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Transaction costs, standardization and modularity in credit risk transfer market

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Abstract-The advent of a credit risk market has profoundly altered the role of banking firms into one of asset originator and asset distributor rather than the asset holder. Banks have traditionally originated and held credit risk. It emphasis the different role of financial institutions from holders of credit risk to originators and distributors of credit risk. In this paper I aim to evaluate how the modularity and the standardization create the precondition for the creation of a credit risk transfer market in the banking industry. The intermediate market of credit risk transfer appears when the banking production processes have become more disintegrated. The vertical disintegration of the banking industry and the creation of a credit risk transfer market enables the shifting from a firm-based governance to a market-based governance. Furthermore, this paper proposes that modularity and standardization drives the creation and growth of credit risk transfer market. With the improvement of credit risk measurement methodologies and risk management practices the credit risk transfer market requires standardization and modularisation of bank lending value chain. Transaction cost economics, the dominant paradigm for understanding make or buy decisions, represents the starting point of my research. I argue that vertical integration in lending business is not only determined by transaction costs, but also by standards and modularity at product, process and industry level. I illustrate this thesis by examining how they work in mutually reinforcing ways. This perspective could open up some unexplored paths for research into economics of banking firms.
Keywords: Credit risk, securitization, credit derivatives, standardization, modularity, lending value chain.

1. Introduction

The production and distribution of banking products and services has traditionally been vertically integrated. Nowadays, financial innovation and new technologies are reshaping the process of production and distribution of all financial services [1] [2]. Information technology enables better information handling capabilities across firm boundaries. Banks tend to seek new opportunities to diversify or to refocus their supply of financial services according to their relative competitiveness. New developments in technologies are questioning the basic assumptions of the integrated banking business model. The integrated banking processes, traditionally managed within one bank, is increasingly broken up into multiple businesses with different organizations focusing on one section or aspect of the value chain. Value chains become more disintegrated and intermediate markets appear [3]. Until the early 1970s the traditional value chain of the banking lending was integrated. Banks processed applications and serviced loans until they expired. Credits remained on the bank's portfolio until their extinction. Nowadays, the traditional credit process is fragmented and different organizations are performing single aspects of the value chain. Intermediate markets are created.

Transaction cost economics, the dominant paradigm for understanding make or buy decisions, represents the starting point of my research in order to understand the effects of modularity and standardization on the creation of intermediate markets. The next section analysis the tools of the credit risk transfer market: credit derivatives and asset securitization. Section three analysis the role of standardization and modularity on the creation of a credit risk transfer market and the consequent process of unbundling of bank lending value chain. The final section concludes.

2. The New Financial Tools of Credit Risk Transfer Market: Credit Derivatives and Securitization

Credit risk has historically been regarded as illiquid, while credit risk management has been regarded as static in nature. Instead, the use of credit derivatives and securitization increases the liquidity of credit risk market and facilitates the adoption of new dynamical approaches to risk management compatible with the dynamic nature of credit risk [4].

Prior the development of credit derivatives and securitization a bank had only one solution to manage credit risk: transferring the loan assets. With the introduction of credit derivatives a bank can manage credit risk avoiding the transfer of underlying credit assets. Credit derivatives and securitization have emerged as a mechanism to actively manage credit risk in order to overcome the inefficiency and illiquidity of the traditional credit risk market. This new approach views the credit risk as a separable asset that can be managed dynamically as market risks [5].

Credit derivatives are financial instruments that structure the credit risk of a portfolio of credit assets in a format that allows credit risk to be traded in capital markets. Credit derivatives allow the unbundling of credit risk from other transactions. Credit risk can be separately traded in financial markets. This deconstruction of financial assets (loans) into the constituent

element (default risk) facilitates the separate trading of credit risk as an individual risk aspect. This decomposition allows banks and other financial institutions to regard credit risk as a separate and distinct tradeable asset class. Credit derivatives are a mechanism for disaggregating credit risk and allowing trading in this risk attribute [6] [7] [8]. Banks and other financial institutions can originate credit risk either in on-balance sheet form or in off-balance sheet form. From the banking relationship point of view, credit derivatives enable banks to separate the management of credit risk from the management of client relationship. Banks continues to maintain relationships with clients even when they use credit derivatives to manage their credit exposures. The ability to isolate and transfer credit risk on specific assets, allowing banks to hedge their credit risks and to transfer credit risks to other financial or non-financial institutions and investors [9].

Commercial and investment banks form the largest credit derivatives users. They have a dominant position in the buying and selling of credit risk. Most of them are both a buyer and a seller of credit derivatives products. Credit derivatives market is highly concentrated. The range of participants in the credit derivatives market includes other financial investors and non-financial corporations. Commercial banks use credit derivative for:

- hedging credit risk exposure in their credit portfolio, by purchasing default protection;
- transferring credit risk, as an alternative to conventional credit risk sale transactions;
- trading credit risk, by purchasing and selling credit risk protection, in order to complement trading activities in other assets and enhance adjusted risk performance;
- managing credit portfolio, by reducing portfolio credit concentration and improving the allocation of bank capital.

The market for credit derivatives continues to grow as well as the sophistication and complexity of the products. Credit default swaps are the most important credit derivative instrument. They are designed to isolate the default risk on credit exposures. They transfer credit risk on the underlying loan in the case of a credit event. There is no settlement between the parties unless there is a credit event. Total return swap transfers the full risk of the underlying asset covering the credit spread risk and the default risk. The total return swap usually uses a confirmation based on the principal terms of the swap. With credit linked notes a credit derivative (usually a credit default swap, a total return swap or a credit spread option/forward) is embedded in the structure. In addition, there are a number of variations to the basic note structure. Credit linked notes have the capacity to create synthetic exposure to the underlying credit. They allow capital allocation in the underlying asset without making direct investment in it.

Credit risk became a separate and distinct asset class which will be managed, transferred, hedged within asset allocation frameworks. It is a separately traded market-variable. Credit derivatives isolate and unbundle the credit risk from other risks and structure it in a format which allows it to be traded within capital markets. Credit derivatives allow credit risk to be viewed as a disaggregated commodity, separate from other risks such as interest rate or currency risk, which is capable of being managed dynamically through techniques previously associated with market risk [10].

Credit derivatives enable banks to manage concentration risk in credit portfolios. The presence of concentration risk in credit portfolios may be related to several causes: the degree of specialization (geographic, industry) of banking firms, knowledge and competence possessed in the loan origination process of the value chain and loan management, competitive forces available, competitive position in the market, and structure of credit markets. The use of credit derivatives enhances the management of credit portfolio through portfolio diversification (in terms of individual entities, geographic regions, or industry sectors) in order to enhance the risk return characteristic of the portfolio [11]. Mergers and acquisitions among banks and financial institutions during the 1990s have increased the banking industry consolidation and the degree of portfolio concentration. The fusion of credit portfolios of banks involved in the M&A transactions have largely increased the concentration risk. In addition, the consolidation process among industry sectors has contributed to raise the concentration risk in credit portfolios.

Credit derivatives facilitate the separate trading of individual attributes of the asset in isolation from the asset itself. Exposure to other issuers or industry sectors to whom the bank is less exposed can be generated through entry into a credit derivatives in which the bank assumes the credit exposure. A bank may decide to take a credit risk exposure because an absence or insufficient level of:

- loan origination capabilities: the bank is unable to directly participate in loans in the primary market;
- knowledge to penetrate new credit markets;
- loan syndication infrastructure, making participation in the primary loan market difficult;
- loan secondary market and liquidity.

Alternatively, a bank overexposed to a particular borrower or industry can purchase credit risk protection to reduce its exposure to optimal level. In addition, a non-bank investor has the opportunity to access a new class of

assets (bank loans) which had traditionally not been directly available. Using credit derivatives facilitates access to credit assets, and consequently credit risk, where direct exposure is otherwise not possible or not available in the market. Credit derivatives provide the capacity to participate in certain market segments which were conventionally excluded to certain investors, also because of the lack of credit origination capacities. Credit derivatives markets give investors an access to specialized credit management skills. In this way a bank can originate loans and then transfer credit risks to investors who have the necessary capacity and management competences to hold credit risks efficiently for a long term. Traders (both banks/financial institutions and investors) invest in credit derivatives in order to do trading on expectations of credit risk attributes. This reflects the capacity to separate the different dimensions of credit risk through credit derivatives. Investors (such as banks and other financial institutions like insurance companies or mutual funds) can generate yield enhancement through investment in credit risk through credit derivatives exposures, without the acquisition of the credit asset itself.

Securitization enables the conversion of assets traditionally considered illiquid into tradeable securities. It is the process of packaging financial contracts and transforming them into a form whereby they can be freely transferred among a multitude of investors. Structuring rearranges the cash flows and risks of the financial assets to meet investor needs. The cash flow and credit characteristics determine the performance of the securities and drive the structuring process [12, 13, 14, 15]. Understanding the cash flow characteristics of underlying assets is the key element to creating and evaluating securities. Cash flows represent a mix between the contractual features of underlying assets and the behavior of the borrowers. Because of its nature, securitization reflects a dual function: a sale of assets and a financing. Securitization enables banks to diversify their sources of funding. In the securitization process, cash flows of the loans are split into various securities. Several classes of securities may be created and sold to investors. In a typical securitization process, the owner of the assets transfer them to a special purpose vehicle, which, in turn, issues securities backed by these assets. The vehicle establishes a legal separation between the issuer and the pool of assets. Various legal structures can be used to create a remote entity to hold the loans and issue the securities. Also different class of securities with different exposure to credit loss may be issued. Generally, a senior class is issued which is protected from credit losses.

The residential mortgage segment is the largest product segment that has been securitized to date. The mortgage market in the U.S. is the largest in the world in terms of mortgage debt outstanding. The largest segment of outstanding mortgage is represented by residential mortgage. The second one is represented by commercial mortgage [16]. Securitization allows banks to transfer credit risk portfolio, and investors to capture the return on the underlying credit assets and to invest in diversified portfolios of credit risk. Securitization alters the role of banks into that of the originator of credit assets and distributor to investors.

3. Vertical Disintegration of Lending Value Chain and Credit Risk Transfer: Transaction Costs, Standardization and Modularization

Transaction cost economics has been the dominant paradigm for understanding make or buy decisions. The literature on transaction costs and the theory of the firm originates with Coase [17]. Coase has made the crucial question “What determines the boundaries of the firm?”. He answered that transaction costs guide the decisions of “make-or-buy”: firms with high transaction costs will have an integrated value chain and firms with low transaction costs will prefer go to the market instead of in-house production. Transaction costs are costs of using the market and are related to: asset specificity, frequency, uncertainty, bounded rationality, information asymmetries and opportunistic behavior [18] [19]. This approach emphasizes the importance of transaction costs in guiding firm action.

From this point of view the growth of credit risk transfer market is caused by the reduction of transaction costs related to the transferring of credit risk. The new financial instruments for credit risk transfer (credit derivatives and securities issued with asset securitization) reduce the transaction costs [7] [8] [20] if we compare these ones to the traditional risk transfer instruments (personal warranties, tangible securities, insurance policies, guarantees, loan sale). The new financial instruments can be negotiated in the secondary market and for this reason they can be used for different purposes by the financial intermediaries:

- hedging credit exposures;
- diversifying credit risk portfolio;
- arbitraging and speculating on the secondary credit risk market.

For instance, asset diversification (at different level: industry, geographic, client segments and size) requires screening, selection and monitoring activities in the lending value chain. This traditional diversification of credit portfolio could be really expensive for the banking firms. Access to credit risk through credit derivatives allows investors to assume credit risk, even if they have no loan origination infrastructures or capabilities [21]. Credit derivatives are specifically designed to allow the separate trading in, and management of, credit risks. Transaction costs can be reduced by:

- transferring the credit risk with credit derivatives and asset securitization;

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- assuming financial stakes with credit derivatives and securities.

Also loan sale could not be an easy way to transfer risks because it is an illiquid market and the trading activity is limited. In addition, the sale of loans may not be possible in some market segments because of the lending relationship or legal complexity. With credit derivatives and credit securitization a bank does not alter its lending relationship. With the securitization the loan originator usually continues to service loans by collecting principal and interest payment from the borrower and forwarding the payments to the special purpose vehicle [15]. Credit derivatives allow the separation of the term for which credit risk is assumed from the term of the underlying credit obligation. Credit derivatives can transfer the credit exposure to other banks or investors without the necessity to sell the credit asset. The derivative transactions avoid the difficulty of the physical transaction in the secondary loan market. Credit derivatives do not require the sale of the loan assets, which continue to remain on the balance sheet of the bank. Credit derivatives coexist with a range of other credit risk management instruments: securitization, credit insurance, loan sales/assignment, letters of credit and guarantees, loan syndication.

3.1 Modularity principles in lending business

Transaction costs paradigm does not explain exhaustively the birth and development of credit risk transfer market. The transaction cost paradigm "is informed by the perspective that in the beginning there were markets" [46]19. Important advances over the last twenty years in the theory of the firm have profoundly influenced management studies. Jacobides [22] highlights an evolutionary perspective with the question "Where do markets come from?" [23] in order to find what drives the degree of vertical specialization and intermediate market creation. Several factors, such as standardization of communication patterns and information conditions, lead to the creation of intermediate markets and the vertical fragmentation of the value chain. The credit risk transfer market is an example of vertical dis-integration and intermediate market creation. Integrated banking firms that used to produce, hold and service loans have given way to a specialized banking model, that originate and service loans but sell them to securitizers or sell the credit risk to the capital market [24].

A useful theory that helps us understand the creation of intermediate markets along side the lending value chain is modularity theory. It is rooted in the design theories of Herbert Simon [25] of the "near decomposable system". The modern literature can be referred to Henderson and Clark [26], von Hippel [27], Langlois and Robertson [28], Baldwin and Clark [29] [30]. An exhausted definition of modularity is made by Baldwin and Clark [30, 63-88] "modularity is a particular design structure, in which parameters and tasks are interdependent within units (modules) and independent across them. Modules are units in a larger system that are structurally independent of one another, but work together. The system as a whole must therefore provide a framework – an architecture – that allows for both independence of structure and integration of function".

The modularity theory, originally related to design strategy and production, has extended to business and management research area to study the dynamic boundaries of different lines of business and the vertical structure of the industries [29, 30, 31, 28]. Within this theoretic paradigm, the creation of intermediate market is caused by a process of standardization of information, standardization of communication patterns and coordination simplification. The creation of an intermediate market implies that the interdependences [32] between different steps of the lending value chain can be reduced. The absence of standardization and the presence of coordination difficulties determine transaction costs. So, the standardization process reduces transaction costs and enable the creation of intermediate market. Jacobides [33] theorized about the causes of vertical separation in an industry (mortgage banking). Jacobides and Billinger [34, 35] analysed the process of vertical *separation* within a single firm, and so on with a growing body of empirical research on the vertical structure of industries.

At the deeper level of analysis suggested by modularity theory, we can find the conditions for the development of the credit risk market:

- standardization of products;
- standardization of documentation;
- standardization of default risk and pricing risk models;
- standardization of organizational processes;
- regulatory certainty.

Standardization of products and documentation represents the process of taking different loan types, collateral and terms and moving toward a common framework. The range of diversity of financial assets, collaterals and terms represents a formidable barrier to the credit risk market. In absence of standardization it is necessary to analyze and evaluate each loan individually. It means an huge increase of transaction costs. Because of it banks are not able to transfer credit risk economically. In the mortgage market, the federal agencies (Ginnie Mae, Fannie Mae and Freddie Mac) ([i]) and some associations (National Association of Mortgage Brokers, American Association of Residential Mortgage Regulators, Mortgage Industry Standard Maintenance Organization) have made successful efforts to standardize loan terms, loan documentation and underwriting requirements. The basis characteristics of the loans have been standardized and it has significantly reduced the asset specificity in mortgage banking [22,

33]. The creation of uniform loan contracts reduces not only costs associated with issuing mortgages, but also costs associated with selling mortgages into the secondary mortgage market. Market participants have developed standard definitions for collateralised-mortgage obligation types. Mortgage cash flows are distributed to bonds based on a set of specified rules. Over the time the basis characteristics of the banking loans have been standardized in order to transform cash-flow structures and performance characteristics into a variety of investment instruments to meet the different needs of the investors [20].

Data management technologies increase the role of modularity in the banking industry: modularity decrease the vertical integration and increase the specialization in the banking industry. The modularity has a profound impact on deconstruction and fragmentation of the integrated banking model. It enables the disintermediation of traditional banks and the process disintegration in banking industry [22, 33, 34, 36].

3.2 Modularity and standardization: product, process and industry level

The standardization process acts at three different levels: product, process and industry level [30]. At the first level, standardization involves loan characteristics, loan documentation and loan contracts. At the second level, standardization involves the creditworthiness evaluation processes, credit risk evaluation models, credit rating and credit scoring, credit profiles, credit underwriting. At the third level, standardization involves agreements, definitions, terminology, documentation.

The standardization creates a sort of "shared language" and a process of *knowledge codification* [37] to measure, describe and represent credit risks of banking portfolio. The standardization of default risk and pricing risk models is strongly related not only to the standardization of products and documentation but also to the availability of statistical histories of credit performance. If the legal rights of the parties involved in a contract are clearly assigned, if the definition of default, contractual covenants and characteristics of collateral are standardized, if statistical histories of borrowers' behavior are available, a bank is able to better measure the credit risk of credit expositions.

Credit evaluation and risk measurement is a complex process (*credit assessment*) involving analysis of borrower information in order to estimate the probability that the loan will be regularly repaid. The probability of regular repayment depends on the borrower's operating environment and personal attitude toward the obligation. Repayment performance also depends on the bank's ability to evaluate these two aspects through available information and on the bank's ability to control risk through specific contractual conditions. The development of more accurate measures of credit risk with banking industry and financial institutions in general allows improvement of the efficiency of credit risk pricing, and in general the efficiency of credit risk management. The credit risk transfer market needs unified and consistent methodologies for pricing credit risk uniformly across markets.

A legal framework is a necessary condition in order to create a set of rules to regulate relationships between borrowers and lenders. It provides a degree of certainty of the rights of the parties involved in financial transactions. It is a condition to evaluate the outcome of the events when they happen, for example how a borrower and a lender are treated in the event of default.

The evolution of credit derivatives is rooted on its modularity feature and standardization. Modularity enables a framework of structural flexibility of products [31, 38]. It is a "building-block approach" of credit derivatives that allow them to structure new mechanisms to either transfer credit risk or customize risk. Credit derivatives enable credit risk to be disaggregated and transferred to a third party. They enable credit risk to be separated from the funding component of its underlying instrument. This separation creates new financial and managerial opportunities for banks and other different classes of investor either inside or outside the financial system.

The central element in pricing credit derivatives is the measurement of default risk. In the past, the lack of standardization of credit derivatives structures and the not transparent and private nature of the market have created difficulties of characterization and collection of data. The standard ISDA agreement (*master agreements*) and the resulting standardization of documentation constitutes the underlying driver of the marketability of credit risk and the transformation of credit into a more generic asset class [7, 8, 39]. ISDA (*International Swaps and Derivatives Association*) provides standard documentation for credit derivative markets. It provides a standard market language or documentary format for issuing and trading credit derivatives. Since the 1990s ISDA has developed a standard documentary format for credit default swaps. The first standardized documentation (letter of confirmation) was published in 1998. Since then ISDA has standardized contractual forms, terms, and credit derivatives definitions. Standardized elements include: reference entity, reference obligations, reference assets, transaction dates, confirmation agreement, credit events, fee calculations, credit event notice, settlement mechanisms and timing. The identification of credit risk and quantification of it is the main problem with credit derivatives. ISDA has classified and standardized the credit events as follows: *bankruptcy, credit event upon merger, cross acceleration, cross default, downgrade, failure to pay, repudiation, restructuring*. The documentation framework

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has also evolved over time in response to market concerns and developments, facilitating trading in credit derivatives. Standardization is useful because it reduces delays and confusion, the risk of operational errors and legal disputes. Briefly, the drivers of evolution of credit derivatives market are: standardization of structures, standardization of documentation and terminology, standardization of pricing models.

The financial tranching in credit risk transfer market is also rooted on modularity and standardization. The tranching mechanism in securitization and credit derivatives creates differentiated credit risk profiles or credit risk layers by issuing different series of debt with different payment priorities [40]. The distribution of the quality of cash flows in the portfolio constitutes the basis for the evaluation of the distribution of losses among different securities tranches (risk profile). The cash flows of the underlying credit portfolio are first used to satisfy the senior securities issues (super senior and senior tranches) and then the subordinated ones (mezzanine and equity tranches). Investors in different layers of risk have different exposures to credit events. There are a lot of possibilities and techniques to tranch a credit portfolio in terms of number of tranches, levels of subordination, performance of individual tranches, and levels of rating. A vast amount of evidence in the literature highlights that the tranching allows the transfer of risk more efficiently and at a lower cost to the originator because the tranching enables the pursuing of a matching between financial needs of different credit risk profiles of demand and supply in the market.

Briefly, banking firm's choices of having an integrated or disintegrated lending value chain depend not only on the characteristics of the transactional conditions, but also on the availability of interaction standards at process, product and industry level of analysis.

3.3 Financial innovation in risk transferring is rooted on modularity and standardization

Over the time, basic derivative contracts have evolved in structured credit products, often hybrid products, following a building block approach, that facilitates transfer and investment in credit risk portfolio. This approach of creation of new credit derivatives and structured credit exposures to credit risk is rooted on modularity principles. The modularity facilitates the flexible assumption of structured credit risks. The basis products are decomposed into a number of distinct and separate elements of financial transactions and recomposed from, changing them and/or adding new financial components [14, 41], to originate new and more sophisticate credit derivatives products. Contractual elements subjected to substitution, decomposition and recomposition are:

- underlying credit assets (single reference entity, multiple reference entities, types of loan, credit exposure on derivatives transactions, credit indexes, asset backed securities);
- credit risk dimensions (such as default correlation, recovery rate or loss given default, credit spreads, sequential default risk positions, migration risk);
- credit events and structure of cash flows;
- terms, leverage, maturity, and options;
- timing of payments, currency, and interest rates.

The principal feature of this evolution process is the variation of existing elements and the incorporation of new elements into a standard structure. It is a process of unbundling the basic financial product into its components and the bundling of them and other components (typically from other basic financial structures) into a new financial product. A consistent number of structural variations on the basic forms have evolved in the last decade. Over the time, more standardized credit derivatives basic forms become, more variations emerge in the market, and consequently new credit derivatives structures are created.

The credit derivatives technology implies all principles of modularization. This technology provides standard interfaces among different contractual components; enables the combination and substitution of single contractual components. Generally speaking, the modularisation enables the creation of credit derivatives products that have the following characteristics: configurability, compatibility, upgradeability and interoperability [42, 43].

An example of this modularisation process is the extension of the underlying credit assets used in structuring a credit derivative product such as a synthetic CDO (*collateralized debt obligation*). The credit derivative technology is able to combine and assemble a pool of assets (different credit assets such as: types of loans, bonds, asset backed securities, credit derivative exposures) in order to enhance portfolio diversification, and transfer the underlying credit risk to other investors through the issue of securities using tranching techniques that enable the creation of various layers of risk.

With synthetic CDOs credit assets continue to remain on the bank's balance sheet. The credit risk is transferred to a special purpose vehicle through a credit derivative (usually a credit default swap) on the underlying credit assets rather than the sale of assets. Synthetic structures do not create funding sources for the bank. The transfer of credit risk is unfunded because the note proceeds are used to collateralise the credit default swap by acquiring a portfolio of risk free assets. This technology uses credit linked notes structures and securitization techniques [8, 10]. The portfolio of assets is structured into multiple tranches of securities (stratification of credit risk) that are then distributed to investors.

Investors can invest in different tranches of securities, enabling them to assume their preferred level of credit risk coherently with their expectations of credit market performance. The portfolio of credit assets usually has a minimum level of diversity in terms of issuer, industry and country. The credit portfolio could contain not only loans but also credit derivative exposures (usually credit default swaps).

The synthetic CDOs market is growing fast. It is driven by the increasing standardization, homogeneity and liquidity of credit default swap market. The credit default swap represents the core component of a synthetic CDO's structure. As credit default swaps become a commoditised product, variations and new credit derivatives products are created. Over the time, the most used CDO structure has begun the synthetic one. The market increasingly use synthetic structures because of its superior economics. It reflects its advantage in structuring and transferring credit risk without the need to transfer the underlying credit asset. This is evident in those markets where transaction costs of the sale of credit assets are high [44].

As the market has evolved, a vast number of CDOs variations has emerged. Particularly, the range of underlying credit assets has been widening in the last years, including not only corporate and sovereign loans (traditional CDOs' credit assets), but also residential and commercial mortgages, loans to small and medium enterprises, credit exposures on derivatives transactions. Synthetic CDOs structures can be also undertaken without the interposition of a special purpose vehicle. The different types of CDOs has broaden credit risk management tools for the bank originator and the investor, partly removing the constraints of the available instruments in the market.

An other aspect of the financial standardization and evolution process in credit derivatives market is the creation of credit indexes used both as a benchmark and a financial investment product. They have allowed the development of index based products, that take a variety of structures. Index based financial products are traded in the over-the-counter markets.

This process of financial evolution creates a framework of additional and structural flexibility that enlarges applications, enables to manage credit risk of specific type of exposures, enables to manage more actively bank's capital structure, allows investors to take customized credit risk positions and to actively trade and manage credit risk, satisfies much more financial needs, and increases the user value of credit derivatives, especially allowing to trade credit risk in various forms. This entails the creation of credit assets that are not directly available in the market.

On one hand, this process of continuing evolution creates a proliferation of new products to better manage credit risk in a more volatile, uncertain and differentiated financial market. On the other hand, the process of generating new contractual structures increases the complexity (particularly, the quantitative models used to price and evaluate credit derivatives), creates problems of liquidity and price transparency, and attenuates the benefits of emerging standardization in the credit derivatives market [45].

4. Final remarks

The growing standardization of documentation and product structures has facilitated trading of credit risk. It has reduced transaction costs and market frictions in trading in credit risk. The growing credit risk transfer market has increased the ability to trade credit risk in a relatively liquid format with relatively low transaction costs. Credit derivatives and securitization have begun the standardized financial technology to transfer and invest in credit risk portfolio. The standardization of information and modularity creates the preconditions for a market to be feasible.

Modularity and standardization have contributed to separate the process of credit origination from the assumption and management of credit risk. Credit risk has emerged as a separate asset class which is traded in a way similar to trading in other assets. Transaction costs, standardization and modularity are the conditions under which banking firms choose to abandon vertical integration in favor of markets. I hope these results will stimulate further research to understand what drives vertical disintegration in lending industry.

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([i]) These governmental agencies are involved in the process of securitization of conventional mortgage loans that conform their standards. Non conventional loans (not conform to the guideline set by the agencies) are traded in non-agency markets where there is not any guarantee against credit risk by federal agencies (internal or external credit enhancement is required in order to receive investment-grade rating). This mechanism represents an effective incentive to adopt a standardized relationship framework in the primary mortgage markets.