007), "Konut Finansmanı Sistemine İlişkin Çeşitli Kanunlarda Değişiklik Yapılması Hakknda Kanun", URL:
http://www.alomaliye.com/2007/5582_sayili_kanun_mortgage.htm

redeemed in full. A reduction in the length of the foreclosure period, which is currently up to three or four years is foreseen with the new law. Also, regulated real estate appraisers will be introduced, the misuse of challenges available to the debtors is to be prevented by increasing fines for false requests for annulment of legal tender and increasing the borrower deposit required to stop the sale of a foreclosed property, and the lender is to be allowed to collect on the borrower's other assets.[190]

Only mortgage loans relating to housing units with valid permits will qualify for housing finance and securitization. Prepayment penalties for fixed rate loans are now being abolished but they will be capped to 2% of the outstanding balance, and the introduction of variable interest rates, although a maximum rate of interest must be stated in the contract.[191]

The new law aims to make it possible for banks to tap the ABS market and raise the funding required to finance new mortgage loans. However, it should be noted that illegal housing represents more than half of the existing housing stock, which reduces the number of potential assets available for securitization in the immediate future. Some of the new law's provisions, for example, the licensing requirements for appraisers or the detailed organization of housing finance funds, will need to be supplemented by regulations from the Capital Markets Board of Turkey. In addition, the licensing requirements for appraisers will be subject to a three-year transition period. Although the primary focus of the new law is housing finance and RMBS, it also introduces the concept of set finance funds (similar to housing finance funds). These may be used to securitize non-mortgage-related existing assets, such as credit cards or consumer loans, but the law includes much less detail on these other assets. It leaves the Capital Markets Board to define detailed specific provisions.[192]

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[190] Dönmez, İ. (2005) "Konut Finansmanı Kanunu", p. 10. URL:
http://www.gyoder.org.tr/zirve7/Z7sunum/Ibrahim.Donmez.Konut.Finansmani.Kanunu.pdf
[191] Ministry of Industry of the Republic of Turkey (2007), "Yeni Çıkan Konut Finansmanı Kanunu ve Tüketicilere Getirdikleri", URL: http://www.sanayi.gov.tr/webedit/gozlem.aspx?sayfaNo=3237
[192] Capital Markets Board of Turkey (2007), "Konut Finansmanı Sistemine İlişkin Çeşitli Kanunlarda Değişiklik Yapılması Hakkında Kanun" p. 1-4. URL:
www.spk.gov.tr/displayfile.aspx?action=displayfile&pageid=137&fn=137.pdf

4. SECURITIZATION IN CRISIS

4.1. Subprime Crisis and Its Impact

Subprime lending is a general term that refers to the practice of making loans to borrowers who do not qualify for the best market interest rates because of their deficient credit history. Subprime lending is risky for both lenders and borrowers due to the combination of high interest rates, poor credit history, and murky financial situations often associated with subprime applicants. A subprime loan is offered at a rate higher than prime loans due to the increased risk. Subprime loans became the reason for a major crisis when banks gave out these loans in huge amounts of mortgages in order to quickly dispose of them by securitization.[193] As shall be explained later, when it became clear that delinquencies would be much higher than previously suggested by pricing models, the crisis finally struck. However, the origins of the subprime crisis date back to much earlier times than when those loans were first started to be handed out.

The origins of the subprime crisis can be traced back to the policies of the Federal Reserve Bank with respect to the asymmetrical policy response to changes in the prices of financial assets. When financial prices registered sharp drops as in the 1987 stock market crash, 1998 LTCM crisis or 2001 NASDAQ crash, Fed was quick to cut borrowing rates rapidly to make sure there was a quick recovery in equity prices. However, every time policy rates were cut to near zero levels, they became the cause of another asset bubble. The final asset bubble was in housing prices and this was to an extent a very Anglo-Saxon problem because in the Anglo-Saxon world owning a house was seen almost as a right, not a privilege.[194] Therefore, even those people with no incomes, assets or even jobs were encouraged to borrow from the mortgage market and these types of loans became know as subprime, i.e. below the prime credit quality loans.

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[193] Hong, Y. P. "Mortgage Credit Securitization and Subprime Mortgage Crisis", p. 1-2. 67th International Atlantic Economic Conference Website URL:
http://iaes.confex.com/iaes/Rome_67/techprogram/P2835.HTM
[194] Ferguson, Niall "There will be blood", **The Globe and Mail**, 23 Febraruary 2009

USA home ownership rate increased from 63.5% in 1985 to an all-time high of 69.2% in 2004.[195]

The value of USA subprime mortgages was estimated at $1.3 trillion as of March 2007, with over 7.5 million subprime mortgages outstanding. In the fourth quarter of 2006, about 310,000 foreclosure proceedings were initiated, which represented a growth of almost 35% versus the previous quarter. By October 2007, approximately 16% of subprime were either 90-days delinquent or the lender had begun foreclosure proceedings, roughly triple the rate of 2005.[196] By January 2008, the delinquency rate had risen to 21% and by May 2008 it was 25%.[197]

The impact of the crisis was huge in both the financial markets and the real economy. US GDP fell by a 6.2% annual rate in the fourth quarter of 2008.[198] US jobless rate jumped to 8.1% by February 2009.[199] The financial impacts were even more severe. Across the globe, stock markets registered losses of more than 45%, and coupled with the losses in housing assets, retirement assets, savings and investment assets lost a total of over $8 trillion from 2007 to end-2008.[200] The crisis also claimed many victims in the financial sector, from Bear Stearns and Lehman Brothers in the US to Northern Rock in the UK. Many banks and other financial institutions also either had to be nationalized or sold at deep discounts to third parties. Government sponsored entities FNMA and FHLMC, the insurer A.I.G., Citibank and many other regional and local banks were examples of this. The crisis also claimed the US investment banking model, which had relied on use of heavy leverage, credit derivatives and synthetic securitizations as a victim. By the end of 2008, all of the main investment houses had

[195] U.S. Department of Commerce (2007) "Census Bureau Reports on Residential Vacancies and Homeownership" Census Bureau Website, p. 4, URL: http://www.census.gov/hhes/www/housing/hvs/qtr307/q307press.pdf
[196] Bernanke, Ben S. (2007) "The Subprime Mortgage Market" Federal Reserve Website, URL: http://www.federalreserve.gov/newsevents/speech/bernanke20070517a.htm
[197] Bernanke, Ben S. (2008) "Mortgage Delinquencies and Foreclosures" Federal Reserve Website, URL: Bernanke, Ben S. "The Subprime Mortgage Market" Federal Reserve Website, URL: http://www.federalreserve.gov/newsevents/speech/Bernanke20080505a.htm
[198] Bureau of Economic Analysis (2009), "Gross Domestic Product: Fourth Quarter 2008 (Preliminary)" URL: http://www.bea.gov/newsreleases/national/gdp/2009/gdp408p.htm
[199] Reuters (2009), "US Jobless Rate Hits 25-year High", URL: http://www.reuters.com/article/topNews/idUSTRE52517Z20090306?feedType=RSS&feedName=topNews
[200] Altman, Roger C. (2009) "The Great Crash, 2008", p. 12. **Foreign Affairs**, January/February 2009.

either gone bankrupt (Lehman Bothers), been takenover by commercial banks (Merrill Lynch) or had converted themselves into deposit banks to qualify for federal aid (Goldman Sachs). The crisis is still being tried to be controlled by huge fiscal interventions from the US Treasury and central bank easing policies across the globe.

One of the underlying reasons why subprime mortgages became so prevalent was the so-called "originate to distribute" model used by many institutions. Traditionally, most mortgages were issued by thrifts and kept on their balance sheets as loans. However, securitization allowed first government sponsored entities and then investment banks to purchase these risks, repackage them as MBS or CDOs and sell them in the primary or secondary markets for an origination fee. On the investor side, many mutual and hedge funds eagerly purchased these assets because the central banks, Fed playing a major role among tem, had flooded the world with cheap funding to counter the effects of the 2001 NASDAQ crisis. The purchases spilled over into European and Asian banks that were eager for the spreads such CDOs provided. Using CDSs and other credit derivatives, investment banks created synthetic securitization, and as shall be seen later on, the leverage provided by such structures exacerbated the whole crisis. However, one of the main reasons why so many qualified investors jumped on the wagon to purchase the subprime securities was that they had been assigned AAA ratings from the major ratings companies.

4.2. The Curse of Leverage: The Role of Credit Derivatives and Synthetic Securitizations in Augmenting the Crisis

Leverage can be described as borrowing money to purchase more assets. This strategy works in times when assets prices go up but it can backfire if the markets turn around. One of the main culprits in the aftermath of the subprime crisis has often been pointed out as high leverage of the institutions originating securitized deals. If securitization is merely a restructuring of loans into tradable securities, then how could this have been possible? The answer, as was discussed in chapter 2, was that the credit derivatives and the ensuing synthetic securitizations made leverage not only possible but almost inevitable.

There is a certain bravado in the business of investment banking. The Goldman Sachs, the Merrills and the Morgans of this business have gained (and lost) trillions of dollars in high-stake bets on currencies, bonds and many exotic derivatives thereof. However, as the 1990s showed, for making money consistently and on a huge scale, one needs respectively, credit risk and leverage. As the central banks of G-7 countries pumped trillions of hard currency in the financial system, funding became highly available, almost taken for granted. On the other hand, securitization which really took off in the 1990s was an easy way for these banks to take on credit risk without having to actually own a network of branches.

The best example of this strategy was actually the most infamous. Bear Stearns, a pioneer in securitization and hedge funds business, was the first major US investment bank to go under in the opening phase of the subprime crisis.[201] Investors learned the hard way that in a turnaround in market sentiment, leveraged funds can quickly lose the principal investment and go bankrupt.

However, the most readily available form of leverage was not actual borrowing from central banks and purchasing assets. It was the use of credit derivatives, and especially synthetic securitized CDOs (CSOs as discussed in chapter 2). Imagine an investment bank securitizing a loan of $100 mio. belonging to a firm. The potential loss from the firm going bankrupt is $100 mio. Now imagine that the investment bank, by using the CDSs of that firm instead of outstanding loans, structures a synthetic securitization of $500 mio. Then the potential fallout from the firm going bankrupt jumps fivefold. Of course there may not actually be that much outstanding loans belonging to the firm so that the actual damage to the system may be much more. However, in an illiquid and panic driven market there is no way of really assessing that information so that anyone holding an asset related to the firm may be suspect. Now if we multiply those firms by hundreds and pool them altogether using CSOs, and furthermore have the investment banks hold the equity-tranche, which bears the first loss on the CSO, we begin to fathom the extent of the problem. When the probability of default jumps from 1% to 5%, on a CSO leveraged 20 times (which was not unusual

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[201] Goldstein, Matthew "Bear Stearns' Subprime Bath" BusinessWeek, June 12 2007.

given that the general leverage for firms like Goldman Sachs and Morgan Stanley were 1 to 25) we can wipe out the entire portfolio of CSO created by using CDSs. In fact, as the bearers of equity tranche, the investment banks can lose their entire shareholders' equity in such a scenario. Actually, the default probability increased to 20% on subprime loans and the reality turned out to be much worse than even the most pessimistic scenario. The models that the investment banks used predicted that such an occurrence could happen once in a million years only, yet it has happened so quickly, proving that their models were wrong in the first place.[202]

4.3. Basel II, Credit Rating Agencies and the Crisis

As the Basel II Process was already underway and had been partially implemented as of 2007, mainly by some banks in Europe[203], there have been accusations placed on this process as a culprit of the financial crisis that ensued. As early as 2001, critics of the Basel II had begun criticizing the process as a destabilizing force due to its emphasis on VaR related risk measures, statistical models which are inadequate and heavy reliance on credit rating agencies.[204] After the crisis became full blown, the criticisms multiplied and Basel II's shortcomings were proclaimed globally. The main responsibilities ascribed to Basel II in its role during the crisis are the inadequacy of capital requirements under the new accord, the role of fair-value accounting, procyclical capital requirements, role of credit rating agencies and allowing off-balance sheet placement of risky exposures.[205] Yet the single most important factor is perceived as the Basel II agreement to revise the rule-based standards of its predecessor and instead emphasize principles and discretion. Under Basel II, large banks can use internal risk models, rather than standardized formulas and rules, to determine their own capital levels. Moreover, the agreement explicitly recognizes the legitimacy and accuracy of credit rating agencies in the process of determining the

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[202] Tully, Shawn (2007) "Wall Street's Money Machine Breaks Down" CNNMoney.com Website, URL: http://money.cnn.com/magazines/fortune/fortune_archive/2007/11/26/101232838/
[203] Cannata, F., and Quagliariello, M. (2009) "The Role of Basel II in the Subprime Financial Crisis: Guilty or Not Guilty?" CAREFIN Research Paper No. 3/09. p. 14, SSRNURL: http://ssrn.com/abstract=1330417
[204] Danielsson, J. et al. (2001) "An Academic Response to Basel II" p. 3, RiskResearch Website URL: http://risk.lse.ac.uk/rr/files/JD-01-6-19-992957996-8.pdf
[205] Cannata, p. 3.

appropriate size of a bank's capital cushion.[206] As the current financial crisis unfolds, the notion that banks can successfully govern themselves using internal models or rely insouciantly on credit rating agencies for risk evaluations strains credulity.[207]

Credit rating agencies are also being blamed for the AAA ratings they gave to CDOs and MBSs based on subprime mortgages. It is obvious that the high ratings given by the agencies to many subprime debt not only allowed but openly encouraged the purchase of these assets. The rating agencies claim having given these ratings based on the internal and external credit enhancements such as overcollaterization, yield spread (excess servicing), third-party or parental guarantees, letters of credit, and cash or other collateral accounts.[208] However, there are serious allegations that the rating agencies suffered from conflicts of interest, as they were paid by investment banks and other firms that organize and sell structured securities to investors.[209] In 2008, the Securities and Exchange Commission has proposed some changes to increase the regulation of credit rating agencies after an "extensive 10-month examination of three major credit rating agencies that found significant weaknesses in rating practices."[210]

There is no doubt that the valuation of the structured and complicated financial instruments pooling credit risks rested on rating agencies' models, biased by observations limited to a relatively short span of a very benign history. Those products were issued and rarely traded over the counter: marked to model, as there was no proper market assessing their liquidity. Even the S&P admitted that "assumptions that went into decision-making [on credit ratings] were informed by what had happened in the past," and yet in this instance "previous loss data proved to be much less of a guide to future performance."[211]

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[206] Gerding, E. F. (2009) "The Outsourcing of Financial Regulation to Risk Models and the Global Financial Crisis: Code, Crash, and Open Source" p. 31-37, SSRN URL: http://ssrn.com/abstract=1273467
[207] Singer, D. (2007) **Regulating Capital: Setting Standards for the International Financial System**. Ithaca, NY. Cornell University Press. p. 2-12.
[208] See Chapter 2 for an explanation of Credit Enhancement procedures.
[209] Buttonwood "Credit and blame to the agencies" **The Economist**, 6 September 2007.
[210] SEC (2008) "SEC Approves Measures to Strengthen Oversight of Credit Rating Agencies" URL: http://www.sec.gov/news/press/2008/2008-284.htm
[211] Milligan, Jack "The Model Meltdown" Entrepreneur Website, URL: https://www.entrepreneur.com/tradejournals/article/178442313_2.html

4.4. Eastern Europe and the Credit Crunch

4.4.1. Convergence and the Importance of Maastricht Criteria

For much of this decade, a very lucrative trade that financial markets played excessively was the convergence trade. First started during the adoptation of Euro and the consequent convergence in interest rates throughout Western European EU members, the issue was also raised during the accession processes of Eastern European countries to the EU because once these Eastern Euopean countries had guaranteed to become members of the EU, their financial prowess and stability seemed assured. Overnight, in the eyes and screens of the market players, they turned into highly rated sovereign risks from relics of the communist era. Naturally, this hope, although with hindsight more than just a little overly optimistic, was not entirely unfounded. The story that was sold was that after becoming members of the EU, these countries were destined to become members of the EMU as well, set to adopt the Euro as national currency, thereby, guaranteeing a stable, low-interest rate environment for the foreseeable future. The argument rested on some trackable data by the financial markets such as the Maastricht Convergence criteria. These four criteria are as follows: an inflation of no more than 1,5% of the three best performing EU countries (calculated as 3,2% in 2008); government budgetary position (excessive deficit of not more than 3%); exchange rate (at least two years in ERM without devaluing); and long-term interest rate levels in line with three best performing EU member states(calculated at 6.5% in 2008).[212] As can be observed from Table 5, there were only two countries that fulfilled all 4 criteria in 2008: Poland and Slovakia. In fact, as will be observed in Chapter 5, Poland sovereign CDS had a cointegration relationship with German sovereign CDS, and it is possible that adherence to the convergence criteria may have helped in this respect. On the other hand, while seemingly qualifying for three out of four criteria, Bulgaria, and the Baltic countries failed spectacularly on the most important criterion of all: inflation. This to an extent may also explain the strong divergence observed in these countries following the outfall from the crisis.

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[212] ECB (2008) "ECB Convergence Report 2008" p. 39-46 ECB Website URL:
http://www.ecb.int/pub/pdf/conrep/cr200805en.pdf

Table 5: Observance of Convergence Criteria[213] (2008)

	Inflation (%)	Government balance (% of GDP)	Government debt (% of GDP)	Long-term interest rates (%)
Bulgaria*	9,40	3,20	14,10	4,70
Estonia*	8,30	0,40	3,40	…
Latvia*	12,30	-1,00	10,00	5,40
Lithuania*	7,40	-1,70	17,00	4,60
Poland	3,20	-2,50	44,00	5,70
Romania	5,90	-2,90	13,60	7,10
Slovakia	2,20	-2,00	29,20	4,50
Czech Republic	4,40	-1,40	28,10	4,50
Hungary	7,50	-4,00	66,50	6,90
Convergence criteria	3,20	-3,00	60,00	6,50

Note: The grey fields indicate compliance with the criterion. * indicates a fixed-exchange-rate regime. Inflation and interest rates are changes in per cent year-on-year, and data refers to the period April 2007-March 2008. Besides complying with the above convergence criteria, a member state must have participated in the exchange-rate mechanism ERM II for at least two years without severe tensions and must also meet a number of legal criteria, including central-bank independence.

Source:ECB

Before the crisis, given the easy credit cycle, the argument of cEMU convergence proved so persuasive that, not only the foreign players of the financial markets, but even the citizens of these countries fully bought it and rushed ahead to borrow cheaply in hard currency, convinced that their currencies were as stable as the Euro, so why pay the higher local interest rates?. As a rising tide lifts all boats, all the Eastern European countries started rising in value and converging to Germany credit-riskiness until 2007, as shall be seen in the empirical part of the paper under Chapter 5. Everybody bet on the same occurrence, and Eastern European markets strengthened even more, in essence becoming a self-fulfilling prophecy, at least until the bubble of easy money burst

4.4.2. Causes and Effects of the Crisis

The subprime crisis started in the US and it spread over to European banks' balance sheets via the subprime CDOs and CLOs they purchased from the US. However, the real impact, especially on some Western European countries such as Austria and Sweden will most likely be felt via their exposure to Eastern European countries.

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[213] Ibid., p.49-184

Table 6: Overview of EU residential mortgage markets (2007)

	Value of Mortgage Debt, € million	Growth in Mortgage Debt	Residential Debt to GDP Ratio
EU27	6,146,672	7.4%	50.1%
Estonia	5,625	31.5%	36,3%
Latvia	6,726	43.9%	33,7%
Lithuania	4,849	61.8%	17,5%
Czech Republic	19,554	45.1%	15,3%
Hungary	12,535	16.3%	12,4%
Slovakia	6,529	55.0%	11,9%
Poland	35,966	57.8%	11,7%
Bulgaria	2,868	64.4%	9,9%
Ukraine	8,285	92.6%	8,6%
Slovenia	2,671	36.5%	8,0%
Albania	536	84.9%	6,7%
Serbia	1,275	96.2%	4,2%
Turkey	20,112	32,0%	3,9%
Romania	4,253	86.8%	3,5%
Russia	15,952	N/A	1,9%

Source: Eurostat, National Central Banks, EMF, IMF, Turkish Banking Association

As one can observe from the above table, the share of mortgages to GDP at the end of 2007 in Eastern Europe was highest in the Baltic countries, which were to witness the most severe shock during the subprime crisis. Furthermore, the growth of these loans in the region was much above the EU-27 average of 7.4%.[214] It is interesting to note that one of the lowest mortgage to GDP ratios can be found in Turkey. The problem with Eastern European countries has reached a peak point after the subprime crisis in so much as foreign credit to these countries has fallen dramatically. However, their problems did not begin with the subprime crisis but occurred because the citizens of these countries and the banks who lent to them ignored a basic rule: Never underestimate currency risk.

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[214] European Mortgage Federation (2007), "Key Figures", URL:
http://www.hypo.org/content/default.asp?PageID=202

Figure 23: Share of Mortgages in Foreign Currency to Overall Lending[215] (2007)
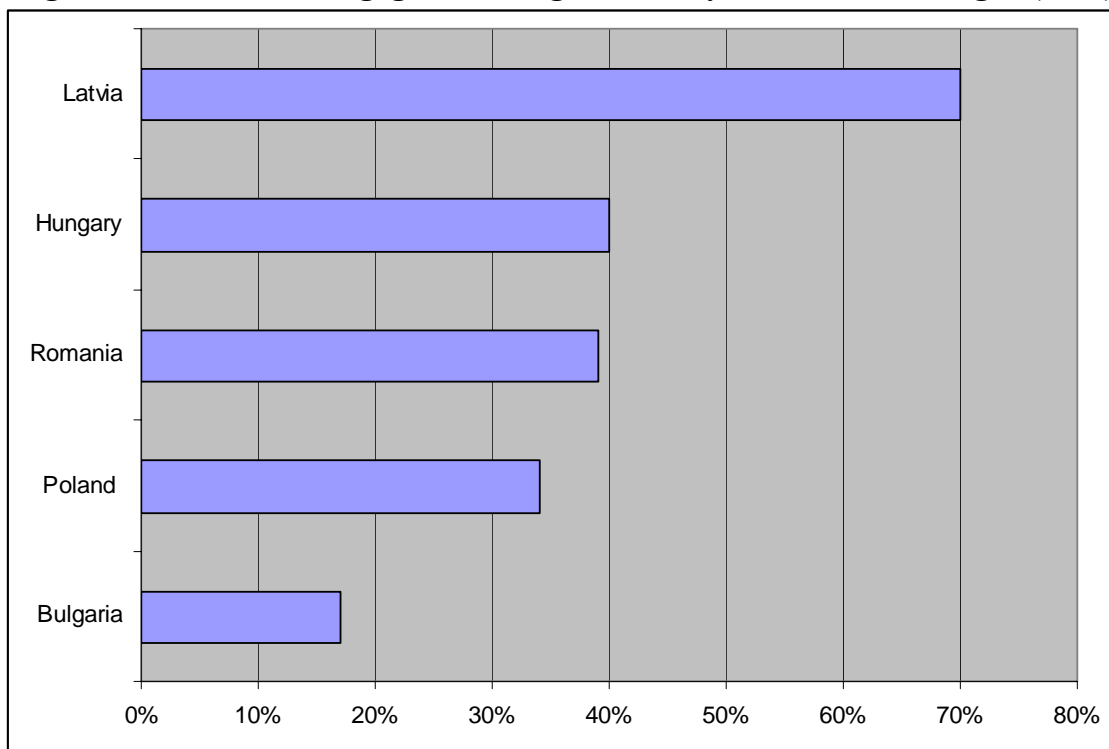
Source: Roy (2008)

The problems with Eastern European economies begin and end with their huge current account deficits. On top of that, many people in these countries also chose to borrow their mortgage loans, which exploded in recent years, mainly in Euros, Swiss Francs and even Japanese Yen because of two reasons: First, the interests on those loans were much cheaper than local currency loans. Secondly, banks that made these loans could find cheap sources of funding from foreign countries, mainly Western European banks. A very small part of the loans were funded from local sources as most local sources were very short in nature. The easiest and cheapest credits with a long maturity were obtained via securitizations, which reached almost 60% of all mortgages outstanding in Hungary in 2006.[216] The growth in covered bond issuance was also exponential in Eastern Europe. As credit risk of newly admitted EU-member sovereign nations were perceived as very low by markets as measured by their CDS spreads (see

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[215] Roy, Friedemann (2008) "Mortgage Markets in Central and Eastern Europe – A Review of Past Experiences and Future Perspectives" **European Journal of Housing Policy**, 8:2, p. 145.
[216] European Mortgage Federation (2008), "Quarterly Review of European Markets", URL: http://www.hypo.org/Content/Default.asp?PageID=215

chapter 5), there was a race to lend to them. Securitization and covered bond issuance was mainly used in the more advanced countries of Eastern Europe such as Hungary or Czech Republic. However, for other countries in the Baltic and Eastern European region, the funding was not local sources either. In fact, most of the mortgages that were issued in these banks were funded via parent companies which had purchased the local banks. Foreign ownership of banks in the region reached a zenith during this time.

Table 7: Foreign Bank Ownership in Eastern European Countries (2006)[217]

Country	Asset Share of Foreign-Owned Banks (%)	Total Foreign Currency Loans to Non-banks (%)
Estonia	99	79
Czech Republic	96	10
Slovak Republic	93	30
Lithuania	92	65
Croatia	91	76
Bulgaria	80	47
Poland	67	26
Hungary	63	46
Romania	62	58
Latvia	48	70
Turkey	6	31

Source: ECB

The riskiest countries are those with the most foreign ownership and most foreign currency loans because they are most exposed to both currency depreciation risk and foreign funding issues. As foreign banks turn to domestic issues in their own countries, they are most likely to leave these Eastern European countries to their own fates. In this category of riskiness, the Baltic countries, Bulgaria and Romania stand out not only because of above mentioned characteristics but also because of the small size of their domestic funding capacities. The following table shows the size of the domestic bond markets relative to the GDP of the countries. It can be observed from the graph that the Baltic countries, Bulgaria and Romania have very small bond markets compared to their respective GDPs, much smaller than the EU-average as well as other Eastern European markets.

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[217]ECB Monthly Bulletin (2006), "Financial Development in Central, Eastern and South-Eastern Europe", ECB Website, p. 97. URL: http://www.ecb.int/pub/pdf/other/pp93-104_mb200611en.pdf

Figure 24: Size of Domestic Bond Market As Percentage of GDP (2007)[218]
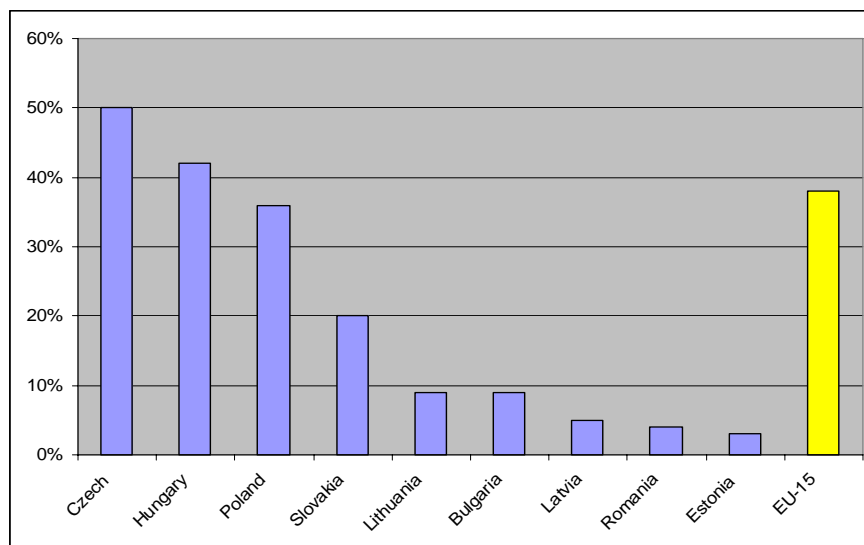
Source: Roy (2008)

If there is not enough local funding for the risky countries, they have to fund their rollover with foreign funding. After the subprime debacle, the capacity of foreign banks to lend to their subsidiaries in Eastern Europe is greatly hampered. On the other hand, the chances of tapping the dried up securitization market for these countries' banks are also very slim indeed.

Figure 25: Capital Movements to Emerging Markets[219] (net, billion of dollars)
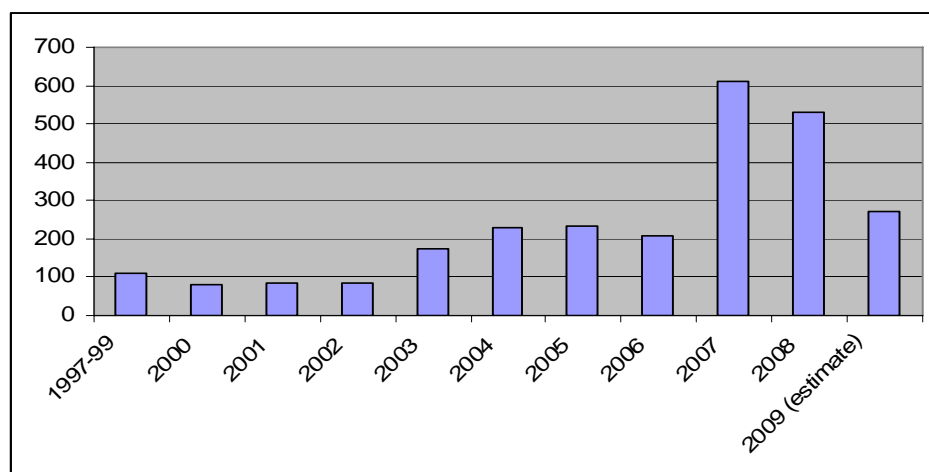
Source: IMF

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[218] Roy, p.153.
[219] IMF (2008), "Global Capital Flows", URL:
http://www.imf.org/external/pubs/ft/gfsr/2008/02/sa/sa_table1.csv

After the subprime crisis the world financial system has undergone a major credit crunch. Nowhere is this more acutely felt than in certain Eastern European countries highlighted above. The supposed advantages from becoming EU members for these countries have not materialized; on the contrary, they are witnessing the largest downturn since the collapse of communism. The only way out of this crisis seems to be coordinated EU-wide fiscal intervention to prop up the weakening economies. Here, however, in stark contrast to the policy response in the US, an EU-wide concentrated effort cannot materialize as Germany does not want to foot the bill.[220] Furthermore, a failure in a large Eastern European country may bring down with it quite a few of the banks in Western European countries such as Unicredito (Italy), Erste Bank, Raffeisen (Austrian) or Swedbank (Sweden). [221] Therefore, without a coordinated effort led by the heavyweights of the EU, France and Germany, in order to save Eastern Europe from its current financial doldrums, questions about the internal solidarity and stability of the EU itself may be raised.[222]

4.5.   Global Response to the Crisis

Eichengreen (2008) calls the subprime crisis "The Great Securitization Crisis of 2007-2008".[223] It would certainly be too simplistic to put the entire blame for the subprime debacle on securitization. However, there is quite strong evidence that the problems with the "originate to distribute" model, excessive use of leverage and too complicated product structures helped exacerbate what initially started from easy credit policies of the central banks.[224] The effects of the subprime crisis are still being played out, and especially in places like Eastern Europe, there are still major problems to be solved before a return to normalcy. In all likelihood, the crisis will extend to beyond 2010. However, even though the crisis will still have time to play itself out, someday it will end. When the crisis ends, it will be time to make a new world order because it has

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[220] The Associated Press "Merkel, EU reject bailout for eastern Europe" **International Herald Tribune**, 2 March 2009.

[221] The Economist "The Whiff of Contagion" 26 February 2009.

[222] The Economist "The Bill That Could Break Up Europe" 26 February 2009.

[223] Eichengreen, B. (2008) "Ten Questions about the Subprime Crisis**" Financial Stability Review,** No. 11, p. 27, Banque de France Website, p. 19. URL: www.banque-france.fr/gb/publications/telechar/rsf/2008/etud4_0208.pdf

[224] Ibid., p. 20.

by now become clear that the current global financial markets are quite flawed in many aspects, which were already discussed above. The new financial order that will be created must be akin to the great order of the Bretton Woods system that was mapped out in the closing days of the Second World War. After the Asian crisis and the ensuing world order after 2000, there have been calls for a new financial order.[225] It must in a way be a so-called "Bretton Woods II" system that gets back to the growth and stability of the post-war period.[226]

The new system that is being proposed as a replacement of the failed financial system is supposed to have three legs. The first leg determines the regulatory environment in which the financial institutions operate. The regulatory environment covers the central banks, the supranational organizations, the rating agencies and the local banking authorities. They are supposed to be the pillars on which sound banking and stable markets are placed. To this extent, even an umbrella regulatory body which covers the risk aspects of the financial instruments utilized may be pondered. The second leg of the system must be designed around the way in which trading takes place in the credit derivatives markets, which was a main source of problem during the crisis. To this end, the opaque and unaccountable aspects of the OTC market must be exchanged for a more transparent and answerable organized market in which trading and settlements take place. This will also have the added benefit of efficiently allocating risk so that any potential systemic risk may be recognized and a market failure may be avoided. The final leg of the system must be the securitization markets themselves. This crisis was facilitated by the American model of securitization, so any future of securitization must avoid the pitfalls that caused systemic failure in the first place and in their stead, put in place structures that will ensure the stability and the soundness of the financial system where securitization deals are done.

Finally, the modification of existing principles of regulation within Basel II is an integral precondition to the creation of a new international standard. While it may be overreaction to claim that the entire crisis was caused by the Basel II Process, the crisis

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[225] Dooley, Michael et al.(2003) "An Essay on the Revived Bretton Woods System", **NBER Working Paper** No. 9971
[226] Dooley, Michael et al. (2009) "Bretton Woods Still Defines the International Monetary System", **NBER Working Paper** No. 14731

nevertheless disclosed some of the aspects of Basel II which are in need of overhaul.[227] There may be some delays in the full implementation of Basel II[228], yet there is no doubt that ultimately better risk management systems, a clearer understanding of credit risk, a simpler and more cautious approach to derivatives and synthetic securitization will have to take place before securitization can start to be used in earnest, as before the subprime crisis of 2008.

4.5.1. The Regulatory Overhaul

The current economic crisis began in the US as a conjunction of a housing crisis, a credit market crisis and, increasingly, an employment crisis. The crisis has revealed the unsustainability of the model of growth that has prevailed across OECD economies in the past decade, particularly in the US: a model that was based not on the real economy with wage increases reflecting productivity growth, but on debt-financed consumption and investment and the excessive leveraging of the private sector.[229] Neither governments nor the central banks foresaw the bubble that grew in the US mortgage market up to 2006, which imploded in the first quarter of 2007. What accelerated the crisis was the complex and lightly regulated structured finance industry that securitized the credit risks of the US mortgage market. Coupled with "pro-cyclical" accounting rules and rigid prudential rules, the credit crunch that followed created a self-perpetuating, asset depressing process in the banking sector.

Regulators and governments were content to let the structured finance industry develop outside their jurisdiction. Structured finance is founded on the belief that spreading risk ultimately mitigates risk, reduces the cost of capital and thereby enhances economic growth. It created the illusion of low risk, low-cost capital. Being managed by "sophisticated" investors, regulators believed that the business did not need regulation. As it happened, however, this created major complications for regulators. Light regulatory approaches helped to blur the boundaries between regulated and un-regulated

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[227] Cannata, p. 15

[228] Ugut, Gracia S. "Complex Made Simple: Subprime and Basel 2 Problems" Business Mirror Website, URL: http://businessmirror.com.ph/component/content/article/28-opinion/1496-complex-made-simple-basel-2-and-the-subprime-problems.html

[229] Demyanyk, Y. S. and Van Hemert, O. (2008) "Understanding the SubprimeMortgage Crisis", p. 1-5. SSRN Website URL: http://ssrn.com/abstract=1020396

financial services. Off-balance sheet operations allowed regulated banks and insurance groups to practice double accounting.

The subprime crisis, therefore, was a direct result of the unregulated and opaque nature of the trades that financial firms carried out. In order to avoid a complete meltdown of the financial system, central banks and governments of major countries have been pumping money into the system. However, the problem cannot be truly fixed without a major overhaul of the regulatory bodies which watched while the markets continued their unprecedented growth.[230] The future, therefore, is bound to be much more regulated than the past. The American model of using opaque highly leveraged and credit derivative driven synthetic securitization is no longer viable. In its place, a banking environment regulated by supranational organizations like BIS, OECD, The Basel Committee on Banking Supervision and IMF as well as national central banks and other regulatory bodies is most likely to take place.

On the other end of the spectrum, the rating agencies will have to make major reforms regarding the way they dole out ratings as well. The models rating agencies used in order to judge credit quality of complex products like CDOs have clearly proven very ineffectual at best and plain wrong under the worst circumstances.[231] The CDO creators and rating agencies built their models that basically discounted the probability for a real estate price meltdown (since median prices had not dropped significantly since the Great Depression). There were no contingencies for such an event as evidenced by the fact that a large number of SPVs did not have accompanying mortgage documents (which has rendered them unenforceable in the courts).[232] In other words, such an outcome was considered a "black swan"[233] event when such events were determined to be near impossibilities. The entire idea of very high ratings for such basket products was based on the benefits of diversification and assumption of rational markets.

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[230] Schmudde, D. (2009) "Responding to the Subprime Mess: The New Regulatory Landscape." Fordham Law Legal Studies Research Paper No. 1333798. p. 19-25. SSRN URL: http://ssrn.com/abstract=1333798
[231] Ibid. p. 23.
[232] Kerwer, D. (2009) "Rating Agencies and the Subprime Crisis: Discursive Accountability of Global Financial Institutions", p. 7-12. Allacademic Website URL: http://www.allacademic.com/meta/p312821_index.html
[233] Taleb, N. N. (2007) **The Black Swan: The Impact of the Highly Improbable.** Random House. p. 3-10

However, as the crisis has shown, under times of stress, such assumptions may lose all meaning as all the investors try to rush via a very small door. Therefore, in the future for securitized products, stress scenario findings are much more likely to be used as a basis for making investment decisions, rather than simply looking at the ratings of structures. Appropriate regulation of credit rating agencies will play an important role in building confidence in the marketplace, especially if the purpose of this regulation is to ensure that rating agencies comply with policies and procedures designed to promote independence and objectivity.[234]

4.5.2. The Future of Credit Derivatives Markets

There is no doubt that the credit derivatives market used to create synthetic securitization was one of the main facilitators of leverage, and consequently the prime suspect for the crisis that followed. As discussed in Chapter 2, and shown in Figure 19, Credit Default Swaps (CDSs) constitute the majority of credit derivative transactions. Therefore, any plan to ensure that a crisis like the subprime crisis will not reoccur must take the deficiencies of these markets into consideration.

A good example of the poor working of the CDS market was demonstrated by the failure of Lehman Brothers in September 2008. When Lehman Brothers declared bankruptcy, it triggered the transfer of large sums in the CDS market to insure buyers of Lehman credit default risk protection against all losses from that event. The sellers of these contracts received the Lehman debt and in return they were obligated to pay the contract buyers (the insured parties) enough money to make the buyers "whole" i.e. to give them their full investment in the bonds back as if they had never bought the Lehman bonds. The auction for Lehman's debt occurred on 10 October 2008 and the final auction price was $8.63.[235] This means that for each $100 initial par value, the debt was only worth $8.63. The sellers of Lehman CDSs were obligated to pay the insured counterparties 91.37% of the bonds' face value and, in return, they received the bonds. Because Lehman had hundreds of billions of dollars of debt outstanding, this had been a

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[234] Standard & Poor's (2009) "Toward a Global Regulatory Framework for Credit Ratings", p. 2-3. S & P Website: URL: http://www2.standardandpoors.com/spf/pdf/media/GlobalRegReport.pdf
[235] Reuters (2008), "Lehman CDS sellers lose $365 bln after auction" Reuters Website, October 10, 2008. URL: http://www.reuters.com/article/companyNewsAndPR/idUSN1038718020081010

large worry for the market. The Lehman debt was trading at 12 to 13 cents on the dollar before the auction[236] yet it was auctioned at a substantial discount, and the huge losses triggered contagion into other markets, including Eastern European markets.[237]

In the future, derivatives markets like the CDS markets cannot go unregulated. These contracts must be disclosed, standardized and controlled via an organized exchange like the Chicago Board Options Exchange. As a first step, on March 12, 2009, the International Swaps and Derivatives Association, Inc. ("ISDA") published the 2009 ISDA Credit Derivatives Determinations Committees and Auction Settlement to the 2003 ISDA Credit Derivatives Definitions together with a new protocol (known as the "Big Bang Protocol") specifying standard auction settlement procedures and related terms applicable to credit default swap transactions. The fundamental components of the Auction Supplement include the establishment of standard auction settlement procedures to eliminate the need for future auction protocols; a credit event and succession event look-back period to enhance the fungibility of similar CDS trades with respect to the impact of credit and succession events; and credit derivatives determinations committees comprised of dealer and buyside representatives to make binding determinations with respect to certain conditions and events.[238] The aim of all this revision is to improve the liquidity of the market by increasing the transparency and simplicity of CDS trades.[239]

4.5.3. The Future of Securitization

Some of the major problems with securitization as it was professed in the USA were that the synthetic structures were too complex, the trades too opaque and the deals too leveraged.[240] In fact, the crisis would not have happened on such a great scale and with such a big and global impact had it not been for securitization. Without the

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[236] Reuters (2008), "Lehman CDS sellers face massive losses in auction" Reuters Website, 9 October 2008, URL: http://www.reuters.com/article/bondsNews/idUSN0932589620081009
[237] Reuters (2008), "Emerging Markets-Contagion spreads to Hungary, Ukraine" Reuters Website, 15 October 2008, URL: http://www.reuters.com/article/usDollarRpt/idUSLF10729420081015
[238] ISDA Website, "Big Bang Protocol: FAQ", URL: http://www.isda.org/bigbangprot/bbprot_faq.html
[239] Bowman, Louis (2009) "Credit Derivatives: Big Bang to Avert Blow-up" **Euromoney**, March 2009.
[240] Ashcraft, A. B. and Schuermann, T. (2008) "Understanding the Securitization of Subprime Mortgage Credit" Wharton Financial Institutions Center Working Paper No. 07-43; FRB of New York Staff Report, No. 318. p. 2-3, 64. URL: http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1071189

securitization tools that allowed the loans to be packaged and sold to many investors all around the world, the subprime crisis would have remained a local non-performing loan crisis. Therefore, in order to make sure these problems do not rearise, the future shape of securitization will most likely entail much simpler structures, with little use of leverage or synthetic securitization utilizing credit derivatives.

Another problem with the securitization model was the "originate-to-distribute" model discussed above. When financial intermediaries knew that they were giving out loans only to shortly thereafter pass them onto third parties via securitization, their incentives for proper screening of credit were greatly reduced, leading to more defaults on portfolios likely to be securitized.[241] In the future of securitization, the assets will have to be on-balance sheet transactions. The model to take example from could in all likelihood be the German covered bond market, the so-called *Pfandbriefe* discussed in Chapter 3. Consequently, banks are much more likely to retain a significant portion of their securitizations, preferably on-balance sheet as with the *Pfandbrief* model, in order to convince the investors to buy these products.

An equally important factor, especially for Eastern European countries, will have to be more efficient allocation of credit and growth of local funding sources so as to not become wholly dependent on foreign sources of funding. In this respect, taking current account deficits under control must surely play a major part for these countries, Turkey included among them. Only by creating sound and safe guarantee structures backed by legal and regulatory environment as well as strong institutional balance sheets can there be a future in securitization for the countries of Eastern Europe.

4.6. Turkey and the EU After Subprime: Policy Alternatives

It is clear that after the end of the crisis, the financial world will be a less complicated and greatly deleveraged place. The flow of funds to emerging markets are anticipated to fall greatly, more than to half of the amount realized in 2007, as shown in Figure 25. In such a world, Turkey will also face some difficulties to roll over the existing short and medium-term foreign debt that is due to be paid in 2009-2010.

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[241] Keys, B. J et al. (2008) "Did Securitization Lead to Lax Screening? Evidence from Subprime Loans", p. 28. SSRN Website URL: http://ssrn.com/abstract=1093137

Nevertheless, as shall be seen from the empirical findings of the next chapter, Turkey has not been as affected from the crisis as some of the other Eastern European countries. The reason for this is twofold: First, Turkey did not become cointegrated with the EU markets before the crisis either, as shown in the cointegration analysis between Germany and Turkey in Chapter 5. Meanwhile, Eastern European countries such as Poland and Bulgaria were either fully cointegrated or became so after the year when their EU accession was approved. The markets, therefore, had assigned to them EU credit risk, as seen from their CDS spreads until 2007. Secondly, given the easy credit cycle and the low risk premium priced in by the markets, these countries had huge access to cheap credit, which they used utterly to finance the growing consumer finance and mortgage markets, as discussed above and seen in Tables 5 and 6 as well as Figure 23. Then the foreign banks, who also had a large foothold in the banking sector, either funded these banks via loans or securitized these assets to finance the loans. The countries who suffered the most were those countries that had the most amount of foreign currency loans relative to their GDP and also whose local funding was the lowest, as they had to depend totally on foreign funding or securitization markets, which dried up totally after the Lehman crisis in 2008.

Even though Turkey has so far been comparatively better off in that its relative backwardness has helped it escape the worst of the crisis, it has still been greatly affected by the lack of foreign funds flowing into the country. The country faced negative growth in the last quarter of the year 2008.[242] Turkey and the Eastern European countries have turned to the IMF as a last resort to replace the foreign funds that have stopped flowing into their countries. However, the correct response, especially for Eastern European countries problems might have been an EU-wide fiscal stimulus program. It is up to the EU, especially to countries with big clout like France and Germany, to show their support for the regions in crisis. Otherwise, the advantages to Turkey of following the EU path would remain subdued in an environment where the first serious crisis is enough to undermine cohesion and support between the member states.

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[242] TUİK (2009), "GAYRİ SAFİ YURTİÇİ HASILA IV. DÖNEM: EKİM, KASIM, ARALIK / 2008" URL: http://www.tuik.gov.tr/PreHaberBultenleri.do?id=4026

5. EMPIRICAL ANALYSIS OF CONVERGENCE AND DIVERGENCE IN THE EU

5.1. Introduction

5.1.1. Objective

There are two parts to the empirical analysis. The aim of the first part of the analysis is to establish whether cointegration relationships exist between CDS spreads of Germany on the one hand and those of Poland, Bulgaria and Turkey on the other. There are many studies that show a correlation between bond and CDS spreads[243], and there have been some studies, mostly by investment bank analysts, to measure credit riskiness as a measure of whether Eastern European countries are close to joining the EU bloc.[244] The objective of this study is to utilize CDS spreads of EU aspiring states vis-à-vis that of an already member country, and to infer from that whether membership expectations are quantifiably priced in those spreads, and if so, then to measure whether at any point in time the cointegration regime shows a structural shift.

The aim of the second part of the analysis is to measure whether after the subprime crisis there has been a move from convergence to divergence within the EU. Countries are divided into "core EU" such as France and Germany and "new EU" such as Eastern European countries. Then by using a combination of graphical analysis, dynamic correlations and Z-score studies, it is tried to establish whether the latter group has been worse hit by the credit crunch than the former group of countries. The existence of a divergence from "core EU" could be perceived as a realization of credit risks in Eastern European countries, a risk which until 2007, the markets thought had disappeared thanks to their EU membership..

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[243] For instance:

Zhu, Haibin (2004) "An Empirical Comparison of Credit Spreads Between the Bond Market and the Credit Default Swap Market" BIS Working Paper, No. 160.
Chan Lau and Kim (2004) "Equity Prices, Credit Default Swaps and Bond Spreads in Emerging Markets" IMF Working paper WP/04/27. URL: http://openlibrary.org/b/OL19857843M
[244] Hristova, Zlatomira (2006) "Will Bulgaria and Romania Join the EU in 2007?" WestLB Research Paper. URL:
http://www.westlbmarkets.net/cms/sitecontent/ib/investmentbankinginternet/en/Equities/Research-Overview.standard.gid-N2FkNDZmMzU4OWFmYTIyMWM3N2Q2N2Q0YmU1NmI0OGU_.html

5.2. Literature Review

One of the earlier examples of the literature on a Credit Default Swaps is Hull and White[245], who develop a reduced-form type pricing model, with an extension to several underlyings and non-perfectly correlated default. They calibrate their model based on the traded bonds of the underlying on a time series of credit default swap prices on one underlying.

Aunon-Nerin et al.[246] investigate the determinants of credit default swap spreads, while Houweling and Vorst[247] examine the pricing performances of several credit default swap models. Longstaff, Mithal and Neis[248] study the valuation of credit default swaps relative to the cash bond market and examine which market leads in price discovery. Hull, Predescu and White[249] analyze the relationship between credit default swap spreads and bond yields, and explore the extent to which credit rating announcements by Moody's are anticipated by credit default swap markets. It has also been shown in a study by Zhu[250] that CDS spreads lead bond spreads.More recently, the contemporaneous works of Tang and Yan[251] as well as Bongaerts, Jong and Driessen[252] find evidence for an illiquidity premium in the CDS market. This presents itself in the form of a wider bid/offer spread ans the problem has been solved in this study by taking the average of the bid and offer quotations.

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[245] Hull, J. and White, A. (2000) "Valuing Credit Default Swaps I-II". **The Journal of Derivatives**, Fall 2000.
[246] Aunon-Nerin, D., Cossin, D., Hricko, T. and Zhijiang, H. (2003) "Exploring for the Determinants of Credit Risk in Credit Default Swap Transaction Data: Is Fixed-Income Markets' Information Sufficient to Evaluate Credit Risk?" FAME Research Paper No. 65. SSRN URL: http://papers.ssrn.com/sol3/papers.cfm?abstract_id=375563
[247] Houweling, P. andVorst, T. A.C.F. (2005) "Pricing Default Swaps: Empirical Evidence" **Journal of International Money and Finance**, Vol. 24, p. 1200-1225, 2005
[248] Longstaff, F. A., Mithal, S. and Neis, E. (2004) "Corporate Yield Spreads: Default Risk or Liquidity? New Evidence from the Credit-Default Swap Market", NBER Working Paper No. W10418. SSRN URL: http://papers.ssrn.com/sol3/papers.cfm?abstract_id=528998
[249] Hull, J., Predescu M. and White, A. (2004) **The Relationship Between Credit Default Swap Spreads, Bond Yields and Credit Rating Announcements**, University of Toronto Press
[250] Zhu, Haibin (2004) "An Empirical Comparison of Credit Spreads Between the Bond Market and the Credit Default Swap Market" BIS Working Paper No. 160. SSRN URL: http://ssrn.com/abstract=477501
[251] Tang, D. Y. and Yan, H. (2007) "Liquidity and Credit Default Swap Spreads", AFA 2007 Chicago Meetings Paper, SSRN URL: http://papers.ssrn.com/sol3/papers.cfm?abstract_id=891263
[252] Bongaerts, D., Jong, F. and Driessen, J. (2007) "Derivative Pricing with Liquidity Risk: Theory and Evidence from the Credit Default Swap Market", EFA 2007 Ljubljana Meetings Paper. SSRN URL: http://ssrn.com/abstract=966167

There is also a significant empirical literature on credit risk in general. Two recent empirical studies analyze the default probabilities of US corporates. In a study by Driessen[253], the default risk premia of US corporate bonds are estimated by using the average default frequencies by credit rating agencies as the benchmark for physical default probabilities. In another study[254], the relation between risk-neutral and physical default probabilities on a sample of firms, using the credit default swap data, finding dramatic variation in risk premia over time. Some papers have concentrated on a direct analysis of credit ratings as provided by the big rating agencies. These ratings are important as they are used extensively in practice as a proxy for credit risk. Duffee[255] finds that the credit spread is negatively related to the level of interest rates and the term spread. He also finds that the sensitivity to changes in the term structure is more pronounced for lower rated bonds. He observes further that changes in bond values might be due to the influence of the call feature present in a bond. Allessandrini[256] confirms these findings and concludes further that the business cycle effect is mainly captured by the changes in long-term interest rates. The study by Collin-Dufresne et al[257] uses time series of quoted bond prices to analyze the influence of various financial variables that should in theory influence changes in yield spreads. They find that these variables have only limited explanatory power. Moreover the residuals of the regressions are highly cross-correlated pointing to the influence of an unobserved common factor. The authors remain short of determining this common factor but find little support for structural form variables explanatory power of credit spread changes. Some further evidence for co-movements of credit spreads is provided by Batten et al[258]

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[253] Driessen, J. (2005) "Is Default Event Risk Priced In in Corporate Bonds" **The Review of Financial Studies**, 2005 18:1, p. 165-195.

[254] Berndt, A., Douglas, D., Duffie, D., Ferguson, M. and Schranz, D. (2004) "Measuring Default Risk Premia from Default Swap Rates and EDFs" Stanford University Website URL: http://www.stanford.edu/~duffie/cdsedf.pdf

[255] Duffee, G.R. (1999) "Estimating the Price of Default Risk." **The Review of Financial Studies**, Spring 1999, Vol 12, No.1, p. 197-226.

[256] Alessandrini, F. (1999) "Credit Risk, Interest Rate Risk and the Business Cycle." **The Journal of Fixed Income**, September 1999, p. 42-53.

[257] Collin-Dufresne, P. et al. (2001) "The Determinants of Credit Spreads Changes". **The Journal of Finance**, Vol. LVI, No.6, p. 2177-2179, 2205-2206.

[258] Batten, J. Et al. (1999) "Scaling the Volatility of Credit Spreads: Evidence from the Australian Bonds", p. 2-3. URL: http://www.sirca.org.au/research/centres/papers/2007/2007-Paper2.pdf

in their study on Australian Eurobonds. Finally, Yu[259] examines the effect of accounting transparency on credit spread term structures.

5.3. Theoretical Background

In the conventional cointegration test, the cointegration model is: $Y_t = a + bX_t + \varepsilon_t$ in which X_t and Y_t are integration time series with order of d and $\{\varepsilon_t\}$ is residual series, and the test is the residual-based one in which the null hypothesis is no cointegration against the alternative that the relation is cointegrated. With this method we can deduce that there is no cointegration between variables if the test fails to reject the null hypothesis for a sample period. In fact, this may be falsely concluded because of the existence of structural breaks.

Yang Baochen and Zhang Shiying defined three types of cointegration with structural breaks.[260] They are cointegration with parameter changes, partly cointegration and cointegration with mechanism changes. Simply speaking, cointegration with parameter changes means the parameters of the cointegration equation happen to change at some time, but the cointegration relationship still exists. Partly cointegration means the cointegration relationship exists before or after some time but disappears in other periods. Cointegration with mechanism changes means the former cointegration relationship is destroyed because new variables enter the system and they form a new type of cointegration relationship.

Define y_{1t} and y_{2t} as m-vectors, for the cointegration with parameter changes, Gregory and Hansen (1996) developed three models as follows:[261]

$$y_{1t} = \mu_1 + \mu_2\varphi_{t\tau} + \alpha^T y_{2t} + e_t, \ t=1,...,\ n \tag{1}$$

$$y_{1t} = \mu_1 + \mu_2\varphi_{t\tau} + \beta t + \alpha^T y_{2t} + e_t, \ t=1,...,\ n \tag{2}$$

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[259] Yu, Fan (2002) "Accounting Transparency and the Term Structure of Credit Spreads", p. 1-4. URL: http://papers.ssrn.com/sol3/papers.cfm?abstract_id=350040
[260] Yang, B.. and Zhang, S. (2002) "Study on Cointegration with Structural Changes" **Journal of Systems Engineering**, Vol. 17, No.1. p. 26-31.
[261] Gregory, A. and Hansen, B. (1996) "Residual-based tests for cointegration in models with regime shifts**" Journal of Econometrics**, 70, p. 102-104.

$$y_{1t} = \mu_{1} + \mu_{2}\varphi_{t\tau} + \beta t + \alpha_{1}^{T} y_{2t} + \alpha_{2}^{T} y_{2t} \, \varphi_{t\tau}, \; t=1,..., n \qquad (3)$$

where α is a cointegration vector, $\{\varepsilon_t\}$ is residual series, n is the sample size, and $\varphi_{t\tau}$ is the dummy variable:[262]

$$\varphi_{t\tau} = \begin{cases} 0 \; if \, t \leq [n\tau] \\ \\ 1 \; if \, t > [n\tau] \end{cases}, \quad \tau \in (0,1)$$

$T = [n\tau]$ is the breakpoint when cointegration may happen to change, and cointegration relationship is one type before time T and another after. It can be realized by giving different values to the dummy variable. Model (1) represents that there is a level shift in the cointegration relationship, i.e. there is a change in the intercept μ, while μ_1 represents the intercept before the shift, and μ_2 represents the change in the intercept at the time of the shift. Model (2) is added a time trend β_t on the basis of Model (1). Model (3) allows the slope vector to shift as well in which α_1 denotes the cointegration slope coefficients before the regime shift, and α_2 denotes the change in the slope coefficients. Model (3) includes all of the three changes in intercept, time trends and slope coefficients.

We can divide the method of testing cointegration with structural breaks into two steps: first, for each possible breakpoint $T = [n\tau]$, estimate the models (1)-(3) by OLS, yielding the residual series $\{\varepsilon_t\}$ from which we can get the values of ADF test statistic. The statistic of the cointegration test with allowance of regime shifts is the smallest value of the conventional ADF test statistic across all values of every possible breakpoint. The new test statistic we use is ADF*, ADF*=inf ADF(τ); Second, compare the value of ADF* test statistic and the critical value given by Gregory and Hansen (1996) using Monte Carlo simulation method. If the value of ADF* test statistic is smaller than the critical value, we can conclude that there exists a cointegration

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[262] Ibid.

relationship. To detect this and carry out the necessary tests described above, we use a Gauss coded computer program.[263]

5.4. Empirical Analysis of Convergence: 2002-2009

5.4.1.Data Selection and Methodology

It is important to clarify why Germany on one hand and Poland, Bulgaria and Turkey on the other are chosen for analysis. The choice of Germany seems quite obvious at first sight because it is perceived as a natural candidate for the anchor in most cointegration analyses, being the largest and most credit-worthy country in the EU. However, it may also be argued that as the CDS market of Germany is rather illiquid, it may not be suitable for such an analysis. Actually, while it is true that the CDS market of Germany is not liquid in general, this is not really a very negative situation as far as the cointegrtion analysis is concerned. We can view the CDS spread as the cost of insuring against a country's risk of default. When that risk is perceived as low, it is natural that there are few buyers of the risk; consequently, both the spread and the liquidity of German CDS remains low. On the other hand, when the risk of default globally increased after the Lehman crisis, even the liquidty of German sovereign CDS started to pick up due to higher demand.

In fact, when one looks at the situation regarding EU credit-risk after the subprime crisis, one observes two diverging risk trends in terms of even the Western European "old EU" members. On the one hand, large countries with sound financial systems and strong state intervention possibilities such as Germany and France have been able to keep their credit-worthiness high as observed from their CDS spreads. On the other hand, small countries or those with weak financial institutions have been placed under suspicion, causing their CDS spreads to widen relative to the "core". In this category, one may plaace countries such as Portugal, Ireland, Spain and Greece)so-called "PIGS") to name a few. In this paper which aimed to analyze the convergence and divergence of Eastern Europe to EU standards of low credit riskiness, it was decided to use Germany as a proxy for "high quality" and "good, core EU". France may

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[263] Hansen, Bruce E. (1996) URL: http://www.ssc.wisc.edu/~bhansen/progs/joe_96.html

have been used instead, as its CDS spreads were quite similar to Germany as well, yet an EU-average could not be used due to the impairing effects of the low-credit EU countries discussed above.

The choices for East European countries depended on size and data availability. Poland was a natural candidate due to its size among the first wave EU accession countries among Eatern European candidates. On the other hand, Bulgarian data was the most available, stretching back to 2002. Had data been available, it woud have been very interesting to include Hungary along with Poland and Romania along with Bulgaria as additional datapoints. Apart from domestic and national concerns, Turkey was included in terms of the importance it played as a non-EU member country with relatively low levels of retail FX loans, securitization markets and foreign bank ownership. The data consists of the 5 year sovereign CDS spreads of Germany, Poland, Bulgaria and Turkey from October of 2002 to mid-2009. All data are collected from Bloomberg and JP Morgan Morgan Markets websites with special data collection privileges.[264]

Table 8: Data Descriptive Stats

	BLG_CDS	GER_CDS	PLN_CDS	TUR_CDS
Mean	1.382574	0.064301	0.473180	4.105258
Median	0.800000	0.035830	0.260000	2.890900
Maximum	7.000000	0.906100	4.100000	14.40000
Minimum	0.108200	0.021250	0.083900	1.165300
Std. Dev.	1.396924	0.130458	0.623634	2.932767
Skewness	1.596946	4.371139	3.523655	1.376469
Kurtosis	5.429411	22.73990	16.08667	3.961340
Jarque-Bera	1174.176	33985.81	16109.15	619.9992
Probability	0.000000	0.000000	0.000000	0.000000
Sum	2419.505	112.5263	828.0647	7184.201
Sum Sq. Dev.	3412.995	29.76679	680.2190	15043.36
Observations	1750	1750	1750	1750

Source: JP Morgan, Morgan Markets Website

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[264] Bloomberg Website, URL:http://www.bloomberg.com and JP Morgan Markets Website URL:http://www.morganmarkets.com

The empirical study focuses on the convergence between Germany and the three accession countries to the EU. To this end, the long-run equilibrium relationships between the sovereign CDS spreads of the three accession countries are measured using German sovereign CDS spreads as a proxy. In order to be able to carry out cointegration analysis we have to establish that the series are integrated of the same order. The method we use is to search for unit roots in the level and 1st differences of the time series and look at the Augmented Dickey-Fuller (ADF) test results. Then, having established that the time series are integrated of the first order I(1) using Augmented Dickey-Fuller (ADF) tests, the cointegration analyses can be carried out. The cointegration analyses reveal that there is a long-term relationship between the sovereign CDS spreads of Germany and Poland, but we fail to establish such a relationship for Bulgaria and Turkey between the years 2002-2009.

Figure 26: Graph of CDS series 2002-2009
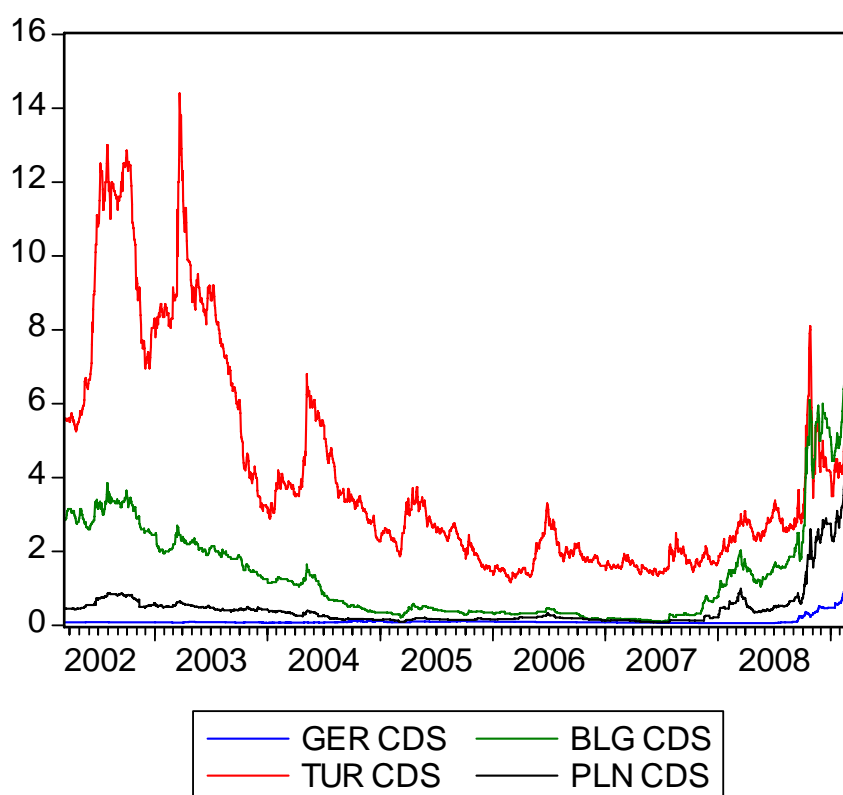
Source: JP Morgan, Morgan Markets Website

Since the main objective of this paper is to examine the long-term consistency and short term dynamic linkages between CDS premia of certain countries, a cointegration test is most appropriate for the study. The concept of cointegration test proposed by Engle and Granger is often used to test the long-term relationship among financial series, especially when the series tend to be non-stationary. The test is divided into two steps. First, the standard Dickey-Fuller unit root test is applied to the two credit spread series to confirm their non-stationarity. In the second step, we need to examine the order of cointegration for the two variables. Since the theory has predicted that the two prices should be equal in the long run, a natural candidate for the cointegration relationship is [1 -1]. Therefore, only the stationarity of the CDS spread need be tested. If it follows an I(1) process, and the spread is stationary, the equivalence relationship predicted by the theory is not rejected.

However, we also carry the analysis one step further. The question is, even though the relationship doesn't hold for the whole of the period 2002-2009, what if at one point in time there was a structural break in this relationship so that we cannot detect the relationship using conventional cointegration test? In other words, what if for example the spreads of Germany and Bulgaria became cointegrated sometime between 2002 and 2009, can we detect it? Actually using the methodology developed by Gregory-Hansen (1996) we can determine just such a case.[265] We establish that sometime in 2005, after the Bulgarian accession treaty was approved by the EU, the cointegration relationship starts existing between Germany and Bulgaria. We fail to find such a relationship with structural break for Germany and Turkey.

5.4.2. Conventional Cointegration Test for the Whole Sample Period

To carry out cointegration analyses, we have to make sure that all series are integrated of the order 1. We conduct the analysis using EViews 5.0 and selecting the test equation with intercept and time trends and with lag length chosen automatically using the Schwarz Info Criterion with maximum 20 lags. (Full output of results may be viewed in the annex.)

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[265] Gregory, A. and Hansen, B., p. 102-104.

Table 9: ADF Unit Root Tests with Intercept and Time Trend

		ADF Test Statistics	Critical Value		Order of Integration
			1%	5%	
Germany	Level	4.60	-3.96	-3.41	I(1)
	1st Difference	-10.78			
Poland	Level	1.25	-3.96	-3.41	I(1)
	1st Difference	-39.49			
Bulgaria	Level	2.14	-3.96	-3.41	I(1)
	1st Difference	-10.58			
Turkey	Level	-2.25	-3.96	-3.41	I(1)
	1st Difference	-19.57			

Source: Own Calculations

From the above table, we conclude that the series are integrated of the order one. As all time series are I(1), we can conduct cointegration analyses again using EViews 5.0. (Full Results can be found in annex.)

Table 10: Cointegration Test with Linear Deterministic Trends

	Trace Statistic	Critical Value 0.05	Cointegration?
Germany-Poland	20.60	15.49	**Yes**
Germany-Bulgaria	13.51	15.49	**No**
Germany-Turkey	7.97	15.49	**No**

Source: Own Calculations

Thus Johansen cointegration test results between Germany and Poland indicate that at 5% confidence interval, the null of no cointegration can be rejected. Trace test indicates the existence of a cointegration relationship at 95% confidence level. Cointegration relation between Germany and Bulgaria cannot be determined at 95% confidence level. Even more strongly, cointegration relation between Germany and Turkey cannot be determined at 95% confidence interval.

5.4.3. Cointegration Relation with Regime Shifts

After searching for conventional cointegration, we had concluded that only Poland CDS was cointegrated with that of Germany. However, what if there was a structural break between 2002 and 2009 when Bulgaria or Turkey CDS became cointegrated with Germany's? In order to find that out, a test to measure the

cointegration relation with a structural break between Germany and Bulgaria and Turkey is necessary.

The theoretical aspect of cointegration with structural breaks was already covered. In order to run the tests, a Gauss program that runs the software developed for this specific test by Bruce E. Hansen (1996) is used.[266]

Table 11: Germany-Bulgaria Cointegration with Structural Break

Model	ADF*	Time Point	Critical Value		Coint. w/ Structural Break?
			1%	5%	
(1)	-5.41	0.4357	-5.13	-4.61	**Yes (99%)**
(2)	-8.28	0.8169	-5.45	-4.99	**Yes(99%)**
(3)	-5.40	0.4357	-5.47	-4.95	**Yes(95%)**

Source: Own Calculations

The t statistic of ADF* is beyond the critical value at 5% and 1% for all three models, which indicates a cointegration relation with a structural break exists between Bulgaria and Germany.[267] For models (1) and (3) the ADF breakpoint indicates a structural break at observation no 272, which corresponds to 31/03/2005.[268] The accession treaty was confirmed by the Council of ministers in December 2004 and the European Parliament ratified it in April 2005.[269] As it is a requirement for the European Parliament to give its consent to accession countries' treaties, we can say that the accession of Bulgaria to the EU became a certainty in April 2005. Thereafter, it follows from the convergence in CDS spreads that the markets fully bought this expectation in 2005 by starting to price Bulgarian sovereign CDS spreads in line with those of Germany, even though the actual accession of Bulgaria were to occur 2 years down the road in 1/1/2007. Thus, by 2007, Bulgaria had already been welcomed by the markets in

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[266] Hansen, Bruce E. (1996) URL: http://www.ssc.wisc.edu/~bhansen/progs/joe_96.html Also full program code may be found at the annex.
[267] Full test results may be found at the annex.
[268] Full test results may be found at the annex.
[269] URL: http://ec.europa.eu/enlargement/bulgaria/key_events_en.htm

the credit-worthiness category awarded to EU-member countries two years prior to its actual accession.

However, statistically, Model (2) is the strongest finding. For model (2) the ADF breakpoint indicates a structural break at observation no 1430, which corresponds to 30/11/2007. As explored in Chapter 4, 2007 was the year when the subprime crisis began and as can be seen from the graph, Bulgaria CDS rates started to widen significantly after 2008. The structural break analysis catches this break as well, and also signifies this is an even more important date of change.

According to our analysis, the nature of the relationship between Bulgaria and Germany CDS spreads changed structurally very soon after this date, which is a very important finding in showing the importance of using CDS premia as a proxy for EU convergence in terms of default risk and general convergence to the EU economically.

Table 12: Germany-Turkey Cointegration with Structural Break

Model	ADF*	Time Point	Critical Value		Coint. w/ Structural Break?
			1%	5%	
(1)	-3.53	--	-5.13	-4.61	**No**
(2)	-3.83	--	-5.45	-4.99	**No**
(3)	-3.53	--	-5.47	-4.95	**No**

Source: Own Calculations

We fail to find a similar result for Turkey, which shows in our view that Turkish accession to the EU is far from being seen as a certainty as indicated by the convergence of its CDS premia to EU averages.[270] Furthermore, following the subprime crisis, Turkey-Germany spread relations do not seem to have changed significantly.

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[270] Full test results may be found at the annex.

5.5. Divergence Following the Credit Crunch

5.5.1. Data Selection and Methodology

The data consists of the 5 year CDS spreads of Turkey, Bulgaria, Romania, Poland, Hungary, Czech Republic and Germany as well as average AAA rated CDO spreads from 2007 to March 2009. All the spreads start out very low, below 100 basis points, except for Turkey. After the second half of 2007, CDO spreads start to widen, and soon the CDS spreads of Eastern European countries follow suit. In fact, August 2007 was an important period in the timeline of the subprime crisis as BNP Paribas became the first bank to suspend subprime funds due to complete evaporation of liquidity and the Fed started cutting rates as a response to the crisis in September 2007, a time perceived as the beginning of the major crisis. All data are collected from Bloomberg and JP Morgan website with special data collection privileges.[271]

Table 13: Data Descriptive Stats

	TURKEY CDS	GERMANY	BLGR CDS	CDO SPREAD
Mean	261.0510	11.83481	170.6893	520.5494
Median	228.0000	2.125000	116.0000	450.9017
Maximum	810.0000	90.61000	700.0000	1674.967
Minimum	134.2000	2.125000	10.82000	23.00000
Std. Dev.	121.7490	20.93024	193.2375	460.6621
Skewness	1.475514	2.226632	1.303447	0.497956
Kurtosis	5.213835	7.124659	3.346218	2.093649
Jarque-Bera	311.8875	844.3503	158.4863	41.55506
Probability	0.000000	0.000000	0.000000	0.000000
Sum	143578.0	6509.143	93879.14	286302.2
Sum Sq. Dev.	8137734.	240503.1	20500056	1.17E+08
Observations	550	550	550	550

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[271] Bloomberg Website, URL:http://www.bloomberg.com and JP Morgan Markets Website URL:http://www.morganmarkets.com

	CZECHCDS	ROMANIACDS	POLANDCDS
Mean	56.64916	198.9944	77.51504
Median	25.00000	135.0000	38.50000
Maximum	335.0000	770.0000	410.0000
Minimum	6.830000	15.69000	8.390000
Std. Dev.	79.28467	227.5816	101.0733
Skewness	1.900194	1.310533	1.738779
Kurtosis	5.553788	3.298246	4.801502
Jarque-Bera	480.4428	159.4756	351.5145
Probability	0.000000	0.000000	0.000000
Sum	31157.04	109446.9	42633.27
Sum Sq. Dev.	3451046.	28434575	5608483.
Observations	550	550	550

Source: JP Morgan, Morgan Markets Website

Figure 27: Graph of CDS series 2007-2009
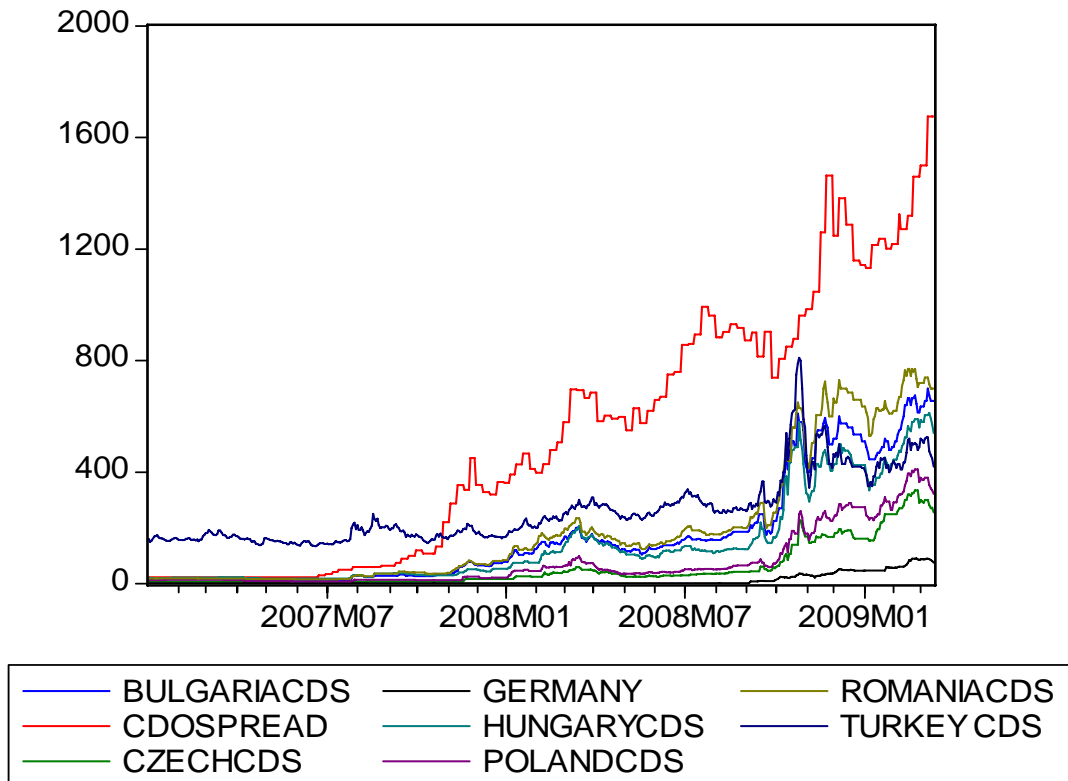
Source: JP Morgan, Morgan Markets Website

As the data is fairly limited, a cointegration test may not be meaningful.[272] Instead we carry out dynamic correlation tests and Z-tests. In measuring the dynamic correlation, we measure the 10-day rolling correlations between each country and Germany. The Z-test is a statistical test used in inference which determines if the difference between a sample mean and the population mean is large enough to be statistically significant, that is, if it is unlikely to have occurred by chance. The formula for calculating the z score for the Z test is as follows:[273]

$$Z = \frac{Y - \mu}{\sigma \sqrt{n}}$$

(4)

Where Z is the Z-test result, Y is a random variable with mean μ and standard deviation σ and n is the number of samples. The Z-test results are found by using data from JP Morgan Website. Then from a Z-table, the statistical probability is calculated. Finally, also using information from JP Morgan Website, a comparison between expected CDS at rating of the country and realized CDS is made in order to determine whether the country trades below the spread at which one would expect it to given its rating.

5.5.2. Analysis of CDS Spreads After the Crisis

In order to analyze the CDS spreads after the crisis, data is analyzed starting from 2007, which was the year the crisis started spreading globally. Figure 28 shows two things: First, the correlation that was high between German and Eastern European countries' CDS spreads before 2008, and it has come down in July and October of 2008, roughly around the time of the subprime crisis. Secondly, Turkey's CDS spread correlation with Germany acts quite differently than the Eastern European countries'. The Eastern European countries CDS spreads correlation with Germany change throughout time but they all move almost in the same way versus Germany. This clearly shows that they are lumped together, whereas Turkey is viewed separately from the pack.

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[272] Still, with the limited data, carrying out a cointegration test whose results are not included here gave no cointegation between Germany and any other country except the Czech Republic between the years 2007-2009.

[273] Larsen, J. Richard and Marx, L. Morris (1990), **Statistics**, Prentice Hall Inc. p. 331.

Figure 28: 100 days Dynamic Correlation of
Eastern European countries' CDS spreads with those of Germany
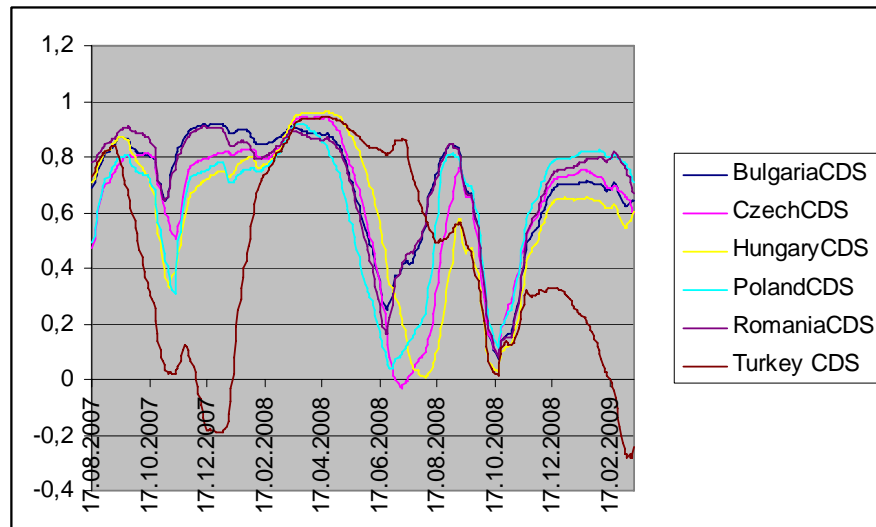
Source: JP Morgan, Morgan Markets Website

Since the Eastern European countries spreads move very similarly together, it creates a visually important aid to graph the difference in sovereign CDS spreads between Germany and Turkey on the one hand and Germany and the Eastern European average sovereign CDS on the other. Looking at this data reveals that in the beginning of 2007, before the subprime crisis spread globally, the spread between Turkey and Germany CDS was quite high compared to those between Eastern European countries and Germany. In fact, Eastern European countries, namely Bulgaria, Czech, Hungary, Poland and Romania were not more than 10-20 basis points higher in CDS spread terms than those of Germany, implying almost risk-free rates. The next figure, Figure 29, shows the difference between CDS spreads of Germany and Turkey on the one hand and the average of the Eastern European countries on the other. The difference closed rapidly leading to the Lehman crisis, and except for a shock to CDS spread of Turkey right after the Lehman default, CDS spreads of Turkey have actually been lower than those of Eastern European countries' average rates.

**Figure 29. Difference of CDS spreads of Turkey
and Eastern European Countries with those of Germany**
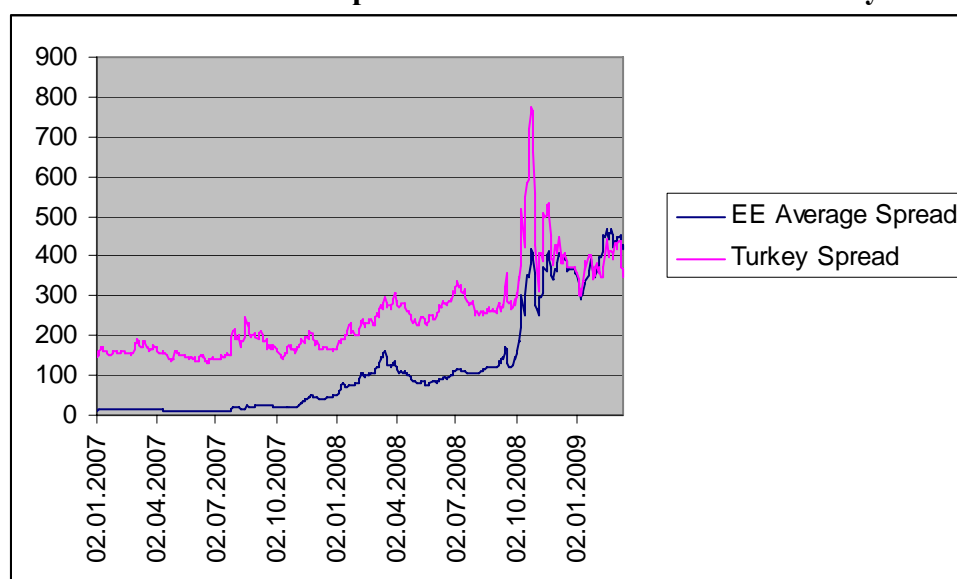
Source: JP Morgan, Morgan Markets Website

The second test is the expected versus realized level of the CDS spreads. This table is taken partially from a JP Morgan analysis note dated 13 March 2009.[274] Using the CDS spreads given the credit ratings of all emerging markets, a best-fit line of expected CDS spreads given rating is calculated. In order to calculate the best fit line, a log-linear regression of credit rating versus CDS spread is used. If a country is above this expected rate, then it means it has underperformed. If it is below the expected rate, it means it has overperformed (that is its riskiness is below the level one would expect given its credit rating.)

Table 14: Expected vs. Realized CDS Spreads (13 March 2009)

	Average Rating	Expected	Realized	Difference
Latvia	BB+	528	1051	523
Lithuania	BBB+	312	780	468
Estonia	A	255	640	385
Hungary	BBB	345	540	195
Bulgaria	BBB-	517	655	138
Romania	BB	633	700	67
Poland	A-	276	322	46
Turkey	BB-	1050	420	-630

Source: JP Morgan

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[274] JP Morgan (2009), "Sovereign CDS vs. Credit Rating" URL:
https://mm.jpmorgan.com/stp/t/c.do?i=53881-13F&u=a_p*d_277910.pdf*h_-161ggih

The results of the above test are very important. They show that all the Eastern European countries have been underperforming the markets for the past two years, and that Turkey has been greatly overperforming. The Baltic countries are the worst performers, having riskiness more than twice of what their ratings would command. On the other hand, Turkish spread is less than half of what it should be. This is a very strong indication from the markets, yet is it meaningful? To answer that question, we have to look at Z tests for the data. The data, collected from JP Morgan, covers the two years of sovereign CDS spreads from 13 March 2007 to 13 March 2009. The following table lists the countries according to their Z score. This score shows whether the deviation from the average is meaningful, given that the distribution is a standard one:

Table 15: Z score and Probability of Significance

	Z score	Probability
Poland	2.04	97.90%
Lithuania	1.7	95.50%
Hungary	1.12	86.90%
Bulgaria	1.01	84.30%
Estonia	0.99	83.90%
Romania	0.84	80%
Latvia	0.16	56.30%
Turkey	-1.74	95.90%

Source: JP Morgan, Own Calculations

The test results show that in Poland and Lithuania the results are above expected deviation at above 95% confidence level. For Turkey, the result is below expected deviation at 95% confidence interval. For the rest, the findings are not as strong, yet except Latvia, they are still above 80% confidence interval.All these data reveal that Eastern European spreads deteriorated strongly vis-à-vis Germany, the EU's biggest and most stable economy, and that this deterioration was beyond what would be expected given their ratings, their previous cointegration relations, correlations and market history. The convergence of Eastern Europe to the EU-15 which was the big story up until 2007, has left in its place a strong divergence in terms of credit risk as measured by the CDS spreads relative to Germany. On the other hand, Turkey has been a clear outlier in this trend given that it has not participated in this convergence play. In fact, in the current crisis environment, Turkey has strongly outperformed all the Eastern European countries analyzed in this study.

6. CONCLUSION

The subprime crisis has already been called "The Great Securitization Crisis". Therefore, while penning an analysis of convergence and divergence between Eastern Europe and the rest of the EU, the impact that securitization has had on these markets and the consequent crisis it has precipitated cannot be understated. Starting from the historical roots of securitization was essential for understanding the benefits of securitization that caused it to be so prevalent on the financial arena, and subsequently increased the ease with which total credit could be increased, as discussed in Chapter 2. On the other hand, the same forces that allowed credit to freely roam and multiply itself in developed countries, namely a combination of leverage allowed by credit derivatives and synthetic securitizations and a policy of asymmetrical responses by central banks which reacted strongly to sudden falls in asset prices by cutting rates aggressively, while allowing bubbles to be built up by not reacting at all, have also been the principal causes of the crisis. As outlined in Chapter 2 under risks of securitization and also in Chapter 4, securitization, while not being the only cause of the crisis, was certainly one of the main factors that exacerbated it and allowed it to become a global instead of a localized American event. In fact, had securitization not been invented at all, the mainly European and Japanese banks as well as US insurers, hedge and mutual funds that piled up on subprime debt would not have been able to take on credit risk that should normally have stayed on the balance sheets of the local thrifts and banks in the US. However, they did, and the crisis became a global one that required a global response.

The global response to the subprime crisis has so far been mixed. While there has been a strong fiscal stimulus from the USA, and many nationalizations have taken place in Europe as well as America, the real pillars on which a sound financial system need to be placed have not so far been erected. The crisis was caused by lax regulatory oversight, faulty modeling by rating agencies and opaque markets. In the future of securitization, if there is to be a future for securitization at all, these deficiencies must be addressed. As discussed in Chapter 4, global risk and regulatory oversight is necessary. Markets must also be organized, with less leveraged and simpler trades.

The American version of securitization was the exact opposite of what is tried being structured today by the regulators of the world. Asset and mortgage backed securitizations in the US were largely unregulated, over-the-counter and heavily laden with the use of synthetic versions utilizing credit derivatives. Furthermore, American investment banks pioneered the use of excessive leverage by tranching, synthetic securitization by using credit default swaps instead of actual loans and worked hand-in-hand with the rating agencies by using their models to prove low default probability due to "diversification" and "correlation risks". The final invention of the American investment banks, as detailed in Chapter 4, was the granting of subprime credit to those who could not afford it. The whole "originate-to-distribute" model, also described in Chapter 2, meant that these banks would only need to hold on to these securities long enough to be able to sell them to unsuspecting clients in Europe or Asia, who gobbled them up due to their hunger for spreads, given the low level of their domestic interest rates. It was the same forces that would cause them to purchase banks in Eastern Europe.

After having established the history of securitization as an American innovation in financial markets, the study concentrated on the differences that occurred to securitization when it crossed the Atlantic into Europe. The domestic markets of Western Europe were in fact no strangers to securitization. As discussed in Chapter 1, the first securitization occurred in Northern Europe almost 200 years ago. However, the main difference between American securitization (ABS) and its European variant (best represented by the German *Pfandbriefe* as described in Chapter 3) could be boiled down to a single word: oversight. The European type was regulated by decent official and semi-official bodies as well as the banks themselves. The securitizations were highly overcollateralized, the transactions were left on balance sheet instead of using SPVs and the securities were highly standardized with very liquid markets to fall back on. Furthermore, the funding was mainly done domestically and as a consequence, there has not been a single *Pfandbrief* default for over 200 years.

Had the European banks stayed within their domestic securitization markets, they might have been less hurt by the credit crunch. If they had not bought subprime

debt in order to make up for low spreads at home, some of them might not have ended up being nationalized. However, even under such a scenario, the European banks would still have expanded into Eastern Europe because of two reasons: growth opportunities and a perceived stability implied by EU membership. One way to look at markets' perception of default risk of these countries is to look at their credit default spreads, a study which is carried out in Chapter 5. To make the analysis, the CDS spreads of Poland, Bulgaria and Turkey were compared with that of Germany. When analyzing the spread, a trend became readily perceivable: After 2005, the spreads collapsed to near German levels for Poland and Bulgaria but not so much for Turkey. In fact, the markets had placed such a great faith in the credit-worthiness of Poland and Bulgaria after their EU accession that their default probabilities were seen as very unlikely events.

The cointegration analysis between Poland and Germany gave clear cut answers. Extending the relation to the 2002-2009 period, cointegration between German and Polish CDS spreads were observable. The case was more complicated for Bulgaria. While conventional cointegration between Germany and Bulgaria could not be established, a structural break analysis yielded very interesting results. The cointegration analysis pointed to two possible structural break times, and both were at significant times for Bulgaria. The first break came in 2005, when one can also observe a convergence to German spreads even on the graph. This was when Bulgarian membership to the EU became a certainty after the Accession Treaty of Bulgaria was signed in Luxembourg. The second possible structural breakpoint in time is late in the year 2007. August 2007 was an important period in the timeline of the subprime crisis as BNP Paribas became the first bank to suspend subprime funds due to complete evaporation of liquidity and the Fed started cutting rates as a response to the crisis in September 2007, a time perceived as the beginning of the major crisis. This is a very important finding in that the cointegration analysis with structural breaks manages to capture both monumental changes within the same time series. For this result, Bulgarian CDS spreads may be used as a proxy for whole of Eastern Europe.

The cointegration analysis between Turkey and Germany could not be established, with or without structural breaks, and this suggested that Turkey is

structurally not very related to the changes in the EU countries' spreads. The reasons for this could be that market had never perceived Turkey as part of EU so that there was always additional risk premium on its credit risk. It could also be that Turkish markets are relatively less foreign owned, less securitized and in general less leveraged than Eastern European markets so that Turkish default risk was not really that much augmented by the "Great Securitization Crisis".

After having established 2007 as an important break point in the relation of convergence between Germany and Eastern Europe, further analysis of the 2007-2009 era gave some very interesting divergence stories. As the time series here was relatively short, cointegration analysis was not meaningful; however, simpler tools such as visual aids in the form of graphs of time series, dynamic correlations, log-linear regression of ratings vs. CDS spreads and Z tests of differences from mean were carried out. These tests showed to a large extent that not only there had been divergence between spreads of Germany and Eastern European countries, but these divergences seemed amplified after the peak of the crisis during the collapse of Lehman brothers. Before that time dynamic correlations were much higher; however, afterwards, spreads of Eastern Europe widened considerably and to a meaningful amount as shown by the Z tests.

All these findings show that the EU has failed its first test of convergence when confronted with a crisis of the credit crunch magnitude. Until 2007, with the help of low interest rates, easy access to capital via foreign funding and access to securitization markets, Eastern European banks and their customers binged themselves on cheap foreign currency consumer loans and mortgages. The Western European banks, fed up with low interest rate spreads from their safe but stale domestic markets, entered this promising market en masse. The first clash with reality came in the form of the subprime crisis and the ensuing credit crunch. So far, the response from EU has not been uniform and strong compared to the USA. The findings of this study indicate that the markets in Eastern Europe are far from normalcy, let alone the convergence they witnessed in 2005-2006. On the other hand, Turkey can be seen as an exception due to its relatively backward markets and its low foreign exchange consumer loans. However, no country is safe from the storm, and a coordinated policy response from the EU will

be crucial not only to ease the troubled countries of Eastern Europe but to give a clear and strong message about the commitment of EU countries to all their members' economic and financial stability. Under these circumstances, Eastern Europe, the EU and Turkey stand at a historic crossroads. If the EU fails to address the problems in the East via EU-wide fiscal and monetary expansion, the situation could get worse, and envelope not only the Eastern European countries, but also the banking sectors of those countries of the EU which have substantial exposure to these risky markets. If the EU fails with the recovery of the East, then the future bodes badly not just for the accession candidate countries like Turkey, but the entire cohesion of the EU itself. Since the regulatory and financial environment Turkey will face itself in the future is likely to be much stricter, it is in Turkey's advantage to become part of a bloc that supports its less developed regions. Yet the onus is on the EU, especially on countries with big clout like France and Germany, to show their support for these lesser regions. Otherwise, the advantages to Turkey of following the EU path would remain subdued in an environment where the first serious crisis is enough to undermine cohesion and support between the member states. A strong policy response that ends the current crisis in Eastern Europe could cement the cohesion of the EU and give a very strong message to all current applicants to the EU, Turkey included, that the benefits of membership are so great that full membership must be viewed as the ultimate and indispensable goal.

ANNEX

Germany Level:

Null Hypothesis: GER_CDS has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 24 (Automatic based on SIC, MAXLAG=24)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		4.596651	1.0000
Test critical values:	1% level	-3.963372	
	5% level	-3.412416	
	10% level	-3.128153	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(GER_CDS)
Method: Least Squares
Date: 03/23/09   Time: 22:05
Sample (adjusted): 4/23/2002 3/13/2009
Included observations: 1725 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
GER_CDS(-1)	0.012163	0.002646	4.596651	0.0000
D(GER_CDS(-1))	0.108173	0.024700	4.379545	0.0000
D(GER_CDS(-2))	0.133477	0.024822	5.377259	0.0000
D(GER_CDS(-3))	0.046911	0.025026	1.874469	0.0610
D(GER_CDS(-4))	-0.007068	0.025124	-0.281343	0.7785
D(GER_CDS(-5))	-0.044875	0.025548	-1.756494	0.0792
D(GER_CDS(-6))	-0.094669	0.026169	-3.617657	0.0003
D(GER_CDS(-7))	-0.028979	0.025964	-1.116102	0.2645
D(GER_CDS(-8))	0.082218	0.025874	3.177633	0.0015
D(GER_CDS(-9))	-0.001589	0.025951	-0.061225	0.9512
D(GER_CDS(-10))	0.001336	0.026056	0.051286	0.9591
D(GER_CDS(-11))	-0.063382	0.026040	-2.434048	0.0150
D(GER_CDS(-12))	-0.068388	0.026366	-2.593817	0.0096
D(GER_CDS(-13))	0.012459	0.026314	0.473460	0.6359
D(GER_CDS(-14))	0.029147	0.026274	1.109356	0.2674
D(GER_CDS(-15))	-0.065064	0.026331	-2.471007	0.0136
D(GER_CDS(-16))	0.039093	0.026521	1.474057	0.1407
D(GER_CDS(-17))	0.032842	0.026458	1.241313	0.2147

D(GER_CDS(-18))	-0.217169	0.026511	-8.191511	0.0000
D(GER_CDS(-19))	0.067348	0.026950	2.499004	0.0125
D(GER_CDS(-20))	-0.121444	0.027790	-4.370053	0.0000
D(GER_CDS(-21))	-0.076811	0.028532	-2.692133	0.0072
D(GER_CDS(-22))	0.045925	0.030085	1.526532	0.1271
D(GER_CDS(-23))	-0.065051	0.030461	-2.135571	0.0329
D(GER_CDS(-24))	-0.174146	0.030478	-5.713855	0.0000
C	-0.001511	0.000389	-3.883184	0.0001
@TREND(3/18/2002)	7.80E-07	3.40E-07	2.293656	0.0219

R-squared	0.157411	Mean dependent var	0.000382
Adjusted R-squared	0.144509	S.D. dependent var	0.007059
S.E. of regression	0.006529	Akaike info criterion	-7.209533
Sum squared resid	0.072387	Schwarz criterion	-7.124182
Log likelihood	6245.222	F-statistic	12.20068
Durbin-Watson stat	2.033219	Prob(F-statistic)	0.000000

Germany 1st difference:

Null Hypothesis: D(GER_CDS) has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 24 (Automatic based on SIC, MAXLAG=24)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-10.78059	0.0000
Test critical values:	1% level	-3.963375	
	5% level	-3.412418	
	10% level	-3.128154	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(GER_CDS,2)
Method: Least Squares
Date: 03/23/09   Time: 22:06
Sample (adjusted): 4/24/2002 3/13/2009
Included observations: 1724 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(GER_CDS(-1))	-0.949107	0.088039	-10.78059	0.0000
D(GER_CDS(-1),2)	0.067734	0.086141	0.786314	0.4318

D(GER_CDS(-2),2)	0.215131	0.084430	2.548040	0.0109
D(GER_CDS(-3),2)	0.291607	0.082823	3.520842	0.0004
D(GER_CDS(-4),2)	0.298456	0.080617	3.702155	0.0002
D(GER_CDS(-5),2)	0.256028	0.078908	3.244637	0.0012
D(GER_CDS(-6),2)	0.196912	0.078542	2.507104	0.0123
D(GER_CDS(-7),2)	0.168863	0.077849	2.169106	0.0302
D(GER_CDS(-8),2)	0.300405	0.078346	3.834357	0.0001
D(GER_CDS(-9),2)	0.336527	0.078074	4.310334	0.0000
D(GER_CDS(-10),2)	0.366755	0.076627	4.786233	0.0000
D(GER_CDS(-11),2)	0.346208	0.075151	4.606852	0.0000
D(GER_CDS(-12),2)	0.315711	0.073372	4.302906	0.0000
D(GER_CDS(-13),2)	0.346447	0.070375	4.922897	0.0000
D(GER_CDS(-14),2)	0.398514	0.067655	5.890383	0.0000
D(GER_CDS(-15),2)	0.356318	0.065510	5.439143	0.0000
D(GER_CDS(-16),2)	0.421529	0.064035	6.582817	0.0000
D(GER_CDS(-17),2)	0.504475	0.062975	8.010719	0.0000
D(GER_CDS(-18),2)	0.315907	0.060969	5.181409	0.0000
D(GER_CDS(-19),2)	0.404502	0.058980	6.858259	0.0000
D(GER_CDS(-20),2)	0.301772	0.055543	5.433114	0.0000
D(GER_CDS(-21),2)	0.269682	0.053738	5.018445	0.0000
D(GER_CDS(-22),2)	0.334835	0.047636	7.029102	0.0000
D(GER_CDS(-23),2)	0.301595	0.040575	7.433032	0.0000
D(GER_CDS(-24),2)	0.169444	0.030436	5.567296	0.0000
C	-0.000614	0.000328	-1.871678	0.0614
@TREND(3/18/2002)	1.07E-06	3.38E-07	3.172693	0.0015

R-squared	0.510237	Mean dependent var	-8.24E-06
Adjusted R-squared	0.502733	S.D. dependent var	0.009235
S.E. of regression	0.006512	Akaike info criterion	-7.214670
Sum squared resid	0.071973	Schwarz criterion	-7.129279
Log likelihood	6246.046	F-statistic	67.99776
Durbin-Watson stat	1.983556	Prob(F-statistic)	0.000000

Poland Level:

Null Hypothesis: PLN_CDS has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 0 (Automatic based on SIC, MAXLAG=24)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		1.252007	1.0000
Test critical values:	1% level	-3.963298	
	5% level	-3.412380	

	10% level	-3.128132

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(PLN_CDS)
Method: Least Squares
Date: 03/23/09   Time: 22:06
Sample (adjusted): 3/19/2002 3/13/2009
Included observations: 1749 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
PLN_CDS(-1)	0.002167	0.001731	1.252007	0.2107
C	-0.003527	0.002098	-1.680839	0.0930
@TREND(3/18/2002)	4.67E-06	2.13E-06	2.194798	0.0283

R-squared	0.004791	Mean dependent var	0.001578
Adjusted R-squared	0.003651	S.D. dependent var	0.043401
S.E. of regression	0.043322	Akaike info criterion	-3.438617
Sum squared resid	3.276826	Schwarz criterion	-3.429240
Log likelihood	3010.070	F-statistic	4.202545
Durbin-Watson stat	1.894430	Prob(F-statistic)	0.015109

Poland 1st difference:

Null Hypothesis: D(PLN_CDS) has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 0 (Automatic based on SIC, MAXLAG=24)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-39.49442	0.0000
Test critical values:	1% level	-3.963301	
	5% level	-3.412382	
	10% level	-3.128133	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(PLN_CDS,2)
Method: Least Squares
Date: 03/23/09   Time: 22:07
Sample (adjusted): 3/20/2002 3/13/2009

Included observations: 1748 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(PLN_CDS(-1))	-0.947241	0.023984	-39.49442	0.0000
C	-0.002950	0.002075	-1.421482	0.1554
@TREND(3/18/2002)	5.07E-06	2.06E-06	2.466617	0.0137

R-squared	0.471985	Mean dependent var		-8.01E-05
Adjusted R-squared	0.471380	S.D. dependent var		0.059546
S.E. of regression	0.043293	Akaike info criterion		-3.439917
Sum squared resid	3.270689	Schwarz criterion		-3.430536
Log likelihood	3009.488	F-statistic		779.9142
Durbin-Watson stat	1.995596	Prob(F-statistic)		0.000000

Bulgaria Level:

Null Hypothesis: BLG_CDS has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 22 (Automatic based on SIC, MAXLAG=24)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		2.145531	1.0000
Test critical values:	1% level	-3.963365	
	5% level	-3.412413	
	10% level	-3.128151	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(BLG_CDS)
Method: Least Squares
Date: 03/23/09   Time: 22:07
Sample (adjusted): 4/19/2002 3/13/2009
Included observations: 1727 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
BLG_CDS(-1)	0.003351	0.001562	2.145531	0.0321
D(BLG_CDS(-1))	0.064838	0.024010	2.700428	0.0070
D(BLG_CDS(-2))	0.026640	0.024044	1.107934	0.2680
D(BLG_CDS(-3))	0.025411	0.023739	1.070424	0.2846
D(BLG_CDS(-4))	0.145418	0.023800	6.110010	0.0000
D(BLG_CDS(-5))	-0.062991	0.024146	-2.608781	0.0092

D(BLG_CDS(-6))	-0.004918	0.024112	-0.203956	0.8384
D(BLG_CDS(-7))	-0.161730	0.024104	-6.709703	0.0000
D(BLG_CDS(-8))	-0.050415	0.024308	-2.074015	0.0382
D(BLG_CDS(-9))	-0.000812	0.024217	-0.033522	0.9733
D(BLG_CDS(-10))	0.091314	0.024177	3.776829	0.0002
D(BLG_CDS(-11))	-0.049178	0.024287	-2.024842	0.0430
D(BLG_CDS(-12))	-0.003190	0.024369	-0.130889	0.8959
D(BLG_CDS(-13))	-0.072259	0.024327	-2.970345	0.0030
D(BLG_CDS(-14))	-0.069000	0.024417	-2.825966	0.0048
D(BLG_CDS(-15))	-0.108697	0.024453	-4.445133	0.0000
D(BLG_CDS(-16))	0.088939	0.024402	3.644694	0.0003
D(BLG_CDS(-17))	0.090689	0.024641	3.680483	0.0002
D(BLG_CDS(-18))	0.054798	0.024646	2.223399	0.0263
D(BLG_CDS(-19))	0.089794	0.024392	3.681275	0.0002
D(BLG_CDS(-20))	-0.176581	0.024487	-7.211143	0.0000
D(BLG_CDS(-21))	0.043733	0.025063	1.744941	0.0812
D(BLG_CDS(-22))	-0.173681	0.025037	-6.936983	0.0000
C	-0.016916	0.004987	-3.391950	0.0007
@TREND(3/18/2002)	1.67E-05	4.24E-06	3.939400	0.0001

R-squared	0.150038	Mean dependent var	0.002085
Adjusted R-squared	0.138052	S.D. dependent var	0.086408
S.E. of regression	0.080222	Akaike info criterion	-2.193666
Sum squared resid	10.95336	Schwarz criterion	-2.114712
Log likelihood	1919.230	F-statistic	12.51841
Durbin-Watson stat	1.992356	Prob(F-statistic)	0.000000

Bulgaria 1st difference:

Null Hypothesis: D(BLG_CDS) has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 21 (Automatic based on SIC, MAXLAG=24)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-10.58928	0.0000
Test critical values:	1% level	-3.963365	
	5% level	-3.412413	
	10% level	-3.128151	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(BLG_CDS,2)

Method: Least Squares
Date: 03/23/09   Time: 22:07
Sample (adjusted): 4/19/2002 3/13/2009
Included observations: 1727 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(BLG_CDS(-1))	-1.099848	0.103864	-10.58928	0.0000
D(BLG_CDS(-1),2)	0.169849	0.101373	1.675476	0.0940
D(BLG_CDS(-2),2)	0.201668	0.098610	2.045099	0.0410
D(BLG_CDS(-3),2)	0.231600	0.096766	2.393414	0.0168
D(BLG_CDS(-4),2)	0.382401	0.094595	4.042490	0.0001
D(BLG_CDS(-5),2)	0.324225	0.092077	3.521237	0.0004
D(BLG_CDS(-6),2)	0.324957	0.088707	3.663276	0.0003
D(BLG_CDS(-7),2)	0.168960	0.084550	1.998352	0.0458
D(BLG_CDS(-8),2)	0.124164	0.080580	1.540875	0.1235
D(BLG_CDS(-9),2)	0.128672	0.077084	1.669241	0.0953
D(BLG_CDS(-10),2)	0.224691	0.073839	3.042995	0.0024
D(BLG_CDS(-11),2)	0.180109	0.070525	2.553833	0.0107
D(BLG_CDS(-12),2)	0.181739	0.067527	2.691345	0.0072
D(BLG_CDS(-13),2)	0.115156	0.063633	1.809687	0.0705
D(BLG_CDS(-14),2)	0.051741	0.059278	0.872850	0.3829
D(BLG_CDS(-15),2)	-0.051330	0.054920	-0.934628	0.3501
D(BLG_CDS(-16),2)	0.042273	0.051469	0.821327	0.4116
D(BLG_CDS(-17),2)	0.137920	0.047837	2.883145	0.0040
D(BLG_CDS(-18),2)	0.197089	0.044961	4.383563	0.0000
D(BLG_CDS(-19),2)	0.291714	0.039859	7.318603	0.0000
D(BLG_CDS(-20),2)	0.120053	0.033979	3.533120	0.0004
D(BLG_CDS(-21),2)	0.168683	0.024955	6.759585	0.0000
C	-0.010754	0.004082	-2.634901	0.0085
@TREND(3/18/2002)	1.46E-05	4.13E-06	3.540809	0.0004

R-squared	0.548448	Mean dependent var	1.67E-18
Adjusted R-squared	0.542349	S.D. dependent var	0.118710
S.E. of regression	0.080307	Akaike info criterion	-2.192123
Sum squared resid	10.98299	Schwarz criterion	-2.116327
Log likelihood	1916.898	F-statistic	89.93198
Durbin-Watson stat	1.990857	Prob(F-statistic)	0.000000

Turkey Level:

Null Hypothesis: TUR_CDS has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 3 (Automatic based on SIC, MAXLAG=24)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-2.255437	0.4578
Test critical values: 1% level	-3.963307	
5% level	-3.412385	
10% level	-3.128135	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(TUR_CDS)
Method: Least Squares
Date: 03/23/09   Time: 22:08
Sample (adjusted): 3/22/2002 3/13/2009
Included observations: 1746 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
TUR_CDS(-1)	-0.004784	0.002121	-2.255437	0.0242
D(TUR_CDS(-1))	0.000548	0.023825	0.022996	0.9817
D(TUR_CDS(-2))	0.128299	0.023648	5.425322	0.0000
D(TUR_CDS(-3))	0.115387	0.023850	4.838022	0.0000
C	0.033716	0.018471	1.825305	0.0681
@TREND(3/18/2002)	-1.68E-05	1.23E-05	-1.362965	0.1731

R-squared	0.031498	Mean dependent var	-0.000773
Adjusted R-squared	0.028715	S.D. dependent var	0.193375
S.E. of regression	0.190579	Akaike info criterion	-0.474072
Sum squared resid	63.19723	Schwarz criterion	-0.455292
Log likelihood	419.8651	F-statistic	11.31788
Durbin-Watson stat	2.004731	Prob(F-statistic)	0.000000

Turkey 1st difference:

Null Hypothesis: D(TUR_CDS) has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 2 (Automatic based on SIC, MAXLAG=24)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-19.56733	0.0000
Test critical values: 1% level	-3.963307	
5% level	-3.412385	
10% level	-3.128135	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(TUR_CDS,2)
Method: Least Squares
Date: 03/23/09   Time: 22:08
Sample (adjusted): 3/22/2002 3/13/2009
Included observations: 1746 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(TUR_CDS(-1))	-0.764127	0.039051	-19.56733	0.0000
D(TUR_CDS(-1),2)	-0.237670	0.033375	-7.121143	0.0000
D(TUR_CDS(-2),2)	-0.112185	0.023836	-4.706588	0.0000
C	-0.002474	0.009161	-0.270008	0.7872
@TREND(3/18/2002)	2.08E-06	9.06E-06	0.229902	0.8182

R-squared	0.507032	Mean dependent var	-0.000172
Adjusted R-squared	0.505899	S.D. dependent var	0.271441
S.E. of regression	0.190802	Akaike info criterion	-0.472298
Sum squared resid	63.38200	Schwarz criterion	-0.456648
Log likelihood	417.3166	F-statistic	447.6674
Durbin-Watson stat	2.003607	Prob(F-statistic)	0.000000

Cointegration Test Germany-Poland

Date: 03/23/09   Time: 22:17
Sample (adjusted): 3/25/2002 3/13/2009
Included observations: 1745 after adjustments
Trend assumption: Linear deterministic trend
Series: GER_CDS PLN_CDS
Lags interval (in first differences): 1 to 4

Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.010375	20.89871	15.49471	0.0069
At most 1	0.001546	2.700479	3.841466	0.1003

Trace test indicates 1 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.010375	18.19823	14.26460	0.0113
At most 1	0.001546	2.700479	3.841466	0.1003

Max-eigenvalue test indicates 1 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegrating Coefficients (normalized by b'*S11*b=I):

GER_CDS	PLN_CDS
-18.15261	4.073377
12.63545	-0.756241

Unrestricted Adjustment Coefficients (alpha):

D(GER_CDS)	0.000584	0.000140
D(PLN_CDS)	-0.002564	0.001270

1 Cointegrating Equation(s):   Log likelihood   9364.668

Normalized cointegrating coefficients (standard error in parentheses)

GER_CDS	PLN_CDS
1.000000	-0.224396
	(0.02204)

Adjustment coefficients (standard error in parentheses)

D(GER_CDS)	-0.010610
	(0.00293)
D(PLN_CDS)	0.046542
	(0.01781)

Cointegration Test Germany-Bulgaria

Date: 03/23/09   Time: 22:17
Sample (adjusted): 3/25/2002 3/13/2009
Included observations: 1745 after adjustments
Trend assumption: Linear deterministic trend
Series: GER_CDS BLG_CDS
Lags interval (in first differences): 1 to 4

Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None	0.004637	13.51922	15.49471	0.0971
At most 1 *	0.003095	5.409073	3.841466	0.0200

Trace test indicates no cointegration at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None	0.004637	8.110143	14.26460	0.3676
At most 1 *	0.003095	5.409073	3.841466	0.0200

Max-eigenvalue test indicates no cointegration at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegrating Coefficients (normalized by b'*S11*b=I):

GER_CDS	BLG_CDS
-8.636183	0.997477
8.589738	0.054617

Unrestricted Adjustment Coefficients (alpha):

D(GER_CDS)	0.000288	0.000293
D(BLG_CDS)	-0.004532	0.002837

1 Cointegrating Equation(s):	Log likelihood	8098.494

Normalized cointegrating coefficients (standard error in parentheses)

GER_CDS	BLG_CDS
1.000000	-0.115500
	(0.03023)

Adjustment coefficients (standard error in parentheses)

D(GER_CDS)	-0.002484
	(0.00140)
D(BLG_CDS)	0.039138

(0.01736)

Cointegration Test Germany-Turkey

Date: 03/23/09   Time: 22:17
Sample (adjusted): 3/25/2002 3/13/2009
Included observations: 1745 after adjustments
Trend assumption: Linear deterministic trend
Series: GER_CDS TUR_CDS
Lags interval (in first differences): 1 to 4

Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None	0.002795	7.976782	15.49471	0.4679
At most 1	0.001771	3.092509	3.841466	0.0787

Trace test indicates no cointegration at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None	0.002795	4.884273	14.26460	0.7564
At most 1	0.001771	3.092509	3.841466	0.0787

Max-eigenvalue test indicates no cointegration at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegrating Coefficients (normalized by b'*S11*b=I):

GER_CDS	TUR_CDS
-8.083142	-0.133207
3.872213	-0.314935

Unrestricted Adjustment Coefficients (alpha):

D(GER_CDS)	-0.000307	0.000151
D(TUR_CDS)	0.005786	0.006537

1 Cointegrating Equation(s):	Log likelihood	6654.175

Normalized cointegrating coefficients (standard error in parentheses)

GER_CDS	TUR_CDS
1.000000	0.016480
	(0.01916)

Adjustment coefficients (standard error in parentheses)

D(GER_CDS)	0.002479
	(0.00132)
D(TUR_CDS)	-0.046771
	(0.03686)

Germany-Bulgaria
Level Shift (C)
   ******** ADF Test ***********
  t-statistic =   -5.4114587
  AR lag =   6.0000000
  break point(ADF) =   0.43576017

   ******** Phillips Test ********
  Zt =   -19.030698
  breakpoint(Zt) =   0.42184154
  Za =   -553.01500
  breakpoint(Za) =   0.42184154

Level Shift with Trend (C/T)
   ******** ADF Test ***********
  t-statistic =   -8.2811849
  AR lag =   5.0000000
  break point(ADF) =   0.81798715

   ******** Phillips Test ********
  Zt =   -26.424211
  breakpoint(Zt) =   0.81691649
  Za =   -976.54963
  breakpoint(Za) =   0.81691649

Regime Shift (C/S)

********* ADF Test ***********
t-statistic =   -5.4088352
AR lag =   6.0000000
break point(ADF) =   0.43576017

********* Phillips Test *********
Zt =   -18.986195
breakpoint(Zt) =   0.41970021
Za =   -550.64155
breakpoint(Za) =   0.41970021

Germany-Turkey
Level Shift (C)
********* ADF Test ***********
t-statistic =   -3.5341075
AR lag =   2.0000000
break point(ADF) =   0.40149893

********* Phillips Test *********
Zt =   -4.0523133
breakpoint(Zt) =   0.38972163
Za =   -27.310888
breakpoint(Za) =   0.40042827

Level Shift with Trend (C/T)
********* ADF Test ***********
t-statistic =   -3.8316613
AR lag =   3.0000000
break point(ADF) =   0.39828694

********* Phillips Test *********
Zt =   -3.8462695
breakpoint(Zt) =   0.40042827
Za =   -24.213764
breakpoint(Za) =   0.40042827

Regime Shift (C/S)
********* ADF Test ***********
t-statistic =   -3.5351055
AR lag =   2.0000000
break point(ADF) =   0.40149893

********* Phillips Test *********
Zt =   -4.0570212
breakpoint(Zt) =   0.38972163
Za =   -27.404998
breakpoint(Za) =   0.40042827

Gauss Source Code Written by Bruce E. Hansen
/* SHIFTS.PRG
This is a GAUSS program.
It calculates the statistics discussed in
"Residual-based tests for cointegration in models
with regime shifts"
by Allan W. Gregory and Bruce E. Hansen

Questions about the program can be addressed to

Bruce E. Hansen
 Department of Economics
Social Science Building
University of Wisconsin
Madison, WI 53706-1393
bhansen@ssc.wisc.edu
http://www.ssc.wisc.edu/~bhansen/

/* ******** testing program ******** */
new;
load y[1750,1] = blg.dat ;
load x[1750,1] = ger.dat ;
call main(y,x,4,2,8);
end;
end;

----PROC MAIN
----FORMAT: call main(y,x,model,choice,k)
----INPUT: y - depend variable
     x - data matrix for independent variables (first row is
first observation)
            model - choice for model   =2 C
                  =3 C/T
                  =4 C/S
     choice - only in ADF test, =1 pre-specified AR lag
                  =2 AIC-chosen AR lag
                  =3 BIC-chosen AR lag
                  =4 downward-t-chosen AR lag
     k - maximum lag for ADF test
----OUTPUT: print automatically Za*, breakpoint for Za*, Zt*, breakpoint for Zt*
, ADF*,   breakpoint for ADF* and AR lag chosen for ADF*
----GLOBAL VARIABLES: none
----EXTERNAL PROCEDURES: adf, phillips
----NB: Constant included in regression

*************** Main procedure ******************

```
                                                                                              */

proc(0)=main(y,x,model,choice,k);
   local t,n,final,begin,tstat,x1,lag,j,dummy,temp1,temp2,temp3,temp4;
   local breakpt1,breakpt2,breakpta,za,zt;
  n=rows(y);
  begin=round(0.15*n);
  final=round(0.85*n);
  temp1=zeros(final-begin+1,1);
  temp2=temp1;
  temp3=temp1;
  temp4=temp1;
  t=begin;
  do while t<=final;
    dummy=zeros(t,1)|ones(n-t,1);
    @ adjust regressors for different models @
    if model==3;
       x1=ones(n,1)~dummy~seqa(1,1,n)~x;
    elseif model==4;
       x1=ones(n,1)~dummy~x~dummy.*x;
    elseif model==2;
       x1=ones(n,1)~dummy~x;
    endif;

    @ computer ADF for each t  @
    {temp1[t-begin+1],temp2[t-begin+1]}=adf(y,x1,k,choice);

    @ compute Za or Zt for each t  @
    {temp3[t-begin+1],temp4[t-begin+1]}=phillips(y,x1);
    t=t+1;
  endo;

  @  ADF test @
  tstat=minc(temp1);
  lag=minindc(temp1);
  breakpta=(lag+begin-1)/n;
  lag=temp2[lag];
  print "******** ADF Test ***********";
  print "t-statistic = " tstat;
  print "AR lag = " lag;
  print "break point(ADF) = " breakpta;
  print " ";

  @  Phillips test @
  za=minc(temp3);
  breakpt1=(minindc(temp3)+begin-1)/n;
  zt=minc(temp4);
```

```
    breakpt2=(minindc(temp4)+begin-1)/n;
    print "******** Phillips Test ********";
    print "Zt =            " zt;
    print "breakpoint(Zt) =  " breakpt2;
    print "Za =            " za;
    print "breakpoint(Za) =  " breakpt1;
    print " ";
retp;
endp;
@ ------------------------------------------------------------ @


/******************** PROC ADF ***************************
**  FORMAT
**      { stat,lag } = adf(y,x)
**  INPUT
**      y - dependent variable
**      x - independent variables
**  OUTPUT
**  stata - ADF statistic
**  lag - the lag length
**  GLOBAL VARIABLES: none
**  EXTERNAL PROCEDURES: estimate
*********************************************************************/

/*
************** ADF for each breakpoint ******************
*/
proc(2) = adf(y,x,kmax,choice);
  local b,m,e,e1,n,n1,sig2,se,xe,yde,j,tstat,de,temp1,temp2;
  local lag,k,ic,aic,bic;
  @ compute ADF  @
  n=rows(y);
  {b,e,sig2,se}=estimate(y,x);
  de=e[2:n]-e[1:n-1]; @ difference of residuals @

  ic=0;
  k=kmax;
  temp1=zeros(kmax+1,1);
  temp2=zeros(kmax+1,1);
  do while k>=0;
    yde=de[1+k:n-1];
    n1=rows(yde);
    @ set up matrix for independent variable(lagged residuals)  @
    xe=e[k+1:n-1];
    j=1;
    do while j <= k;
```

```
    xe=xe~de[k+1-j:n-1-j];
     j=j+1;
   endo;
   {b,e1,sig2,se}=estimate(yde,xe);
   if choice==1;  @ K is pre-specified @
     temp1[k+1]=-1000;   @ set an random negative constant @
     temp2[k+1]=b[1]/se[1];
      break;
   elseif choice==2;  @ K is determined by AIC @
     aic=ln(e1'e1/n1)+2*(k+2)/n1;
     ic=aic;
   elseif choice==3;  @ K is determined by BIC @
     bic=ln(e1'e1/n1)+(k+2)*ln(n1)/n1;
     ic=bic;
   elseif choice==4; @K is determined by downward t @
     if abs(b[k+1]/se[k+1]) >= 1.96 or k==0;
     temp1[k+1]=-1000;    @ set an random negative constant @
        temp2[k+1]=b[1]/se[1];
         break;
    endif;
     endif;
   temp1[k+1]=ic;
   temp2[k+1]=b[1]/se[1];
   k=k-1;
  endo;

  lag=minindc(temp1);
  tstat=temp2[lag];
  retp(tstat,lag-1);
endp;
@ --------------------------------------------------------- @




/********************* PROC PHILLIPS  ***************************
**   FORMAT
**   { za,zt } = phillips(y,x)
**   INPUT
**  y  - dependent variable
**  x - independent variables
**   OUTPUT
** za - the Phillips test statistic
** zt -  the Phillips test statistic
**   GLOBAL VARIABLES: none
*****************************************************************/

/*
```

```
**************** Za or Zt for each breakpoint *******************
*/
proc(2)=phillips(y,x);
  local n,b,e,be,ue,nu,bu,uu,su,a2,bandwidth,m,j;
  local c,lemda,gama,w,p,sigma2,s,za,zt;
  n=rows(y);

  @  OLS regression  @
  b=y/x;
  e=y-x*b;

  @  OLS regression on residuals @
  be=e[2:n]/e[1:n-1];
  ue=e[2:n]-e[1:n-1]*be;

  @ calculate bandwidth number @
  nu=rows(ue);
  bu=ue[2:nu]/ue[1:nu-1];
  uu=ue[2:nu]-ue[1:nu-1]*bu;
  su=meanc(uu.^2);
  a2=(4*bu^2*su/(1-bu)^8)/(su/(1-bu)^4);
  bandwidth=1.3221*((a2*nu)^0.2);

  m=bandwidth;
  j=1;
  lemda=0;
  do while j<=m;
    gama=ue[1:nu-j]'ue[j+1:nu]/nu;
    c=j/m;
    w=(75/(6*pi*c)^2)*(sin(1.2*pi*c)/(1.2*pi*c)-cos(1.2*pi*c));
    lemda=lemda+w*gama;
    j=j+1;
  endo;

  @ calculate Za and Zt for each t @
  p=sumc(e[1:n-1].*e[2:n]-lemda)/sumc(e[1:n-1].^2);
  za=n*(p-1);
  sigma2=2*lemda+ue'ue/nu;
  s=sigma2/(e[1:n-1]'e[1:n-1]);
  zt=(p-1)/sqrt(s);
  retp(za,zt);
endp;
@ ----------------------------------------------------------- @


/******************* PROC ESTIMATE  **************************
**  FORMAT
```

```
**        { b,e,sig2,se } = estimate(y,x)
**   INPUT
**      y  - dependent variable
**      x - independent variables
**   OUTPUT
** b - OLS estimates
** e - residuals
** sig2 - variance
** se - standard error for coefficients
**   GLOBAL VARIABLES: none
******************************************************************/
/* *****  ols regression ****** */
proc(4) = estimate(y,x);
  local m, b, e, sig2, se;
  m=invpd(moment(x,0));
  b=m*(x'y);
  e=y-x*b;
  sig2=(e'e)/(rows(y)-cols(x));
  se=sqrt(diag(m)*sig2);
  retp(b,e,sig2,se);
endp;
@ ------------------------------------------------------------- @
```

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