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# The Financial Industry and the Crisis: The Role of Innovation

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## 1. INTRODUCTION

The acceleration of the process of liberalization and globalization in the financial sector which began in the United States in the 1970s, initiated and spurred on by changes in information technologies, has not been accompanied by a parallel development of the system's regulatory framework, whose instability has steadily increased. Financial innovation in derivatives and securitization, fuelled by a lax monetary policy, created a bubble in the housing and credit-supply markets which burst when the subprime mortgage crisis hit in 2007. In the past, major technological changes such as the railway, the automobile or the internet have been accompanied by speculative bubbles in a context of asymmetric information and biased predictions, and the effects of financial innovation on derivatives and securitization are no exception to this historical trend.

What were the mechanisms that produced this outcome? How can potential crises be averted or mitigated in the future? Should we impose restrictions on innovation? What role should regulation play?

In order to answer these questions, we must first understand the role of financial

innovation in the transformation of banking and the financial markets, determine whether it has increased the fragility and risks of the system, put the contribution of regulation in context, and consider the relationship between economic growth and innovation in the financial industry.

This chapter discusses the role of financial innovation in the transformation of the banking industry (section 2) and in the progress of the crisis (section 3), the effects of asset securitization (section 4) and regulatory reform and the role of agent incentives (section 5), and concludes in section 6.

## 2. FINANCIAL INNOVATION AND THE TRANSFORMATION OF BANKING

The recent history of the financial sector can be divided into two periods. The first, characterized by strict regulation, interventionism and stability, encompasses the years from the 1940s to the 1970s, while the second was an era of liberalization and growing instability which lasted from the 1970s until 2007, when the subprime mortgage crisis began. The stability of the first period contrasts sharply with the

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considerable increase in the number of bankruptcies and crises registered during the second period, when the sector was liberalized. The heightened instability of the latter period has its origin in this liberalization accompanied by a woefully inadequate regulatory framework, as evidenced by the crises in the United States, Japan and Scandinavia.<sup>1</sup> However, and despite these periodic crises, financial liberalization has contributed to the general development of the financial industry and consequently to the growth of the economy.

The liberalization of the financial sector cannot be explained without taking financial innovation into account. To this we must add the progressive globalization of the financial sector and the “shareholder value” movement, which has affected the market for corporate control of banks and companies and has put pressure on banks to obtain higher profitability.

The second period witnessed the advent of numerous innovations in forms of payment (credit and debit cards), transaction processing (ATMs, telephone and online banking, e-commerce for financial assets), saving options (such as investment funds and structured products), loans (automated credit scoring) and risk management techniques (derivatives and securitization). Breakthroughs in information technologies are largely responsible for these new developments which boost productivity, permit a better diversification of risk, and generate economies of scale in internal activities as well as a need for highly qualified and specialized human resources.

Prior to the 2007 crisis, banking had evolved from the traditional business of accepting deposits and granting and supervising loans, to providing services to investors (asset/investment fund

management, advice and insurance) and companies (consultancy services, insurance, mergers and acquisitions, underwriting share offerings and debt securities, securitization, risk management), while also engaging in proprietary trading. In a financial conglomerate we can find a retail bank, an investment or merchant bank, asset management, proprietary trading, and insurance. The now-infamous “originate-and-distribute” banking model is a good example of the banking industry’s process of evolution. At the same time, although banks created off-balance-sheet entities (SIVs, ABCP conduits), these were guaranteed by liquidity lines.

New developments in information technology have intertwined intermediaries and the financial markets almost inextricably. The importance of a bank’s investment portfolio at market value has increased substantially because there are now more opportunities for trading assets, which means that the risk profile of a financial institution can change in a matter of seconds with financial market transactions (for example, using e-commerce and derivatives). The banking industry has increased its market funding, particularly in short-term funds that can be liquidated very quickly. As a result, banking is now more vulnerable to the vicissitudes and volatility of the market, herd-behaviour phenomena, and asset price boom-bust cycles.<sup>2</sup> This in turn increases the risk of illiquidity. Meanwhile, agents may have even greater incentives to take excessive risks that remain hidden from investors—risks that are significant but quite unlikely to materialise (tail risk) due to compensation schemes based on the short-term results achieved by other agents.<sup>3</sup> The effective compensation received by agents, with the approval of the financial intermediaries’ shareholders,

<sup>1</sup> See Reinhart and Rogoff (2009) and the analysis in section 2 of Vives (2010a).

<sup>2</sup> See chapters 6 and 8 in Vives (2008).

<sup>3</sup> In addition, if investors demand financial instruments with guaranteed returns and are unaware of the improbable or tail risk, there will be an excess of share offerings and the market will become fragile when the investors finally understand the risks involved (see Gennaoli *et al.*, 2010).

tends to soar when things are going well, and is more inflexible when they are not (in technical terms, it is markedly convex), thus providing an incentive to take excessive risks. Paradoxically, an increase in market depth may be accompanied by a significant rise in systemic risk (Rajan, 2006). The progress of the present crisis is a perfect example.

### 3. THE COURSE OF THE CRISIS AND REGULATION

In the current financial crisis, the contagion spread and was exacerbated via market channels. The globalization of the financial markets can lead to greater diversification, but it also increases the likelihood of domino-effect contagion between entities and contagion due to information difficulties. The result was the collapse of the asset-backed commercial-paper market (via securitizations) and of the interbank market. Wholesale funding made the situation even more fragile and revealed itself as a critical weakness of the balance sheets of financial institutions, two cases in point being Northern Rock and Lehman Brothers (Shin, 2009; Adrian and Shin, 2010). Leverage evolved procyclically with fair value accounting. When asset values rose, the balance sheets of the institutions were strengthened, which in turn allowed them to increase their debt levels, and new asset purchases fuelled the upward climb of prices and leverage. This process was inverted during the second stage of the crisis when de-leveraging began.<sup>4</sup>

However, at the epicentre of this crisis was the originate-and-distribute model, which gave rise to an inverted pyramid of complex derivatives based on subprime mortgages. In the originate-and-distribute model, banks try to get rid of credit risk by originating mortgage loans and quickly securitizing them with a chain of increasingly complex structured products. The problem

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with this model is that it leaves mortgage monitoring in limbo, it is opaque and, given the complexity of the products, it leads to an underestimation of true risk levels. Moreover, the mortgage risk reappears on the bank's balance sheet when its structured investment vehicles (SIVs) begin to experience liquidity problems owing to the institution's explicit and implicit obligations. Risk underestimation was further aggravated by the use of

<sup>4</sup> See chapter 2 in EEAG (2009).

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statistical models based on short series and historical correlations (and fat-tailed distributions) without taking into account the systemic risk generated by the new products and high levels of leverage. Mechanical risk assessment models that only work within very strict parameters were routinely misused. The opacity of the new derivatives (partially attributable to over-the-counter or (OTC) transactions, which make it difficult to provide a comprehensive assessment of counterparty risk) led to an underestimation of the tremendous systemic risk that had built up in the market as well as to a very serious problem of adverse selection, given that no one knew when the crisis would hit or what the magnitude or distribution of exposure to toxic products derived from subprime mortgages would be. This problem of asymmetric information paralysed the interbank markets, making them illiquid.

A chain of misaligned incentives culminated in catastrophe. Public agencies in the United States encouraged the granting of subprime mortgages to families with limited ability to repay the loans; the credit scoring agencies, siding with securities issuers, vied to see who could give the most favourable

scores to the riskiest products; and the short-term compensations available to financial agents led many to take excessive risks (this is true of the originators and distributors of complex products as well as of the buyers). This chain thrived on the incredibly low interest rates that financed the real estate bubble. Meanwhile, monetary policy only concerned itself with inflation, ignoring the bubbles in asset prices and the balance-sheet situation of financial institutions.

The crisis was brought about and exacerbated by inadequate regulation. The first major flaw in regulation was a dualist framework that permitted regulatory arbitrage between the regulated sector of depository institutions and the parallel banking system of structured vehicles and investment banking. The second shortcoming was qualitatively and quantitatively insufficient capital requirements. These low levels of capital were compounded by low liquidity, rendering the system more fragile, while leverage continued to rise. To make matters worse, because capital ratios remained fixed they accentuated the cycle instead of modulating it. In addition, fair value accounting evidenced procyclical tendencies in the leverage cycle. Financial regulations failed to take systemic risk into account, regulators were not properly informed of that risk, and potentially-systemic institutions were not given special treatment. The opacity of the parallel banking system and the unorganized OTC-derivatives markets helped to camouflage the underlying systemic risk. Finally, the important role played by credit scoring agencies in the field of regulation (for example, in determining capital requirements) was reduced to a competition to see who could lower their standards faster, without the proper supervision of any regulatory authority.

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#### 4. THE EFFECTS OF ASSET SECURITIZATION

In light of the pivotal role that asset securitization has played in the current crisis, it would seem that an analysis of its benefits and disadvantages is in order. There is little doubt that securitization has facilitated the development of financial markets, permitted credit expansion and contributed to economic growth. However, the recent financial crisis has exposed the weaknesses of this innovation, such as the incentives to over-expand credit by compromising on loan quality, or the complexity of the structured products derived from those loans, which made it hard for investors to evaluate the risks to which they were exposed. The result was a substantial yet hidden increase in systemic risk.

##### *Credit Expansion and Regulatory Arbitrage*

By means of securitization, banks can turn illiquid loans, such as mortgages, into tradable instruments. Spreading the credit risk among investors with different risk profiles facilitates a more efficient use of capital, and banks acquire an additional

source of funds which allows them to extend more credit. At the same time, securitization makes it possible to reduce their legally-stipulated capital requirements by selling the loans to off-balance-sheet vehicles. These loans can be entirely dissociated from the originating institution or not in order to lower capital requirements.<sup>5</sup> Naturally, the ability to maintain a high level of credit supply with less capital allowed banks to cut financing costs for loan recipients and offered people who would not normally be considered creditworthy the chance to take out mortgages (and other types of loans).<sup>6</sup>

##### *Loan Quality Deterioration*

The originate-and-distribute model gave rise to the application of laxer criteria when selecting loan recipients and fewer incentives to monitor borrowers. The ability to quickly shift at least part of the risk onto other investors by using structured products, coupled with the assumption that mortgage refinancing was always possible given the steady rise of housing prices, resulted in the application of lower standards for evaluating the default risk of loan recipients. This situation increased the level of risk in the entire financial system (Keys *et al.*, 2008).

##### *Higher Systemic Risk*

Securitization allows banks to redistribute risk to those investors most willing to bear it. However, when evaluating the diversification potential of securitization risk, one must bear in mind that lower diversifiable risks increase the level of systemic risk. Thus, when faced with an event which negatively affects the economy as a whole, such as plummeting housing prices, structured products will be harder hit than traditional instruments with the same credit rating (Colval *et al.*, 2008). Meanwhile, liquidity risk also rose and

<sup>5</sup> Under the terms of Basel I, by selling loans to off-balance-sheet vehicles, banks were able to reduce the capital they needed to meet regulatory requirements. In the Basel II framework, banks could transfer loans to off-balance-sheet vehicles and endow them with liquidity lines, turning them into instruments with the highest possible rating (triple-A). In this way, banks could then buy back these instruments and include them in their balance sheets, thus lowering their capital requirements. (See Brunnermeier (2009) and chapter 2 in EEAG (2009))

<sup>6</sup> See ECB (2008). Sabry and Okongwu (2009), for example, show that securitization in the United States has resulted in an increased availability of credit and lower loan costs. Between 1999 and 2006, a 10% increase in the level of securitization led to a decrease of between 4 and 64 basis points in loan yield spreads, depending on the type of loan analysed (mortgages, car loans and credit card loans).

contributed significantly to systemic risk, because off-balance-sheet vehicles were funded by commercial-paper issuance which was backed by long-term mortgages but had short- or medium-term maturities (average of 90 days and one year, respectively). Thus, the principal and the interests were paid in part with the cash flow generated by mortgages, and the rest was paid by issuing new securities. Banks further increased this risk by providing their vehicles with liquidity backstops to safeguard against any temporary inability to pay investors.<sup>7</sup>

Finally, structured products derived from loans, which were often granted without considering the credit risk, are hard to evaluate. The structure of these products—built upon a portfolio of loans which is subsequently divided into tranches with different risk/return profiles, and is usually restructured into new complex securities (re-securitization via collateralised debt obligations or CDOs)—can ultimately result in a lack of information about the risks to which investors are exposed, given their distance from the underlying loans, and making direct assessment virtually impossible. This opacity derived from the securitization process is considered a crucial factor in the loss of confidence in the financial system, which ended up triggering the crisis.<sup>8</sup>

### **Credit Rating Agencies and Complexity**

Given the complexity of structured products, investor purchase decisions were largely based on the ratings provided by risk assessment agencies. The subprime mortgage crisis revealed two major problems in this area. Firstly, the same rating scale was applied to structured and traditional products, yet one of the things that characterizes structured products is their ability to transform risky loans into highly-

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rated instruments by creating tranches according to priority of payment, targeting investors with different risk profiles.<sup>9</sup> In this way, investors could purchase products with the best possible rating but which offered a higher yield than traditional bonds. Moreover, the banks made sure that payment tranches were designed in such a way that they just barely met the minimum requirements for AAA rating (a practice known as *rating at the edge*). Secondly, investors did not account for the fact that credit ratings were based on calculations which only considered default risk and ignored the risk that the ratings themselves could be revised downwards or that the situation of the housing market could change (IMF, 2008). Another factor that contributed to the favourable rating of structured products in comparison to traditional bonds is the fact that rating agencies charged the issuers higher commissions for structured products.

### **5. REFORMING REGULATION AND INCENTIVES**

Like any technological breakthrough, financial innovation can either improve the economy's efficiency or introduce activities that generate private benefits as well as social costs (negative externalities). Innovations that enhance markets,

<sup>7</sup> See chapter 2 in EEAG (2009) and Brunnermeier (2009).

<sup>8</sup> See, for example, Gorton (2008), Brunnermeier (2009) and chapter 2 in EEAG (2009).

<sup>9</sup> Approximately 75% of all subprime mortgages in the United States have been securitized. Of this percentage, 80% were funded by tranches of senior or AAA-rated securities (IMF, 2008).

providing financial instruments that offer new possibilities of diversification and risk coverage (such as options and futures), and help them overcome problems of asymmetric information (the typical debt contract, for example) are beneficial. Examples of the second possibility include financial instruments that facilitate rent seeking, taking advantage of investors or consumers through obfuscation, the inflation of speculative bubbles, the increasing fragility of the system, and regulatory arbitrage when adequate regulation exists. Following the advent of the crisis, prominent economists and public decision-makers (Paul Volcker, Lord Turner, Paul Krugman, Simon Johnson and James Kwak, to name but a few) voiced their scepticism about the positive contributions of financial innovation. Nevertheless, it is obvious that many financial innovations have boosted economic growth, and the relationship between financial progress and economic progress is well documented (Levine, 2005). We should also remember that financial innovation (venture capital, for example) has played an important part in the development of new technologies and innovative firms in a variety of sectors.<sup>10</sup>

How innovation is used is determined by the incentives of the economic agents, who are in turn influenced by the regulatory framework. For example, some analysts are now exploring the degree to which pressure to generate value for shareholders and possible flaws in corporate governance mechanisms contributed to the crisis. The limited responsibility of shareholders in a context of deposit guarantees and explicit or implicit TBTF (too big to fail) policies leads investors to demand high-risk options, given that the profits are private and the losses, in the event of bankruptcy, are shouldered by society to a large extent. Shareholders

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therefore agree to compensation contracts for executives that encourage risk-taking, with a remuneration package that is unaffected when share prices drop but shoots up when they rise. There is recent evidence which indicates that this occurred in the pre-crisis period.<sup>11</sup> Of course, there can also be additional problems of agency (conflicts of interest) between shareholders and executives and between executives and the financial intermediaries’ traders.

Therefore, the main issue is actually incentives and reforming the regulatory framework so that private agents shoulder the potential social costs of their decisions. The regulatory reform now underway will be successful if it embraces the following principles: the existence of a systemic risk regulator; standardized regulations for all entities that provide banking services (to avoid regulatory arbitrage); risk premiums and limited scopes of activity in keeping with the characteristics of each intermediary; capital requirements and rates that take systemic risk into account; and a holistic approach that brings the incentives of the

<sup>10</sup> See Litan (2009) for a defence of many financial innovations.

<sup>11</sup> See Fahlenbrach and Stulz (2009), Cheng *et al.* (2010), Bebchuk and Spamann (2010), and Bebchuk, Cohen and Spamann (2010). The words of Chuck Prince, CEO of Citigroup (*Financial Times*, July 2007), can also be interpreted in this light: “When the music stops, in terms of liquidity, things will be complicated. But as long as the music is playing, you’ve got to get up and dance. We’re still dancing.”



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system’s various agents into line, both domestically and internationally.

The process of reforming liquidity and capital requirements (known as Basel III) and the legislative reforms introduced in the EU and the USA are headed in the right direction, though they may have limitations; however, since these reforms have not yet taken root, it is still too soon to determine whether or not they will be sufficient (Vives, 2010b). For example, the Dodd-Frank Act passed in the United States in July 2010 has established a variety of measures to align private and social incentives in innovative products or markets. Banks wishing to complete derivative transactions must now go through central clearing instead of engaging in direct OTC transactions, which are under federal supervision. Among other things, this regulation seeks to prevent a cascade

of losses in the event of failure of a major player in the OTC market of credit default swaps (CDS), which offers protection against potential default on a loan or bond. The act also establishes prudential standards and rules on transparency, designed to help the securitization market recover its pivotal role in funding the economy. For example, originators are now required to retain part of the credit risk (5%), giving them a good incentive to monitor loans. In addition, the law created a consumer protection agency to help restore investor confidence and overcome the conflicts of interest that have infested the financial industry. This agency may be instrumental in improving transparency for consumers and investors, facilitating the comparison of financial products and services offered by different companies, and curtailing the deleterious effects of innovations that increase opacity.

However, there are some questionable aspects of the regulatory reform. The proposed reforms for corporate governance in the financial sector run the risk of being ineffective if they fail to address the root problem of the incentives generated by deposit insurance and the bailouts of TBTF institutions which, combined with limited responsibility, induce shareholders to take risks which are excessive from a social standpoint. With regard to market reform, the desirability of the restrictions on short selling or naked shorting imposed in certain countries is questionable given that the root problem is market manipulation.

## 6. CONCLUSION

Financial innovation has been accused of destabilising the banking industry and the financial markets and of helping operators get around regulatory requirements. Although these accusations are true in

some cases (such as the abuse of certain complex structured products), the real underlying problem is not innovation per se but inadequate regulation. For example, derivatives markets provide economic agents with opportunities for risk coverage and signposts that condense the scattered information floating around the market, and this role can be maintained with trading in organized markets, monitoring, and transparent information on counterparty risk. Securitization is an innovation that allows investors to transfer risk and diversify, which in turn increases the amount of available credit in an economy. The problems that have been detected derive from a chain of inappropriate incentives in a context of deficient regulation.

Innovation is necessary for the progress of the financial system, and this progress is an essential ingredient for economic growth. The challenge is to devise a regulatory framework which allows innovation, globalization and the financial system to develop while ensuring a proper balance between private and social incentives.

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