Financial Innovation and Risk Transfer to Capital Markets: Fundamentals and Recent Topics

Heinz Zimmermann*

For centuries capital markets have played a key role in the allocation of risk. They improve the possibilities for individuals and institutions to diversify or transfer a portion of their risks more efficiently. Over the years, many innovations – in terms of contracts, processes or institutions – have contributed to improve this process by widening the range of risks covered by financial contracts or by strengthening the risk-bearing capacity of the economy, but not always successfully. Based on this analysis, the regulatory agenda of OTC markets as well as the emerging direct lending facilities of institutional investors are discussed.

Content

I. Risk transfer to capital markets: The fundamentals

1. Key functions

Many risks can be transferred directly from natural persons to legal entities, companies, or financial intermediaries by using contracts: Traditional credit and insurance contracts are classic examples for such a transfer. Funds and pension provisions can be arranged using collective agreements that enable risks to be transferred or offset within and between risk communities.

What are the advantages of transferring risk to capital markets? From an economic perspective, four aspects are important (legal issues are not dealt with here, such as the subordination of securitized claims under securities legislation):[1]

- *Segmentation and diversification:* The transfer of securitized claims to capital markets allows an improved segmentation (splitting) as well a wider diversification of risks. Classic examples of this are shares, bonds and other corporate securities.
- *Fungibility and liquidity:* Fungible investments are transferrable and unspecific in nature, which is a precondition for trading on a secondary market. Market liquidity facilitates the purchase and sale of investments and their associated risks. It allows risks to be allocated flexibly when the appetite for risk changes over time. With objects that are essentially non-homogeneous, the conditions for fungibility have to be established by quality standards (e.g., commodities) or by ratings (e.g., credit or loans).
- *Monitoring and control:* The capital market improves the possibilities for managing risks by simplifying the dissemination of information and makes monitoring as well as the exercise of control rights cheaper and more effective.

* Prof. Dr. rer. pol. *Heinz Zimmermann* is a professor for Finance at the Center for Economic Sciences (WWZ) of the Faculty of Business and Economics of the University of Basel. This article first appeared in German in the *Swiss Review of Business and Financial Market Law* (SZW) 06/2016, 574-582. The author would like to thank Hermione Miller-Moser for the excellent translation. The wording of the original article is adjusted with minor changes.

1 Financial innovation and its relevance to risk transfer are discussed by *Peter Nobel* and *Heinz Zimmermann*: Financial Innovation in Jurisprudence and the Theory of Finance, in: Financial Innovation and the Legal System, Zurich: Schulthess (2014), 45–97.

– *Structuring (Financial engineering):* Individual components of risk can be traded independent of the instrument they relate to (a claim, security or physical entity), or they can be dismantled into various components according to the specifications of the financial contracts. The process of separating and altering the risk characteristics targets improving the allocation of risks, and in some cases even making risk allocation possible. Derivative instruments based on credit events (e.g., credit default swaps, CDS), which allows the debtor's default risk to be traded independently of the specific claim. The segmentation of claims into different priority classes (waterfall principle) improves the allocation of risks by aligning them with the risk budgets of institutional investors.

2. Critical appraisal

Subsequent to the financial crisis of 2007-08, these functions need to be critically appraised. First: It is difficult to distinguish the two dimensions of risk distribution, diversification (unsystematic risks) and risk transfer (systematic risks), from each other in practice. The credit risks that the banks transfer via special purpose vehicles (SPVs), potentially owing to structuring objectives, turn out to be non-diversifiable for investors.
Second, both diversification and risk transfer require upstream "engineering" of risks (i.e. the specification, segmentation, and structuring of risk components), that ideally results in intelligently defined financial contracts. The list of unsuitable, failed financial contracts is long.

Third: The process of risk transfer, however, features numerous feedback effects. Risks cannot be transferred without being trans*form*ed. They may be triggered, for instance, by behavioral risks (*moral hazard*): While the originator is in the process of ceding credit risks to a third party (SPVs), the monitoring function is altered, and thus also the character of the transferred risk.

Fourth: General economic and collective aspects of the risk transfer process are often ignored. Systematic risks cannot be hedged in the aggregate but must also be borne by risk taking counterparties. This requires a heterogeneous range of risk budgets and risk capacities of economic agents. This allocation process is particularly difficult for off-exchange traded risks, because the coordination mechanism of the price system is missing or incomplete - which has the potential to impair market liquidity and macroeconomic stability.

3. Information and coordination functions of capital markets

A central aspect of the market allocation of risks follows from the previous point made: The supply and demand for assuming and transferring risks is manifested directly in the prices observed by economic agents and applied as the basis for their decisions.[2] The prices of securities in liquid markets are particularly informative, because they reflect large (and ideally heterogeneous) trading volumes and are less vulnerable to the biases that result from large transactions. The precondition for a high level of market liquidity is the quality of the price discovery process, which is reflected in a transparent order-matching system -- for example, a public order book. The availability of market prices has decisive advantages for the evaluation of outstanding risk positions, which serves as the basis for the clearing and settlement (C&S) of the associated claims and obligations.
It is hardly a new precept that the daily clearing and settlement of risk positions is an essential precondition that financial market agents must meet in order to deal rationally with capital market risks, and that their risk tolerance is largely determined by their success in doing so. In this respect, the targeted duty to settle over-the-counter derivatives, which will be discussed briefly in Section III.3, should basically be viewed as a desirable development.

[2] See *Martin Hellwig:* Die Kommunikationsfunktion der Finanzmärkte [The Communication Function of Financial Markets], Swiss Journal of Economics and Statistics 127 (1991), 351–364.

II. Four classic innovations for risk transfer and the role of derivtives

Against the background of the previous discussion, we will now focus on four innovations which have significantly shaped the efficiency of capital markets in the past when transferring risk, and which have to be critically appraised in the light of more recent developments.

1. Shares and limited liability

Restricting liability risk to invested capital in limited liability companies, i.e., the limiting of shareholder liability in incorporated companies,[3] is probably the most important financial innovation and a crucial pre-condition for the risk transfer function of capital markets.

The history of limited liability began long before the development of modern capital markets. A legal framework was widely used in Italy as early as the 12th century with the emergence of the trading company (*commenda*), which protected the most important (often silent) capital investors of a specific shipping company from losses, in sharp contrast to the travelling managing partners who were not necessarily financially involved. Once the undertaking was over, the *commenda* would be liquidated and potential profits distributed as previously stipulated.[4] The counterpart to this was the *compagnia*, which dealt with transportation by land and did not provide limited liability for silent capital providers. The risks involved here were more predictable, and were partially insurable (from the 14th century onwards), so that a family-ownership partnership structure was sufficient to guarantee the risks.

The central concern when allocating risk is indirectly associated with limited liability: The latter facilitates a wider diversification of the risks carried by the partners who provide the capital.

In the industrial age with the spread of joint stock companies, limited liability became an essential condition for mobilizing huge sums of capital that was needed for investments and company expansion.[5]

It is widely accepted that, owing to the non-insurability of entrepreneurial risk and the need to facilitate heterogeneous shareholding relations (spanning the smallest and the largest shareholders) that a general limitation of liability was the key prerequisites for the emergence of the stock market as a source of capital.[6]

In the interests of enabling a broad diversification of shareholdings, it is necessary to ensure a separation between the ownership and the management of the company's resources and to minimize the information costs to the providers of capital, which is only possible to achieve feasibly by limiting liability.

At the same time, limited liability creates additional risks: The separation of ownership and control (management) leads to well-known agency costs, and the asymmetric risk character of limited liability increases shareholders' incentives (and management who are potentially remunerated with shares or stock options) to engage in greater risks, that are then transferred to stakeholders who have fixed claims (e.g. external creditors). If the risk of bankruptcy increases, then the public domain will also bear a part of the associated monitoring-, reorganization-, and bankruptcy-costs.[7]

3 Naturally, the capital providers' relief from liability can be achieved using various contractual and corporate structures. Here, the focus is on joint stock companies («Aktiengesellschaften»).

4 Details can be found in: *Robert W. Hillman:* Limited liability in historical perspective, Wash & Lee L. Rev. 54 (1997), 621 ff

5 In 1602, the first listed public company was the Dutch East India Company, which existed for approximately 200 years.

6 A theoretical analysis of limited liability under corporate law can be found in *Paul Halpern et al.:* An economic analysis of limited liability in corporation law, The University of Toronto Law Journal 30 (1980), 117–150 or in *Frank H. Easterbrook and Daniel R. Fischel:* Limited liability and the corporation, The University of Chicago Law Review 52 (1985), 89–117.

7 It is no coincidence that in the case of institutions which were exceptionally exposed the risk of cost externalization and [high] creditor information costs (e.g., banks), partnership models without limited liability were widespread, and the number partners sometimes restricted by law.

2. Futures exchanges[8]

Forward contracts in general, and futures contracts[9] in particular, combine two central features regarding the transfer of risk: The flexible specification of contracts allows risks and components of risk to be shared in almost any desired manner, and to be separated from the underlying investment vehicle (securities, commodities, or abstract risk factors). By standardizing such contracts, a fungibility can, ideally, be achieved that makes these contracts desirable to a wide range of market participants who have completely different – even contrary – trading motives. This gives rise, at least potentially, to a high level of market liquidity for trading risks. Here, the purchase and sale of derivatives, in contrast to insurance contracts, requires no insurable interest on the underlying risk, which substantially expands the spectrum of risk-bearers and increases liquidity.

The flexibility of contract design allows, in particular, risks outside the financial sector to be 'financialized': In this way, price fluctuations in the agricultural or commodity markets or the financial consequences of catastrophic events (e.g., earthquakes and storms) can be delineated in financial contracts and are accessible to a broader universe of risk-bearing investors. These types of contract also allow risks to be traded that cannot even be represented on physical markets, e.g. price fluctuations of future harvests, with the consequence that the futures market becomes a substitute for the spot (basis) market.

The latter case can even occur within the financial sector: Many bond markets are extremely illiquid owing to the buy-and-hold behavior of institutional investors, so that the daily price determination in the secondary market or for newly issued bonds is accomplished by the prices observed on the more liquid futures (or swap) markets.

The art of optimally designing futures contracts consists in the fact that standardization must strike a balance between the needs of a large number of individuals with heterogeneous risk preferences, so that the implied basis risk[10] is balanced by the liquidity of the contract.[11] This means that futures contracts will ultimately always be traded on just a few underlying risks – as the great majority of risks are far from being fit for trade on the capital markets.

3. The clearing house

Exchange-traded derivatives are cleared and settled by central counterparties (CCPs), the Clearing House of the Derivatives Exchange. The counterparty risk of the parties is limited to the solvency of the CCP, which is associated with a substantially lower level of information costs than if all counterparties would have to be monitored individually. The counterparty risk of each market participant is distributed across all the other market participants by means of a complex system of risk-based margins, the daily repricing of all contracts, and the clearing and settlement (C&S) of the associated claims. These factors contribute to the clearing house being a market organization that has the highest possible level of security and transparency for the transfer of risk on capital markets. *Telser/Higinbotham*[12] argue that "An organized market facilitates trade among strangers" and compare the economic benefit of clearing via CCPs with the use of cash as opposed to bank checks. This analogy further underlines the importance of the clearing house for optimizing the stakeholders' liquidity management of the securities/collateral that they must provide. Therefore, regulatory changes in this area--such as the obligation to centrally clear OTC-derivatives or increased competition between clearing service providers—touch the nerve of the financial system.

8 See *Merton H. Miller:* Financial Innovation, Journal of Financial and Quantitative Analysis 21 (1986), 459– 471.

9 The term applies here to all standardized forward contracts traded on a derivatives exchange.

10 Basis risk results from the imperfect correlation between the price fluctuations to be hedged and the price fluctuations of the derivative contract.

11 *Holbrook Working:* Futures trading and hedging, American Economic Review 43 (1953), 314–343.

12 *Lester G. Telser/Harlow N. Higinbotham:* Organized futures markets: Costs and benefits, The Journal of Political Economy (1977), 969–1000.

4. Option contracts: Non-linear risk transfer

From a theoretical finance perspective, option contracts are a true miracle cure: owing to their non-linear payoff structure and flexible specification of exercise prices, they allow risks to be structured and segmented in almost any desired manner. These possibilities have always been employed for re-/structuring companies' debt and equity capital: What is considered, from a legal perspective, to be a repayment priority, a subordination, or a conversion right when servicing debt/loan claims and shares, can be interpreted, from an economic perspective, as different types of options causing a non-linear transfer of the underlying risks.

A variety of possibilities for structuring risks using (not always simple, even sometimes exotic) option rights are often used in practice to construct complex products that are traded over-the-counter due to their lack of standardization. The wide scope for structuring products does not inadvertently elicit the excessive diversity and complexity of these products; it actively solicits these excesses. Diversity and complexity both contradict the central innovative advantage of derivative markets, namely the creation of an organized, liquid market for transferring standardized risks.

III. Current issues

In the previous discussion, the role of regulation was omitted. Regulation plays a central role in the issues that are discussed next.

1. Risk appetite

Systematic risks, i.e., risks that cannot be completely diversified, can only be hedged if there are counterparties willing to take these risks. The incentive to do comes from the risk premiums inherent in asset prices: When investors have a low risk tolerance or appetite,[13] risk premiums rise, which decreases asset prices and thereby increases the cost – and attractiveness - of hedging.

Various regulatory developments imply that the capacity of institutional investors to bear risk – and often their derived willingness to bear risk – responds uniformly to fluctuations of capital markets. This is the result of three interrelated factors: (1) fair-value accounting standards which require that the valuation of assets is based on market prices; (2) minimum capital requirements or coverage rules for banks, insurance companies and pension funds which are explicitly based on market values; (3) and finally, the tendency to align company results and investment performance to short time horizons.

In particular, the rigorous solvency requirements in the insurance sector (for the EU, Solvency II Directive, and for Switzerland, the Swiss Solvency Test (SST)) reinforces the current trend of pension funds to manage their risk budgets in the same cyclical way as traditional asset managers do, without accounting for the far longer-term liabilities.[14] If the risk capacity of these investors is not differentiated from the risk structure of banks' trading positions, then the risk-transfer process will lose a quantitatively important counterparty. The absence of countercyclical investors leads to a stronger (countercyclical) variation in the required risk premiums, which increases volatility — and under certain circumstances has a negative effect on market liquidity.[15]

The effects that the principles presented by the Financial Stability Board (FSB) concerning the minimum requirements for a "Risk Appetite Framework" will have on the systemically relevant financial market players cannot at present be evaluated. Formally, these principles serve to establish a general, internationally valid context within which the respective institutes define their risk appetites, break it down to disaggregated sector categories, and define the responsibilities of the top-management.

The extent to which material aspects are affected, that have a direct effect on the type and size of the risk budget, is an open issue in the current state of implementation. It would, however, be surprising if more explicit information about the risk appetite of an institution were to trigger the use of larger budgets to be used to the countercyclical willingness to take on risk.

[13] Notice the distinction between "risk capacity" which defined using measurable criteria, and "risk tolerance" (or risk appetite, risk budget) which is determined by subjective willingness to bear risk.

[14] "Cyclical" means that risk budgets are reduced when the amount of capital or the coverage ratio decreases.

[15] See, for example, *Alain Cohn et al.:* Evidence for countercyclical risk aversion: An experiment with financial professionals, American Economic Review 105 (2015), 860–885.

For years now, with the decreasing profitability and capital base of hedge funds, a further investor group has slipped from the market: as largely unregulated investors, they at least had the potential for managing risk positions in a countercyclical way. Owing to this incipient crisis, the popularity of sovereign wealth funds (SWF) which according to their own information have investment horizons of several decades, is easily understood.[16] However, it is particularly ironic that these asset wrappers are in many cases awarded a longer investment time horizon by their respective government's supervisory authorities than other institutions with effectively long-term liabilities.

An indication of the overall economic appetite for risk can be observed in the capitalization or risk capacity of the reinsurance sector:

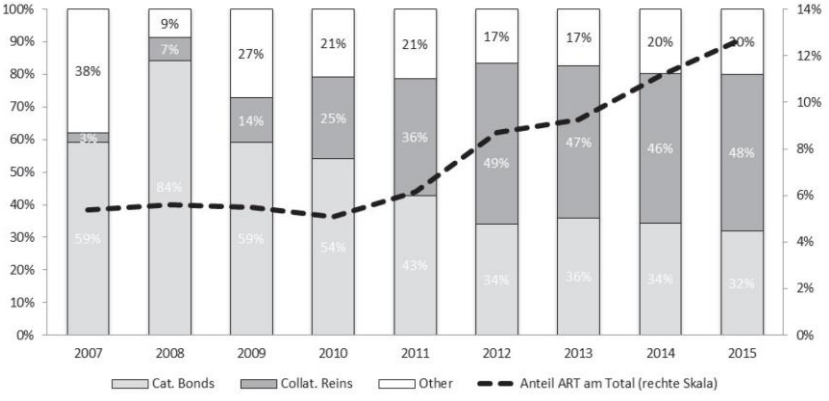
2. Collateralized reinsurance

Exhibit 1 (see below) visualizes the importance of so-called ('alternative capital' or alternative risk-transfer, ART), which has become substantially more important over the last few years as a supplement to the capitalization of reinsurance companies, and currently represents 12% of their total capital: It consists of instruments that enable specific reinsurance risks to be placed on the capital market or transferred directly to investors using special purpose vehicles (SPVs) to the capital market. There are numerous possibilities for structuring these [instruments]. The most well-known form are 'cat bonds' (catastrophe bonds), which have the structural design of collateralized debt obligations (CDOs), i.e., representing a traditional securitization in the form of a security. The market share is still very significant today and makes up approximately 33% of the alternative capital segment. The strongest growing alternative capital segment[17] with a share of more than 50% consists of the risk vehicles where the investors directly enter a reinsurance contract using a suitable legal structure, and pledge securities in lieu of servicing premiums. Here, non-rated and illiquid investments are used, and the operational risks are considerable. The advantage lies in the wider diversification possibilities compared to traditional reinsurance risks.

3. Direct lending

Direct lending facilities have also developed in the credit business in recent years, practically unnoticed by regulatory authorities. Owing to bad experience

Exhibit 1: Share of alternative capital (ART) in reinsurance capital (right-hand scale), and shares of Cat Bonds and Collateralized Reinsurance in alternative capital (left-hand scale)



Based on *Aon Benfield/Guy Carpenter* (various publications)

[16] See: *Patrick Bolton et al.:* Sovereign wealth funds and long-term investing, Columbia University Press (2012).

[17] In addition, there are further segments such as ILWs *(industry loss warrants)* or Sidecars.

during the financial crisis, the innovation is not the transfer and re-structuring of credit risk from banks' balance sheet to SPVs, but the direct placements of credit with institutional investors (*direct lending*). On the one hand, this is a consequence of the increased equity cost of capital reflecting the general concern about the systemic risk of banks in the aftermath of the financial crisis.[18] On the other hand, it is the result of the higher capital requirements in commercial lending which mainly affect debtors from the middle and lower credit-rating segment (i.e., private debtors and small and medium-sized enterprises, SME). In this segment, bank lending has strongly decreased since the financial crisis.

Does direct lending via capital markets really offer an alternative source of funding? In the United States, non-bank lending facilities for non-financial corporations (NFCs) are highly developed; during the period 2002—2014 its share amounted to approximately 80% of aggregate debt capital, while in the Euro Area its share is approximately 45%, although with a steeply rising trend.[19] The public placement of bonds is, naturally, not an option for SMEs. The market share of privately placed bond issues (i.e., placed directly with institutional investors), however, rose from 10% to 30% in the last ten years (source: ECB), which highlights the willingness of institutional investors to engage in lending activities, but this alternative, nevertheless, still necessitates a financial intermediary, which is unsuited to a SME.

As a result, an increasing number of fund structures have emerged that grant small- to medium-sized loans that are financed *directly* by institutional investors, that function in a similarly way to private equity funds. In 2015, a credit volume of USD 36 billion was financed globally in this way, whereby Europe's share exceeded that of the United States for the first time. An even more direct funding option are peer-to-peer lending networks or platforms (so-called P2P or *marketplace lending*), via which investors or debt funds interact with loan-seeking firms directly.[20]

Credit risks require active information processing and monitoring, and diversification capacity is mostly over-estimated: Credit defaults also have macroeconomic causes. Direct lending ultimately transfers risks to a non-transparent, less regulated area, creates additional risks by structuring the investment vehicles (and the possible debt capital) and requires that the risk-bearing agents (institutional investors) have a sophisticated investment process. It is fundamentally an allocation process outside organized financial markets and does not rely on standardized derivatives or central counterparties to hedge the risks. However, price information (e.g. credit spreads) on P2P platforms is publicly available and simplifies the overall pricing of credit risk. From the perspective of risk allocation, one wonders whether pension plans, which presently represent a 33% share of private debt capital (source: Preqin), have sufficient knowledge and risk capacity for monitoring and managing their engagements. This is less of a concern for foundations, endowments, or hedge funds that have an aggregate share of 30%: The activation of this investment capital is likely to be the real economic benefit of this emerging market segment.

4. OTC clearing

The market value of outstanding over-the-counter (OTC) derivatives is enormous. It amounted to USD 15,000 billion (BIS) at the end of 2015 and thus represents one quarter of the capitalization of the aggregate of listed shares worldwide (see *Exhibit 2*). When one considers bilateral netting agreements between the same counterparties, the total reduces to USD 2,000 billion, the so-called gross credit exposure.[21] It shows the potential loss of the financial sector if all counterparties would fail. The most important position within OTC derivatives are the interest-rate swaps, followed by equity and index derivatives, while credit derivatives (in particular credit default swaps, CDS) have become less important since the financial crisis.

OTC markets lack the safeguards of organized derivative markets. In order to limit the associated systemic risks, extensive measures were approved at the 2009 G20-Summit in Pittsburgh,[22] the most important of which being the clearing requirement for standardized derivatives via the central counterparty clearing house (CCP).

[18] This is reflected, for example, in the credit premiums of European banks.

[19] See *Helmut Kraemer-Eis et al.:* Institutional Nonbank Lending and the Role of Debt Funds, EIF Research & Market Analysis (2014).

[20] Examples are: OnDeck (USA) or Funding Circle (UK).

[21] This does not yet include *collateral*.

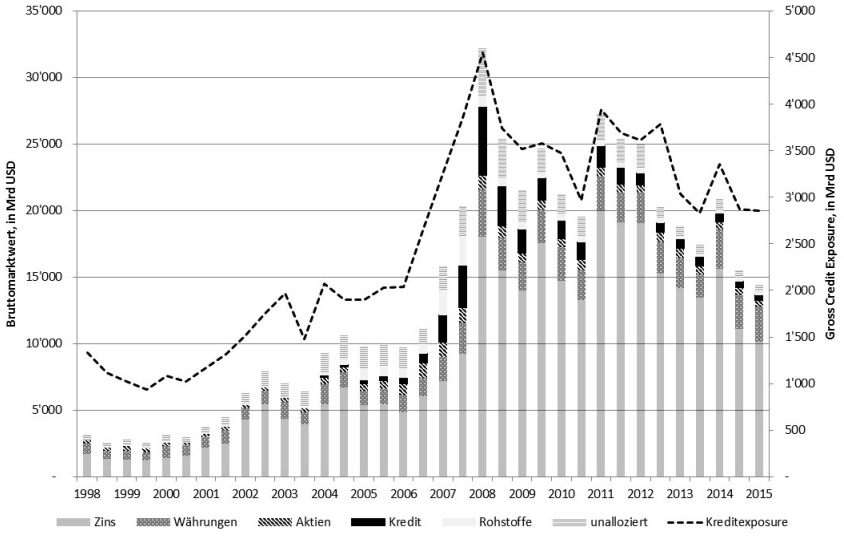
[22] In Europe, this regulation was implemented by EMIR (European Market Infrastructure Regulation) which came into force in 2012.

The main advantage of this requirement lies in multilateral clearing, which substantially reduces the gross lending exposure. Currently, i.e., prior to the stepwise implementation of the clearing requirement from 2017 onwards, approximately 50% of the interest rate derivatives (Bank of England) and 33% of the CDS (BIS) were cleared and settled via CCPs. Even though this development is extremely positive, two points have to be taken into consideration: CCP-clearing does not create market liquidity, but instead assumes there is a minimal level of liquidity in derivatives trading. Moreover, clearing is associated with immense scale effects, not only for CCPs, but also with the back-office clearing process of the market participants. The implied trend to engage in outsourcing activities[23] leads to a concentration of C&S risks with IT service providers, which amounts to potential and largely unrecognized systemic risk.

In the case of derivatives not processed via CCPs, various risk-minimizing measures must be employed, which include portfolio compression[24] and stronger margin requirements: While *variation margins* are already being employed by almost 70% of the counterparties,[25] the new envisaged *initial margins* are more controversial: Because their size crucially depends on volatility assumptions, among other things, they can additionally provoke procyclical effects in securities markets and have a destabilizing impact. Sound judgement is therefore needed when implementing this measure.

However, the benefit in transparency derived from all the measures presently in force that require OTC-derivatives to be reported to public *trade repositories* is uncontested.

Exhibit 2: Gross market value and credit exposure off-exchange derivate (OTC)



Based on: OTC Derviatives Statistics, BIZ (various publications)

[23] This trend can even be observed for very large institutions (e.g., Credit Suisse, in May 2016).

[24] This stipulates that contracts before the end of their maturity have to be settled or terminated, in order to reduce the credit exposure.

[25] ISDA Margin Survey (2012).

5. Regulatory circularity

Finally, it is important to emphasize the feedback effects between financial innovation and regulation, which lead to circularities precisely when the financial system is being stabilized: These circularities in turn complicate the nature and extent of risk transfer—irrespective of whether this is achieved using contracts, banks or capital markets: The stakeholders substitute opaque risks for transparent risks, unregulated risks for regulated risks, easily measurable risks for poorly measurable risks—and risks associated with complex structures and contracts belong to the latter category. The structuring of the legal regulatory framework for financial innovations is, for this reason, perhaps the most important determinant of the cost and efficiency of the various forms of risk transfer.