

FESSUD

FINANCIALISATION, ECONOMY, SOCIETY AND SUSTAINABLE DEVELOPMENT

Working Paper Series

No 56

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Factors generating and transmitting the financial crisis: The role of incentives: securitization and contagion.

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Abstract: This contribution attempts to explain the recent financial crisis and the subsequent Great Recession from the point of view of incentives that change as a consequence of securitization and contagion processes. It provides a critical analysis of the basic principles of the Asymmetric Information Approach and its two branches that view differently the evolution of banking and the role of securitization in it. The former focuses on its impact on the traditional model of commercial banking, whereas the latter sees the role of securitization in the emergence of a parallel banking system (shadow banking). This divergence between the two approaches leads to different policy implications that can be drawn from the analysis of the crisis, advocating respectively the elimination (or heavy mitigation) of securitization and shadow banking, and the strict regulation of shadow banking and all the credit transfer processes.

The paper is organized in three parts: the first finds out the crisis and the contagion within the financial system; the second is focused on the securitization process, describing the agents involved and the associated risks; finally, the third part is devoted to the theoretical analysis, particularly within the asymmetric information framework.

Key words: Financialisation, Great Recession, Financial Crisis, shadow banking, securitization.

Date of publication as FESSUD Working Paper: September 2014



This project has received funding from the European Union's Seventh Framework Programme for research, technological development and demonstration under grant agreement no 266800



Journal of Economic Literature classification: D52, D53, D82, G21, G24

Acknowledgments:

The research leading to these results has received funding from the European Union Seventh Framework Programme (FP7/2007-2013) under grant agreement n° 266800.

Website: www.fessud.eu

1. Introduction

Most causes and consequences of the financial crisis (and the subsequent Great Recession) may be investigated from the point of view of incentives. In order to avoid an unproductive overlapping with other papers of the same deliverable we apply this point of view exclusively to factors that are not specifically investigated in other contributions, i.e. to securitization and contagion. Our analysis, on the other hand, is not restricted to the role of incentives but surveys and discusses different aspects of the process of securitization and of the related contagion of financial stress between countries and economic units that may be relevant for understanding the Great Recession.

In our investigation we use the distinction between impulses and propagation, since it is convenient to study the crisis as a process originated by impulses (*triggering factors*) which is sustained and shaped by *propagation factors* that modify its speed, strength and nature (see, e.g., Reijnders, J., 2007). The reason for trying to connect in this paper the literature on contagion surveyed in the first part of this paper with that on securitization surveyed in the second part of the paper is because there is a wide consensus on the observation that the process of securitization has deeply modified the process of propagation of financial distress, although there are different ideas on its determinants and implications. Financial and real contagion can be originated by fundamental factors affecting price co-movements. Even though these propagation mechanisms could be considered normal interconnections rather than contagion processes in the strict sense of the term, these factors can be triggered by either global or local shocks. Otherwise, there is a second way to design contagion, as a result of the behavior of investors and changes in their attitude towards risk. This kind of contagion – also defined as irrational – could be associated with panic, herd behavior, loss of confidence and increases in risk aversion. These two ways to describe contagion processes are usually based on separate contributions, but empirically irrational events are more likely to occur when fundamentals are weak. A promising approach helping to describe the contagion features and, eventually, to define early

warning systems and critical factors, is the network approach that allows a systematic investigation of the structural conditions and implications of contagion processes. This methodology is based on accounting interactions between economic units. When applied to the banking system, normally uses information about mutual interbank exposures or payment systems exposures. This approach has significant policy implications that may help guiding the choice of policy rules and interventions on the basis of the network topology, degree and strength of interconnections between relevant economic units.

Most of the financial innovations developed during the last decades and often quoted as responsible for their contributions to the contagion occurred during the 2007 crisis originate a set of interconnections among agents involved, with several accounting linkages. Particularly, credit risk transfer processes, such as loan sales, credit derivatives, and securitization, can be analysed as network facilitators aimed at transferring the credit and financial exposure to third parties. Securitization has had a significant impact as catalyser of the generating process of the financial crisis by pushing the excessive indebtedness of many players, among which households, while contributing to the rapidity and intensity of its transmission. The growing importance of securitization-based structured finance in the balance sheets of economic units increased the rapidity and strength of contagion originating a generalized balance sheet recession.

The literature on contagion addresses the issues related to the strength and nature of the propagation of financial distress in the light of the empirical evidence. This justifies why we start the paper from a survey of this literature in the hope of finding important clues on the subject matter of this paper: the transformation of the propagation process as a consequence of the process of financialization, in particular of that of securitization, which has greatly reduced the incentives of the units securitizing assets to review its value and the risk involved by holding them. The systemic consequences of securitization considered benign ex ante by supervisory authorities ("the market knows better") proved to be devastating ex post ("no one knows"). In particular, the ensuing discharge of banks' responsibilities encouraged their excessive leverage that was a crucial precondition of the crisis. The securitisation process has also increased in consequence of banks' regulatory

arbitrage to reduce the capital absorbed by credit risk transferring the loans/mortgages exposure from the banking book to the trading book.

However, at the moment the two literatures (contagion and securitization) remain surprisingly unrelated although the recent contributions to the structural approach raises concrete hopes of a constructive integration in the future. In the light of the critical surveys developed in the first two parts, the third part of the paper tries to clarify the nexus between incentives and securitization in the explanation of the recent crisis by sketching a critical survey of the main schools which have focused on this nexus.

2. Financial Contagion and its Propagation: Theories and Empirical Evidence

Alesia Kalbaska

The recent global financial crisis that was triggered by the bubble in the US housing market has demonstrated one more time how an initially country-specific shock could spread quickly around the globe like a contagious disease. Indeed, a medical metaphor such as contagion became a common feature of the functioning of financial markets.

2.1 Definition and Theoretical Foundations of Contagion

Albeit there is no general agreement on the definition of contagion in economics and finance, the standard approach to contagion has traditionally focused on the correlation between relevant time series in different countries (see, e.g., Sell, 2001, for a comprehensive survey of the early literature and Panizza et al., 2009, for a recent one). Within this approach we may identify different research streams that strongly disagree on the theoretical assumptions, the econometric methods and the implications of empirical evidence. Thus, part of the literature defines contagion as the co-movements between relevant time series that take place after a bad shock (see, e.g., Kaminsky and Reinhart, 2000). Another part considers only the “excess” co-movements (relative to the norm) as the evidence for contagion (see, e.g., Forbes and Rigobon, 2002, Caporin et al., 2012).

The classification of contagion suggested by the World Bank distinguishes between three definitions (broad, restrictive and very restrictive) of contagion on the basis of the nature of its occurrence. According to the broad definition, contagion is referred to as a “cross-country transmission of shocks or general cross-country spillover effects”. This definition assumes that contagion can be caused by any type of linkages between countries (fundamental and non-fundamental). According to the second, more restrictive, definition “contagion is a transmission of shocks to other countries beyond any fundamental links or common shocks”. Contagion in this sense can be caused by “irrational” phenomena (e.g., financial panic, herd behavior, etc.). According to the third, very restrictive, definition,

financial contagion does not involve fundamental linkages either. It assumes that “contagion occurs when cross-country correlations increase during “crisis times” relative to correlations during “tranquil times”. This definition allows a feasible econometric measurement of contagion.

Thus, there are different theories proposed as an explanation for the occurrence of contagion effects. According to Dornbusch et al., 2000, depending on the reason of the transmission of shocks, it is possible to distinguish two main types of contagion.

The first type is so called “fundamentals-based contagion” that refers to co-movements in asset prices as a result of normal interdependencies between markets. Among fundamental factors there can be common global shocks, that can trigger crises in several countries simultaneously, and a local economic shock that can transmit across borders through trade and financial linkages. However, most of the literature distinguishes fundamental linkages from contagion (e.g., Kaminsky and Reinhart, 2000, Dornbusch et al., 2000, Edwards, 2000). Besides, Masson, 1998, argues that the transmission of shocks via real or financial linkages should not be referred to as contagion but rather as normal interdependence.

The second type of contagion is often called “irrational” and implies the transmission of financial crises as a result of the behavior of investors and changes in their attitudes towards risk rather than macroeconomic fundamentals. Thus, “irrational contagion” is normally associated with panic, herd behavior, loss of confidence and increases in risk aversion, even though these events are more likely to occur when fundamentals are weak.

Nevertheless, there are at least three reasons for which investors’ behavior should not necessarily be considered irrational but rather individually rational. First, Calvo and Mendoza, 2000, show that information asymmetries and high fixed costs required for gathering and processing country-specific information make investors imitate the behavior of other investors instead of collecting country-specific information on their own. Besides, highly diversified investors have lower incentives to learn about individual countries than investors with few diversification opportunities. Therefore, diversification may exacerbate herd behavior by making investors more sensitive to market news or rumors. Similarly,

Pasquariello, 2007, examines how heterogeneity of private information may induce financial contagion. Using a model of multi-asset trading, the author shows that financial contagion can still be an equilibrium outcome when speculators receive heterogeneous fundamental information. Second, investors' behavior can be determined by changes in their expectations of what others would do (Diamond and Dybvig, 1983). For instance, it is rational for investors to withdraw funds if the funding pool is limited and if they expect that other depositors would do the same. In a similar vein, after hitting one country the liquidity crisis can hit another country if investors see it as being the last eligible for support from a limited fund sponsored by the international lenders of last resort. One more explanation for investors' behavior lies in high reputation costs bared by them. Sometimes investors may refrain from acting first and thus prefer to follow the "crowd" in order to avoid the risk of taking a wrong decision, which can damage their reputation.

2.2 Empirical Measurement of Contagion

In the literature there is also ambiguity concerning the empirical measurement of contagion. Broadly speaking, there exist two different approaches to empirically investigate financial contagion: statistical and structural. The statistical approach studies changes in the co-movements of asset prices, sovereign spreads, capital flows and rates of return. Under this approach, contagion is usually measured as a marked increase in correlations between selected time series during "crisis" times relative to correlations in some "tranquil" period. This type of contagion is often said to be caused by "irrational" phenomena such as financial panic, herd behavior, loss of confidence and increases in risk aversion. This approach may provide some useful insights on the strength and nature of contagion processes between countries but clouds the structure of the effective causal links between increasingly interconnected economic units.

In contrast, the structural approach focuses on the structural characteristics of the system that are represented by the structure of financial links between economic units. Some researchers argue that the transmission of shocks via real or financial links constitutes

normal interdependence rather than contagion (e.g., Masson, 1998). According to them, “pure” contagion should be referred only to changes in the perception of market players and their attitudes towards risk.

These two approaches to financial contagion address different issues and have policy implications of different kind. Therefore, the two approaches do not necessarily exclude each other.

2.2.1 Statistical Approach to Contagion

The literature on statistical tests for the existence of financial contagion is very broad. Excellent surveys can be found in Pericoli and Sbracia, 2003, Dungey et al., 2005, and Pesaran and Pick, 2007. In order to measure contagion, researchers have often used data on stock market returns, interest rates, exchange rates, bond and CDS spreads. However, there is no unifying framework of testing for contagion during financial crises. Instead, a broad range of different methodologies has been developed. This, as argued by Dungey et al., 2005, by no means makes the assessment of contagion easier.

Empirical tests based on the correlation coefficients of asset prices are the most popular. In this category evidence of contagion is confirmed by a marked increase in correlations between markets of different countries (World Bank's very restrictive definition). The main advantage of the correlation approach is that it provides a straightforward framework to test for contagion by simply comparing cross-market correlation coefficients after a shock or crises with coefficients during a relatively stable period. Another advantage is that this approach allows to distinguish investors' behavior from alternative explanations of how contagion emerges and transmits across markets. Indeed, rapid changes in cross-market correlations can only occur due to factors unrelated to fundamentals since fundamentals cannot change instantly. However, Forbes and Rigobon, 2002, suggest that in order to measure financial contagion correctly, it is necessary to control for general volatility rising during financial crises since its simultaneous rise could be just due to normal interdependencies between markets.

Based on the approach of Forbes and Rigobon, 2002, Andenmatten and Brill, 2011, perform a bivariate test for contagion in 39 industrialized and emerging countries to examine whether correlations of sovereign CDS spreads increased significantly with the onset of the Greek debt crisis in October 2009. The authors conclude that European countries experienced both contagion and interdependence. Similarly, Anderson, 2011, investigates contagion and excess correlations in daily corporate CDS spreads during the 2007-2009 credit crisis. The author detects that only a small fraction of the increase in correlations can be explained by changes in fundamental factors that determine credit risk. Instead, he finds convincing evidence that the default risk premium was the main factor that amplified correlations. Liquidity risk played a smaller role, whereas counterparty risk did not appear to influence correlations. Bhanot et al., 2012, examine whether the sovereign debt crisis in Greece led to contagion to the sovereign bond markets of Portugal, Ireland, Italy and Spain. The authors reveal a significant increase in unconditional correlations between yield spreads of Greece and other markets during the crisis. However, after they account for time-varying volatility and changes in fundamental factors, they find no evidence of contagion from Greece to other PIIGS since conditional correlations of their yield spreads actually decreased during the crisis period.

Bruyckere et al., 2012, investigate contagion between the bank risk and sovereign risk in Europe over the period of 2006-2011 and find that various contagion channels are at work. The authors conclude that banks with a weak capital and/or funding position are particularly vulnerable to risk spillovers, whereas at the country level, the debt ratio is the most important driver of contagion. They also suggest that breaking the link between banks and their sovereigns should be a priority. Similarly, Ejsing and Lemke, 2009, examine co-movements between CDS spreads of ten Euro area countries and CDS of their banks for the period from January 2008 to June 2009. The authors find that the government rescue packages led to a decrease in the CDS spreads of the banking sector at the cost of the increase in the price of sovereign CDSs. Furthermore, the bailout schemes made sovereign CDSs even more sensitive to any future shocks.

A considerable amount of empirical literature is also devoted to the study of causal relationships between selected time-series by means of a vector autoregressive (VAR) and a vector error correction (VEC) models. Thus, Gentile and Giordano, 2012, test for contagion in Euro area countries during the Lehman default and sovereign debt crisis. Using a three-steps Granger causality/Vector error correction model applied to sovereign bond spreads and stock returns, the authors find that causality patterns have changed during the “crisis” period compared to the pre-crisis “flat” period. Their results also highlight that Germany and Spain have a leading role in spreading contagion in the sovereign bond market, whereas Italy shows a high degree of vulnerability. Similarly, by means of the Granger-causality test, Kalbaska and Gatkowski (2012) find an increase in interdependencies between CDS markets of PIIGS (Portugal, Ireland, Italy, Greece and Spain), France, Germany and the UK during the “crisis” period compared with the pre-crisis period. Besides, by means of the impulse-response function analysis the authors reveal that among PIIGS the CDS markets of Spain and Ireland have the biggest impact, whereas the Italian CDS market responds to shocks the most. Moreover, the reaction to turbulence in each of PIIGS is higher for the rest of PIIGS than for France, Germany and the UK. The results of Gómez-Puig and Sosvilla-Rivero, 2011, also indicate that the causality relationships between bond yields of PIIGS have been significantly reinforced during the crisis in sovereign debt markets, providing evidence for contagion between them. Alter and Schuler, 2011, employ a vector error correction and vector autoregressive framework to study the relationship between sovereign CDSs of seven EU countries and CDSs of their banks. The authors analyze the period between June 2007 and May 2010 and look at differences in the market before and after government interventions. They find that before the government rescue interventions contagion spills over from the banking sector to the sovereign CDS market, whereas after the interventions sovereign CDS spreads largely determine the price of banks’ CDS series. The authors also highlight the short-term impact of the financial sector on sovereign CDS spreads and its insignificance in the long run. O’Kane, 2012, studies the relationship between the price of the Eurozone sovereign CDS and bond market during the Eurozone debt crisis of 2009-2011. The author examines

whether CDS spreads cause (in a Granger sense) changes in bond spreads or vice-versa. He finds evidence for a Granger causal relationship with a one day lag from CDSs to bonds for Greece and Spain, the reverse relationship for France and Italy and a feedback relationship for Ireland and Portugal.

There are also other tests for financial contagion. For instance, Mink and Haan, 2012, use an event study approach to examine the impact of news about the economic situation in Greece and news about its bailout on bank stock prices in 2010. The authors find that only news about the Greek bailout has a significant effect on bank stock prices, whereas news about the situation in Greece does not lead to abnormal returns. At the same time, sovereign bond prices of Portugal, Ireland and Spain are sensitive to both types of news. Missio and Watzka, 2011, estimate a dynamic conditional correlation model to assess whether during the European sovereign debt crisis there were contagion effects or, instead, tensions between countries spread due to fundamentals. The authors find evidence for contagion within the Euro Area. They also argue that news about Greek rating downgrades generates contagion to Portugal and Spain, whereas some of the countries (Italy and Belgium) remain unaffected. Caporin et al., 2012, evaluate the extent of contagion in the Eurozone credit default swaps by using a reduced-form approach based on quantile regressions. The authors show that the propagation of shocks in Europe's CDSs has been remarkably constant for the period of 2008–2011, even though a significant part of the sample periphery countries has been extremely affected by their sovereign debt and fiscal situations. Furthermore, from the analysis of bond data they find that the intensity of the propagation of shocks in the pre-crisis (2003–2006) and the post-Lehman (2008–2011) periods even reduced. Delatte et al., 2011, use a non-linear approach to analyze the influence of CDS premia on underlying bond spreads for PIIGS and five core European countries. The authors conclude that CDS spreads are a better indicator of the probability of default during the periods of turmoil.

Metiu, 2012, investigates sovereign risk contagion in the Eurozone between 2008 and 2012. The author elaborates on a canonical model of contagion proposed by Pesaran and Pick, 2007, and finds significant cross-border contagion since the outbreak of the global financial

crisis. A paper by Manasse and Zavalloni, 2013 is a recent contribution in which the authors study European sovereign CDS spreads by estimating an econometric model with time varying parameters for the period of 2006-2012. They find that, unlike the US subprime crisis, which affected many European sovereigns, the Greek crisis is largely a matter concerning the Eurozone. The authors also detect remarkable differences in vulnerability to contagion within the Eurozone. Thus, their findings state that core Eurozone members are less vulnerable to contagion, possibly due to a safe-heaven effect, than peripheral countries.

There also exists a vast empirical literature on systemic risk, which is closely related to contagion since systemic risk usually refers to situations where multiple financial institutions fail as a result of a common shock or a contagion process (Allen et al., 2010). Thus, Adrian and Brunnermeier, 2008, developed a co-risk approach that uses market data (e.g., CDS spreads, bond spreads, equity returns), which, under the assumption of market efficiency, should convey information on both direct and indirect linkages across financial institutions. By means of quantile regressions, this approach allows to measure the value at risk of one institution in distress conditional on another institution (or the whole financial system) being in distress. One more approach that uses market data is a distress dependence matrix developed by Segoviano and Goodhart, 2009. The authors generate a multivariate distribution describing asset price movements of different institutions. From this multivariate distribution, they derive pairwise conditional probabilities of distress. Thus, the approach permits to calculate the probability of one institution falling into distress conditional on the probability of another institution being in distress. Furthermore, Giesecke and Kim, 2009, developed a default intensity model to measure the probability of failures of a large fraction of financial institutions due to both direct and indirect systemic linkages (see International Monetary Fund, 2009, European Central Bank, 2010a, European Central Bank, 2010b).

Thus, the statistical approach is normally applied to market data available at high frequency. However, although market data allow to capture the co-movements of risk and distinguish investors' behavior from alternative explanations of contagion, often the risk is

overestimated by market participants, who act on fear during the periods of crisis, and underestimated during tranquil periods.

2.2.2 Structural Approach to Contagion

In our opinion, to measure financial contagion, it would be more promising to adopt a network approach that allows a systematic investigation of the structural conditions and implications of contagion processes (see, e.g.: Markose et al., 2010, Markose, 2012, Giansante et al., 2012, Kalbaska, 2013b). This methodology is in principle rigorous as it is based on accounting interactions between economic units. This does not exclude the study of behavioral factors as the reaction of decision makers to accounting changes may be affected by expectations, risk aversion and irrational factors. Indeed, the main causal mechanism of contagion is rooted in the strict interaction between the balance sheets of economic units. An unexpected reduction of financial inflows of a unit typically translates in a reduction of the financial outflows of the same unit that immediately brings about an identical reduction of financial inflows of one or more interconnected units, etc. At the same time, an unexpected reduction of expected inflows reduces the net worth of the unit altering its decision strategies. In particular, when the net worth breaches the perceived safety threshold, units try to recover the safety margin by deleveraging and fire selling greatly accelerating the vicious circle of contagion (Minsky, 1982, Vercelli, 2011). Therefore, the contagion process crucially depends on the structure and strength of the interrelations between the balance sheets of economic units.

A considerable amount of literature has been published on contagion in financial networks. The theoretical underpinning is provided, among others, by Allen and Gale, 2000, Iori et al., 2006, Nier et al., 2007, Babus, 2009, Gai and Kapadia, 2010, Martinez-Jaramillo et al., 2010, Acharya et al., 2010.

A large part of the theoretical contributions focus on the effects of various parameters and network structures on the resilience of the network to contagion. Thus, Allen and Gale, 2000, model contagion in the network formed by four banks. The authors suggest that the

likelihood of the propagation of financial distress between network players is mainly determined by the nature of their interconnectedness. Thus, complete network structures, where all entities are connected to each other, are more resilient to contagion as each entity bears a small share of the shock. By contrast, in incomplete networks the losses of a distressed entity are distributed between fewer connected players, which increases the impact of the shock on each player. Iori et al., 2006 discuss a dual role of the interbank market: as an insurer against liquidity shortages experienced by individual banks and as a source of contagion spreading from a distressed bank to other banks. They show that in the network with homogeneous banks the interbank market performs mainly the role of a stabilizer of the system; whereas networks with heterogeneous banks are more prone to knock-on defaults.

Nier et al., 2007, apply network theory to capture the generic relationship between the level of systemic risk in the banking system and its key characteristics such as the size of exposures, capital buffers, degree of connectivity and degree of concentration. The authors conclude that the higher interbank exposures and the lower banks' capital buffers, the more susceptible to contagion effects is the banking system. Besides, more concentrated banking systems are exposed to larger systemic risks. Another important finding is that the degree of connectivity has a non-monotonic effect on the resilience of a banking system to contagion. Thus, at first a small increase in connectivity causes large contagion effects; however, the resilience to contagion improves when connectivity reaches a certain point. Similarly, Babus, 2009, shows that when banks reach a certain connectivity threshold, they are capable of forming networks resilient to contagion risks. Gai and Kapadia, 2010, examine how the likelihood of contagion and its potential impact vary with aggregate and idiosyncratic shocks, changes in network structure and liquidity of the asset market. The authors suggest that the financial market can be characterized by a robust-yet-fragile nature, i.e., contagion is rather an unlikely event, but can have devastating effects once it occurs.

There are also some works that are devoted to the measurement of systemic risk¹. Thus, Martinez-Jaramillo et al., 2010, estimate the distribution of losses for the banking system and distinguish between initial losses and contagion losses. Besides, the authors propose a measure of fragility for the banking system and calculate it for different years in order to track the vulnerability of the financial system over time. Acharya et al., 2010, measure the contribution of each financial institution to systemic risk as its systemic expected shortfall (SES), i.e., its propensity to be undercapitalized when the system as a whole is undercapitalized. According to the authors, the higher the level of institution's leverage and the higher the expected losses during a crisis, the larger is its SES. The authors argue that imposing a tax based on institution's SES can reduce its contribution to systemic risk. Furthermore, they show empirically that SES appears to be helpful in the prediction of the risks emerging in the system during the recent global financial crisis.

Besides numerous theoretical contributions on systemic risk and financial contagion, a large body of empirical literature has emerged on the topic. In some empirical studies researchers compute network measures and track the evolution of network properties over time. Thus, von Peter, 2007, shows how network measures can be used to identify the most important banking centres in the international banking network. Likewise, Hattori and Suda, 2007, compute various network measures and find that the network of cross-border bank exposures became more interconnected over time. Garratt et al., 2011, apply a network clustering technique to estimate how the interconnectedness of 21 international banking groups affects the spread of systemic risk in the network in 1985-2009. The authors find that the contagious capacity of the international banking network was increasing during that period and peaked at the time of the Lehman Brothers collapse. In a similar vein, Minoiu and Reyes, 2011, study the evolution of the global banking network of 184 countries over the period of 1978-2009 and document that the network was relatively unstable. Besides, the authors reveal structural breaks in the network indicators and reduced connectivity between network players during and after systemic crises.

¹ Bisias et al., 2012, provide a survey of various quantitative measures of systemic risk to be used in economics and finance.

In recent years, there has been an increasing amount of literature that focused on monitoring systemic risk within the banking systems of individual countries. Examples can be found in Boss et al., 2003, for Austria, Wells, 2004, for the UK, Müller, 2006, for Switzerland, van Lelyveld and Liedorp, 2006, for the Netherlands, Degryse and Nguyen, 2007, for Belgium, Furfine, 2009, for the US, Toivanen, 2009, for Finland, Canedo and Jaramillo, 2009, for Mexico, Krznar, 2009, for Croatia, Mistrulli, 2011, for Italy, etc. Most papers in this strand have access to the data on interbank exposures only on the aggregate basis. In order to know the actual structure of bilateral exposures, the authors apply statistical methods (e.g., the maximum entropy technique) assuming that bank lending is spread as evenly as possible. The majority of papers finds that contagion appears to be a possible but rather an unlikely event. Upper, 2011, provides a critical overview of this literature and argues that it needs to incorporate behavioral foundations in order to be more suitable for policy making.

Several attempts have been also undertaken to analyze cross-border linkages. Thus, Cihák et al., 2011, and Schoenmaker and Wagner, 2011, study the costs and benefits of cross-border banking and argue that after a certain value gains from the increase in cross-border linkages diminish and fragility increases. International Monetary Fund, 2011, distinguishes the main determinants of cross-border linkages and finds empirically that geographical, historical and cultural factors account for their magnitude the most. Espinosa-Vega and Solé, 2010, and Chan-Lau, 2010, illustrate how financial surveillance across borders can be analyzed with network methods. The authors consider not only credit but also funding shocks and their joint realization at a particular point in time. Degryse et al., 2010, study cross-border contagion from triggering countries to the banking systems of recipient countries in a multi-period context (1999-2006). Similarly, Kalbaska, 2013b, tracks changes in the banking system sensitivity to cross-border contagion over the period of 2006-2011. Even though markets were looking at the main protagonists of the European sovereign debt crisis – PIIGS – with a lot of anxiety, unexpectedly, the author finds that a single failure among PIIGS could be absorbed by the network in 2011. Nevertheless, multiple initial failures (especially combinations including Italy and/or Spain) could be more dangerous. At

the same time, the US, the UK, France and Germany appear to be the most important systemic players that cause the highest capital losses to the system. The author also reveals that the resilience of the banking systems to contagion risks tends to improve over the years.

CGFS, 2011, discusses the main channels through which sovereign tensions propagate to the banking sector. The authors stress that banks need to build up sufficient capital buffers in order to reduce the risk of domestic and cross-border contagion. Blundell-Wignall and Slovik, 2010, carry out a study in which they conduct stress tests for 18 EU member countries. The authors consider the small trading book exposures of 91 European banks to sovereign debt of other countries and find that most banks appear to be resilient.

The network approach usually uses information about mutual exposures between banks and/or other economic units. Although it faces some problems with data availability, especially on an international level, and accounts for only direct financial interlinkages between units, its main advantage is that results can be clearly assigned to one specific channel of shock transmission. Besides, the network approach has significant policy implications that may help guiding the choice of policy rules and interventions on the basis of the network topology, degree and strength of interconnections between relevant economic units.

We wish to emphasize that in both statistical and structural approaches the contagion process is by definition a crucial component of the propagation process; however, it also plays the role of triggering a critical financial process within units, sectors and countries not yet hit by the crisis. The statistical approach is thus mainly used to study the propagation of financial instability across countries. This approach may explain the origin of a critical financial process in a country, when it is triggered by the spill-over of financial instability developing in another country. The structural approach is significant to study the propagation of financial instability from one unit to other units interconnected with it and so on, providing microeconomic foundations to the analysis of contagion processes. In both cases the process of contagion forwards changes in incentives and disincentives to other agents and hence pushes most economic units towards similar decision strategies (herd

behaviour), for example, inducing a generalized process of deleveraging and fire selling. Thus, we believe that in order to have more complete information on the potential risks of contagion during financial crises, it is wise to consider the two approaches as complementary, combining the information that can be obtained by the contemporaneous use of both methods (Kalbaska, 2013a, p. 107).

3. Securitisation process, the role of rating agencies and the regulatory impact

Giampaolo Gabbi

Within a structural approach to contagions, some financial innovations have eased the enlargement of networks and weakened their links. Every process of risk transfer creates a link within a network. Credit risk transfer (CRT) is implemented from originators to other portfolios, especially to save capital for further loans. There are many transfer techniques used for this purpose (Bedendo, Bruno, 2012): loan sales, credit derivatives, and securitization. Among others, securitizations could be analysed as network facilitators aimed at transferring the credit and financial exposure to third parties. The “opportunity” to sell illiquid assets in financial markets has been considered as a way to save capital, to minimize credit losses, to generate liquidity, and to accelerate decisions affecting banks’ size preferring a “buy strategy” instead of a “make” one.

Securitization has had a significant impact as catalyser of the generating process of the financial crisis by pushing the excessive indebtedness of households, while contributing to the rapidity and intensity of its transmission. This phenomenon has greatly reduced the incentives of the units securitizing assets to review its value and the risk involved by holding them. The systemic consequences of securitization considered benign *ex ante* by supervisory authorities (“the market knows better”) proved to be devastating *ex post* (“no one knows”). In particular, the ensuing discharge of banks’ responsibilities encouraged their excessive leverage that was a crucial precondition of the crisis (Fisher, 1933, Minsky, 1982, and many recent contributions). The securitisation process has also increased in consequence of banks’ regulatory arbitrage to reduce the capital absorbed by credit risk transferring the loans/mortgages exposure from the banking book to the trading book (Minton, Sanders, Strahan, 2004; Panetta, Pozzolo, 2010).

From the point of view of propagation, the growing importance of securitization-based structured finance in the balance sheets of economic units increased the rapidity and strength of contagion originating a generalized balance sheet recession (Koo, 2011). In particular, within such an environment, the agents playing a role within the securitisation

process can bring about a generalized lack of liquidity (Basel Committee on Banking Supervision, 2008) and, consequently, increase the exposure of the economic units to systemic risk.

This first part describes the historical experience from the 1970s to its role in generating the speculative exposure before the beginning of the crisis. To gather all the critical contributions of the financialization of credit through these asset tranches, we explore the agents involved and its different steps. A review of theories presenting expected benefits and critical issues follows. Finally, we discuss how regulation has introduced incentives to securitizations and how it could be reformed to minimize future negative impacts.

3.1 A History of Securitization

Securitization is the creation and issuance of debt securities, or bonds, whose payments of principal and interest derive from cash flows generated by separate pools of assets. Financial institutions and businesses of all kinds use securitization to immediately realize the value of a cash-producing asset. These are typically financial assets such as loans, but can also be trade receivables or leases. In most cases, the originator of the asset anticipates a regular stream of payments. By pooling the assets together, the payment streams can be used to support interest and principal payments on debt securities. When assets are securitized, the originator receives the payment stream as a lump sum rather than spread out over time. Securitized mortgages are known as mortgage-backed securities (MBS), while securitized assets (non-mortgage loans or assets with expected payment streams) are known as asset-backed securities (ABS).

The first mortgage-backed securities arose from the secondary mortgage market in 1970. Investors had traded whole loans, or unsecuritized mortgages, for some time before the US Government National Mortgage Association (GNMA), also called Ginnie Mae, guaranteed the first mortgage pass-through securities that pass the principal and interest payments on mortgages through to investors. Ginnie Mae was soon followed by Fannie Mae, a private corporation chartered by the federal government, along with Freddie Mac, to promote

homeownership by fostering a secondary market in home mortgages. Pass-throughs were a dramatic innovation in the secondary mortgage market. The whole-loan market, the buying and selling of mortgages, was relatively illiquid. This presented a risk to mortgage lenders who could find themselves unable to find buyers if they wanted to sell their loan portfolios both quickly and at an acceptable price. Holding the loans also meant exposure to the risk that rising interest rates could drive a lender's interest cost higher than its interest income. But trading whole loans meant a raft of details and paperwork that made the business relatively costly. MBS changed that. By combining similar loans into pools, the government agencies are able to pass the mortgage payments through to the certificate holders or investors. This change made the secondary mortgage market more attractive to investors and lenders alike. Investors now had a liquid instrument and lenders had the option to move any interest rate risk associated with mortgages off of their balance sheet. Growth in the pass-through market inevitably led to innovations especially as originators sought a broader MBS investor base. In response, Fannie Mae issued the first collateralized mortgage obligations (CMO) in 1983. A more complicated twist on pass-through, CMOs redirected the cash flows of trusts to create securities with several different payment features. The central goal with CMOs was to address prepayment risk—the main obstacle to expanding demand for pass-throughs. Prepayment risk for MBS investors is the unexpected return of principal stemming from consumers who refinance the mortgages that back the securities. Households are more likely to refinance mortgages when interest rates are falling. As this translates into prepayment of MBS principal, investors are often forced to reinvest the returned principal at a lower return. CMOs accommodate the preference of investors to lower prepayment risk with classes of securities that offer principal repayment at varying speeds. The different bond classes are also called tranches (a French word meaning slice). Some tranches can also be subordinate to other tranches. In the event loans in the underlying securitization pool default, investors in the subordinate tranche would have to absorb the loss first.

The first asset-backed securities (ABS) date to 1985 when the Sperry Lease Finance Corporation created securities backed by its computer equipment leases. Leases, similar to

loans, involve predictable cash flows. In the case of Sperry, the cash flow comes from payments made by the lessee. Sperry sold its rights to the lease payments to an SPV. Interests in the SPV were, in turn, sold to investors through an underwriter. Since then, the market has grown and evolved to include the securitization of a variety of asset types, including auto loans, credit card receivables, home equity loans, manufactured housing loans, student loans and even future entertainment royalties. Credit card receivables, auto and home-equity loans make up about 60 percent of all ABS. Manufactured housing loans, student loans and equipment leases comprise most of the other ABS. And the industry continues to look for new assets to securitize such as auto leases, small-business loans and "stranded cost recovery" ABS.

From the end of the 1980s, in order to improve the liquidity and tradability of securitizations (originally for corporate loans, then mainly for mortgage backed security markets), a new kind of structured asset-backed security, the collateralized debt obligations (CDO) were issued. A CDO is an asset-backed security whose underlying collateral is typically a portfolio of bonds or bank loans. The typical collateral for these assets are structured finance securities (such as mortgage-backed securities, home equity asset-backed securities, commercial mortgage-backed securities), leveraged loans, corporate bonds, real estate investment trust (REIT) debt; commercial real estate mortgage debt. For the number and complexity of underlying assets, the fair pricing of CDOs has been always a puzzle, imperfectly calibrated with Gaussian one-factor model, whose spreads were not consistent (Guegan, Houdalin, 2005). According to Rajan (2008) rather than reducing risk through diversification, CDOs and other derivatives spread risk and uncertainty about the value of the underlying assets more widely.

In this structure, the special purpose vehicle buys the securitization outcomes to issue different kinds of notes of various seniority (new figure 1).

Figure 1 about here

In the US, the Federal mortgage agencies (including Freddie Mac, Fannie Mae and Ginnie Mae) are currently funding more than 90% of US mortgages, and as a result are crowding out any near-term recovery in private-label issuance. Indeed, US non-agency issuance fell from USD2.2 trillion in 2006 to a mere USD129 billion in 2010. This 2010 non-agency issuance figure was largely confined to the relatively vanilla segment of ABS (asset-backed securities, excluding mortgages) - in most part made up of auto loans and student loans. In 2010, issuance of CDOs and home equity loans (HEL) in the US were almost negligible compared to the peaks reached in 2006.

Figure 2 about here

Prior to the global financial crisis, benign economic and financial conditions fuelled an explosion in global securitization issuance, peaking at around USD4 trillion in 2006. Following the crisis, issuance of private-label securitization slumped. Although there have been some signs of a re-emergence in European issuance in 2010, key segments of the securitization market continue to rely on support from the ECB's liquidity program, and is aptly named "retained" issuance.

Figure 3 about here

3.2 The Network Topology of Securitization

Securitizations require a complex network of interconnections among agents who play different roles, with heterogeneous contributions to risk allocation and, consequently, to contagion. There are four steps in a securitization:

- (i) A Special Purpose Vehicle (SPV) is created to hold title to assets underlying securities;
- (ii) the originator or holder of assets sells the assets (existing or future) to the SPV;

- (iii) the SPV, with the help of an investment banker, issues securities which are distributed to investors;
- (iv) the SPV pays the originator for the assets with the proceeds from the sale of securities.

Securitization is a process involving different agents, who can be differently exposed to securitization risks and returns. Some of these agents are commercial banks, some investment banks, some are financial firms, and service companies, such as rating agencies.

The Originator is the entity on whose books the assets to be securitized exist. It is the prime mover of the deal i.e. it sets up the necessary structures to execute the deal. It sells the assets on its books and receives the funds generated from such sale. In a true sale, the Originator transfers both the legal and the beneficial interest in the assets to the SPV. The assets used in securitizations are created or originated in a number of ways. When a lender extends a loan or acquires another revenue-producing asset such as a lease, they are creating assets that can be securitized. Other assets, such as the balances due on credit card accounts or a corporation's accounts receivable can also be securitized. Asset features and their correlation is a critical issue to determine the securitization tranche risk and the potential contagion it can transfer to other financial assets (Hoesli, Reka, 2011). Because they initiate the securitization chain, the lenders, credit card companies and others are also called originators. Originators often retain a connection to their assets following a securitization by acting as a servicer - the agent collecting regular loan or lease payments and forwarding them to the SPV.

The Special Purpose Vehicle (SPV) is the entity, which would typically subscribe the assets, typically loans and mortgages to be securitized, from the Originator. The SPV is often a low-capitalized entity with narrowly defined purposes and activities, and usually has independent trustees/directors. As one of the main objectives of securitization is to remove the assets from the balance sheet of the Originator, the SPV plays a very important role as much as it holds the assets in its books and makes the upfront payment for them to the

Originator. The SPV can either be a trust, corporation or form of partnership set up specifically to purchase the originator's assets and act as a conduit for the payment flows. Payments advanced by the originators are forwarded to investors according to the terms of the specific securities. In some securitizations, the SPV serves only to collect the assets which are then transferred to another entity, usually a trust, and repackaged into securities. Individuals are appointed to oversee the issuing SPV or trust and protect the investors' interests. The originator, however, is still considered the sponsor of the pool. This is a crucial agent which could ease the contagion when the counterparty risk, inevitably high for new companies with high leverage ratios, is perceived and the collateral value collapse, for the deleveraging effect.

Underwriters serve as intermediaries between the issuer (the SPV or the trust) and investors. Typically, the underwriter will consult on how to structure the ABS and MBS based on the perception of investor demand. The underwriter may, for example, advise the SPV to issue different tranches each with specific characteristics attractive to different segments of the market. Underwriters also help determine whether to use their sales network to offer the securities to the public or to place them privately. Perhaps most importantly, underwriters assume the risk associated with buying an issue of bonds in its entirety and reselling it to investors.

Investors may be in the form of individuals or institutional investors like financial intermediaries, or institutional investors (such as mutual funds, pension funds, insurance companies). They buy a participating interest in the total pool of receivables and receive their payment in the form of interest and principal as per agreed pattern.

The Obligor is the Originator's debtor (borrower of the original loan). The amount outstanding from the Obligor is the asset that is transferred to the SPV. The credit standing of the Obligor is of paramount importance in a securitization transaction.

The Administrator collects the payment due from the Obligor/s and passes it to the SPV, follows up with delinquent borrowers and pursues legal remedies available against the defaulting borrowers. Since it receives the installments and pays it to the SPV, it is also called the Receiving and Paying Agent.

The Agent and Trustee accepts the responsibility for overseeing that all the parties to the securitization deal perform in accordance with the securitization trust agreement. Basically, it is appointed to look after the interest of the investors.

The Structurer is responsible as structurer for bringing together the Originator, credit enhancer/s, the investors and other partners to a securitization deal. It also works with the Originator and helps in structuring deals.

Dealers play an important role once an issue is initially distributed. For most bond investors, liquidity is an important characteristic. By offering prices at which they will buy or sell bonds to the investment community, dealers provide this service. Bonds typically trade more actively closer to their date of issue. Because bond investors, usually institutional investors such as pension funds and insurance companies, hold most bonds to maturity, trading in bonds declines as they draw nearer to their stated maturity date. The issuance volume of a certain bond, a bond's credit rating and whether it was issued publicly or privately can also affect liquidity. All ABS and MBS are traded on the dealer-based, over-the-counter markets so liquidity depends in part on the ability and willingness of dealers to maintain an inventory, or make a market, in a certain bond.

The Rating Agency: Since the investors take on the risk of the asset pool rather than the Originator, an external credit rating plays an important role. The rating process would assess the strength of the cash flow and the mechanism designed to ensure full and timely payment by the process of selection of loans of appropriate credit quality, the extent of credit and liquidity support provided and the strength of the legal framework. Virtually all ABS and MBS are rated by independent rating agencies whose analyses is watched closely by investors as a guide to the credit quality of the securities. In almost all cases, rating agencies monitor the performance of the securities on an ongoing basis.

3.3 Rating and securitization

The diffusion of ratings in financial markets can be explained with different rationales: from the asymmetric information (Tang, 2006) to the theory on certification and experts'

incentive starting (Lizzeri, 1999, and Holmström, 1999); from the bank regulation literature underlying investor-protection (Bryant, 1980, and Diamond and Dybvig, 1983) to the channels based upon regulation, coordination and information (Boot et al. 2006; Manso, 2011, and Elendner, 2012).

Along with the explanatory variables of the demand for ratings, a stream of literature has found out incentives and potential conflicts of interests affecting rating agencies. Within a static framework, if rating fees are paid before ratings are publicized, the rating agencies has no particular incentive neither to exert effort to gather its private information, nor to publicize ratings that are correlated with its private information. In contrast, within a dynamic framework, reputation can incentivize a rating agency without commitment power to publicize reliable ratings.

The rating of securitized credit tranches is a fundamental step of the process to issue structured financial products. Within an information asymmetries framework, some investors are not able to assess for themselves the value of the debt securities issued by the SPV, but must rely instead on credit ratings provided by supposed independent parties. Moreover, in some models there is another extreme assumption, based on the idea that securities can be sold in the primary market at yields that reflect only their ratings. This role has increased along with the diffusion of securitizations. According to the Financial Times (December 6, 2007) 'for many investors ratings have served as a universally accepted benchmark', and 'some funds have rued their heavy dependence on ratings'. Not only did investors rely on ratings judgments. Regulators also did trust on the reports of the rating agencies. Some of them, candidly said: 'As regulators, we just have to trust that rating agencies are going to monitor CDOs and find the subprime [...] We can't get there. We don't have the resources to get our arms around it' (Kevin Fry, National Association of Insurance Commissioners, International Herald Tribune, June 1, 2007). Even investment bankers recognized their over-confidence in ratings' decisions.

This is consistent with the evidence of Cuchra (2005) who reports that ratings explain 70-80% of launch spreads on structured bonds in Europe. This role was even greater than in the case of corporate bonds issuance, as already proved by Gabbi and Sironi (2005).

The rating agencies role within the securitization process can therefore hardly be explained as a way to reduce information asymmetries between experts and investors, especially retail ones.

The traditional business of rating agencies is the rating of corporate and sovereign bonds. This is based on a combination of analysis and judgment. According to Hull (2010), the rating of structured products was a departure from this traditional business. Instead of analysis and judgment, it involved the application of a model. In case of performing loans, to generate a rating the agency needs to estimate the probability of default, and the recovery rate, in order to determine the expected loss. This implies that rating agencies need to use a credit model, usually well known by the players involved in the securitization process (Fitch Ratings, 2004, Moody's Investors Service, 1996, Standard & Poor's, 2005).

Hull and White (2012) observe that the ratings criteria used by two of the ratings agencies (Standard and Poor's and Fitch) are supposed to reflect the probability of default but not the possible severity of the investor's loss in a default, which introduces anomalies into the rating process. The default-risk-only criterion is shown to fail the requirements for a risk measure to be "coherent," which means that the structuring process allows for profitable credit arbitrage.

A measure of expected default loss takes no account of the states of the world in which the losses occur. The investment banker may profit then by selling securities whose default losses are allocated to states with the highest state prices per unit of probability. Rating agencies, by providing information about probabilities of default or expected default losses, are providing information about the total risk of the securities that they rate. Although it has been well known for over forty years that equilibrium values must depend on measures of systematic rather than total risk, this insight has not so far affected the practices of the credit rating agencies. The failure of the credit rating agencies to recognize the distinction between total and systematic risk creates an opportunity for investment banks to exploit by designing collateral and security characteristics to raise the systematic risk of the securities they issue above that of corporate securities with similar (total) default risk on which the credit ratings are based.

The securitization process requires three steps:

- a) The due diligence of the originator;
- b) The historical performances
- c) The main portfolio features.

All these steps contribute to the fees paid by the securitization tranche issuers. Originally the credit rating agencies used a “user-pay model.” Ratings were published in books that were issued monthly and sold to users of ratings such as investors. With the development of data copying, this business model was no longer viable and the rating agencies switched to an “issuer-pay model.” This means that the services of rating agencies are now paid for by the issuers of bonds, not by the investors and other market participants that use those services. This creates an obvious potential conflict of interest in which the issuer refuses to pay for a rating unless the rating is satisfactory to the issuer. The main constraint on this potential conflict of interest is that the ratings business is a reputation-based business. The only reason investors rely on ratings is that the rating agencies have a long history of producing reasonably reliable ratings. As long as the reputation is maintained, the ratings business provides an ongoing stream of revenue from new ratings.

The reputation also acts as a barrier to entry since new entrants would presumably have to operate at a loss for some time while developing their own reputation.

If the issuer decides not to pay, the agency may issue an unsolicited rating. Issuers might fear that such an unsolicited rating will be worse than the solicited rating and so pay for the rating. The evidence is that unsolicited ratings are most often issued for poorer quality borrowers and so tend to be lower than average. There is also some evidence that unsolicited ratings are less than solicited ratings for firms with similar financial statements. These considerations explain the increasing number of issuance (and ratings) from 2000 to 2006.

Figure 4 about here

A problem with rating arises when the information is delivered by more than one agency. Within a pure competitive framework, investors could obtain more information with many suppliers, but the room for rating shopping increases when issuers can choose which rating to publicize (Bolton et al., 2011, Skreta and Veldkamp, 2009). When disclosure of rating is mandatory and issuers can obtain multiple ratings, they will be more concerned about the total amount of information provided by the CRAs' ratings. As a result it can be optimal for each single CRA to reduce the accuracy of its rating (Bouvard and Levy, 2012). Nevertheless, during the securitization boom period (2000 – 2006), not only the number of rating assigned by rating agencies exponentially increased, but also the number of AAA ratings assigned by more than one agency. Next table shows the number of ratings given by S&P and Moody's and their differences.

Table 1 about here

The creation of tranches with AAA ratings was the key to the success of the securitization of subprime mortgages during the 2000 to 2006 period. Indeed, the profitability of a securitization to the structurer depended critically as the volume of AAA-rated tranches that were created. This helps to explain the popularity of re-securitizations and re-re-securitizations. These rules often specify that the credit rating of instruments must be above a certain level, and sometimes that the credit rating must be AAA. There is a limited supply of AAA-rated corporate and sovereign bonds in the world. The artificial creation of almost unlimited amounts of AAA-rated securities from the securitization of mortgages was therefore attractive to many fund managers.

The nature of the products that were created from subprime mortgages is explained in Gorton (2007). One of the objectives of designers of the products appears to have been to maximize the volume of AAA-rated securities created from a given pool of mortgages. This maximized the regulatory-arbitrage and spread-arbitrage benefits obtained from the securitization. Also, as already mentioned, AAA-rated securities were relatively easy to sell in the market. Was a AAA-rated tranche equivalent to a AAA-rated bond? If the rating

agencies applied their criteria appropriately, one dimension of the loss distribution of a AAA-rated tranche was the same as that of a AAA-rated corporate bond, but other aspects of the loss distribution were liable to be quite different. For example, if they have the same probability of suffering a loss they are liable to have different expected losses. Consider a bond and a thin tranche, both rated BBB by S&P or Fitch. They will have approximately the same probability of default. However, in the case of the bond, the expected loss in the event of default is about 60% whereas, in the case of the tranche, it is almost 100%.

There are other reasons why investors should have been wary of regarding a AAA bond as equivalent to a AAA tranche. As pointed out by Coval et al. (2009), AAA-rated tranches have high systematic or market risk. They tend to lose money when the market as a whole performs very poorly and there are many defaults. AAA-rated bonds do not have as much systematic risk. The issuing firm may default because the market as a whole performs very poorly or for firm-specific reasons. Investors require compensation for bearing systematic risk. For this reason, even if the loss distribution for a AAA-rated bond and a AAA-rated tranche were exactly the same, the two securities would not be valued in the same way. The AAA-rated tranche would have a lower price and a higher rate of return. Another difference concerns the probability of downgrade. As explained earlier, structurers knew the models used by rating agencies and were able to show proposed structures to rating agencies before creating them.

The crisis taught that resecuritization was badly flawed idea. In the future only one level of securitization is likely to be tolerated by investors. There is clearly something wrong when \$90 of AAA-rated securities cannot be created directly from a \$100 portfolio of mortgages, but financial engineers find a way to create it indirectly. It might be argued that two levels of securitization can be justified if there are extra diversification benefits. However, two levels of securitization are not necessary to realize the full benefits of diversification.

Using a portfolio such as this for a simple "pass-through" (where there is in effect one tranche created) would have no added value. Investors could create the return for themselves by creating a portfolio that was equally divided between a mortgage pass-through, an auto loan pass-through, a credit card receivables pass-through, and a

corporate debt pass-through. The huge losses during the credit crisis were as a result of the steep decline in US house prices. This suggests that it is dangerous to tie a securitization to one asset class (particularly one dependent on the price of a single good) and reinforces the arguments in favor of using well diversified pools of assets. If investors insisted on diversified pools, it would not be possible for any one asset class to dominate the securitization market as it did prior to the credit crisis. This could be an added advantage.

Moving forward, transparency is an important goal. When the way in which a product works is clear to the market, it is likely to retain its liquidity in stressed market conditions. (Single-name credit default swaps continued to trade actively throughout the crisis because all market participants understood how they worked.) Restricting securitizations to one stage should improve transparency. Another suggestion here is that issuers should be encouraged to provide software for their waterfalls. This software could be structured to make it easy for purchasers of tranches to quickly compute their returns in different scenarios.

The implications of the role played by rating agencies before the crisis within the securitization process, particularly before the crisis, demonstrates how the conflicts of interests are implied in the issuer-pays model and, at the same time, in the private ownership of rating agencies where a more competitive market introduces a rating shopping behaviour, far from the expected information asymmetry reduction behind the rationales explaining the rating demand.

A first solution could be based on a regulatory intervention to impose an investor-pays model. This can solve both rating inflation and the conflicts of interest stemming from the issuer-pays model. However, this could create free-riding among investors. Furthermore, absent the conflicts of interest, moving from issuer-pays to investor-pays model can reduce social welfare as shown by Stahl and Strausz (2010). In addition, the investor-pays model might create its own conflicts of

interest between investors and rating agencies (SEC, 2012). Instead of choosing a unique model between the issuer-pays and the investor-pays model, one can encourage competition between the two different models by creating a level playing field.

A second, and in our view more convincing solution, would be the opportunity of building a public certification institution, even though at this time, it is unclear whether the net social cost related to setting up a public rating agency, which would be needed to build up credibility and reputation, would be inferior to the social cost related to using already established private agencies. In any case, the incentives and rating criteria guiding a public rating need to be carefully designed to make its ratings credible to investors and desirable to issuers.

Finally, it should be considered the opportunity of eliminating the regulatory references to ratings (already done in the US by the Dodd-Frank Act). This decision could induce investors themselves to gather more information and to be less naïve (Kurlat and Veldkamp, 2012) and would eliminate the regulatory incentive to design securitizations aimed at getting the best ratings, saving capital.

3.4 A critical analysis of Securitization: Pros and Cons

Economic and financial literature finds out the securitization process comparing expected advantages and disadvantages.

According to securitization “sponsors”, there are some rationales to support the securitization as a financial strategy to calibrate the risk/return profile of credit portfolios originated by commercial banks. The existence of a liquid secondary market for home mortgages and other financial debt instruments increases the availability of capital to make new loans. This increases the availability of credit. Securitization also helps to decrease the cost of credit by lowering originator’s financing costs by offering lenders a way to raise funds in the capital market with lower interest rates. Finally, securitization reallocates risk by shifting the credit risk associated with securitized assets to investors, rather than leaving all the risk with the financial institutions

Disadvantages may be found within either a banking framework based on information asymmetries, where securitization introduce incentives to reduce credit monitoring, or the economic and law approach, which could help to identify more critical issues against the financialization process and its responsibility in the income and wealth distribution.

3.4.1 The expected advantages

Pennacchi (1988) pointed out that securitization was going to be a fundamental change in the commercial banking business. It allows banks and also non-financial firms to obtain liquidity from assets that, otherwise, cannot be sold in liquid markets. Credit firms can issue a covered bond referenced to a mortgage or (more commonly) to a portfolio of mortgages instead of holding them in the balance sheet for their whole maturity (i.e. during 30 years). Alternatively, banks could also sell the mortgage or a part of the whole mortgage portfolio to a SPV that, at the same time, funds the transaction selling mortgage-based bonds (such as residential mortgage backed securities, RMBS) to institutional or retail investors (Piskorski, Seru, and Witkin, 2013). Therefore, securitization allows banks to transform into liquidity assets that otherwise would be stuck on the balance sheet until their maturity. With the new funds raised, they can increase lending. At the same time, risk transfer has increased significantly thanks to securitization. In fact, some banks are becoming more and more mere originators of loans and distributors of their risk: soon after the loan has been granted, it is packaged into a bundle of other mortgages, given a risk assessment by a rating agency and sold out through ABS. Securitization is, thus, shaping a new type of banking, one where relationship with the customer is fading in favor of a transaction-based bank where its main proceeds come from the fees they earn originating and packaging loans.

The public benefits of securitization are evident in a number of ways. Chief among these is the contribution of securitization to lower borrowing costs both for individuals and corporations. This advantage is especially related to “traditional” securitization, where the assets are more frequently non-performing loans. The existence of a liquid secondary

market for home mortgages increases the availability of capital to make new home loans. Financial institutions that realize the full value of their loans immediately can turn around and re-deploy that capital in the form of a new loan. This is often the most efficient way to raise new funds in the capital markets and the savings are passed on to the borrower. Consumers other than homebuyers also benefit from lower borrowing costs. Securitization can lower a firm's financing costs as well. MBS and ABS are often designed to carry a higher credit rating than the originating firm would otherwise realize for other types of bonds. Higher credit ratings mean the security is less risky and translates into a lower interest rate for the originator as investors do not demand the same risk premium. The originator passes the savings on to the consumer in the form of lower lending rates. Securitization also aids in the geographic dispersion of capital to areas that may otherwise be deprived of credit options. Traditionally, depository institutions have provided credit in the areas where they accepted deposits. By securitizing loans, however, the lender generates capital for new loans that may come from a different location. This linkage to the capital markets broadens the range of regions where depository institutions obtain capital to provide credit. By subjecting the lending decisions of financial institutions to valuation by the capital markets, securitization also encourages an efficient allocation of capital. Financial institutions and others who securitize assets depend, of course, on investors. Investors seek an appropriate return based on a level of risk. If the asset pools are not of a sufficient quality, for example, investors will demand a higher interest rate as compensation. At its most basic level, securitization is the process of isolating risk and repackaging it for investors. This increases efficiency in the capital market by removing intermediary steps between investors and the risk they are assuming. A money manager, for example, may be interested in a mortgage-backed bond that pays interest and principle on a monthly basis, but not in the debt securities issued by the originator of the securitized assets. Securitization reallocates risk at many levels. By shifting the credit risk of the securitized assets (for a price) to ABS and MBS investors, financial institutions can reduce their own risk. As the risk level of an individual institution declines, so does systemic risk, or the risk faced by the financial system overall.

Reducing the return/risk ratio of credit and financial portfolios, banks are allowed to save regulatory capital. Within the Basel I framework, that capital was a very rough function of the level of risk held in their assets. For instance, a loan to a firm needed 8% of capital, no matters what the risk of the firm was. That is one of the main reasons why banking supervisors engaged in 1999 in a thorough revision of the current capital regulatory framework. That process ended up in the so-called Basel II framework, in which the capital requirements of banks will be better aligned with the risk profile of their portfolios. In this way, they will be obliged to hold a higher level of capital for loans granted to high-risk borrowers. However, thanks to securitization it is possible that banks sell a part of those loans (in particular that of better quality) and with the proceeds, lend to riskier borrowers so as to increase the expected returns of their portfolio with no change in capital requirements. This would be in line with the predictions of Greenbaum and Thakor (1987) that better quality assets will be sold (securitized) and poorer quality assets will be funded with deposits under asymmetric information and without government intervention. Pennacchi (1988) considers bank regulation as one of the incentives to securitize. Calomiris and Mason (2004) and Ambrose, Lacour-Little and Sanders (2005) show that securitization of credit cards and mortgages, respectively, responds to regulatory capital arbitrage. Similarly, Thomas (1999) finds that securitization alleviates the regulatory burden. Actually, this benefit is obtained through synthetic securitizations, whose purpose is to reduce the credit risk within the banking book, save economic and regulatory capital, and increase the counterparty standing.

The structure of synthetic securitizations is described in figure 5.

Figure 5 about here

The junior tranche (or equity tranche) is the riskiest component of credit portfolios (sometimes called first loss). It is usually retained by the sponsor bank. It contains the expected loss. The mezzanine tranche is frequently characterized by different rated assets. To securitize these assets a credit linked note is issued to be distributed among investors

who face the risks losses above the junior tranche. Finally, the super senior tranche has the highest credit enhancement, with a AAA rating. This risk is transferred by the sponsor bank through a credit default swap (CDS), that is an unfunded transaction. The name of this tranche depends on the assumption that it faces only the catastrophic risk.

While the traditional securitization has an originator selling its assets to a SPV which borrows money issuing a bond, in this case the originator buys protection using credit derivatives (particularly CDS), holding its assets in the balance sheet. Synthetic securitizations do not provide liquidity to the originator, only credit protection, which affect the capital absorption.

The benefit of these contracts, under the actual regulation, is that they minimize the cost of capital (figure 6).

Figure 6 about here

As noted above, investors benefit from the legal segregation of the securitized assets. The segregation protects the payment stream on the MBS and ABS from a bankruptcy or insolvency. Higher-rated securitized instruments generally offer higher yields than similar sovereign government issues. The actual size of this yield premium, the yield the securities pay in excess of similar government securities—will depend on the credit quality of the assets and the structure of the transaction. Pension funds—which comprise much of the market for MBS and ABS—pay close attention to this premium as they seek a wide variety of safe fixed income products with attractive yields. Insurance companies, money managers and other institutional investors with needs for fixed-income securities with specific features are also large ABS/MBS investors. The ability of issuers to vary the terms of securities backed by the same asset pool through different securitization techniques also makes MBS and ABS attractive to investors. In a sense, issuers can tailor the coupon, maturity and seniority of a security according to particular investor's needs. This flexibility not only boosts investor interest in ABS and MBS, but also contributes to more efficient capital markets by ensuring investors and money managers have access to the most appropriate securities.

Securitization also benefits the financial institution or corporation that originates the securitized asset. Without securitization, a bank making a home loan usually would hold that loan on its books, recognizing revenue as payments are made over time. To realize the value of the loan immediately, the bank can sell the whole loan to another institution, though this is generally not economical unless the loan is very large. The more efficient option is to pool similar loans together, as discussed above, and enter into a securitization transaction. The process makes even more sense for originators with assets considered illiquid, such as equipment leases or the balance due on a credit card. The latter comprises an asset class called credit card receivables that account for approximately 20 percent of outstanding ABS. Similar to banks securitizing home loans, credit card companies are able to use the securitization process to provide more credit and manage their balance sheets. Originators realize another benefit from securitization as the transfer of the asset to an SPV removes it from the firm's balance sheet. This can help the originator improve certain measures of financial performance such as return-on-assets (ROA). A way to gauge a firm's efficiency, ROA tells observers how many dollars are earned for every dollar of assets. Moving an asset off of the balance sheet while simultaneously increasing income has a positive effect on ROA and demonstrates to investors a more efficient use of capital. Banks realize a unique advantage from securitization. Removing loans from their balance sheet can lower regulatory capital requirements, or the amount and type of capital banks must hold given the size of their loan portfolio, to reflect lowered risk. The segregation of assets that takes place in a securitization can also effectively lower the firm's financing costs. This occurs when the securities issued by the SPV carry a lower overall interest rate than the originating firm pays on its debt. As the firm receives the proceeds from the securitization it has, in effect, achieved cheaper financing than might have been extended to the firm based solely on its own credit rating.

3.4.2 Issues against Securitization

This “originate to distribute” model is not free of risks as the recent turmoil in financial markets has shown. There many problems. The first one is the incentives that the lender has to properly screen and monitor borrowers, since it is going to get rid off the credit risk quickly. As Gorton and Pennacchi (1995) pointed out earlier, a bank selling loans must continue to convince loan buyers of its commitment to evaluate the credit quality of borrowers by maintaining a portion of the loan’s risk. That makes asset securitization incentive compatible. The fact that some loan originators might have shed off all the credit risk in a loan securitization made the lack of confidence from investors in those ABS an accident to happen.

The second problem is an excessive reliance on the wholesale market to fund lending growth. The fact that the alternative “originate-to-hold” model has been eroded during the last years makes even more compelling to understand why do banks securitize.

Moreover, banks have been driven by the regulatory arbitrage, aimed at saving capital, especially switching assets from the banking to the trading book, which was less expensive with the respect the credit risk, particularly the migration factor.

Theories against securitization can be compared as follows.

Securitized involve substantial one-off costs. These include consultancy and organizational costs related to the bundling and tranching of loan portfolios, payments to the agencies responsible for assigning a rating to the different tranches, underwriting fees, and legal expenses. According to Davidson et al. (2003), for example, the upfront costs of a typical securitization can easily exceed US\$ 1 million, mainly from legal fees and from those due for structuring and arranging the operation. Many of these costs are relatively fixed, and so they bear more heavily on small banks, which should therefore be less likely to use CRT techniques.

Because banks have private information on the quality of their loan portfolio, outside investors will require a lemon discount on the price of the assets that are sold (Gorton and Pennacchi, 1995). The securitized assets are therefore likely to be underpriced relative to the book value of the loans. According to this hypothesis, banks that pay a lower lemon discount should be more likely to securitize their assets. The discount is likely lower if (i)

the bank can credibly certify the quality of the assets it is selling (Focarelli et al., 2008); (ii) private information is less relevant because the loans are less opaque or more standardized; (iii) the loss given default is lower, for example because the loans are collateralized. Thus, banks that in previous years had a lower level of charge-offs and problem loans – which are likely to enjoy a higher reputation and hence can credibly advocate a superior ability in screening and monitoring borrowers – will be more likely to securitize their assets. The probability to use CRT techniques should also be higher for banks with a larger proportion of credit card receivables, automobile loans and mortgages, which are less subject to asymmetric information (because of their high degree of standardization) and have lower loss given default (because of their high degree of collateralization). Listed banks might also pay a lower lemon discount, since their balance sheets are typically under close scrutiny by external analysts.

More recently, Keys et al (2010) demonstrate that banks often rely on borrowers' credit (FICO) scores in order to make lending decisions, and there are particular score thresholds, such as 620, below which it is hard to get a loan. KMSV argues that securitizers also use FICO score thresholds when deciding which loans to buy from banks. Loan applicants just to the left of the threshold (FICO of 619) are very similar to those just to the right (FICO of 621), but they differ in the chance that their bank will be able to sell their loan to securitizers.

A securitizing bank may have an incentive to retain a significant share of credit risk, in order to signal the quality of the assets (Pennacchi, 1988; Gorton and Pennacchi, 1995). However, de facto for many investors information on the risk retained may be difficult and costly to obtain, leading to imprecise estimates of the bank's overall credit risk. As the subprime mortgage crisis has made clear, uncertainty on the true degree of risk of bank assets can lead to severe funding problems. These problems are likely to be more pronounced for banks with a larger share of short term liabilities and wholesale liabilities, which are subject to frequent rollover on markets that tend to be highly sensitive to issuers' conditions. Hence, under this hypothesis, the probability to use CRT techniques should be negatively correlated with the share of (i) short term liabilities and (ii) interbank liabilities

(as a more intense use of these instruments would imply higher transparency costs for the securitizing bank). Ex-post, the lower transparency of the bank's assets due to the securitization should increase the cost of these funding sources, thus inducing the securitizing banks to reduce their weight over total liabilities.

Differences in supervisory and regulatory regimes are likely to influence the costs and benefits that banks face in securitizing their loans. While specific information on the regulatory treatment of securitizations are not available for a sufficiently wide set of countries, this hypothesis can still be tested using a set of proxies of the stringency of each country's regulatory framework, such as the type and number of bank supervisory authorities, the presence of regulations or guidelines on portfolio concentration and the degree of disclosure of off-balance sheet activities (Barth et al., 2004).

3.5 Financial Regulation and Securitization

3.5.1 The regulation before the crisis

The capital treatment of securitization transactions has been one of the most difficult areas to be determined in the new framework. This is reflected by the fact that from the initial phases of development of the framework, securitizations were dealt as a separate issue, and that number of publications solely related to the theme were issued by the Basel Committee, where the final publication contains chapters exclusively dedicated to securitization.

The treatment of securitization within the Basel 2 framework suffered from the idea that the process was able to transform credit risk exposures into a portfolio exposed to market risk able to originate liquidity useful for financial institutions. Moreover, financial rules were apt to introduce arbitrage opportunity both for banks adopting standardized methodologies and for those validated with their internal models.

The key issues that made securitizations a difficult area for the Basel Committee were:

1. The inherent level of complexity existing in securitization transactions and the fact that there is little standardization. It is worthy to note that, albeit in an implicit way, Basel II analyses securitization as either a risk transfer tool or a funding tool, and tend to disregard the other potential drivers. In order to accommodate transactions which are neither risk transfer nor funding, Pillar 2 provides certain level of discretion to supervisory authorities in the application of the rules. This discretion was biased by the incapability to model the risk within a macro-prudential framework.
2. The fact that supervisory authorities, and law-makers, have adopted different approaches to securitization transactions.

3.5.2 The regulation after the Crisis

Proposed Basel III liquidity requirements are likely to limit future demand for securitized products by the banking sector, which has traditionally been the largest investor in the asset class. In its present form, Basel III banking regulations propose that Asset Backed Securities (ABS) be excluded from the list of securities eligible for meeting the proposed Liquidity Coverage Ratio (LCR) and the Net Stable Funding Ratio (NSFR). In this context, ABS comprise all collateralised securities, including mortgage-backed issues. In contrast, covered bonds and highly rated corporate bonds attract a more favourable risk weighting. With banks thought to comprise more than one-third of the securitization investor base, Basel III reforms are likely to lead to a reallocation in investor demand away from structured-finance securitization and toward covered bonds. While the liquidity ratio requirements are not slated for implementation until 2015, it is possible that they could be incorporated into the upcoming EU Capital Requirements Directive (CRD IV) to support bank stress-testing as early as 2012. Stricter capital requirements for insurance companies contained in Solvency II are also likely to temper investor demand for securitization.

On the monetary policy point of view, central banks have begun tightening the collateral criteria for securitized products they deem acceptable in their repo operations. In January 2011, the European Central Bank (ECB) raised the haircut applicable to ABS (asset backed securities, including mortgage-backed securities) from 12% to 16%. In addition, to be eligible for repo from March 2011 on, ABS will need to carry two triple-A ratings at issuance, and a single A rating over the life of the security. By mid-2012, the ECB also plans to implement “loan-level reporting requirements” for ABS it accepts in its repo operations, and the Bank of England is expected to implement a similar “loan level data initiative” by the end of 2011. While these loan-level initiatives are likely to improve disclosure and transparency within the securitization market, the general tightening in collateral eligibility criteria may further deter banks from investing in securitized products in order to generate liquidity. There have been suggestions by some market analysts that the ECB’s implicit funding of the securitization market could inhibit a full recovery in private-label issuance. Until such a time that liquidity support and government guarantee programs are scaled back, a revival in European and US private-label issuance is likely to be limited.

3.6. Concluding remarks

The analysis of the theories and practice behind the securitization process allows to underline some key points:

- a) from the end of the Eighties to 2006, the process of credit risk transfer (CRT) has exponentially increased, along with the opportunity to save capital, increase liquidity and being at the same time compliant with the “prudential regulation” introduced in 1988;
- b) the securitization process creates a series of links among agents, where rating agencies play a relevant role to improve the circulation, and sometimes the misevaluation, of assets (Barre, Raybaut, Torre, 2009);
- c) securitizations were originally balanced in terms of collaterals, quality and maturities; with the explosion observed during the first half on the last decade, CDO collateral became dominated not by loans, but by lower level (BBB or A) tranches recycled from other asset-backed securities, whose assets were usually non-prime mortgages;

- d) CDOs were, more than other kinds of securitizations, the mean of a credit risk transfer which helped US banks to transfer the risk to European financial firms and even retail investors, through the exposure of mutual funds;
- e) this allows the issue of contagion among intermediaries within and among countries, which was essentially due to securitizations, and particularly CDOs, even more than credit derivatives (Bedendo, Bruno, 2012). The hypothesis that entering the securitization market would imply an increase of systemic risk factors for any single agent involved in the process was confirmed (even though paradoxically, within a framework aimed at demonstrating a positive contribution of CDOs to risk transfer between banks and markets) by Franke and Krahen (2007) who show that securitization activity by a bank is associated with an increase in the systematic component of the bank's stock return, in terms of beta;
- f) finally, the issue of asymmetric (dis)information between lenders/loan seller and investors is often analyzed within an optimal contract framework. According to Leland and Pyle (1977), the loan seller signals a higher-quality borrower through the costly retention of a larger fraction of the loan. According to Malekan and Dionne (2012) the optimal contract should contain a retention clause in the presence of moral hazard. It is in this spirit that in the next section we find out the role of securitization and information to explain the financial crisis.

4. The nexus between securitisation and contagion and its impact on the Great Recession

Alessandro Vercelli

In this section we explore the nexus between securitization and propagation of financial distress to investigate its crucial impact on the recent subprime crisis. We discuss here exclusively the contributions focused on the impact of information, or lack of it, on the incentives impinging upon individual economic behaviour. Though its scope is quite narrow, this literature provided what has become the mainstream approach in academic and governmental institutions: the "asymmetric information approach" (from now on AIA) to banking and financial crises.

Both mainstream economics and orthodox finance theory aim to explain and predict economic and financial behaviour as a rational response to market signals. It is therefore natural to look at the role of banking and at the recent banking panics in terms of information and incentives. However, if we look at the economic system in this way, i.e. from the point of view of general equilibrium (GE) theory, the very existence of banks becomes a puzzle. In a perfect-competition market where all agents are fully rational and the relevant information available to each of them complete, why should banks exist? The supply of loanable funds should match well the demand of credit directly in the market, guaranteeing the smooth and efficient working of the system without requiring any need of financial intermediation. Therefore in this view the explanation of banks' role and behaviour must be found on some significant deviation from the GE assumptions. In the recent decades (since the early 1970s), the crucial deviation from the GE model introduced to justify the prominent role of banks and to explain their behaviour is the ubiquitous existence of asymmetric information (AI) in financial markets. This assumption has been used to explain many stylized facts observed in financial markets under physiological conditions and also to account for some of their pathologies (banking panics and financial crises).

In section 4.1 we briefly recall the basic principles of the Asymmetric Information Approach (AIA). In section 4.2 we mention the point of view of the mainstream branch of the AIA (from now on A1) focusing on the recent metamorphosis of the traditional model of commercial banking. In section 4.3 we review the main alternative branch of the AIA (from now on A2) that focuses on the emergence and evolution of a parallel banking system often called "shadow banking system". In section 4.4 the role of contagion in the Great Recession is briefly reconstructed. In section 4.5 we discuss the main policy implications of the two main branches of AIA, while in section 4.6 we present a few concluding remarks on the strengths and shortcomings of the AIA.

4.1 The asymmetric information approach

The asymmetric information approach (AIA) recognizes a significant impact of finance on the dynamic behaviour of the economic system (denied by traditional GE theory) by focusing on the different quality and quantity of information available to different parties in financial contracts. In particular borrowers are assumed to have better information than lenders about their own genuine financial position and the investment projects to be financed through the loan. The structural nature of IA is likely to produce significant deviations from optimal equilibrium (see, e.g., Mishkin, 1991, pp.70-71). This depends, first of all, from adverse selection as AI provides a relative advantage to bad quality borrowers (often called “lemons”) over good quality borrowers who could thus withdraw from the market (Akerlof, 1970). Since lenders are unable to discriminate correctly between bad and good borrowers, they charge an average rate of interest that, taking account of the effective risk, is too high for good borrowers and too low for bad borrowers. The ensuing distortions of investment imply a higher degree of systemic risk for the economy as a whole, less aggregate investment, and thus more financial instability and less growth. Lenders react to these circumstances by further increasing the average rate of interest; the latter, however, results in greater adverse selection as well as in credit rationing (Stiglitz and Weiss, 1981). Under these circumstances the higher interest rate does not equilibrate the market even in the case of an excess demand for loans but, on the contrary, further increases disequilibrium. This cumulative out-of-equilibrium process may easily lead to a credit crunch and possibly to a collapse of financial markets (Mankiw, 1986). The exponents of the AIA claim that this cumulative process contributes to explain the recurrence of financial fluctuations and their occasional degeneration in episodes of severe financial crisis (see, e.g., Mishkin, 1991, p.71). In addition, the disequilibrating impact of adverse selection is often reinforced by the increase of moral hazard brought about by an increment of AI. Since lenders cannot easily ascertain the quality of borrowers’ projects, the latter have incentives to engage in projects which increase the expected profits but also the risk of default. The AIA has provided an influential explanation of the prominent role of banks in financial markets. Their main role is seen in a specific ability to reduce AI mitigating many problems raised by adverse selection and moral hazard. In particular, according to the traditional

model of banking, recently christened “originate-to-hold”, banks have an expertise in collecting information about the reliability of borrowers exploiting their lower-cost of monitoring as compared to individuals and their more efficient enforcement of restrictive covenants (Diamond, 1984). This advantage is enhanced by long-term customer relationships such as those entertained by local commercial banks with their clients. Summing up, the AIA supports the traditional idea that banks realize an efficient role of intermediation between saving and investment channelling investible funds in the most profitable directions to promote economic efficiency and growth.

Though the AI school relies as much as possible on market self-regulation, the problems produced by AI cannot be easily solved through market mechanisms. The main market remedy for the lender's risk is the request of an adequate collateral for the loan such that in case of default the value of the loan is covered. This solution, however, requires that the value of the collateral be information-insensitive so that it is unaffected by bad news also in case of unexpected unfavourable conditions of the borrower and/or of the economy at large. This calls for the intervention of specific institutions able to create information-insensitive debt. The private institutions that play this crucial role are banks. So doing they play also an active role in the endogenous process of money creation that provides liquidity to the system whenever it is needed. We will see, however, in section 4.3 that banks play fairly well this role only when the markets are characterized by physiological conditions but not when some sort of pathology develops.

The AIA provides many clues not only for explaining the existence and the crucial role of banks in financial markets and in the economy as a whole, but also for explaining financial fluctuations and their recurring degeneration into serious, sometimes devastating, financial crises. The causal mechanisms brought about by AI are liable to trigger cumulative processes bringing about recurring fluctuations and, under particular circumstances, financial collapse. A crucial triggering factor is an unexpected increase in the rate of interest (see e.g. Mishkin, 1991). Analogously, a stock market crash lowers the value of collaterals enhancing adverse selection and moral hazard and this is likely to lead to financial disruption (see Calomiris and Hubbard, 1990; Greenwald and Stiglitz, 1988).

Financial distress may be induced by any reduction in the net worth of borrowers because they have less to lose by engaging in moral-hazard activities in the hope of defending their declining net worth (Bernanke and Gertler, 1989). Any of the vicious circles mentioned above may be triggered or reinforced by an autonomous increase in AI or by a negative shift of expectations that may depend on exogenous factors. In all these cases the vicious circle generated by AI eventually leads to a reduction of investment explaining how a financial crisis is transmitted to the real economy.

Coming to the subprime financial crisis, the AIA splits between two different basic explanations having radically different policy implications. The crucial divergences between them are rooted in a different understanding of the evolution of banking since the early 1980s, and in particular of the crucial role that the process of securitization came to play in recent years. To simplify the analysis we focus on two polar approaches: the “A1” based on “the originate-to-distribute hypothesis”, and the “A2” based on the “shadow banking system hypothesis”. The first point of view is discussed in the section 4.2 while the second point of view is discussed in section 4.3.

4.2 The process of securitization as a distortion of the traditional banking system: the “originate-to-distribute” hypothesis

According to the prevailing view within the AIA, the ultimate cause of the subprime collapse and the ensuing banking crisis is rooted in the progressive distortion of the crucial role played by banks in the intermediation between lenders and borrowers, a degenerative process started in the early 1980s. In this view the process of securitization progressively transformed the traditional model of banking often called “originate-to-hold” in a new model christened “originate-to-distribute”. In the traditional model banks originate credit by providing loans to investors and hold the right to receive the future payments from the borrowers. Within this model banks are believed to have strong incentives to reduce the problems raised by AI contributing to a beneficial reduction of systemic risk and to a significant increase in the efficiency of financial markets.

In the new model of banking, the credit originated by banks is typically securitized and sold to the market. The bank draws significant advantages from this new strategy but produces at the same time negative externalities for the system as a whole as it shifts the risk to the market eventually increasing systemic risk (see *retro* Chap.2). The incentives of banks to assess accurately the reliability of borrowers, the soundness of their investment projects and the risks involved in lending are significantly weakened since they are not residual claimants on these loans (Gorton, 2008, p. 27). The banks lose their role of intermediation between lenders and borrowers while, in consequence of this process of disintermediation, AI tends to increase enhancing the related pathologies mentioned above. Even the reliability of the balance sheets of banks adopting the new paradigm is jeopardized since the process of securitization is largely based on off-balance-sheet transactions through SPVs and conduits established ad hoc. This further contributes to enhance AI strengthening the vicious circle.

This line of analysis has been adopted by most financial institutions and policy authorities. The Joint Forum (which includes the Basel Committee on Banking Supervision, the International Organization of Securities Commissions, and the International Association of Insurance Supervisors) endorsed this view of the emerging financial crisis as early as in April 2008:

“...under the “originate-to-distribute” model, banks frequently no longer have significant retained exposures, nor have they necessarily retained the personnel specializing in workouts who can steer creditor negotiations (Credit Risk Transfer, April 2008, p.20)... Since 2005, the growth of CRT [CRT] continues to provide banks and securities firms with opportunities to profit from originating, structuring and underwriting CRT products. They can earn fees while not having to hold the associated credit risk or fund positions over an extended time period.” (ibidem, p.41).

In this view the originate-to-distribute model of banking brought about “severe incentive problems, which are referred to as principal-agent problems, or more simply as agency problems, in which the agent (the originator of the loans) did not have the incentives to act fully in the interest of the principal (the ultimate holder of the loan). Originators have every

incentive to maintain origination volume, because that would allow them to earn substantial fees, but they had weak incentives to maintain loan quality..." (Mishkin, February 29, 2008). According to Gorton (2008, p.28) "all the major bank regulators and central bankers appear to subscribe to this view, though their views have differences and nuances". There is, however, an unsolved tension between the policy implications descending from this approach and the effective policy measures taken so far by bank regulators and central bankers (see section 4.5)

4.3 The process of securitization as crucial component of a parallel banking system

A particularly interesting and articulated "vision" of the origin and early stages of the Great Recession focuses on the relationship between securitization and contagion in the shadow banking system (see the contributions of Gary Gorton and his collaborators, in particular: Gorton 2008 and 2009, Gorton and Metrick 2009, Gorton and Winton, 2000 and 2003). The following synthetic exposition of this branch of the AIA (henceforth called A2) aims to reconstruct some of the crucial steps of the A2 argument. The basic idea is that the financial crisis started in 2007 in the U.S. has been in its essence a banking panic with many significant (although not trivial) analogies with, and a few far-reaching differences from, the banking panics of the past when the banking system as a whole was believed to be insolvent. In the recent crisis this panic originated within the shadow banking system when an unexpected exogenous shock (slowdown of housing prices in late 2006 followed by a significant reduction) affected first the MBS market in the early 2007 and then since August 2007 the whole banking system.

In order to understand the causal mechanism underlying the process mentioned above we have to clarify first the nature of shadow banking as compared with that of traditional banking. The essence of banking according to Gorton and his collaborators is not that of intermediating between savers and investors, as is maintained by the branch A1 surveyed above, since the matching between savers and investors in financialised capitalism does not necessarily require the intermediation of banks. The essential role of banking is instead

that of creating a special kind of debt, informationally-insensitive debt, that tends to retain its value when new information flows in even if the latter remains restricted to privately informed traders. (Gorton and Pennacchi, 1990a; Gorton, 2009, pp.3-4). This kind of debt is immune to adverse selection and is very liquid exactly because “its value rarely changes and so it can be traded without fear that some people have secret information about the value of debt.” (Gorton, 2009b, pp.2-3). Information-insensitive debt originally was limited to demand deposits but “demand deposits are of no use to large firms, banks, hedge funds, and corporate treasuries, which may need to deposit large amounts of money for a short period of time” (Gorton, 2009b, pp.3-4). Firms do not deposit large sums in banks also because the deposit would not be insured. They “deposit” instead their short-term liquidity in the sale and repurchase (“repo”) market. These deposits are “insured” by posting bonds as collateral, including in a growing percentage also securitized products. The collateral may be rehypothecated where “rehypothecation is somewhat akin to being able to write checks” (Gorton, *ibidem*, p. 4) with similar multiplicative effects. Collateral is a sort of currency for firms since it does not only mitigate default risk but it may be also reused or spent. Repo is thus a form of banking as it creates “deposits” of money on call (mostly overnight). The progressive growth of the repo market stimulated the parallel growth of securitization to satisfy the growing need of collateral for derivative positions and settlement purposes. Securitization itself is seen by Gorton as a form of banking since the special purpose vehicles (SPVs) hold loans financed with high-grade debt which is largely information-insensitive. In particular it has an information advantage over corporate debt with similar rating since the latter is subject to speculation on information about the corporation performance. Securitized debt is in demand as collateral also because SPVs are bankruptcy remote since the failure of the originator of loans does not affect the investors in securitization bonds, called “tranches”.

We may say that shadow banking grew out of a symbiotic integration of two forms of banking: the securitization system and the repo market. In the decade preceding the subprime crisis securitization and repo banking became organic parts of an alternative banking system, parallel to the regulated banking system, that came to be called “shadow

banking". The main trouble with shadow banking was the fact that its peculiar "deposits" gave the illusion of being information-insensitive being "insured" by the market through the process of collateralization mentioned above. However the crisis of 2007 revealed that such belief was just an illusion. The collaterals proved to be information-insensitive in periods of financial tranquillity but became suddenly information-sensitive, and highly so, as soon as the crisis burst. This is clearly revealed by the behaviour of repo haircuts:

"when the depositor deposits money, the collateral may involve a 'haircut' or margin. The haircut is the percentage difference between the market value of the pledged collateral and the amount of funds lent. For example, a haircut of 5% means that a "bank" can borrow \$95 for each \$100 in pledged collateral. A haircut further protects the depositor against the risk of borrower default... The size of the haircut reflects the credit risk of the borrower and the riskiness of the pledged collateral" (Gorton, 2009b, p.30).

The haircut had been zero until early July 2007 showing a widespread trust in the information-insensitiveness of collateral in the U.S. repo market; however, after the housing shock that started to affect mortgage-related assets in early 2007, the haircut began to be perceived as a systemic event. By the end of 2007 the average repo haircut on structured debt had reached in the U.S. the significant level of 9%. In 2008 it increased rapidly from 10% in January to 15% in June, reaching 24% in August, and jumping to 46% after the bankruptcy of the Lehman Bros. (see Gorton, 2009b, p.33). The increasing haircuts may be interpreted as "withdrawal" of repo deposits from banks and its continuous and rapid increase to unprecedented values may be interpreted as a bank run in the interbank ("repo") market. The run on repo was thus analogous to previous banking panics before the deposits of commercial banks were insured in 1934. Earlier bank runs happened because deposits were not insured; the recent one happened when the depositors discovered that their deposits believed to be "insured" by information-insensitive collaterals were in fact only partially and very imperfectly covered by collaterals that suddenly proved to be much more information-sensitive than it was believed before.

As Gorton emphasizes,

“A panic is an event where informationally-insensitive debt becomes informationally-sensitive. It is a switch because it becomes profitable to produce private information about the debt...This leads to a “lemon market” in which everyone needs to suddenly produce information to trade...This is a devastating regime switch because participants are not prepared to cope with the sudden information requirements for understanding, valuing, and trading securities that are suddenly informationally-sensitive. This makes them illiquid. Not only does information now have to be produced, but the expertise is lacking” (Gorton, 2009b, p.36-37).

What is worse, much of the required information is not available, in particular about where the exposures to the shock were located. The ensuing panic paralyzed all the Interbank market because no one knew which bank was particularly exposed to the shock.

4.4. Contagion and the Great Recession

Combining the contributions of the two main branches of the AIA we get useful insights on the processes of contagion that have characterized the propagation of the financial turmoil triggered by the subprime crisis. The first stage occurred in the U.S. where we can distinguish four main contagion processes. The first is the effect of the bust of the housing bubble on the value of mortgage-based securities (MBS). When, after an unprecedented boom, the price index of houses interrupted its upward trend and started to decline, this was promptly reflected in the value of mortgages and therefore also in the value of the derivatives directly based on their value, that is mortgage-based securities (MBS). This shock affected at first only the subprime assets classes whose value significantly declined. The ABX index showed since early 2007 a steady deterioration of subprime fundamentals and a parallel progressive deterioration of subprime-related assets classes and firms (Gorton, 2009b, p.31). Subprime mortgage originations in 2005 and 2006 amounted to \$1.2 trillion, a remarkable sum that however would not have been sufficient per se to trigger a systemic crisis in the U.S. without the process of contagion affecting the balance sheet of a growing number of economic units (ibidem, p.32). This triggered the second devastating

process of contagion: a bank run in the repo market as analyzed by the A2. In the preceding years, since Treasury bills happened to be more and more in short supply, AAA-rated MBS had been increasingly used as collaterals for loans in the repo market in the belief that they were information-insensitive debt. This produced a vicious circle between increasing haircuts and reduced supply of high-quality collaterals drying up the main source of liquidity of the units operating in the repo market (mainly big organizations and firms including the most important financial institutions). The third contagion process rapidly transferred the growing financial distress from shadow banking to the regulated market. Finding increasingly difficult to refinance their debt because of evaporating liquidity, highly leveraged banks started a process of fire sale of their assets to recover as soon as possible a sufficient margin of financial safety but this triggered an updated form of the debt-deflation vicious circle similar to that thoroughly analyzed by Fisher long ago (Fisher, 1933). The collapse in the value of assets produced by the herd-behavior of financial units increased the indebtedness and illiquidity of most units eventually producing the virtual insolvency of many of them. The violence and devastating rapidity of this contagion process may be better understood in the light of the insights provided by the A2 branch of the AIA. As soon as the trust in the information-insensitiveness of MBS and other related AAA-securities (in particular CDOs and CDSs) disappeared, the web of opaque mispriced risks produced by the new “originate-to-distribute” banking model almost instantaneously generalized the mutual mistrust of economic units. The ensuing process of generalized fire-selling of assets immediately propagated the acute financial distress to all the financial system. This event had probability zero in all the models of risk-assessment used in the last decades (based on Value at Risk analysis). Real-estate assets were considered not only uncorrelated to equities but also “within their class” since there is no reason, it was believed, why a fall in the price of housing in Alabama should affect the price of housing in Chicago or in Massachusetts. In addition the combination of mortgage payments of different typologies of real-estate in the same security (CDO) and their tranching was believed to realize a fully reliable hedging of risk since if “different real-estate markets are already uncorrelated, then cutting them up and recombining them should make them

superuncorrelated” (Blyth, 2013, p.28). Moreover the common practice of insuring residual risk, believed to be very limited, through a CDS contract further strengthened a widespread conviction that financial engineering had succeeded to tame risk altogether. Unfortunately real-estate markets became correlated in consequence of the crisis exactly because they were included in the same security, while the mortgage payments risk became increasingly correlated with equities, affecting first the equity of banks most exposed in MBS and CDOs and then the others interacting with them. CDS made matters worse as soon as it was realized that a collective event such as a generalized financial distress by definition cannot be insured; their value sank and further distressed the balance sheets of the counterparties.

Finally the forth process of contagion transferred the crisis from the financial system to the real economy: the generalized reduction of income and wealth produced by the financial crisis and the severe credit crunch produced by the illiquidity and mutual mistrust of banks brought about a deep and persistent recession soon christened with the disquieting but realistic name of “Great Recession”.

The contagion process in Europe was initially triggered by that occurring in the U.S. but was, and still is, nurtured by a much more complex set of causes many of which are rooted in its specific institutions and practices. The first process of contagion originated by the fact that the portfolio of many European Banks and funds was full of securities (MBS, CDOs and CDS) directly or indirectly connected with U.S. mortgages: “ ... over 70 percent of the SPVs set to deal in US ‘asset backed commercial paper’ (mortgages) ... were set up by European banks...and most of those devalued assets remain stuck on the balance sheets of European banks domiciled in states with no printing presses” (Blyth, 2013, p.85). Also in Europe mortgage markets and the derivatives based on them, believed to be particularly safe before the crisis, were suddenly perceived to be toxic in consequence of the U.S. subprime crisis. This produced a few significant early casualties (such as in the UK the Northern Rock in 2007; in Germany the IKB in 2007, the Hypo Real Estate bank in 2008, and several Landesbanken in 2009) but on the whole the European banking system withstood fairly well this first wave of “infection” with the significant help of taxpayer money (bail-out of many of

the insolvent banks), and the abundant liquidity provided with continuity by the ECB. In the meantime a process of contagion similar to that of the U.S. developed within Europe for largely independent but similar reasons. The housing bubble that had developed in many European countries (such as Ireland, Spain and a few Eastern European countries) burst in consequence of the early effects of the financial crisis triggering a sequence of events similar to those already reviewed in the U.S. The main difference was that the main category of collaterals used in the European repo market had increasingly relied before the crisis on AAA-rated European sovereign debt bonds of peripheral countries (see Blyth, 2013, p.85). In addition while “US borrowers needed a substitute for T-bills and turned to AAA mortgage bonds, so European borrowers had too few nice, safe German bonds...so they began to pledge the periphery debt...which was, after all, rated almost the same, a policy that was turbocharged by a EC directive that ‘established that the bonds of Eurozone sovereigns would be treated equally in repo transactions’ in order to build more liquid European markets. By 2008 PIIGS debt was collateralizing 25 percent of all European repo transactions” (Blyth, 2013, p.85.) This had made financial stability particularly vulnerable to a sovereign debt crisis in these countries. The first case emerged when the Greek government revealed in October 2009 that the fiscal deficit had reached the 13% of GDP, the double of the figure previously declared. The fire sale of Greek bonds was followed by a similar dumping of the other Greek assets and then of sovereign bonds of the other PIIGS countries. This started a vicious circle between sovereign debt and internal deflation of the Eurozone peripheral countries that was greatly enhanced by the adoption of unprecedented austerity measures not only in the more fragile peripheral countries (so called PIIGS) but also in the core countries. This prolonged and deepened the recession in the Eurozone since each round of austerity measures worsened the deficit and debt ratios motivating new rounds of more severe restrictive policies.

This brief reconstruction of the sequence and interaction of the main contagion channels in the U.S. and in Europe since the beginning of the subprime financial crisis may contribute to a more complete assessment of the strength and shortcomings of the literature surveyed in this paper as far as the Great Recession is concerned. The AIA focuses on the

change of the incentives structure to explain the propagation of the crisis. Its two main branches provide insights on the contribution of financial contagion to the process of rapid propagation and amplification of financial distress. The A2 focuses mainly on the core of the financial meltdown: the bank run occurred in the repo market, while the A1 focuses mainly on the second stage of the propagation process involving the new model of banking (originate-to-distribute) in the regulated sector and its far-reaching distortion of incentives affecting the systemic risks of financial markets at large. In both cases the vector of the pathologic structural change underlying the crisis is identified in the process of securitization started in the 1970s whose progressive growth and generalization has deeply affected the functioning of the financial system. The A2 focuses on its role in the emergence of shadow banking while the A1 focuses more on its impact on the prevailing model of regulated banking. The integration of the insights provided by the two main branches of the AIA is thus useful to understand the structural changes in the financial markets underlying the Great Recession but is limited by its theoretical assumptions as is argued in the concluding remarks of this paper (section 4.6).

As for the empirical literature on contagion the statistical approach is unable to capture the causal mechanisms underlying financial distress contagion within a single country. However its focus on inter-country contagion may help to understand the vicious circle between financial distress and austerity policy in the countries of the Eurozone (see retro chapter 2). In both cases, however, contagion developed mainly through the balance sheets of financial Institutions (Banks, funds, treasuries). The structural approach surveyed in chapter 2 shows the promising potential of this approach but also its current immaturity from the point of view of interpretation and policy.

4.5 Policy implications

The two main branches of the AIA draw radically different policy implications from the analysis of the crisis. The “hold-to-distribute” hypothesis points to the correction of the most significant shortcomings of the new model of banking by mending the distortions of

securitization and shadow banking. The opinions differ, however, on which are the most efficacious and urgent measures to be adopted. Generally speaking the policy measures are meant to go in the direction of an effective downsizing of securitization and the request that all the operations, including those that are currently off balance sheet, be rigorously registered in the balance sheets of banks (see retro chapter 3). Though the policy authorities seem to endorse the A1 analysis, they have been so far reluctant or unable to push with the necessary energy towards the implementation of these measures also because the latter are strongly opposed by financial lobbies. The policy measures adopted so far seem to rely on a combination of two strategies that are well received by financial markets. First of all Central banks provided, and still provide, plenty of liquidity to banks by keeping very low interest rates and by implementing quantitative easing (QE) strategies. According to the AIA this strategy should counteract the increase in AI brought about by the crisis.

According to the second main point of view rooted in the AIA, the modification of the model of regulated banking and its distortions are not considered as the crucial cause of the bank panic of 2008 for three basic reasons. First, it is claimed that the process of securitization, contrary to the intentions, did not succeed to transfer all the risk of loans from the originators (banks) to the buyers (investors). This claim is supported by a detailed analysis of the subprime chain: "Significant losses have been suffered by many up and down the subprime chain: originators, securitization structures and underwriters -firms and individuals- have suffered. The subprime originators/underwriters that went bankrupt include, e.g., Option One, Ameriquest, New Century, and to the likes of Citibank, UBS, and Merrill Lynch with billions of write-downs" (Gorton, 2008, p.28). In particular originators retained a number of direct risks. Loans are warehoused before they are securitized, then they are transferred to the underwriters that must warehouse the MBS tranches and, in later stages of the process, dealer bankers underwriting the CDOs also have to warehouse securitization tranches. Second, originators of loans (in particular mortgages) keep a participation in returns or losses that may accrue from the loans originated due to servicing rates and retained interests, in particular in the case of interest-only securities, principal-

only securities and residual securities. In addition some banks keep the most senior portions of CDOs on their balance sheets. Third, the existence of implicit contractual arrangements between buyers of tranches and the SIV sponsor that guarantees them has been empirically documented (Gorton, 2008, p.31) and led some SIV sponsor to take these items back onto their balance sheets.

Summing up, the effective practice of securitization shows that the transfer of risk from the banks originating loans to investors is only partial. Systemic risk and AI increase as risk is spread in an opaque way over much larger categories of subjects participating in the chain of loans securitization. None of the subjects involved in the securitization chain retains significant incentives to assess the risk of securitized loans but, according to the second point of view, this is by itself insufficient to explain the banking panic triggered by the subprime crisis. In this view, in order to understand the latter we have to remind that the process of securitization has become a crucial component of a parallel banking system interacting with the traditional one but having a certain degree of autonomy: what has become to be called “shadow banking”.

While “shadow banking” is seen by the first point of view (A1) as a degeneration of the traditional banking system that in principle should be repressed, the second point of view (A2) sees it as the banking system of large institutions (firms, banks, funds, public administrations) that should be strictly controlled and regulated by law. This view emphasizes that the banking panic of 2008 has originated not in the traditional banking system but in the shadow banking system. In order to understand this crucial point, the recent evolution of banking is put in a long-run perspective in the conviction that, unless we learn from history, we are condemned to repeat past mistakes. Gordon distinguishes two periods: the National Banking Era (1864-1934) following the approval of the National Banking Act, and the Quiet Period (1934-2007). In the National Banking Era, in the absence of a central bank, “bank themselves developed increasingly sophisticated ways to respond to panics...centred on private banks clearinghouses. ... In response to a panic, banks would jointly suspend convertibility of deposits into currency...the clearinghouse would also cease the publication of individual bank accounting information...and would instead only publish

the aggregate information of all the members. Finally, banks issued loan certificates...a kind of deposit insurance” (Gorton, 2009b, p.19).

This response strategy aimed at making the liabilities of single banks more information insensitive while giving also a tangible protection to clients in the form of loan certificates. Though this strategy was well designed, it did not prevent panics but reduced their frequency and the impact of their consequences, in particular by preserving single banks from insolvency caused by specific runs. This clearinghouse system evolved continuously giving birth eventually to the Federal Reserve System.

The Great Depression clarified that the self-regulation of the market system may succeed to avoid bank runs in tranquil times but not when the entire system is believed to be insolvent. Therefore in 1934 the crucial decision was taken of providing bank deposits with public insurance and of re-regulating the banking system according to strict rules. This new policy regime inaugurated a “quiet period” in the U.S. banking as a response to the Great Depression. The number of U.S. Bank failures, that had increased to the remarkable number of 4,000 per year just before this courageous and controversial decision, suddenly dropped to a number very close to zero that was maintained until the recent crisis (apart from a moderate and short-lived spike from the late 1970s to 1994 (see Gorton, 2009b,fig. p.3.). This depends not only on the introduction of public deposits insurance but also on the introduction of strict regulation rules of the banking system (i) by segregating commercial banking from investment banking (Glass-Steagall Act, 1933), (ii) by limiting the entry in the market by rationing in each area banking charters, (iii) by introducing a strict supervision, compulsory balance-sheet disclosure, and interest rate ceilings on deposits (Regulation Q). These measures combined the “stick” of regulation and supervision with the “carrot” of a more valuable bank charter guaranteeing monopoly rents at the local level. This policy strategy reduced the freedom of choice of bank managers and the degree of competition between banks but at the same time greatly increased the stability of the financial system. It is possible to argue that what was lost in efficiency because of the policy constraints on competition was more than compensated by the huge positive externalities accruing with financial stability.

The deregulation of financial markets (for example of interest rate ceilings) progressively introduced in the 1980s, in accordance with the new policy view that became hegemonic in those years, caused bank charter values to decline.² The growing competition also from non-banks (e.g. money market mutual funds) induced banks to reduce capital, to increase risk and to rely on financial innovation. Both the systematic process of securitization and shadow banking can be seen as responses of the banking system to the new policy environment to preserve the returns on equity in banking. Unfortunately, as we have seen, shadow banking was profitable for banks but vulnerable to panic since the system of market insurance through collateral believed to be information-insensitive turned out to be not at all panic-proof.

According to Gorton the solution is not that of “forcing everything back on balance sheets” (Gorton, 2009b, p.39) since this would not solve per se the collateral problem (scarcity of reliable information-insensitive collateral). A better solution in his opinion would be the adoption of a series of measures meant to create charter value and information-insensitive debt. This is possible only through a strict regulation of whatever subject plays the role of banking (including the emission of securitized products and the creation of repo deposits). This could be obtained by introducing the following measures (see Gorton, 2009b, p.40):

- 1) the senior tranches of securitization products should be insured by the state,
- 2) the government must supervise and examine banks directly, including the processes of securitization, rather than relying on the loose and questionable control of rating agencies,
- 3) the entry into securitization should be limited, and any firm that enters should be deemed a “bank” and subject to supervision.

Points 1) and 2) are instrumental to the creation of reliable information-insensitive debt, while Point 3) creates value for the production of information-insensitive debt.

² Charter value may be defined as “the present value of the net income the bank would be expected to earn on new business if it were to retain only its office, employees, and customers. (...) [It] depends on the bank’s authorized powers, including power to do business within specified areas, the market structure in the area, the expertise of the bank’s employees, and the customer relationships it has developed” (Guttentag and Herring, 1983). In banking the value of charters crucially depends on market regulation, which by limiting competition provides a market power to banks operating in regulated markets (Demsetz, Saldenberg and Strahan, 1996).

Finally Gorton emphasizes that, contrary to the standard objection raised against points 1) and 3), their adoption would not encourage moral hazard since the latter would be discouraged by the fear of compromising a valuable charter. On the contrary, as shown by the history of banking in the U.S., moral hazard develops in a climate of unfettered competition as a way to defeat competitors by any means.

4.6 Concluding remarks

As we have seen, each of the two main branches of the AIA captures some significant features of the recent evolution of the banking system and in particular, of the 2007-8 bank panic. The A1 investigates the impact on decision makers of the metamorphosis of traditional banking from the model “originate-to-hold” to the model “originate-to-distribute”. Though this process of transformation is not complete and transfers credit risk only in part, as emphasised by the A2 branch, it is true that in the current banking structure no one within or outside banks retains significant incentives to assess the value and risk of securitized debt. It is also correct the opinion expressed by the A1 branch that, in consequence of this transformation, systemic risk is increased; for the same reason the velocity and strength of propagation of financial distress has been significantly enhanced. The A2 focuses instead on the emergence of a parallel banking system tailored for the needs of big firms and large institutions and analyses its peculiar functioning rules. This allowed A2 to understand better the origin and early consequences of the bank panic of 2007-2008, but the subsequent stages of the financial crisis, its propagation, and its degeneration in a Great Recession cannot be fully understood without taking into account also the point of view of A1, in particular its emphasis on the distortions of incentives brought about by the new “originate-to-distribute” model of banking. A certain degree of complementarity between the two approaches should not be surprising since both are rooted in the AIA and focus on different roles of banking that do not exclude each other: the role of intermediation between lenders and borrowers (A1) and the role of creation of information-insensitive debt (A2). Banks play both roles in the financial system, although

the first role has been declining in recent years especially in big banks. In principle we may consider these two roles as complementary.

The main difference between the two main branches of the AIA derives from a different view of the role of securitization in financial markets. The A1 sees securitization mainly as factors of distortion of the traditional model of commercial banking, while the A2 sees securitization rather as a crucial component of a parallel banking system identifiable as “shadow banking system”. The two branches of the AIA draw from their different analysis radically different policy implications. If taken seriously, the A1 should lead to a policy of “financial repression” focused on securitization and shadow banking to eliminate, or at least mitigate, the distortions of the new model of banking, while according to the A2 shadow banking should not be repressed but strictly regulated. In our opinion these policy prescriptions do not exclude each other and should be strictly co-ordinated. The policy prescriptions of A1, however, are greatly weakened by the illusion that the necessary financial repression may be implemented by self-regulation, while the policy prescriptions of A2 are not credible unless the shadow dimension of the parallel banking system, is brightened by the necessary transparency of the accounting rigour.

More in general we have to emphasize that both branches of the AIA suffer from the limitations of the common trunk: general equilibrium theory with AI. In our opinion financial behaviour and crises depend not only on asymmetric information but more in general on the nature and degree of uncertainty whether it is asymmetric or not. In particular the case of “symmetric ignorance” and “symmetric disinformation” should be taken into account. Asymmetric information is a significant and ubiquitous source of systemic uncertainty but it is not the only one. The spreading of risk across a plurality of unknown and unknowable subjects emphasized by both branches of the AIA implies by itself that uncertainty over the value and risk of securitized assets is strong (not representable through additive probability distributions) or radical (we just do not know and probability reasoning is unavailable). In addition, information and uncertainty do not exhaust the causes of financial crises and their propagation. These are common shortcomings of all the branches of the AIA.

More specifically the A1 approach suffers from a basic internal contradiction. While the theory shows that an apparently small deviation from the axioms of general equilibrium theory is sufficient to question the properties of efficiency and optimality of a competitive equilibrium, most exponents of this approach are not willing to abandon the idea, inbuilt in the general equilibrium approach, that self-regulation of markets is superior to regulation by law even in the extreme circumstances of a great crisis. The exponents of the A1 seem thus convinced that self-regulation, as eventually codified and implemented by the Basel 3 accords, will be sufficient to restore the right incentives to optimizing behaviour. This wishful thinking is explicitly rejected by the A2. An accurate reconstruction of the history of banking clearly shows that financial stability requires strict rules of public regulation and supervision. On the other hand, Gorton's arguments are liable to the criticism of implicit theorizing since the relationship between the basic concepts and the subsequent steps of the argument are insufficiently clarified. The crucial concept that banking is in its essence creation of information-insensitive debt, goes a long way towards the understanding of recent banking practices but the concept is too narrow. This provides a sharp focus to the argument but clouds the relations, potentially illuminating, with other broader theoretical approaches. We may agree that a crucial role of banking has always been the creation of secure debt in the broad sense of shock-insensitive debt (not only information-insensitive debt); however, its meaning and implications are not fully analysed. In particular the A2 mentions the relationship between shock insensitiveness of an asset, its liquidity and the risk of holding it, but their crucial relations are not analysed in depth. In addition, although new information is an important category of potential shocks, there are other important shocks that have a different nature: in particular those triggered by the interaction between the balance-sheets of the units that implicitly play an important role in both branches of the AIA. The latter are not information shocks but the consequence of market interaction necessarily reflected by accounting figures.

Information sensitiveness and, even more, the broader concept of shock sensitiveness, is a concept akin to that of financial fragility: in both cases a small perturbation is sufficient to change the qualitative behaviour of economic units (Minsky, 1982 and 1986; see also

Vercelli, 1991, and 2011). The financial fragility of a unit depends on the degree of shock-sensitiveness of its portfolio of assets and therefore on the structural characteristics of the system and in particular on its model of banking.

Both branches of the AIA aim to provide a theory of the propagation of financial crises not of their ultimate causes. The triggering factors are perceived to be exogenous as is typical of mainstream business cycle theory. However, while in the equilibrium business cycle the exogeneity of shocks is a logical necessity given the assumption of persisting equilibrium, the AI deviation from general equilibrium theory implies the existence of disequilibrium processes. The dynamics of the system depends thus crucially on the structural characteristics of the system. In particular when the triggering factor is an endogenous variable of the model, as in the case of the rate of interest, its role extends to the propagation of this iterative process.

In particular the A1 contributes to clarify that the new model of banking “originate-to-distribute” is conducive to a more rapid and self-reinforcing process of propagation of financial distress through units, sectors, and countries. In a complementary way the A2 shows that the parallel banking system (shadow banking as synthesis of securitization and repo market) provides under the existing institutional arrangements a devastating mechanism of financial distress propagation. This interaction may be understood only by delving into the processes of contagion focusing first of all on the propagation of the financial crisis from the mortgage related assets to the entire finance and then to the whole economy. Contagion plays a crucial role in this theory but its role remains in great part implicit.

It is therefore surprising that the literature on the recent crisis springing from the AIA is so weakly connected with the literature on contagion surveyed in the second part of this paper. We speculate that this depends on the fact that the traditional statistical approach is too macro to combine with the AIA that is intrinsically micro or at least requires a disaggregation between categories of decision makers having a different degree and quality of information. As for the structural literature on contagion there is an obvious potential of integration that may lead in the future to a useful interaction between the two approaches

since both are about the propagation of financial distress through economic units taking into account the balance-sheet interaction between them. To the best of our knowledge, however, this integration has not yet progressed very much, probably because of the complexity of the models that study structural contagion.

The systemic event reflected by the collapse of other asset classes normally unrelated with subprime assets, started only in August 2007 when average repo haircuts, that were still about zero until then, started to rise. The crisis became systemic because no one knew where the increased risk related to mortgage asset classes was located. Therefore when this risk was perceived to have overcome the safety threshold set by the decision makers, the consequent panic was referred to the banking system as a whole. So the problem is not only asymmetric information but lack of information suffered by all decision makers. The ultimate causes of the crisis are related to the strong uncertainty affecting the choices, while asymmetric information is only a specific aspect of it.

The run on repo deposits revealed by the growing haircuts triggered a well-known process of propagation experienced in all preceding financial crises, at least the most serious one: a variant of the Fisherian process of debt deflation as updated by Minsky (see Vercelli, 2013). The main dealers found more and more difficult to re-finance their positions and found themselves over-indebted; in order to reduce their indebtedness they had to sell their assets, even those that were originally unrelated to mortgage collateral. The market values of all these assets progressively declined compelling the main dealers of securitized products in the repo market to downsize their activity. This vicious circle eventually propagated to all the economic units holding assets that underwent a significant loss of value (most financial assets under these circumstances). This process of slow but progressive build-up of bank panic emerged in August 2007 and became progressively more intense culminating in September 2008.

The policy implications drawn from the A2 analysis of the recent banking panic go in a sensible direction: in order to re-establish a period of financial stability comparable with that of the “quiet period” in the U.S. we have to sacrifice the myth of the optimality of unfettered markets. In the 1970s and 1980s it was customary to discuss about the trade-off

between efficiency promoted by more competition and financial stability promoted by strict regulation and severe supervision in the quest of the right balance between these two objectives. In the 1980s the Gordian knot was cut in the direction of competition and efficiency in the illusion that the evolution of banking, the accumulation of theoretical knowledge and improved regulation would have avoided financial instability. The result was that financial instability progressively increased as witnessed by the growing number of severe financial crises experienced in the three last decades (Reinhart and Rogoff, 2009). As for efficiency, there are scanty signs of an improvement, particularly in the activity of support to the real economy, since in the last decades trading and speculation that were more profitable in the short period and were believed to be less risky crowded out credit for firms and households. In addition the progressive disappearance of charter value brought about by the systematic deregulation of financial markets, contrary to what was expected by mainstream economic theory and finance, encouraged moral hazard, predatory lending and corporate irresponsibility, as has been clearly documented by Gorton. The policy perspective advanced by the A2 is questionable, however, in its defence of shadow banking. In this view the latter should be strictly regulated as any form of banking but not outlawed: “forcing everything back on balance sheet seems like an attempt to return to the Eden of the Quiet period without recognizing that the world has changed” (Gorton, 2009b, p.40). This seems to me in contradiction with its own theoretical assumptions. If the ultimate problem is asymmetric information, shadow banking is a crucial part of the problem. As Gorton himself emphasizes:

“keep in mind that there are no official measures of the size of the repo market, or repo haircuts or rates. There are no data on the identity of repo market participants...there are no official measures of collateral usage in derivatives or settlement. There are no official measures on securitization. The shadow banking system was, as they say, “off the radar screen”” (Gorton, 2009b, p.42).

How is it possible to regulate the shadow banking if all the relevant data are missing or just unreliable estimates? How could airport traffic operators regulate traffic and keep safety without a radar? How could regulators supervise banking without an access to reliable

balance sheets? How reliable may be considered balance sheets if off-balance sheets posting is allowed? We have to conclude that complete transparency is necessary to complete the information of all the agents to overcome excessive liquidity preference and other anomalies typical of strong uncertainty and to avoid asymmetric information.

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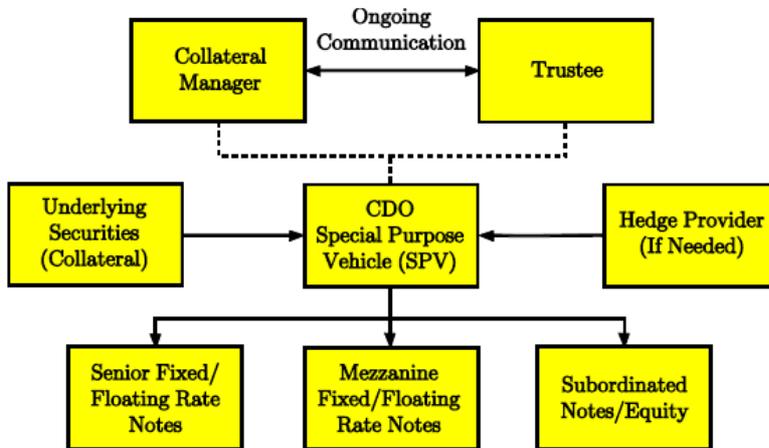
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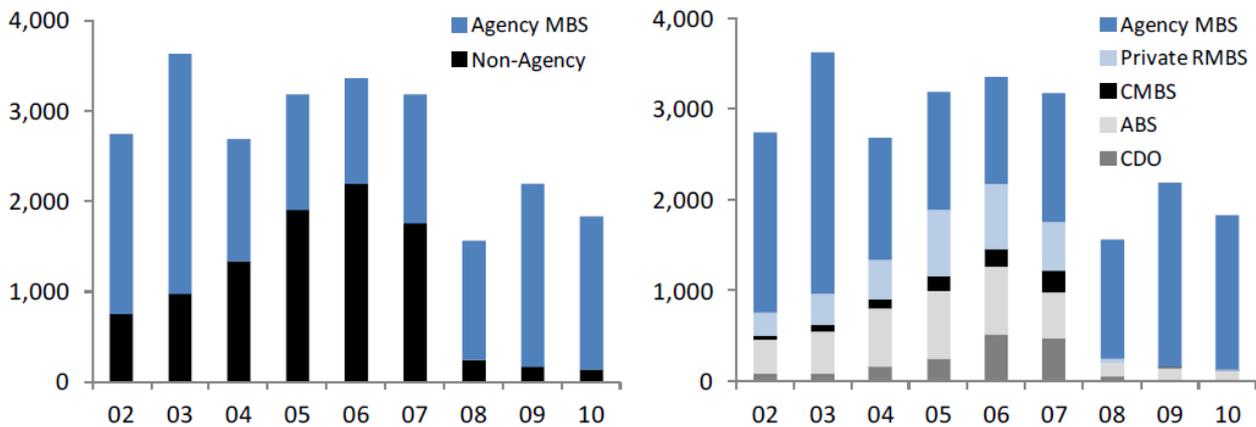
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Figure 1 – Typical CDO contractual relationships



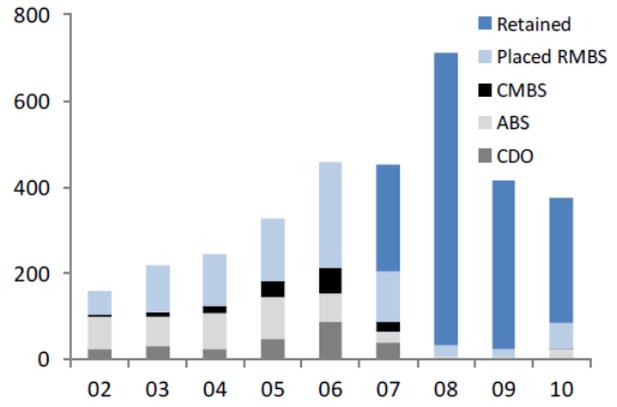
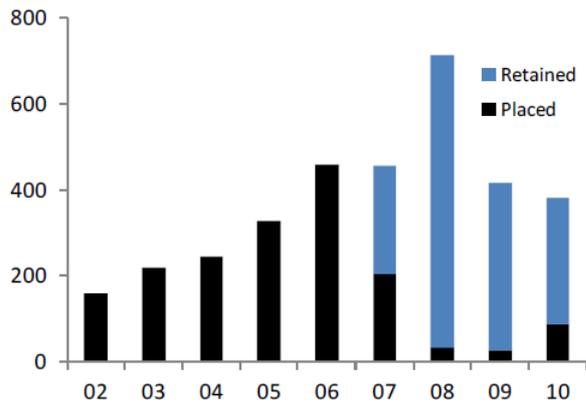
Source: Morgan Stanley

Figure 2 - American securitization issuance 2002-2010, USD bn



Source: SIFMA (Securities Industry and Financial Markets Association).

Figure 3 – European securitization issuance 2002-2010, EUR bn



Source: AFME (Association for Financial Markets in Europe).

Figure 4 – New tranches rated by Standard & Poor's and the number of defaults from 1990 to 2010

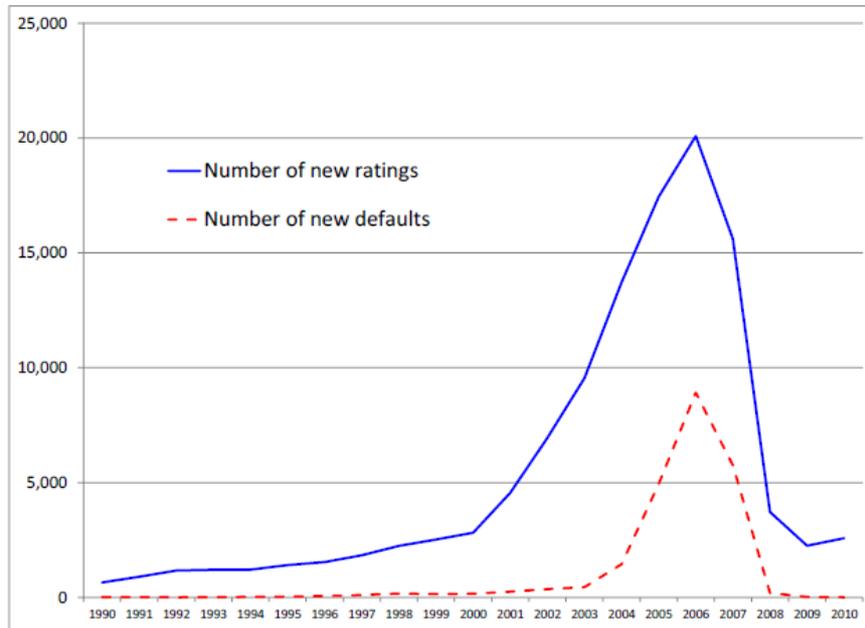


Figure 5 – Synthetic Securitization structure

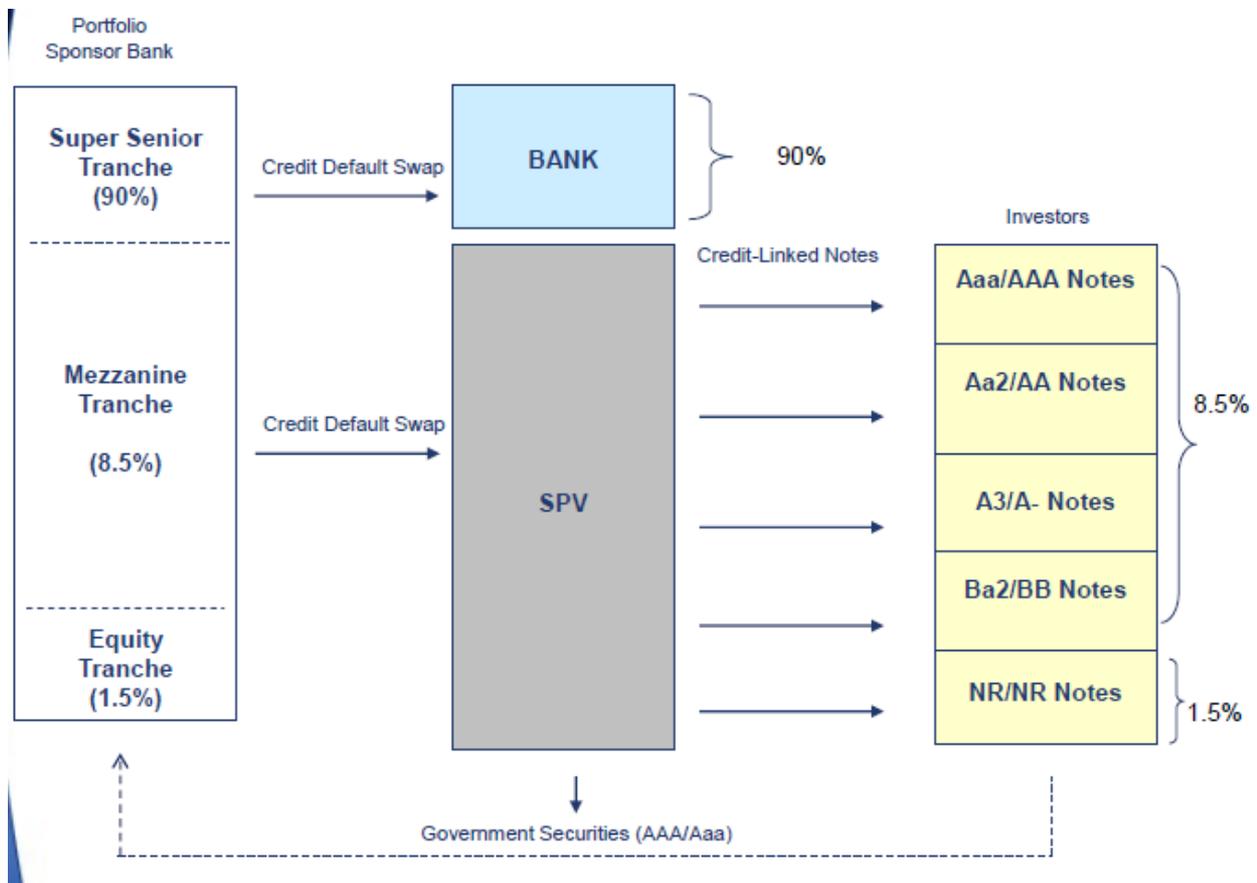


Figure 6 - Estimated spreads and cost of capital (with cost of capital = 25%)

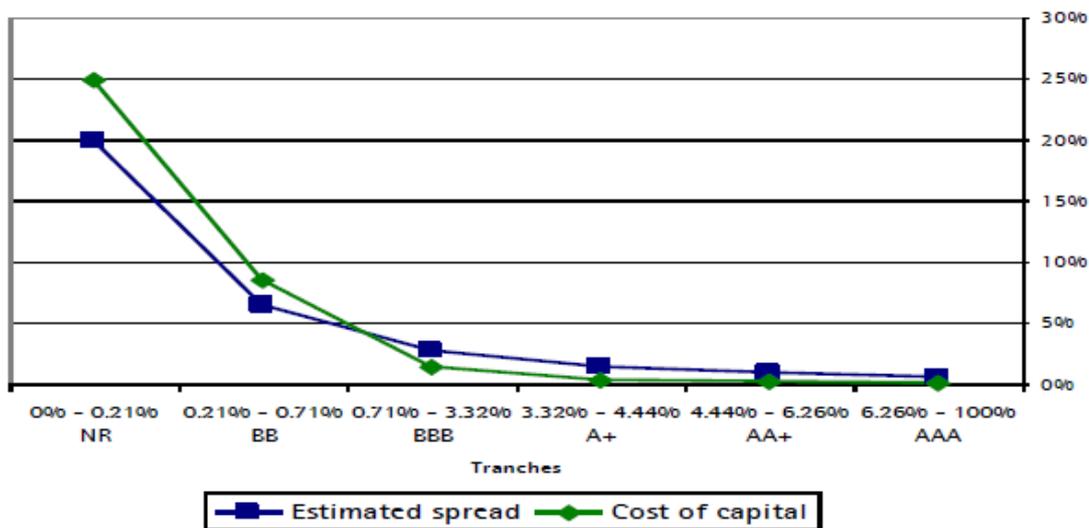


Table 1 - A Comparison of Moody's and S&P's Ratings for Jointly Rated Tranches (until January 2007)

Moody's Rating	Number of Tranches	Average Gap	Moody's Lower	Same	Moody's Higher
Aaa	29,687	0.03	0.0%	98.5%	1.5%
Aa	8,870	-0.16	29.8%	60.3%	9.9%
A	8,408	-0.40	31.4%	59.0%	9.6%
Baa	8,822	-0.45	31.1%	61.6%	7.2%
Ba	2,837	-0.55	34.3%	60.0%	5.7%
B	729	-0.49	26.1%	65.8%	8.1%
Caa-below	194	-2.16	65.5%	16.5%	18.0%

Financialisation, Economy, Society and Sustainable Development (FESSUD) is a 10 million euro project largely funded by a near 8 million euro grant from the European Commission under Framework Programme 7 (contract number : 266800). The University of Leeds is the lead co-ordinator for the research project with a budget of over 2 million euros.

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?'

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Published in Leeds, U.K. on behalf of the FESSUD project.