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Subprime mortgages and the MBSs in generating and transmitting the global financial crisis

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Abstract:

The paper addresses numerous factors which generated and transmitted the 2007-2009 financial crisis, with the special attention paid to phenomena observed in the subprime mortgages and MBSs markets. The aim of the paper is to provide a critical survey which systematically examine the literature of those factors. The paper discusses the roots of the subprime crisis and characterizes briefly the most important milestones in the process of the crisis propagation. Then it presents analysis of the impact of the subprime and MBSs markets on the outburst of the global financial crisis provided by staff of selective international financial institutions and central banks. The special attention is paid to factors of crisis propagation after the subprime mortgage and MBSs markets collapse. Strict interdependencies among tall discussed factors are emphasized.

Key words: global financial crisis, subprime mortgages, structured credit products, risk exposure,

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1. Introduction

It is more than five years after the collapse of subprime mortgages and MBS market financial crisis had crushed economies. The crisis affected not only the financial sector, but also the real economy, causing an economic turmoil worldwide. Fundaments for a global crash also were laid worldwide, as the emerging of house price bubble in the U.S. was strictly linked with the emergence of the bubbles of the same type in many countries (Ghosh, Ostry, and Tamirisa 2009, Shiller 2007). Hence the burst of the American bubble was simply the stimulus for the snowball effect (Allen and Carletti 2008, Gorton 2008). This, in turn, has pushed the global economy into the deepest recession since the half of the previous century (Blanchard 2008).

The consequences of the global financial turmoil can reach far into gloomy future, because of supply-side problems. According to Olivier Blanchard (2009a), Economic Counselor and Director of the IMF's Research Department, in the aftermath of the crisis some parts of the economic system have broken. In advanced countries, the financial systems appeared to be partly dysfunctional. In emerging market countries, capital inflows, which decreased dramatically during the crisis, may not fully come back in the next few years. In nearly all countries, the costs of the crisis have added to the fiscal burden (Cottarelli and Viňals 2009). Thus, in turn, contributed to debt crises in many countries.

Under such circumstances, a question can be raised, whether the existing concepts, explaining the financial crisis of 2007-2009 provide an comprehensive explanation of the background for the outburst of this crisis. This question is of high importance, because since the turn of the 1980s and 1990s banking systems have been deeply modified, being influenced with process of globalization and financial integration (Kose, Prasad, Rogoff and Wei 2007), as well as with the fall of the average inflation rate around the world to the lowest level since the 1990s. According to many authors, existing frameworks, rooted deeply in the mainstream economics, were the best institutional solution, consistent with

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dominant theory. At the same time, there have been many critics of such financial architecture, pointing at its inherent instability (see e.g. Dumenil and Levy 2011, Dymski 2010, Hein and Truger 2012, Toporowski 2000,2009).

Taking this into consideration, the aim of this paper is to provide a critical survey which systematically examine the literature on the factors which generated and transmitted the 2007-2009 financial crisis, with the special attention paid to phenomena observed in the subprime mortgages and MBSs markets. It should be noted, however, that these factors are not independent, but they can rather be found in – in some cases very strict – conjunction with each other.

The forthcoming second section presents the roots of the subprime crisis, with the brief presentation of the important milestones in the process of the crisis propagation. The third section presents analysis of the impact of the subprime and MBSs markets on the outburst of the global financial crisis provided by staff of selective international financial institutions and central banks. The special attention is paid to factors of crisis propagation after the subprime mortgage and MBSs markets collapse. The last section concludes.

2. The roots and the outburst of the subprime mortgages and MBSs crisis

As the beginning of the financial crisis in the U.S. one may perceive 9 August, 2007. The FRS and central banks in the Euro area had to intervene then to prevent a breakdown of the inter-bank money market. This breakdown followed events from July, when Bear Stearns & Co informed clients of its two funds, the High-Grade Structured Credit Strategies Enhanced Leverage Fund and the High-Grade Structured Credit Fund, that they were going to halt redemptions. The reason for the decision was excessive involvement of these funds in various types of mortgage-backed securities, mainly connected with so-called subprime mortgages.

The market for subprime mortgages is a segment of the overall credit market in the US, which includes lower-quality loans.[1] According to the IMF (2007), subprime loans are typically made to borrowers with one or more of the following characteristics:

- weak credit histories that include payment delinquencies and bankruptcies,
- reduced repayment capacity as measured by credit scores or debt-to-income ratios,
- incomplete credit histories.

This assessment is usually based on the borrower's credit record and score, ratio of debt service to income and ratio of the mortgage loan to home value (Kiff and Mills 2007a).

Subprime loans should be distinguished from Alt-A mortgages. These latter mortgages, though of higher quality than subprime mortgages, are considered lower credit quality than prime mortgages due to nonstandard features related to the borrower, property, or loan. Both subprime and alternative-A (alt-A) mortgages refer to nonprime lending.

Subprime mortgages are addressed to individuals with very low income or, in some cases, with no income at all (Kiff and Mills 2007b). Thus, the risk involved is higher, as well as the their costs for the borrowers: interest payments, application fees, appraisal fees, insurance cost, etc. (Chomsisengphet and Pennigton-Cross 2006).

The first symptoms of the crisis are usually linked with the worsening situation in the subprime market. Therefore, the crash of the subprime market may be seen as triggering off all subsequent events. For that reason, the crisis of 2007 is usually called "the subprime crisis". Nevertheless, it quickly turned out that also other segments of the housing market – and financial market as well – were not stable (Gramlich 2007, Mizen 2008). Unfavorable tendencies in the financial system and the U.S. economy, however, had been already growing much earlier (Baker 2009). As usual in such cases, there is no possibility to distinguish just one cause of the crisis. Quite opposite, the vast array of the reasons may be identified, including events and factors relatively distant.

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It is a common belief that the direct cause of the subprime crisis and the global financial crisis was the bubble burst in the U.S. housing market.[2] There were several reasons for the emergence of this bubble. First and foremost, monetary policy of the Fed should be mentioned. At the beginning of 21st century this institution tried to prevent consequences of the collapse of the dot-com bubble. Thus, the Fed started conducting an expansionary policy, consequently reducing the federal funds interest rate. It created the background for the widespread belief that A. Greenspan, the then Federal Reserve chairman, would always intervene to put a floor under asset prices in order to prevent destabilization in the financial market.[3] This lax policy resulted in a deep interest rates' decrease (about 3 percentage points) in just a few months. Another cut came after September 11, 2001. The Fed lowered federal funds rate in order to stimulate economy suffering from the terrorist attack. The last reduction took place on June 25, 2003. The Federal funds rate reached then 1%. Such expansive monetary policy contributed to a long period of economic growth,[4] but also brought about some negative consequences, in the form of a boom in the housing market. Low interest rates encouraged borrowing, especially in the form of mortgage loans.[5] The higher demand for houses accelerated the rise of their prices.

Not surprisingly, under such circumstances banks were very keen on lending. Trying to maximize their profits, financial institutions turned to individuals with very low incomes and/or weakened credit histories. These clients, in normal circumstances, had very small (or even none) chance of receiving loan.[6] Thus, the subprime market developed dynamically. In 2005 total value of such loans amounted to USD 625 billion, constituting about 20% of the overall mortgage loans portfolio (Gramlich 2007).

Extended lending activity required more funds. Thus, banks had to intensify the scale of their passive operations. It is characteristic that aside from „traditional" operations, like issuing shares and securities, financial institutions started implementing financial innovations, among which securitization played the key role as a form of pooling various

types of contractual debt and selling it as securities to various investors. Subprime mortgages were predominantly securitized in the form of mortgage-backed securities (MBSs). These securities were usually split into tranches: the AAA-rated "Class A", mezzanine "Class M" and below-mezzanine tranches. Mezzanine tranches were typically resecuritized into collateralized debt obligations (CDOs). The below-mezzanine tranches were either retained by the originator or sold to hedge funds and investment bank proprietary desks (Kiff and Mills 2007b).

Sale of these securities helped raising funds, simultaneously easing risk burden, connected with subprime loans as the risk of default was transferred to buyers. Moreover, securities of this type were treated as a method for evasion of capital requirements (Blundell-Wignell, Atkinson, Hoon Lee 2008). Finding buyers for these securities was extremely easy as MBSs and CDOs were bought both for speculative and investment purposes (DeMichelis 2009). The mechanism behind the structured products market is shown in the Figure 1.

Situation became more complicated along with the growing popularity of CDOs. These securities papers were first instruments of risk management, but as the time went by they appeared to be used for speculative purposes (Wachter, Pavlov and Pozsar 2008). The CDOs were held by a wide range of investors, not only from the USA.[7] Until July 2007, the growth in structured credit finance products had been exponential: issuance of selected structured credit products in the United States and Europe grew from $500 billion in 2000 to $2.6 trillion in 2007 (Kordes 2007). Moreover, buyers and issuers of CDOs managed credit risk with the use of credit derivatives, i.e. credit default swaps – CDS. The market for CDS (measured by their value) grew rapidly, reaching in the first half of 2008 USD 58 trillion (Cox 2009). After the outbreak of the crisis, market participants began to increase their expectations for losses which was reflected in a widening in CDS spreads on CDOs backed by subprime mortgages (IMF 2007).

[Figure 1]

It must be stressed that on the basis of mortgage loans – including also subprime loans – very complicated and risky structure of financial instruments had been built. In the situation of lasting boom in the housing market, however, this risk was underestimated, being just shifted from those with more risk tolerance to others with less risk tolerance (for example pension funds). The latter agents knew very little of the attributes of the structured credit products but were encouraged to invest by high officials. For example, Larry Summers, the Secretary of Treasury in the Clinton government, publicly announced that derivatives allow to allocate risk "by letting each person take as much of whatever kind of risk he wants" (Eichengreen 2011). Moreover, Summers, Alan Greenspan and Robert Rubin (Summer's predecessor as the Secretary of Treasure) strongly opposed measures to regulate derivatives trading when they were proposed (Eichengreen 2011).[8] Moreover, rating agencies awarded to these securities and their issuers rather high credit ratings.[9]

Thus, the next reason of the crisis was an imprudent and too risky activity of financial institutions. First, the scale of lending was enormous. Financial institutions tried to reap the benefits of boom, thus falling into so-called "predatory lending" trap. At the same time, standards in the area of credit risk control were not complied with. What was even worse, banks placed confidence in collaterals of fluctuating market value. It should have been expected, however, that along with the downturn in the economy, the collateral would lose in value. Second, the scale of securitization, perceived as easily available source of additional capital, appeared to be exorbitant despite the fact that the basis for these operations was formed mainly by subprime loans. Obviously it had influence on the level of risk involved. The risk was however ignored.[10] Third, financial institutions were permitted to take on excessive leverage. The distinction between Tier 1 and Tier 2 capital introduced into the Basel Accord on capital adequacy in 1988 allowed commercial banks to hold as little as 2% common equity as a share of risk-weighted assets. Commercial banks were permitted then to substitute less liquid instruments for shareholders' common equity (Eichengreen

2011). All those factors reinforced and were reinforced by growing scale of financalisation in leading economies.

The question arises, why such activity did not cause any reaction from the supervisors. Without any doubts, too much forbearance for hazardous ventures increased the scale of problems.

Thus, among the causes of the crisis weakness of the supervision, or, more generally, inappropriate legal frameworks which enabled or even encouraged lending to low income social groups, are often listed (Calomiris 2008, Whalen 2008). Among this specific "non-discriminating" legislation one can find the *Home Mortgage Disclosure Act* of 1975 and the *Community Reinvestment Act* of 1977 (Bernanke 2007, Haughey 2008). The motive for passing both acts was to increase access of members of ethnic minorities to the mortgage loans. Lending was also supported by the U.S. tax system, as interest on mortgages for owner-occupied homes was deductible against income tax (Ellis 2008). As a result, by 2006, nearly 69% of households owned (or were buying) their own home, up from 64% in 1994 and 44% in 1940. The gains were especially high among some minorities, as government encouragement of subprime mortgage programs enabled many members of minority groups to become first-time home buyers (Greenspan 2007). Moreover, abovementioned acts made creation of the subprime market possible, as the amendment to the *Community Reinvestment Act* allowed securitization of the subprime loans (Roberts 2008).

The process of securitization of subprime mortgages was intensified due to activity of the three government-sponsored institutions, supporting the U.S. housing market. The first of them, Federal National Mortgage Association (Fannie Mae), was created in 1938 with the mission of creating a secondary market for mortgages. Fannie Mae bought mortgages that "conformed" to certain underwriting standards from the originators, thus acquiring the credit, market and liquidity risks. This institution was in a better position than depository institutions to deal with these risks, as it could borrow longer term and held a mortgage portfolio that was diversified nationwide (Dodd 2007).

The mortgage market was reshaped in 1968 when Fannie May was converted into a federally chartered but privately held corporation, that retained some public interest obligations for low-income housing. At the same time the Government National Mortgage Association (Ginnie Mae) was created. This very institution in 1970 developed the mortgage-backed security in order to eliminate from the federal budget the debt that had been incurred to fund the government housing programs. In this very year the third institution was created: The Federal National Mortgage Corporation (Freddie Mac). Over time, the business models of Fannie Mae and Freddie Mac converged, as they both securitized conventional mortgages. But as Fannie Mae and Freddie Mac guaranteed the securitized loans, much of the credit risk stayed with these two mortgage agents (Dodd 2007).

Due to this market structure and after the U.S. government introduced new rules for derivatives, the major Wall Street banks launched an aggressive move into the issuance of mortgage-backed securities. It was possible due to the *Gramm-Leach-Bliley Act* of November 1999, which repealed part of the *Glass-Steagall Act* of 1933 (Eichengreen 2011). One of the consequences to the *Gramm-Leach-Bliley Act* was higher exposure of depositors and lenders to risk connected with (potentially wrong) investment decisions, made by bankers (Kregel 2008). This act liquidated the separation between commercial banks (which traditionally had a conservative culture) and investment banks (with a more risk-taking culture). As a result, in 2003, the government-sponsored enterprises were the source of 76% of the mortgage-backed and asset-backed issuances whereas issues by major Wall Street banks (Wells Fargo, Lehman Brothers, Bear Stearns, JPMorgan, Goldman Sachs, and Bank of America) accounted for 24%. By mid-2006, the government-sponsored enterprise share had fallen to 43% with private label issues accounting for 57% (Dodd 2007).

This process brought about a change in underwriting standards. Fannie Mae and Freddie Mac were almost entirely "prime" mortgage lenders but the share of commercial banks

grew in large part through the origination and securitization of high-risk subprime mortgages as well as Alt-A loans. Moreover, as investment rules and guidelines for institutional investors restricted their exposure to below-investment-grade securities, subprime loans were pooled into CDOs with different tranches or classes of risk. These tranches were sold separately. Hedge funds, the proprietary trading desks of Wall Street firms, and some institutional investors heavily invested in high-yield lower tranches CDOs (Dodd 2007).

All described factors for a long time did not cause any disturbances. During the boom, both the consumers and investors were very optimistic. But problems started growing along with the switch in the monetary policy. Facing higher inflation pressure, the Fed decided to raise interest rates. The sequence of rises started in June of 2004 and lasted for two years. As a result, the Federal funds rate reached 5%. This contributed to significant increase in interest payments, making the burden of loan heavier for the borrowers. Simultaneously, investments in houses became less attractive.

The first symptoms of decline in the housing market appeared in 2005. During subsequent months situation did not change significantly. The number of transactions dropped, but the prices started to decrease in 2006 (*Median and Average Sales Prices*...). At first, it was not clear, however, whether observed decreases are correction or downward tendency. At the beginning of 2007 there was even small recovery, but, at the end, sale of new houses in this year fell about 19%, whereas sale on the secondary market – about 13%. At the turn of 2007 and 2008 there were any doubt that the market collapsed.

As house prices turned negative in a number of regions and burden of the debt became too heavy, many borrowers were left with no choice but to default. The first sign of trouble was the high volume of "early payment defaults" (EPDs), followed by rising delinquency rates. Delinquencies on the 2006 vintage of subprime loans climbed above 13% of the original balance, while alt-A loan delinquencies also rose (IMF 2007). Moreover, subprime

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delinquencies on the 2006 vintage exceeded delinquencies on loans originated in 2000 at comparable seasoning. The delinquency rates began to increase rapidly up to 25% by the first quarter of 2008 (Bernanke 2008). As a result, the share of non-performing loans in banks' balance sheets increased. Quality of the financial institutions assets worsened. Foreclosure activity increased dramatically but attempts to sell foreclosed houses only accelerated the decrease in prices. Under these circumstances, the collateral accepted by banks also lost most of its value which made the situation of these institutions even worse.

It was necessary for banks to build reserves for exposures connected with mortgage loans (Mizen 2008). Combined with a decrease in receipts, it contributed to massive losses of financial institutions. Yet, it became clear soon that problems with subprime loans are just the tip of the iceberg. The situation deteriorated drastically by the wide use of described financial engineering.[11] The scope of problems, generated by mortgage-backed securities, turned out to be tremendous. Meanwhile, just in the half of 2007, in the face of decrease in house prices and increasing non-performing loans ratio, difficulties arisen in assigning a precise price to the CDOs. Pricing challenge did arise because these instruments were no longer traded. The belief that the complex financial instruments retailed by the U.S. financial institutions could be as reliable as treasury bonds appeared to be false (Eichengreen 2011).

Surprisingly, it turned out that problems affected also institutions not involved directly into the subprime market, but only investing in various types of securities, connected with this market. As a result, their stock prices decreased. The capital market also collapsed. Additionally, due to limited confidence in the market, financial institutions faced problems with liquidity (Song Shin 2009). At the same time, consumer sentiment started to fall. It led to decrease in demand for both investment and consumer goods. Interest rates cuts, made by the Fed and central banks in other countries, did not restore the balance, neither did it liquidity facilities, offered to the banks (Swagel 2009).

Negative tendencies intensified in 2008. Financial institutions contended with more and more problems. In March, Bear Stearns was on the verge on bankruptcy. Just a week later, Merill Lynch was bought by Bank of America, in a transaction of USD 50 billion value (Federal Reserve Bank of St. Louis 2007). Pressing concerns about banks' capital positions resurfaced in June 2008, following negative news about the troubled monoline insurance sector. Moody's and S&P had taken negative rating actions on MBIA and Ambac, two major monolines, the first in a sequence of downgrades of similar insurers over the following weeks. The pressures were most acute, however, for Fannie Mae and Freddie Mac. Despite announcements by their regulator that the GSEs remained adequately capitalized, credit spreads on their debt and on mortgage-backed securities underwritten by these institutions had risen to unprecedented high levels. At the same time, uncertainties about bank funding needs and counterparty risk persisted in money markets resulting in high Libor-OIS spreads for key currencies, including the US dollar. This allowed for worldwide propagation of the initial disturbance through uncertainty channel of contagion (Kannan, Köhler-Geib 2009). Pressures in housing markets persisted, forcing the U.S. government to take control over GSEs. When investor attention turned to refocus on bank balance sheets, financial equity prices and credit spreads came under renewed pressure (BIS 2009).

The tipping point appeared to be September 15, 2008, when the famous investment bank, Lehmann Brothers, declared the bankruptcy. It triggered the most intense stage of the crisis: a global loss of confidence, arrested only after unprecedented and broad-based policy intervention. With markets increasingly in disarray, a growing number of financial institutions were facing the risk of default. The resulting crisis of confidence quickly spread across markets and countries. At the same time, as emerging markets were hit by collapsing exports and tightening financing conditions, the universal nature of the crisis became increasingly evident, as did the need for a global policy response (BIS 2009).

Despite initiating many large-scale programs, with intention to support financial institutions, the situation of these – in the U.S. and in other countries as well – still

deteriorated. Defaults and losses on other loan types also increased significantly as the crisis expanded from the housing market. Furthermore, the crisis spread very fast also to the real sector.

Precise scale of losses, caused by the subprime crisis has not been already known.[12] There is no doubt, however, that the subprime crisis had serious consequences for both micro and macro levels. Among microeconomic problems triggered by the crisis one may list dramatic losses of the financial institutions, changing in their hierarchy, credit crunch and deterioration in households finances. Macroeconomic consequences are mainly recession in many countries, instability of financial systems and excessive volatility of exchange rates.

3. The propagation of the subprime and MBSs markets crisis through the eyes of selective international financial institutions and central banks

3.1. Intrinsic logic of the process

Analyzing the propagation of the U.S. subprime mortgage market worldwide, the National Bank of Poland staff identified seven factors which could have led to the expansion of the global financial crisis (NBP 2009):

- improvement of macroeconomic stability in the second half of the 1990s and in the early years of the 21st century (so called "Great Moderation"),
- the reaction of the Fed to the burst of the Internet bubble and recession threat in 2001 and reductions of interest rates,
- the mercantilist attitude of the South-Eastern Asian countries, China and Japan which assured effective operation of the exports sector, generating large surpluses on the current account which resulted in a high accumulation of capital reinvested in the U.S.,
- deregulation of financial markets, fast development of innovations and financial instruments and as well as an increase in market capitalization with the special consideration of securitization of all credit receivables on real estate markets, credit cards and consumer loans in the U.S.,

- ineffective legal frameworks and activities of financial supervision institutions and market information system, poor risk monitoring by public supervisors and as a result of unreliable operations of financial intermediaries and rating agencies,
- a rapid increase in commodity prices leading to increase in profits in oil exporters and allowing them to set up special sovereign wealth funds aimed at investing large capital surpluses abroad, primarily in the U.S.,
- an increase in risk acceptance as a result of favourable macroeconomic conditions reflected by a record low level of long-term interest rates.

Since the outbreak of the subprime crisis, international financial institutions and central banks have actively started deeply analyzing the sources of this crisis. Members of the IMF Monetary and Capital Markets Department (Dodd and Mills 2008, Kordes 2008, Mauro and Yafeh 2007) as well as the BIS Monetary and Economic Department (Borio 2008, Ellis 2008) underline the importance of the sustained period of low U.S. monetary policy interest rates, ample liquidity, low financial market volatility, poor underwriting practices and rise of demand for structured credit products carrying high rating and earning abnormally high yields. Liberalization of banking law and fast development of aggressively investing hedge funds and private equity funds, low bond spreads and surges in capital inflows are also outlined as well as the lack of sufficient information provided for supervisory authorities to halt the proliferation of overpriced securities. Hoe Ee and Rui Xiong (2008), representatives of the Monetary Authority of Singapore, underline more general factors, pointing out that crisis was triggered by investor panic and the propagation of the crisis was possible due to a liquidity run and rising insolvency of banks. All abovementioned factors, that allow for the initial disturbance in the U.S. housing market to transform into the global financial crisis, are presented in the Table 1 and analyzed below in a detailed way.

Undoubtedly, the initial set of loses was caused by loosening of credit standards during the lending frenzy. Recovery of the economy after so-called dotcom bubble was to the great extend supported by loose monetary and fiscal policies, which favored the consumption

growth, creating a background for the credit boom and speculative price bubbles emergence. Bull market encouraged massive inflow of capital, which was intermediated by financial institutions into consumer credit and mortgages. But, as Kiff and Mills (2007a) from the IMF Monetary and Capital Markets Department underline, despite the fact that by 2006 DTI (Debt-To-Income) and LTV (Loan-To-Value) ratios were insufficient to close the housing affordability gap for many subprime borrowers, lenders started offering "hybrid", "interest only", "negative amortization" and "option" adjustable-rate mortgages (ARMs) that required payments at low, initially fixed "teaser" rates.[13]

Due to abundant liquidity and mounting supply of funds, credit standards were steadily loosened along with easing of terms of nonprime mortgages' repayment. As noted by members of Divisions of Research & Statistics and Monetary Affairs of the Federal Reserve Board (Mayer, Pence, Sherlund 2008), over the 2003-2007 period, originators of nonprime mortgages increasingly promoted products with lower monthly mortgage payments. By 2006 and 2007, more than one-third of subprime 30-year mortgages had amortization schedules longer than 30 years, more than 44 percent of Alt-A loans allowed borrowers to pay only the interest due on their mortgages, and more than one-quarter of Alt-A loans gave borrowers the option to pay less than the interest due and thus grow their mortgage balances. Disintermediation also played a role, with standards declining more in regions where larger portions of the lenders' loan portfolios where sold to third players (Dell'Ariccia, Igan, Laeven 2008).

Any potential repayment problems would be substantially mitigated, if not eliminated, by higher market prices for the underlying collateral. But after the collapse of the U.S. housing market collateral turned to be, at best, insufficient. It eventually led to a sharp rise in payments, which – as warned by the IMF Monetary and Capital Markets Department, Global Markets Monitoring and Analysis Division (2006) just in December 2006 – added to payment shock.

The process of transforming home loans into securities added problems. A vast majority of mortgage loans was converted into MBSs and CDOs. As underlined in a special report, prepared by the Joint Forum (2011) under the aegis of the Basel Committee on Banking Supervision, the International Organization of Securities Commissions and the International Association of Insurance Supervisors, rapid growth of the securitization market was possible due to the high demand for safe assets, translating into higher prices for them and fuelling a fall in the rate of return of most traditional fixed-income assets. This resulted in a search for higher return by investors. Structured credit products perfectly matched this demand, as they were perceived as high-yield assets burdened with low credit risk.

As underlined by Hoffman, Krause and Laubach (2012) from Deutsche Bundesbank, securitization supported the inflow of funds available to borrowers particularly in the housing market leading to further growth of house prices and asset price bubble formation. As a result, property prices rose 50% between 2001 and 2006 a housing price bubble emerged (Dodd and Mills 2008, Kordes 2008). The rapid deterioration in the U.S. housing market led to concerns about dislocations in other housing markets, as in many countries these markets were perceived to be overvalued and vulnerable to a downturn in prices (IMF 2007).

Moreover, as aptly put by Dodd (2007) from the IMF Monetary and Capital Markets Department, the complexity of structured credit products hid the location, size, and leverage of the positions held, sometimes even from the financial institutions themselves. MBSs issued by the US government-sponsored enterprises, Fannie Mae and Freddie Mac, had common underwriting standards, referring to "conforming" loans. But the MBSs issued by the major Wall Street firms had varying loan standards. Therefore, according to Dodd and Mills (2008) and Kordes (2008), investors increased their reliance on the assessments of credit rating agencies. Investors relied excessively on the reputation of the institutions involved and on the credit ratings, paying too little attention to either the product documentation or independent investigation of the underlying instruments

(Financial Stability Forum 2008). There was too little independent due diligence undertaken (The Joint Forum 2009).

[Table 1]

MBSs and CDOs were new and in many cases too sophisticated, even to rating agencies. There was a also a conflict of interest between credit rating agencies and structurers as the latter paid for the ratings, and the rating agencies supplied them (Kordes 2008). Moreover, the complexity involved both the risks in the underlying assets and increasingly leveraged securitization structures (i.e. resecuritizations), leading to inappropriate valuation.[14] Credit rating agencies rated only the risk of actual default despite, neglecting liquidity and market risks. After the structured products market collapsed ratings agencies had to revise their model assumptions for products collateralized by mortgages.

Because there was limited information on past performance of the MBSs, and due to optimism about how they would perform, more than 90% of securitized subprime loans being turned into securities with the top rating of AAA (IMF 2008). However, the models used by the rating agencies proved to be inadequate at anticipating credit risk tranche by tranche. Highly rated senior tranches were assumed to have little correlation with riskier, lower-rated tranches. But as the poor quality of the loans became more apparent and securities were downgraded, tranches soon began to fall in value together (Dodd and Mills 2008). Ratings agencies downgraded an unprecedented amount of ABSs collateralized by subprime mortgages three to four notches, resulting in subsequent downgrades in CDOs that used lower-rated ABS tranches as collateral (Dodd 2007).

Under such circumstances, as analyzed by the staff of the Federal Reserve, financial institutions deliberately utilized securitization to "cherry pick" – to transfer risk to investors along dimensions that the investors disregarded or where their risk assessments were overly optimistic (Calem, Henderson and Liles 2010, Mayer and Pence 2008). Moreover,

large investment banks (especially "big five": The Bear Stearns Companies Inc., The Goldman Sachs Group, Inc., Merrill Lynch & Co., Inc., Morgan Stanley and Lehman Brothers Holdings Inc.), which introduced originate-to-distribute model, not only originated many loans for the purpose of securitization and sale, but also started purchasing a bunch of loans from other originators for the same reason (Bhatia 2007). As a result, as emphasized by Sasca (2008), growth of MBSs and CDOs market gave stimulus to greater aggregate risk-taking, leading to a destabilizing shift of risks toward institutions that could not adequately manage them, to the reversion of some of these risks to banks that had supposedly offloaded them.

High degrees of leverage made investment strategies vulnerable to large market price movements. The stresses arose when banks, relying on wholesale funding markets discovered that the funding methods they used to hold illiquid structured credit products were flawed. Many of these products were being held in off-balance-sheet entities of major banks, typically in structured investment vehicles (SIVs) and conduits, to take advantage of lower capital requirements. These conduits were funded with shorter-term ABCPs, whereas SIVs' liabilities comprised about one-third ABCPs and two thirds longer-term funding. The exact holdings of these entities were not transparent nor was the funding strategy generally known, either to the investing public or to bank supervisors (Kordes 2008, Sasca 2008). The vulnerability of leveraged investment positions and the illiquidity of many structured credit markets were exposed when trading was disrupted in a host of other markets: subprime-linked MBSs, CDOs, ABCPs and credit derivatives (Dodd 2007).

Problems with insufficient and inappropriate surveillance over banking systems exacerbated process of excessive leveraging. As underlined by Caruana and Narain (2008) from the IMF Monetary and Capital Markets Department, Basel I, introduced in 1988, brought in a very basic degree of risk differentiation through a simple risk-weighting system. It did not cover operational risk. Its framework lacked the sensitivity to differentiate

credit quality in the same asset class, and did not capture the risks associated with banks' securitization exposures.

As volatility in MBSs and credit markets increased, the willingness of dealers to offer market liquidity to those seeking to trade declined. Initially, outright losses from subprime mortgages themselves have been relatively small, equivalent to a 2-3% fall in the US stock prices. But the problems mounted and spread to many other key sectors of the financial system and economy (Dodd and Mills 2008). When the markets for MBSs and CDOs became illiquid, this left hedge funds locked into damaging positions at the same time they faced margin calls for collateral from their prime brokers. Not surprisingly, other assets were sold then to meet margin calls. Hence hedge funds' operations added to asset price fall. In turn, banks limited funding, and the originators were unable to carry the inventory of mortgages they had made. As a result, potential home buyers and refinancing homeowners could not obtain mortgages. At the same time buyers of commercial paper ceased purchasing ABCPs after it occurred that the underlying assets were the investment-grade-rated tranches of subprime mortgages (Dodd 2007).

Imperfections of structured credit products were enforced by originate-to-distribute model adopted by banks. When risks materialized, this model added to the crisis of confidence.[15] The opaqueness of the location of exposures in the system, uncertainty about the solidity of counterparties and investment vehicles caused agents to find safe havens for their investments and to distrust counterparties. The combination of new financial products and the originate-to-distribute model both led to involuntary reintermediation wave that threatened financial institutions, with its immediate and long-lasting dislocations in the interbank markets (Borio 2008).

When confidence deteriorated, many holders of ABCPs cashed out of their holdings, shortened their maturity or demanded higher yields. The CDOs market and related markets essentially ceased to exist. But many of the SIVs and conduits had contingent credit lines

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with their parent bank in case ABCP purchasers decided not to roll over their paper. So the drying up of the ABCPs market led to illiquidity in the interbank market, when some of these contingent credit lines were drawn on, or when banks brought the SIV or conduit assets onto their balance sheets to avoid a risk to their reputation. The major banks and broker-dealers that had made guaranteed credit lines had to honor these obligations and move back bad assets onto the balance sheets. This required banks to obtain additional funding. Very often they had no choice but to pursue "fire sales". As banks became unsure of their own liquidity needs, they hoarded liquidity, further exacerbating interbank market illiquidity (Dodd 2007, IMF 2007, Kordes 2008). A decline in mutual confidence of market participants as well as a drop in liquidity on the interbank market led to the end of the so-called easy-money era (NBP 2009).

Many large international banks had to scramble to raise capital during this downturn. At first banks shored up capital by raising funds from private sector sources. But as losses kept mounting public sector funds, via capital injections and guarantees of bank liabilities, replaced private sector sources (BIS 2009). But this in turn brought about unrest among clients and provoked bank runs. This was the contagion channel through which disturbance initially observed in the U.S. was quickly transmitted into global financial turmoil as direct exposure to American mortgage markets extended beyond the U.S. with European and Asian investors active in the ABSs and related markets. And even in countries in which toxic assets had little direct impact on banks (i.e. in Asia and the Pacific) the turmoil brought about some negative indirect effects, as the risk appetites of global investors declined and low-grade borrowers lost access to markets (Filardo et al. 2009).

Taking this into account, González-Páramo (2008), Member of the Executive Board of the ECB, underlined that the international transmission of liquidity tensions and the interaction between market liquidity and funding liquidity played a key role in the international transmission of shocks. Enhanced interaction between market liquidity and funding liquidity deeply perturbed the functioning of markets, ultimately creating risks for systemic

imbalances. The turmoil that started in August 2007 has once again supported the view that the evaporation of liquidity plays a key role in the dynamics of financial distress (Borio 2009).

3.2. Theoretical backgrounds

The crisis exposed poor understanding of financial risk both at the level of the single firm and at the level of the financial system. It pointed to shortcomings in the functioning of securitization markets and demonstrated the vulnerability of funding channels for financial institutions, especially when combined with high leverage. The crisis also showed that the interconnections between financial markets and institutions place a natural limit on how far systemic risk can be reduced through the existence of multiple channels of intermediation (BIS 2009).

Undoubtedly, the core of the subprime crisis were structured credit products. These products were burdened with three specific features that contributed to the turbulence (Borio 2008):

- their payoffs turned out to be highly non-linear, resulting in heavy losses during the disturbance – hence they had high "embedded leverage",
- the risk profile of structured products was different from that of traditional bonds, as tranches of structured products with the same probability of default as an individual bond were exposed to a much higher probability of large losses ("tail risks"),
- modeling the future default and the risk profile of these instruments was subject to considerable uncertainty due to limitations of models used and difficulties in estimating key model parameters with satisfactory degree of confidence.

Thus securitization led to increased system fragility in three ways (Barwell and Burrows 2012):

- it led to a relaxation in lending standards and an incipient increase in credit risk in financial systems in which originate-to-distribute model prevailed,

- securitized assets were never truly distributed off the banking system's balance sheet due to two reasons: 1) although the notional maturity of the securities that banks issued matched the maturity of the loans, these bonds were callable, 2) banks were one of the key investors in CDSs and they often provided the funds which allowed other investors to purchases these assets,
- the demand for CDOs was very fragile, as it was reliant on faith in their rating, hence after demand for these securities had dried up banks were forced not only to bring assets held off balance sheet back on, but also they found themselves saddled with assets they had planned to distribute off balance sheet.

According to Hoe Ee and Rui Xiong (2008), the whole cumulative process of the crisis propagation is consistent with Minsky's financial instability hypothesis. This view is shared by Ingves and Lind (2008) from the Sveriges Riksbank. They emphasize, that the subprime crisis followed a common pattern. This very pattern was identified i.e. by Minsky in his *boom and bust* model. According to it, process of the development of financial crises usually encompass four stages:

- underlying weaknesses become apparent,
- an acute crisis is triggered by a particular event,
- the crisis is propagated and aggravated,
- steps are taken to mitigate and resolve the crisis.

The underlying cause of the subprime crisis, as well as most crises, was credit boom, especially in housing sector. The U.S. credit market debt of households and nonfinancial businesses grew from 118% 173% of GDP between 1994 and 2007, whereas the growth of the credit debt of households accelerated even more, mounting in this period from 98% to 136% of disposable personal income (Sasca 2008).

This boom was based on overly optimistic risk assessments accompanied with loose monetary policy. Since the beginning of this century U.S. monetary policy has become highly accommodative, contributing to considerable risk-taking and fast credit growth. The

boom stemmed also from the politicians' eagerness to promote housing industry. Underestimating the risk involved and extending too much credit supported formation of the speculative bubble along with risks emanating from structured investment vehicles and structured credit instruments, as well as from demands on bank liquidity from off-balance-sheet commitments. These weaknesses strengthened, as neither banks nor regulators considered the implications of the originate-to-distribute business model (Ingves and Lind 2008).

The formation of the bubble was consistent with Minsky's financial instability hypothesis, a period of strong growth encourages increased leveraging. Minsky classified borrowers into three types: hedge borrowers, which can pay their obligations from cash flow; speculative borrowers, which can pay only the interest but need to roll over the principal; and Ponzi borrowers, which can pay neither interest nor principal and must borrow or sell assets to meet their interest bill. The growth of speculative and Ponzi borrowers leads first to an asset bubble. The emergence of the bubble under the circumstances of growing information asymmetry and moral hazard is shown in the Chart 1. The result of the burst of the bubble is a sudden pullback in financing and a crash. These were the phenomena observed during collapse of the U.S. subprime and MBSs markets (Hoe Ee and Rui Xiong 2008).

[Chart 1]

The credit imprudence reflected the principal-agent problem. Investors expected mortgage lenders to maintain credit standards. But in the originate-to-distribute model, lenders had no incentive to keep these standards, as they sold loans to banks, which in turn packaged them as securities. There moral hazard also arose. Banks invested in long-duration structured products using short-term funds, assuming the unchanged access to rollover funding (Hoe Ee and Rui Xiong 2008). Creditors counted on government or central bank, hoping that in case of problems with credits' repayment a help was going to be granted.

Strength of moral hazard was intensified additionally due to conflict of interests between managers and shareholders under the circumstances of imperfect financial supervision. Borrowers also undertook excessive risk taking mortgages assuming that economic policy was going to be conducted in the long term in suitable manner, helping them in repayment of their obligations. This was accompanied with the taking advantage of information asymmetries by financial institutions to shift risks involved to other market participants which based their decisions on inappropriate ratings (Sasca 2008). But this "finance as you go" approach had its limits. As underlined by Tirole (2010) from BIS Monetary and Economic Department, financial market imperfections made it hard during the subprime crisis for cash-strapped institutions to raise financing even for positive net-present-value actions.

The effect of moral hazard, adverse selection and mere transaction costs resulting mainly from irrational euphoria was forming of the price asset bubble.[16] Greenspan warned just in 1999 that "an unwarranted, perhaps euphoric, extension of recent developments can drive equity prices to levels that are unsupportable. Such straying above fundamentals could create problems for our economy when the inevitable adjustment occurs" (Greenspan 1999).

It can be noticed that the house price bubble emerged in a way similar to the one identified by Shiller. In Shiller's feedback model of bubbles the initial success of some investors attracts public attention that fuels the spread of enthusiasm for the market. New investors enter the market and bid up prices. This "irrational exuberance" heightens expectations of further price increases, as investors extrapolate recent price action far into the future (Lansing 2007).

The acute phase of crisis was triggered by a weakening of the housing sector. Outburst of the house price bubble resulted in the drop in equity prices and residential property values. The crisis was propagated then by liquidity squeeze and contagion to other institutions and

markets, being strengthened by difficult to evaluate, complex financial instruments, off-balance-sheet commitments, and SIVs activity (Ingve and Lind 2008). The collapse was exacerbated, because – as emphasized by Claessens, Kose and Terrones (2008a, 2008b) from the IMF's Research Department – declines in house and equity prices tend to occur at the same time. They are also highly synchronized across countries, due to high financial integration, and allow for easier crises spillover. Hence, global deleveraging and increasing risk aversion supported propagation of the crisis worldwide.

Propagation of the subprime crisis underlined the central role of liquidity in the center of the banking systems. As emphasized by Kapadia et al. (2012) from the Bank of England, although the failure of a financial institution may reflect solvency concerns, it often manifests itself through a crystallization of funding liquidity risk. Informational frictions and imperfections in capital markets make it difficult to obtain funding if there are concerns about banks' solvency. Banks appeared to be prone to negative effect of such concerns at the end of 2007. Shortly afterwards, due to snowballing effect, banks were forced to provide themselves with sufficient cash inflows, including incomes from fire asset sales and new borrowing. The cash-flow constraint became critical.

3.3. Proposed policy responses

Despite many measures adopted in advanced economies, the financial crisis spread worldwide. Interdependent markets were affected through second- and third-order effects, as concerns in structured credit products markets trigger a broad-based increase in risk premia and induce a reluctance to lend (IMF 2007).

As a result, the index of financial stress, calibrated for 17 advanced economies since 1980 and published in the IMF's World *Economic Outlook*,[17] in October 2008 reached a level comparable to previous peak periods of stress across the range of countries. The strains have spread to emerging economies, including many of those that were initially seen as being more resilient (Lall, Cardarelli and Elekdag 2008, Frank and Hesse 2009). As

Blanchard (2008) pointed out that is stemmed from the fact that deleveraging by financial institutions translated into more expensive credit for households and firms and private agents worldwide lost confidence.

This caused economic slowdown worldwide due to contagion effect. For example, as examined by Čihák and Koeva Brooks (2009) from the IMF European Department, the subprime crisis' spillover was possible in the area because of the existence of linkages between the financial and real sectors. They outlined four channels of propagation of disturbances:

- the increase in bank funding costs (due to higher money market premiums and rates) is passed on to firms and consumers via higher lending rates,
- in response to their own deteriorated balance sheets and financial conditions, banks limit the amount of credit available to borrowers through stricter lending standards,
- the costs of corporate bond and equity financing are also be higher, limiting the scope for substitution from bank financing,
- tighter financing conditions create "financial accelerator effects" by depressing asset prices and reducing the value of collateral.

According to them, deterioration in the financial soundness of banks translate into a lower bank loan supply and a cutback in bank loan supply is likely to have a negative impact on economic activity. Higher costs of bond financing tend to weaken production, coinciding with the risk increase in the banking, corporate, and public sectors.

Not surprisingly, the primary target to achieve was to restore confidence in the financial system. Initially, in order to cope with financial turmoil and restore confidence in the interbank market, central banks provided emergency liquidity to the financial system, but the need for liquidity has become chronic, requiring central banks to devise and exploit new facilities to supply it (Borio 2008). The major central banks lowered reference interest rates, for example the Federal Reserve quickened the pace at which it had begun to ease

policy in September 2007, making an extraordinary 75 basis point inter-meeting cut on 22 January, followed by 50 basis point cut eight days later. Central banks also altered their operations to accommodate the liquidity squeeze and to offset contagion effect, accepting new types of collateral of lower quality to keep the interbank market functioning (Cassola, Hortaçsu and Kastl 2011).

But despite liquidity support and lower policy interest rates, the crisis has deepened and broadened. Unrest in financial markets was not fully cushioned and recession was not avoided. Losses at major financial institutions included not only those associated with the U.S. subprime mortgages but also losses on leveraged loans and their associated structured products, other types of the U.S. mortgages, commercial real estate, and corporate loans. (Hoe Ee and Rui Xiong 2008, Kordes 2008). Counterparty confidence has been compromised, and financial institutions with weakened balance sheets that needed to raise more capital and ensure their funding found it more expensive to do so (Kordes 2008). Moreover, risk management at individual banks focused on protecting the institution while largely ignoring systemic risks. As a result, individually rational actions to ensure survival have resulted in collectively irrational outcomes (Dodd, Mills 2008).

The crisis resolution turned out to be extremely complex in a world of dispersed risks and derivatives. Hence, in the short run, the purpose was to dampen the runs on banks and reestablishment of capital ratios through unsound asset purchases and recapitalization (Blanchard 2009b). But the crisis itself exposed explicitly that central banks and regulators need to enhance macroprudential tool kits. Thus in order to cope with financial market strains over the long run, some modifications of the functioning of the financial system and necessary policy actions have been formulated, to be introduced by shareholders and owners of financial institutions on the one hand and regulators and supervisors on the other. They are presented in the Table 2.

[Table 2]

Not surprisingly, while proposing measures to improve the financial system after the crisis, attention is paid mainly to risk management. According to Sasca (2008) from the IMF Monetary and Capital Markets Department, the action is needed in at least four areas to reduce the risk of crises and address them when they occur:

- finding a better way to assess systemic risk and prevent its buildup in good times;
- improving transparency and disclosure of risks being taken by market participants;
- expanding the cross-institutional and cross-border scope of regulation;
- putting in place mechanisms for more effective, coordinated actions.

In order to address abovementioned guidelines, important changes have been introduced to capital adequacy requirements among others. In the New Capital Adequacy Framework (Basel II) risk and capital management requirements aim to promote international financial stability by ensuring that banks can effectively evaluate and manage their risks. Under Basel II the range of collateral and guarantees available to reduce credit risk exposure has been considerably expanded. Through Pillar I, it has greatly improved the treatment of the cross-sectional dimension of risk, by aligning capital charges closely with the relative riskiness of exposures. Through Pillar 2, it has substantially enhanced the scope for supervisors to require levels of capital above the minima, thereby allowing them to tailor the capital cushion to the risk incurred by institutions. Through Pillar 3, it has offered a tool to strengthen risk disclosures and market discipline (Caruana, Narain 2008).

Hence Basel II includes stronger incentives for better risk management, a sounder supervisory framework, and the use of market incentives as additional discipline on bank behavior by requiring greater transparency in their operations. Among others, Basel II strengthens the regulatory capital treatment of banks' securitization exposure through a more comprehensive treatment. It offers several approaches to estimate the capital that banks should hold against their exposures to securitized products in their different roles. When fully implemented, it addresses weaknesses in bank risk management and its supervision (Borio 2008, Caruana, Narain 2008).

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4. Concluding remarks

The crisis has undermined prevailing in the mainstream economics conviction that mature economies with sophisticated financial markets are naturally self-equilibrating. Quite the opposite, those markets turned out to be rather unstable, fragile and prone to changes in moods and expectations of investors.

The crisis highlighted also the limitations of the analytical approaches that had guided policy (Borio 2011). What is eye-striking is the phenomenon of very fast diffusion of pessimistic forecast concerning the future performance of the economies, created by mounting problems with the repayment of credits which led to the collapse of mortgage market in the U.S. Due to these events investors' cup of bitterness was filled to the brim, leading to deep re-evaluation of financial and real assets.

Main structural problems observed at the threshold of a crisis were: insufficient surveillance over activity of financial institutions, limited experience among financial institutions in risk management, poor corporate governance which contributed to imprudent lending. Comparing subprime crisis with past banking and currency crisis one may notice that despite the development of financial engineering and new forms of financial intermediation as well as changes in global financial architecture, financial systems are still susceptible to similar shocks, resulting from low transparency of financial markets and excessive risk undertaking (Dungey et al. 2010). This is pessimistic remark, as it underlines inability of policymakers as well as private agents to learn from past mistakes and their adherence to market strategies which occur ineffective in the long run.

Under such circumstances a proper and fast response of the State appears to be necessity, as financial crises tend to converge worldwide. Greater financial linkages may and do lead to the spillover of crises to other countries. Moreover, under the circumstances of mounting capital flows, liberalization and deregulation regional differences eroded. Crises

tend to be less region-specific and spread faster via contagion channels. Hence funding liquidity pressures readily turn into issues of insolvency (Frank, González-Hermosillo and Hesse 2008). Moreover, the global nature of the financial crisis will make it far more difficult for many countries to grow their way out through higher exports, or to smooth the consumption effects through foreign borrowing (Reinhart and Rogoff 2008). Hence, if governments and central banks do not react to unfavourably changing micro- and macroeconomic conditions, problems will tend to accumulate, thus making future crises more severe and costs of offsetting their negative outcomes higher.

Endnotes

1. The subprime market came into being in the 1970s. It is worth noticing that creation and development of the subprime market was the consequence of introducing specific legislation. This issue will be explained in the further part of the paper.

2. Such bubble was identified in August 2002, whereas its peak was reached in 2005. The value of sold houses rose fivefold since 1990. The number of sold houses just doubled in this period, increasing from circa 5 million in 1990 to more than 11 million in 2005. In the beginning of the 1990s, the average price of sold houses exceeded a bit 100000 USD, whereas in 2000 it was already 200000 USD, and in 2005 – 275000 USD (Median and Average Sales Prices... 2009).

3. The idea that Fed was ready to guarantee a minimum level of asset prices was labeled as "Greenspan put" (Eichengreen 2011, Harris 2008).

4. It was sometimes called "The Great Moderation" (Bernanke 2004).

5. The mortgage loans to GDP ratio increased from c.a. 20% in the beginning of the 1990s to more than 90% in 2006.

6. Borrowers with very low creditworthiness were described as "NINJAs" (No Income, No Job, No Assets) (Kregel 2008).

7. Just in 2006 total value of the newly issued CDOs amounted to USD 521 billion, whereas in 2007 – USD 482 billion (Securities Industry and Financial Markets Association 2009). CDOs were themselves frequently backed by structures, resulting in so-called two-layer securitizations.

8. Greenspan (1998) in testimony to the House Committee on Banking and Financial Services stated that "regulation of derivatives transactions that are privately negotiated by professionals is unnecessary".

9. The rating agencies for a long time had been misreading the risk in MBSs and CDOs, giving some of them their highest possible rating (Benmelech and Dlugosz 2008, Eichengreen 2008).

10. Taking excessive risk was a specific element of corporate culture, mainly in the investment banks (Diamond, Rajan 2009). It had also much broader dimension, constituting part of financalisation process and spreading financial culture.

11. Therefore, the subprime crisis represents, as Eichengreen (2008) put it "the *first crisis of the age* of *mass securitization".*

12. In the October 2008, The Bank of England estimated such loss at USD 2,8 billion (Bank of England 2008). Just half a year later, the IMF (2009) reported of already USD 4,1billion.

13. Most adjustable rate mortgages were hybrid products that combine floating and fixed rates. Many ARM originations were "2/28" hybrids, which were effectively two-year below-market fixed rate mortgages that convert to 28-year ARMs at the end of the second year. In an interest-only mortgage, payments covered the interest accruals in the first years, and in a negative amortization mortgage, the payments did not cover the interest accruals (typically, the accumulated negative amortization was subject to a 15-25% cap), so at the end of every five years payments were expected to be computed on the new, higher loan balance. Option ARMs gave borrowers a variety of payment options each month, including interest-only and negative amortization options. These options remained open until five years into the mortgage or until the outstanding balance reached 110% of the original principal (Kiff and Mills 2007b).

14. This phenomenon is analyzed by Hamerle, Liebig and Schropp (2009). Their analysis reveals significant differences in the risk profile between CDO tranches and corporate bonds. These differences in particular referred to the considerably increased sensitivity to systematic risks, leading to mispricing of CDO tranches and exceptional growth of arbitrage CDOs transactions at the threshold of the outburst of the subprime crisis.

15. However, according to Albertazzi et al. (2011) the originate-to-distribute model cannot be blamed for having induced reckless risk-taking. They underline that the model can

work well if based on the securitization of prime mortgages and supported by sound institutional and supervisory framework provided by the authorities

16. The term „irrational euphoria" was coined by Greenspan in the second half of the 1990s (Greenspan 2007).

17. It covers variables such as interbank spreads and equity and bond market performance. Nevertheless, it should be also mentioned that Basel II is also criticised, among others for its pro-cyclicality in bank risk assessments.

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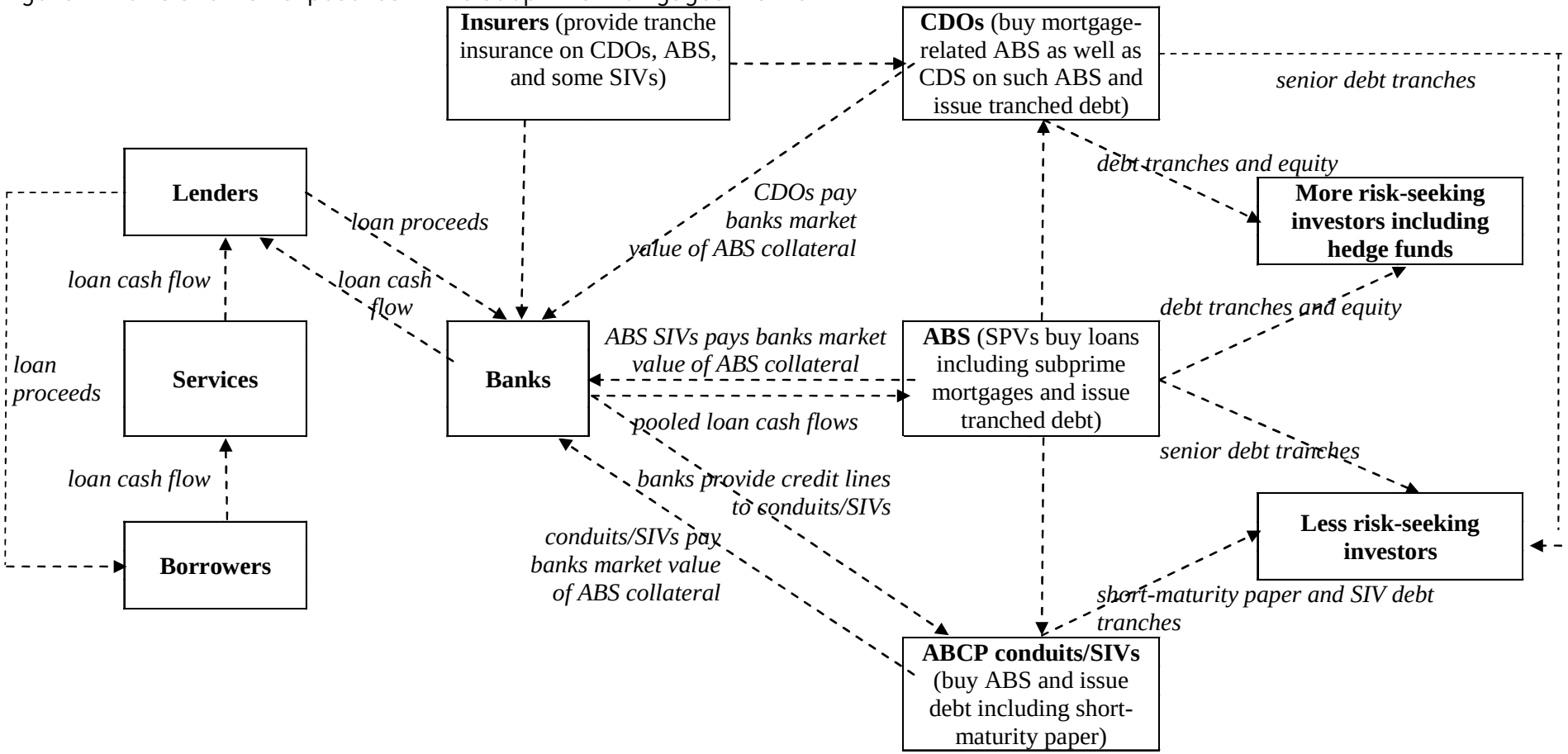
Figure 1 Flows and risk exposures in the subprime mortgages market



ABS – asset-backed security; ABCP – asset-backed commercial paper; CDO – collateralized debt obligation; CDS – credit default swap; SIV – structured investment vehicle; SPV – special purpose vehicle.
Source: IMF (2007

Table 1. Factors which generated the collapse of subprime mortgages and MBSs markets and transmitted the 2007-2009 financial crisis

Factor	Influence of the factor on the process of transmitting the 2007-2009 financial crisis
Dependence of the US mortgage market on state-sponsored entities	• activity of the US authorities in using federal agencies and government-sponsored enterprises to support the mortgage market • mass mortgages refinancing, increasing lending to mortgage banks • additional demand on the mortgage market supporting the forming of the house price bubble
Low quality of credit standards	• replacing core deposit funding with volatile wholesale financing and excessive supply of credit by financial institutions • taking on loans by clients with "teasing" interest rates below the standard variable home loan rates to which they would reset afterwards • increasing use of second mortgages, whether at purchase (as "piggyback") or subsequently (i.e. home equity lines of credit), high LTV ratios, domination of interest-only and negative amortization loans • possibility of refinancing before teaser rates ended only under circumstances of the constant house prices rise • a sharp rise of loan delinquencies and foreclosures with house prices falling • exacerbating the delinquency problem by rate resets on subprime adjustable rate mortgages
Inappropriate credit rating policy and valuation of structured credit products	• assignment of high ratings by rating agencies to complex structured subprime debt based on limited historical data and on flawed models as well as and on inadequate due diligence of underlying collateral • failure of rating agencies to adequately clarify the meaning and risk characteristics of structured finance ratings and address conflicts of interest • inability of financial institutions to disclose the type and magnitude of their risk exposures • dependence of financial institutions on oversimplified, backward-looking models to manage risks, while neglecting due diligence and analysis of fundamentals, what resulted in underestimating risks layering and poor data quality

	• the use of similar models by many market participants and taking similarly oriented market positions, thus exacerbating systemic risk as a result of increasing leverage
Lack of market transparency	• inability of market participants to identify the nature and location of the subprime mortgage risk • creating a panic among investors as a result of sudden shift in risk assessment • fall of the value of CDOs as a result of rising mortgage delinquencies and foreclosures
Extent and speed of rating downgrades of asset-backed securities	• frequent downgrades to subprime securities, reductions by several notches at once because of the sensitivity of such securities' ratings to increases in assumed credit losses • decline of investors' confidence in rating agency opinions and drastic fall in price of CDOs and MBSs to about the same level as BBB-rated corporate bonds • incurring significant mark-to-market losses by banks after downgrading AAA-rated securities
Panic in the financial market	• illiquidity and collapse of unregulated and undercapitalized financial institutions providing the OTC markets with subprime collateralized debt obligations and credit derivatives after solvency troubles emergence • defensive shift in money market funds' portfolios from medium- and long-term bank deposits and commercial paper (essentially corporate IOUS) to overnight and short maturities as a result of the widespread fear of customers' cash withdrawals • increase of the demand for short-term liquidity and a collapse of the ABCPs market used to fund off-balance-sheet investments in long-term assets • difficulties for banks in Europe and North America to borrow for much longer than overnight along with the decline of profits from lending at longer maturities and inability to compensate for the risk of lending to a counterparty that might be in trouble
Off-balance sheet entities' activity	• insufficient capital base of off-balance sheet entities as a result of lacking bank regulatory requirements • increase of bank lending to these entities after the ABCPs market collapse ended with bringing off-balance entities officially onto banks' balance sheets • expanding balance sheets and the amount of capital required by some banks, triggering asset sales and forcing investors to incur losses by others

	• ineffective banking supervision over securitization activity in the face of inability to differentiate credit quality and the risks associated with securitization exposures in the same asset class in Basel I
Banks' liquidity commitments and speed of liquidity runs	• banks' inability to fund themselves in the wholesale markets • hoarding liquidity and reducing the periods at which banks would lend to other banks along with unprecedented illiquidity in the interbank markets • growth of concerns about how many lending commitments banks had made • keeping more loans on banks' books under the circumstances of putting a halt to raise funds by selling loans into securities markets • fragility of trust in wholesale markets resulting in insolvency of many banks after their reputation was tarnished • stopping the use of the backup lines of credit by banks as a result of fear of a tarnished reputation, reluctance to use emergency liquidity support from central banks for the same reason
Financial institutions' forced deleveraging	• engagement of unregulated and undercapitalized entities (hedge funds, other investment companies) in highly leveraged transactions on a narrow capital base, the practice of highly leveraged investing • mounting losses of banks absorbing assets from failed SIVs and hedge funds onto their balance sheets • strict capital rationing • reduction of voluntary loans and tightening of the terms of the credit already extended by banks after losses on home equity loans or on loans to hedge funds impaired capital

Source: BIS (2009), Borio (2008), Caruana and Narain (2008), Dodd (2007), Dodd and Mills (2008), Ellis (2008), Galati and Moessner (2011), Hoe Ee and Rui Xiong (2008), Kordes (2008), Sasca (2008), The Joint Forum (2011)

Chart 1: The emergence of the price bubble

Path of subprime crisis	Appearing phenomena
Credit expansion	▪ excess liquidity of financial institutions ▪ easy access to credit ▪ securitization of mortgages
Excessive risk undertaken by investors	▪ increase in short-term portfolio investment in instruments of complex structure and high duration (CDOs, MBSs)
Principal-agent problem	▪ easing of creditability analysis ▪ no incentive to the limitation of the credit risk ▪ fast transformation of given credit into sellable debt instruments
Excessive risk undertaken by creditors Moral hazard	▪ common belief that the U.S. central bank is going to increase indefinitely financial institutions' liquidity if needed ▪ increase of financial institutions' liabilities due to financing of purchases of structured instruments
Irrational euphoria Price bubbles emergence	▪ rapid increase in housing prices and equity prices ▪ low spreads and volatility of value of credit products

Source: Hoe Ee, Rui Xiong (2008).

Table 2 Policy proposals to cope with the propagation of the subprime mortgages and MBSs crisis

Sphere of activity	Necessary actions
Risk management	• elimination of the twin problems of risks not receiving sufficient attention in an upswing and of traders getting paid to take on bets that return high profits but are very risky • maintenance of the credit standards, especially in times of abundant liquidity and strong economic growth • reassessing risk management models and systems requiring institutions to hold more short-term liquid assets that they can use as collateral for loans • making capital requirements more countercyclical: capital and provisioning requirements and minimum haircuts on collateral should recognize mounting risks during booms and allow for the buildup of adequate capital buffers • providing prudential regulatory authorities with comprehensive information on new products and entities in order to allow for keeping up with financial innovation and understanding the incremental risks to the w financial system • reviewing transparency, disclosure, and reporting rules, and the collection of information from a much larger set of institutions, including insurance companies, hedge funds, and off-balance-sheet entities
Liquidity management	• mitigating the incentive for financial institutions to protect themselves insufficiently against systemic liquidity events, limiting the wholesale funding in favor of solid depositary funding • mitigating the moral hazard of financial institutions believing that their possible liquidity problems would always be offset by central bank help, at the same time neglecting their own liquidity risk management systems • providing financial institutions with insurance or contingent liquidity facilities by a central bank, as in a systemic event such insurance may be more efficient if it is publicly provided and the pooling of liquidity risk within a public institution, such as the central bank, may be preferable • bolstering the dependability of liquidity in over-the-counter markets through formalizing dealers' quote obligations (including acting as market makers), improvement in the public availability of price and trading information
Leverage management	• detecting and limiting excessive risk taking, especially the rapid and sustained buildup of leverage by non-regulated entities • applying higher standards and regulations pertaining to the use of collateral (margin) to OTC derivatives and hedge fund borrowing • preventing leveraged financial institutions from taking on excessive risks without internalizing systemic risk • the registration, licensing, and gathering of relevant information from such entities should be improved
Business model	• modification of the originate-to-distribute model, • establishing of incentives for more credit discipline • forcing the originator to hold some of the risk related to structured credit products on its balance sheet without hedging it, and monitoring the loans • provide effective consumer protection against predatory lending in an originate-to-securitize financial model

Off balance sheet vehicles activity	• mitigating the incentives to place assets and their funding in off-balance-sheet vehicles, where the risks are less transparent to the investors of the parent financial institution, as well as to supervisors and regulators • improving accounting and disclosure standards for derecognition and consolidation of assets • introduction of the clear-cut rules for whether the appropriate amount of capital is being held against the contingent credit lines that support the off-balance-sheet entity • requiring institutions to hold more short-term liquid assets that they can use as collateral for loans • providing banks with appropriate regulatory incentives to consolidate off-balance-sheet entities
Rating activity	• creative incentives for mitigation the tendency to rate the underlying security too highly and to avoid downgrading the rating, ensuring the accuracy and credibility of credit risk analysis • developing a firewall between parts of business of rating agencies so that there would be independent checks between the parts that do the initial ratings and those that are responsible for altering the ratings through time • enhancing the surveillance of the rating process and strengthening internal oversight of rating methodologies
Due diligence	• imposing originating and sponsoring institutions to retain sufficient risks on the securitized assets, so that these institutions would have an incentive to adequately monitor individual loans • examining the rating agencies' analysis and modeling as a second check on accuracy by supervisory authorities • strengthening the transparency by originators and issuers of securitized products about underwriting standards for, and the results of due diligence on, the underlying assets • simplifying structured credit products in order to allow investors to value them independently
Safety of financial instruments, institutions and markets	• product registration limiting investors' access to instruments according to their degree of safety • availability of financial instruments only to those with an authorization • replacing bilateral arrangements with perfectly hedged central counterparties that interpose themselves between the two sides of a transaction, implementation of centrally set margin requirements in order to reduce both the common exposures and the procyclicality • implementing a systemic capital charge designed to create a distribution of capital in the system that better reflects the systemic risk posed by individual failures • developing principles and operational advice to better align supervisory structures with financial stability objectives, including arrangements for coordinated actions among agencies responsible for liquidity provision, supervisory oversight, and bank resolution

Source: BIS (2009), Borio (2008), Collyns (2008), Dodd (2007), Dodd and Mills (2008), Hoe Ee and Rui Xiong (2008), Kiff and Mills (2007a), Kordes (2008)

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THE ABSTRACT OF THE PROJECT IS:

The research programme will integrate diverse levels, methods and disciplinary traditions with the aim of developing a comprehensive policy agenda for changing the role of the financial system to help achieve a future which is sustainable in environmental, social and economic terms. The programme involves an integrated and balanced consortium involving partners from 14 countries that has unsurpassed experience of deploying diverse perspectives both within economics and across disciplines inclusive of economics. The programme is distinctively pluralistic, and aims to forge alliances across the social sciences, so as to understand how finance can better serve economic, social and environmental needs. The central issues addressed are the ways in which the growth and performance of economies in the last 30 years have been dependent on the characteristics of the processes of financialisation; how has financialisation impacted on the achievement of specific economic, social, and environmental objectives?; the nature of the relationship between financialisation and the sustainability of the financial system, economic development and the environment?; the lessons to be drawn from the crisis about the nature and impacts of financialisation? ; what are the requisites of a financial system able to support a process of sustainable development, broadly conceived?'

THE PARTNERS IN THE CONSORTIUM ARE:

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