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Working Paper

2009-03

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The Crux of the Matter: Ratings and Credit Risk Valuation at the heart of the Structured Finance Crisis

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Abstract: The 2007/2008 global credit crisis was born out of opaque securitization transactions. Introducing structured products risk estimation techniques shows how the most basic investment analysis could not be done without detailed and updated knowledge on the assets of the pool. Access to such details was crucial for investors to perform an autonomous valuation, the lack of which led to a pervading acceptance of ratings at face value. The crisis brought numerous delusions to naïve users of these privately issued opinions. Coming back to the central role that investor played during the previous speculative episode and introducing a theoretical discussion on the dynamics of market finance, it is shown that trusting market discipline and due diligence was bound to end up being misleading. Given that unprecedented rating volatility brought a share of the blame game to rating firms, strategies that would aim at securing an informed use of ratings are finally outlined.

Key words: financial crisis, credit risk, rating agencies

JEL codes: G11, G12, G29

Résumé: La crise mondiale du crédit de 2007/2008 a pour origine l'opacité relative aux opérations de titrisation. En expliquant comment mesurer le risque des produits structurés, on montre que l'autonomie d'évaluation des investisseurs passe par une connaissance précise et en continu des éléments du *pool* sous-jacent. Une forme de démission sur ce point a amené l'industrie des notations à jouer un rôle central dans l'intermédiation financière de la titrisation. Ainsi, au cœur de la crise, la volatilité historiquement anormale des notes a eu un écho sans précédent. En introduisant une perspective théorique sur les dynamiques de la finance de marché, on met en avant le rôle clé des banquiers d'investissement dans la phase euphorique ayant précédé le retournement actuel et on montre que s'en remettre à la discipline de marché était naïf voire coupable. Vecteur privilégié de cette discipline, la notation a reçu son lot de critiques qu'il s'agit de dépasser pour penser l'harmonisation et la systématisation d'une activité de contrôle après émission des crédits structurés: la réforme de l'industrie de la notation est à envisager sous cet angle.

Mots clés: crise financière, risque de crédit, agences de notation

Codes JEL: G11, G12, G29

Introduction

A major feature of the 2007/2008 credit crisis is that it began with difficulties with subprime mortgage structured products. These difficulties evidenced disruptions in the due diligence that must guide intermediaries during the origination of structured product securities. Aschraft & Schuerman (2008) identified seven key frictions at the heart of the subprime mortgage securitization process and outlined the mismanagements that brought the summer 2007 turmoil. The authors noted that: 1/ the basic issues outlined were valid for the whole securitization process and 2/ the credit rating agencies played an important role in resolving or at least mitigating several of these frictions.

Attempting a similarly detailed picture of the disruptions in the structured finance intermediation chain is beyond the scope of this paper: the focus here is on the role that rating firms ended up playing and on how this role brings forward critical features of the crisis. The first part of this text introduces the massive downgrades that have brought defiance against the widely shared risk measures known as ratings. How is it that these downgrades came to matter that much? Introducing structured products risk estimation techniques shows that the most basic analysis could not be done without detailed and updated knowledge on the assets of the pool. Access to such details was crucial for investors to perform an autonomous valuation, the lack of which led to a pervading acceptance of ratings at face value. This leads to outline two major issues: (i) once structured products were issued, rating agencies did not provide the monitoring information that was critical for investors to use their ratings in an informed manner and (ii) internal risk management procedures must have been overlooked since their enforcement would have brought rating agencies or others to provide the required information.

The second part of this text provides a discussion on these two issues. Calomiris (2008) introduces the literature on financial crises and sorts out new factors about the current crisis from traditional ones. Turning to concerns with ratings, the investors' complacency is put forward as a striking feature and the critical role of the principal-agent relationship between asset managers and final investors is pointed out. Similarly, introducing a theoretical view about the dynamics of market finance allows us to outline the central role that investment banking played in the previous speculative episode and to provide ground for this intuitive argument. This indeed relates to the now somewhat traditional view that market discipline will break up during euphoric times (see (Minsky (1975, 1982) and Kindelberger (1978))). Such a view does explain why rating firms ended up not doing that a good job at providing information (i). One should however not forget the role of rating users (ii). Hence, the case against rating firms evolves into a case for an informed use of ratings. As critical as incentives of asset managers may have proved, such a goal goes well beyond the issue. Strategies that could help dealing with this challenging task are then discussed.

1. Rating Agencies and Structured Products Evaluation

Although carefully defined as « opinions » on the certainty of future payments, credit ratings have by and by become widely shared measures of credit risk. Such a role made the involvement of rating firms critical for the rise of the structured finance boom: without ratings as standard evaluations, distributing and marketing the complex structured finance securities would have proved harder. Starting over the summer 2007, the fate of securities structured out of *subprime* mortgage credit pools forced rating firms to announce massive downgrades along with a number of rating methodology changes. The imbrications of the structured finance field then brought an unprecedented wave of self-correcting actions, which inevitably lead to a general reconsideration of the use of ratings as standard credit risk measures. Asking why this change in privately issued opinions came to matter that much then brings forward serious concerns about structured product valuations procedures.

1.1 Rating Agencies and the “Subprime” Crisis

Every unexpected rating downgrade can be considered as a rating failure, the importance of which comes from the severity of the downgrade and/or the suddenness of the downgrade. Ratings are however meant to be relative measures and then what matters is the overall rating system. While a bunch of rating failures are threats against rating firms’ reputation, they cannot provide a definitive case against this system¹.

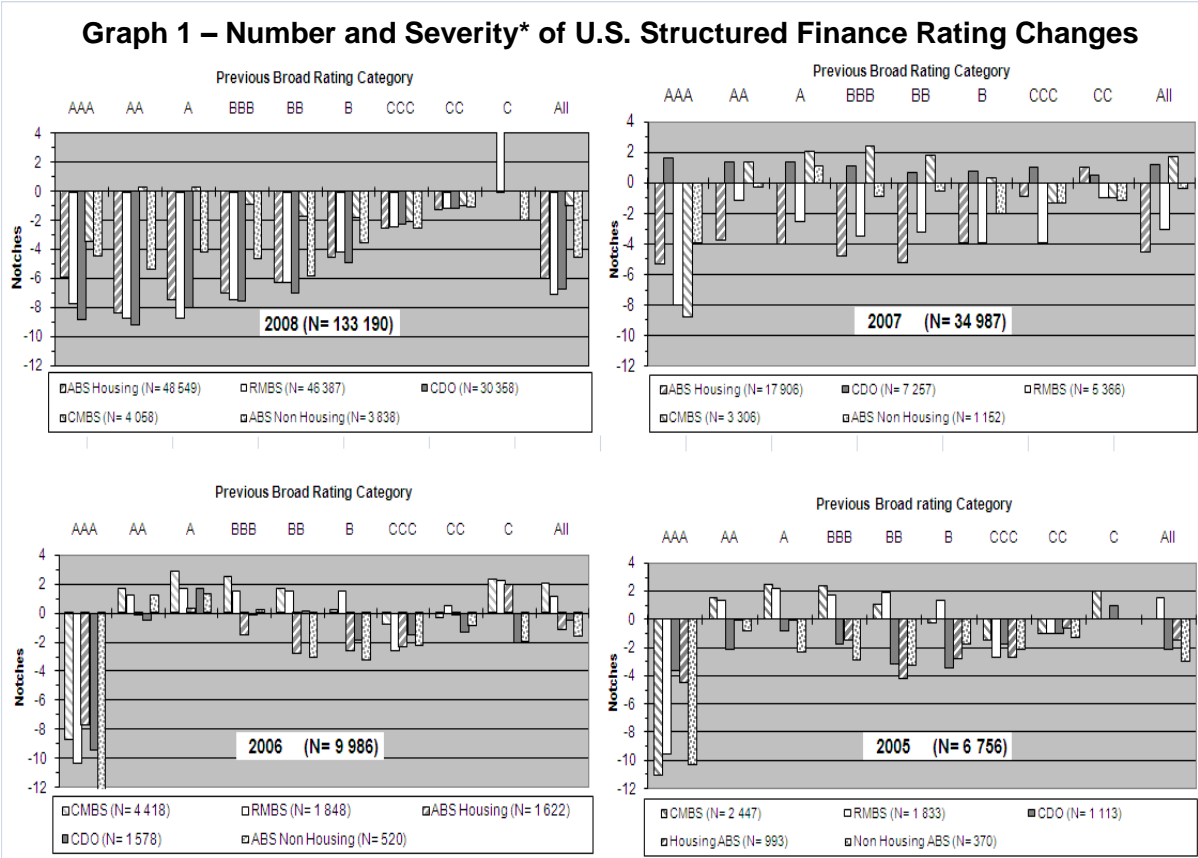
Rating firms may well have sent warning signals about the American housing market dynamics since 2006, substantive corrective actions came with 2007. The graph below provides a tentative overview of the wave of downgrades that occurred. Every change in United States structured finance ratings documented by *Bloomberg* has been tracked over the past 4 years. Excluding short term ratings and outlooks/watch announcements allows a focus on long term ratings migrations. For each year, a panel of graph 1 plots the average move per broad rating categories and per broad structured finance field. These averaged figures are not stability scores since no information is given on all the ratings that kept the same. What can be read is the average move in number of notches *provided that a rating had to be changed either by S&P, by Moody’s or by Fitch*. This shed light on the severity of corrective actions consented by the three global leaders of the rating business.

From 2005 to 2008 and for every broad structured finance field, legend tags give the annual number of long term rating actions (i-e downgrades and upgrades). The increase in these actions is impressive, especially since the 2008 graph merely deals with 8 months. Note that by no means was the ABS housing field especially worrisome up to 2006. Securities structured out of *subprime* RMBS are usually included in this field and by then the number of actions grew exponentially over 2007 and 2008.

Indeed, the situation became critical over the summer 2007. *Subprime* RMBS downgrades were announced around a number of key dates and along with rating methodology changes (See AMF (2007, Table 2 p.16 and Annex 1 p. 27)). As the “wave” of corrections grew in size, it became clear that it would not spare *Collateral Debt Obligations* (CDO), a broad name for a variety of structured products best defined by their relative freedom of investment strategy (as opposed to ABS or MBS which must remain *braindead* structures). Over recent years, this particular type of investor had become a massive buyer of high yield securities structured out of *subprime* pools. Hence, credit default swap on tranches of CDO had risen as early as July 2007. However, a substantial number of negative actions on CDO ratings did not come before Fall 2007 (see, e. g., AMF (2007, inset 4 p.17)). Therefore, as can be seen

¹ Consider the major public outcries following *Enron* or *Parmalat* cases. The usual blame game could not lead to a straightforward case, as shown by American regulators. Rating agencies were quickly excluded from post-Enron proceedings because they were considered as external third-parties relying on biased accounting documents. American regulators were however not that keen on letting credit rating agencies not liable for this event. An independent process of hearings on the role and status of rating agencies was launched, out which came the 2006 Credit Rating Agency Reform Act.

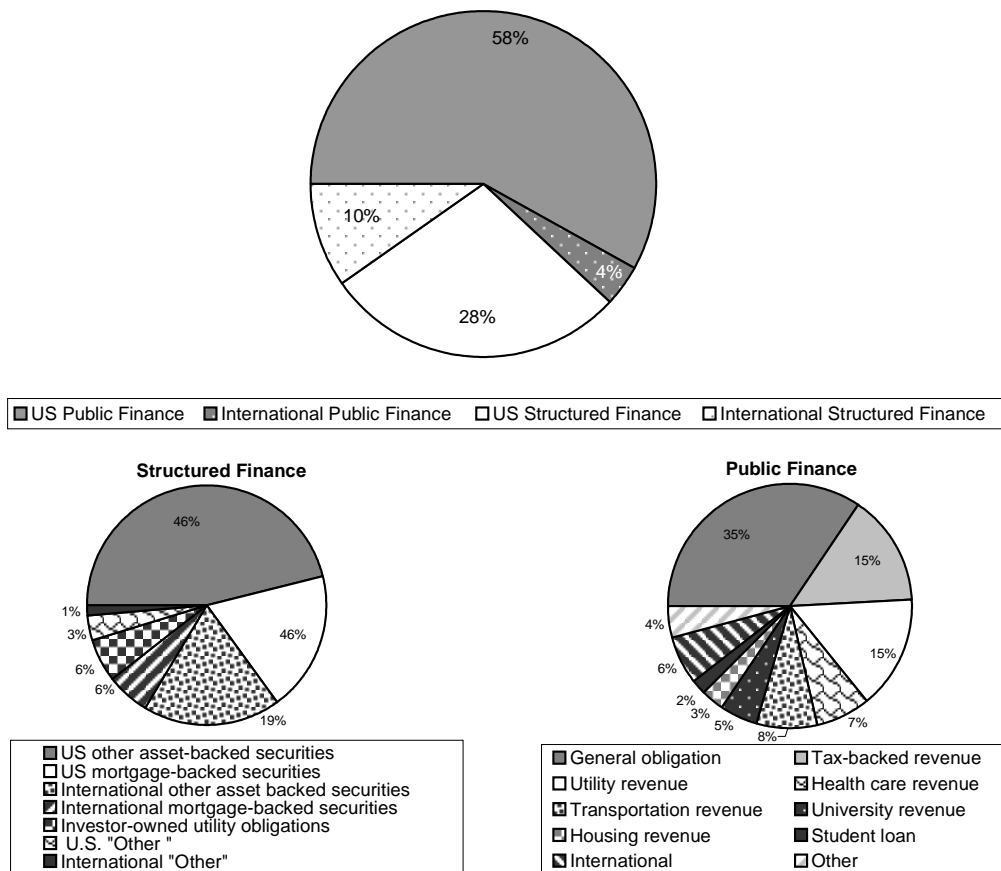
below, the overall change that had occurred in CDO ratings remained positive in 2007; this changed dramatically in 2008...



Source: Bloomberg; *: annual average of long term rating migrations announced by Fitch, Moody's or S&P

From the end of 2007 to the first half of 2008, a crucial issue became the fate of *monoline* insurers (also known as financial guarantors). Born in the 1970s, these institutions were left in charge of the activity of insuring bond payments by an American insurance regulation of 1989. Hence their name: they are dedicated to one type of insurance. Traditionally, this service was predominantly purchased by American states and municipalities. This meant insuring the payments from bond issues with relatively low level of defaults. Provided relevant capital structures, *monolines* insurers were then considered as extremely sound and given the highest grade possible by major rating agencies. Retrospectively, it seems that these institutions have been lured by the consistent lack of default of structured finance securities over the past 15 years. In any case, they ended up massively providing financial guaranties to tranches of structured products. For example, when the desired level of credit enhancement was not gained by tranching or over-collateralisation, the tranche would be “wrapped up” thanks to the service of a financial guarantor; in the case of a CDO, the financial guarantor could end up writing credit default swaps on senior notes or tranches and even taking up the management (*monolines* were also known to provide various credit enhancements to ABCP programmes, see (BIS (2005, box 5 pp.28-29)). From 2002 to 2006, 2003 was the only year where structured finance securities were less than half of the new insurance writings for the whole industry (see AFGI (2007)). This resulted in the following distribution of financial guarantees at the end of 2006:

Graph 2 - Outstanding Amount Insured by Financial Guarantors
 On 12/31/2006, Total Net Par Amount = 2,171,518 Million USD*



Source: AFGI (2007)

*: Including Interest, Total = 3, 259, 189 Million USD

Some have argued that major rating firms have had an active role in leading monoline insurers into structured finance activities... in any case, they were setting the final collateral levels that paid attention to the various enhancements provided by these institutions: they were the one evaluating how relevant were financial guaranties to structured products. As difficulties emerged from subprime RMBS to CDO, the question was: to what extent will suffer the financial soundness of these financial guarantors largely involved in structured finance? With reporting figures for the third quarter of 2007 came plunging stock market capitalizations and the question became: can rating agencies truly keep from downgrading their ratings of monolines?

The answer was critical for two reasons: 1/ a rating at the highest grade possible was at the heart of the financial guarantor business, any downgrade would further impair their ability to cope with their current difficulties; 2/ any downgrade of one financial guarantor would automatically imply the downgrade of all securities that had benefited from its services. Actions began on 12/19/2007 with S&P downgrading ACA from A to CCC; since the starting note was not among the highest grades, impacts were limited to collateral calls. Over January 2008, Fitch removed Ambac, SCA and FGIC from the AAA category. As a result around 290,000 insured issues had to experience a downgrade, most of them being municipal bond issues. Difficulties originated in structured finance were now gaining the financing costs of American local authorities. More downgrades followed over the first semester of 2008 and, as for now, only FSA and AG have retained their AAA ratings.

Coming back to graph 1, the downgrades of monoline insurers are the key factor driving the impressive figures for 2008.

With so wide impacts at stake, a number of “rescue plans” have been considered. As early as November 2007, CFGI had raised 1.5 Million USD from two banks. By January 2008, the New York State Insurance Regulator E. Dinallo was calling for industry efforts and spent the first semester of 2008 trying to orchestrate such private initiatives. Recapitalizations still have to prove their relevance since the loss of the top rating grades has impaired the ability to write new business. Anyhow, a major feature is that all initiatives have been mainly judged on how major rating agencies reacted, a point that may be interpreted as a wide acceptance of their status of monoline insurance “shadow regulators”. Moreover, with the shutting down of structured finance issuance over the end of 2007, the remaining potential customers are the American local authorities. W. Buffett seized the opportunity of creating a new monoline structure focused on municipal issues (Berkshire Hathaway Assurance Corp.). The coming of this top rated new entrant is another issue for existing players: their access to the municipal bond insurance business has been sidestepped while they have to struggle with their structured finance exposures.

Such a bet may however seem hazardous considering how American local authorities have reacted to difficulties with financial guarantors. At the beginning of 2008, the fate of monoline insurers impose changes in State and Municipalities financing costs but whether and how rating agencies would act was still uncertain. This promised overall reconsideration has then been overcast by market disruptions impacting short-term borrowings. From 5 Billion USD in 1998, Auction Rates Securities (ARS) issuance by US local authorities had reached 10 billion in 2000 and remained above 30 billion a year from 2002 to 2007. As a result, Municipals amounted to half of the ARS outstanding at the end of 2007 (see Analysis Group (2008, fig. 2 p. 3) and SIFMA (2008, p. 16)). Over the first quarter of 2008, problems with ARS brought liquidity pressures to sub-sovereign issuers. The very choice of this dubious device for short-term financing needs could be seen as constrained by years of abusively conservative financing terms... by the beginning of March 2008, California State Treasurer B. Lockyer had launched a lobbying process along with 16 local authorities mainly claiming that municipal issuers had faced unfair financing costs because of a systematic downward bias in their ratings. By the end of March, Moody’s had sent a request for comments on “a plan to assign global scale ratings to any municipal bond issue”; Fitch launched a similar process at the end of July. In September, Moody’s announced that it would unify its rating scale from October 2008 to January 2009. Meanwhile, on June 19th, a bill “to ensure uniform and accurate credit rating of municipal bonds and provide for a review of the municipal bond insurance industry” had been introduced to the U. S. Congress; in late July the Committee on Financial Services agreed to support its enactment (see U.S. Congress (2008a)). Further, on July 30th,

² *Auction Rate Securities* (ARS) are long-term debt instruments whose interest or dividend rates are reset periodically through a Dutch auction, usually every 7, 28 or 35 days. ARS are often based on municipal bonds whose maturity can extend to 25 or 30 years; they can also be based on “perpetual” preferred stock. Although ARS are issued and rated as long-term securities, they are priced and traded as short-term instruments. This alchemy works thanks to the auction based interest rate reset mechanism, which requires liquidity over the life of the underlying asset and whose success has traditionally been supported by broker dealers. Their role that could be seen as misleading (in 1995, the SEC fined Lehman Brothers USD 850,000 for manipulating auctions following the very first ARS issued in 1984 by American Express; in 2006, it announced a Cease & Desist order on several practices by 15 broker dealers along with penalties of 13 Million USD). If one auction fails, the long term borrower must compensate “locked-in” holders with a penalty rate defined by contract. This rate can be set as high as 20 percent or be based upon money-market benchmarks. This rate will hold until other buyers support future auctions or until the borrower manages a call for conversion. Starting in the summer of 2007, volatility and spread widening resulted in supply-demand imbalances that brought 31 failed auctions over the last semester of 2007 (as compared to 13 since 1984). As imbalances proved structural, weakened broker dealers became reluctant to sustain auctions. A further 32 auctions failed in a two week period in January 2008 and the ARS market froze with massive auctions failures from February to May 2008. The SEC, the Financial Industry Regulatory Authority, New York Attorney General A. Cuomo and twelve other State securities regulators launched industry wide investigations, which brought a number of lawsuits where banks were accused of failures to comply with the 2006 SEC order and of fraudulent sales misrepresenting ARS as liquid “cash-like” instruments. By the end of the summer 2008, many had chosen to settle out of court and to launch ARS buy back programs.

Connecticut Attorney General R. Blumenthal sued Moody's, S&P and Fitch for "illegally giving Municipalities lower ratings, costing taxpayers millions".

With these evolutions in mind, the demand for monoline insurance seems bound to fade out and every downgrade of any of these firms will bring yet another wave of rating downgrades. Meanwhile, the status of ratings as widely accepted measures of credit risk has been questioned like never before. However, as shown by the next section, their use had always been known to be limited for any informed structured credit valuation. In many cases, questions and critics revealed how ratings were wrongly accepted at face value.

1.2 Ratings and structured product risk

A portfolio manager has to establish risk boundaries or to compute a *Value at Risk (VaR)*. The standard model used in pricing, risk management or regulatory capital ratio is derived from option theory (see Finger (1999), McGuinty & Ahluwalia (2004) and Gordy (2003)). In the case of structured products, the portfolio manager shall then consider tranches as options driven by the underlying portfolio default rate. In order to compute a *VaR*, two elements are further required: *Delta*, which measures the underlying portfolio risk, and *Volatility*, which measures the sensitivity to events affecting the underlying portfolio. *Delta* can be thought of as leverage: an equivalent position is expressed in terms of underlying quantity. Computed as the product price first order derivative to the underlying pool loss distribution, this position will be modified by any default or any change in default probabilities. This means that *Delta* becomes spurious unless updated frequently and that there is no true risk analysis without a focus on the key element of the underlying pool loss distribution.

Taking the example of a CDO, Gibson (2004) shows that risk is concentrated in the more subordinated tranches. The following lines build on such a result to illustrate the core issues of structured product risk analysis. As stated above, standard techniques build on option theory, which states that a firm or a structured entity is in default when it becomes insolvent. Consider the return on the assets from a company *i* as follows:

$$Z_i = \sqrt{\rho}X + \sqrt{1-\rho}\varepsilon_i \quad \text{where, } \begin{array}{l} \varepsilon_i : \text{normally distributed "specific" factor} \\ X : \text{"systematic" factor} \\ \rho : \text{correlation to systematic factor} \end{array}$$

By hypothesis, default occurs with insolvability, which occurs when the value of assets becomes inferior to the one of its liabilities:

$$P_i(X) = \Phi\left(\frac{B_i - \sqrt{\rho}X}{\sqrt{1-\rho}}\right) \quad \text{where, } B_i : \text{distance to default expressed in returns}$$

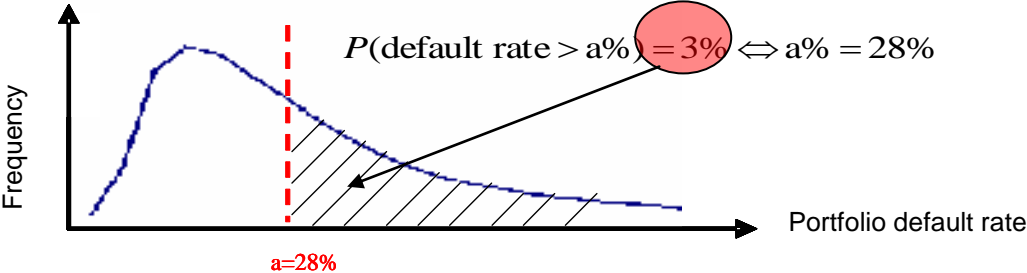
B_i is inferred from statistical tables, which associate rating categories with observed default frequencies interpreted as default probabilities (p_i)

$$P_i(X) = \Phi\left(\frac{\Phi^{-1}(p_i) - \sqrt{\rho}X}{\sqrt{1-\rho}}\right)$$

Given an estimation of default probability, the loss distribution of the underlying pool is computed with the help of Monte Carlo simulations. This means randomly playing thousands of scenarios of the random factor *X* and then summing the losses for every scenario.

Once the loss distribution has been computed, tranche ratings are gained by fixing the required subordination level. This means defining an “attachment point” so that the associated default rate probability equals the historical value derived from the corporate matrix transition. For example, suppose that such a matrix links an A rating to a 3% default rate, then the cumulative probability default rate that satisfies 3% in the loss distribution must be determined. In this example, the tranche must have a 28% attachment point to be rated A.

Graph 3 - Loss Distribution and Tranching

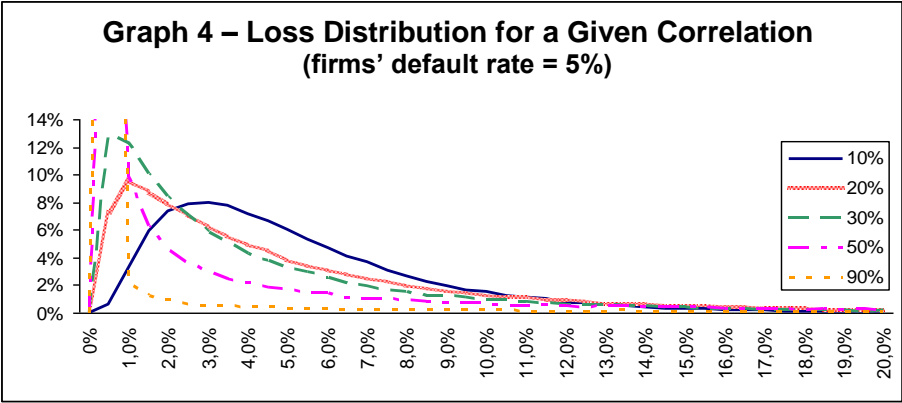


Blindly trusting ratings issued from this methodology may become hazardous since default rates can be very volatile. Moreover, there is no certainty that default losses on structured portfolios will keep around the mean observed in statistics tables. Following difficulties with subprime mortgages originated in the United States between 2004 and 2006, attachment points of CDO have been proven under-estimated. Credit risk models’ parameters have clearly not been conservative enough.

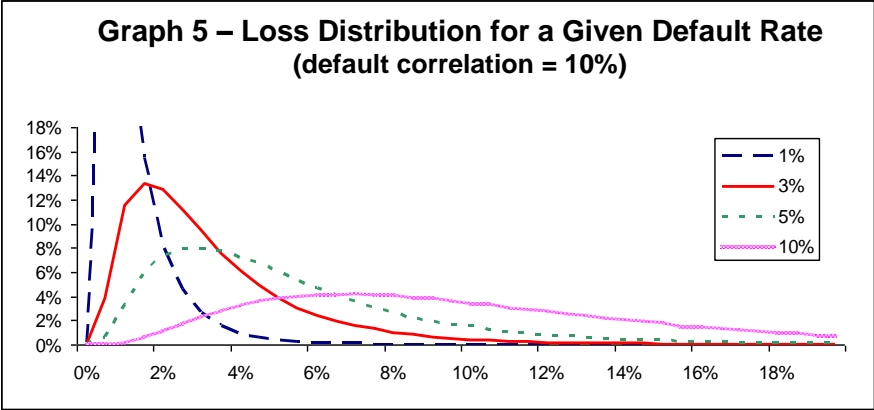
Take the case of subprime portfolios. Correlations have been valued substantially less than 100% when these credits eventually all depend on only one factor: real estate prices. Geographical diversification has been overvalued and when the real estate prices started to decrease over the whole American territory, subprime mortgages became massively insolvent: default rates rose to unprecedented levels. This lack of concern for an overall and massive drop in real estate prices came from a relative short memory of the real estate market. Such a lack of historical insight is a sign of a pervading underestimation of default rates: ABS default frequencies tables were built on a period exempt from a major downturn of the real estate market.

To apprehend the influences of correlations and default rates, loss distributions of a portfolio including 1000 homogenous credits can be built. The following chart shows that an increase in correlations widens the tail of the curve. Overall the distribution converges to a bimodal form and this means that under strong correlations, only one default leads the portfolio to default entirely. This is why an equity investor has long correlations position whereas a senior investor has a short correlations position, i.e. he sells protection against correlations.

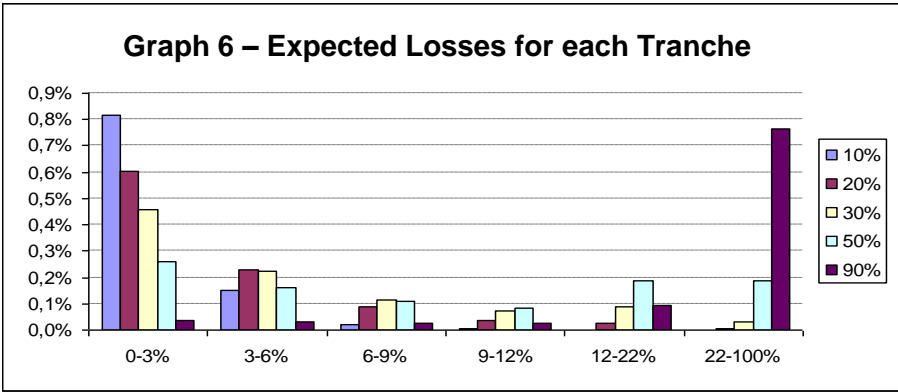
Graph 4 – Loss Distribution for a Given Correlation (firms’ default rate = 5%)



A similar effect can be shown for an increase in the default rate by rating (graph 4). This is an increase in the unconditional probability: at a constant correlation level, an increase of all default rates in the pool means a higher default of the whole portfolio.



However conservative ratings may be, they are simply not enough from a portfolio management perspective. The investor has to know the underlying loss distribution and to be able to compute it so that risk exposure to the different factors of credit portfolio will be quantified. By computing the expected loss on the different tranches, graph 5 shows the risk leverage, defined as an equivalent exposure to the underlying portfolio. Given a 1% default rate, the sum of the tranches' expected losses is equal to the expected loss of the portfolio: 1%.



For a 10% correlation, however, 80% of the expected loss portfolio is located in the equity tranche. For a 90% correlation, 75% of this loss is concentrated in the senior tranche. Going back to the case of 10% correlation and turning to table 1, the equity leverage of risk is 27.26 (= (0.82% / 1%) / 3%). Given a risk perspective, this means that the equity position of 3 € is equivalent to a 27.26 € position in the portfolio.

Table 1 - Tranche Risk Leverage Given a Correlation Level

	Correlations				
	10%	20%	30%	50%	90%
Tranches					
0-3%	27,26	20,17	15,33	8,62	1,22
3-6%	5,09	7,61	7,50	5,40	1,00
6-9%	0,65	3,00	3,78	3,68	0,88
9-12%	0,11	1,23	2,37	2,73	0,93
12-22%	0,01	0,28	0,89	1,85	0,93
22-100%	0,00	0,01	0,04	0,24	0,98

With such leverage values, VaR levels can be very high for securitized tranches and they depend on correlation levels. Suppose a volatility of 10% for the underlying collateral. At a 1% confidence level and given a 30% correlation, the VaR for the 3-6% tranche is -5.24 (= $3 \times 3.78 \times -2.33 \times 10\%$). Table 2 below gives results for all the tranches. It can be seen that the VaR for subordinated tranches represents all the position invested. This is one of the reasons why the Basel II framework is requiring 1 € of capital for every 1 € put in such a position. In the case of a 90% correlation, the VaR is 17.76 € for the 78 € senior tranche: the unexpected loss amounts to 23% of the position.

Table 2 - Parametric VaR at a 1% Confidence Level

		Correlations				
		10%	20%	30%	50%	90%
Tranches	0-3%	-19,03	-14,08	-10,70	-6,02	-0,85
	3-6%	-3,55	-5,31	-5,24	-3,77	-0,70
	6-9%	-0,45	-2,10	-2,64	-2,57	-0,62
	9-12%	-0,08	-0,86	-1,65	-1,90	-0,65
	12-22%	-0,03	-0,64	-2,06	-4,30	-2,16
	22-100%	0,00	-0,11	-0,74	-4,38	-17,76

The above analysis shows the importance of fully implementing an internal credit risk models. Firstly, a critical view on the subordinations levels and on the final grades chosen by rating organizations is mandatory. Secondly, CDO exposures and leverage should be dynamically managed by following the evolutions of the pool characteristics. This requires a detailed knowledge of the underlying portfolios and this leads to point out two major issues:

- (i) once structured products were issued, rating agencies did not provide the monitoring information that was critical for investors to use their ratings in an informed manner
- (ii) internal risk management procedures must have been overlooked since their enforcement would have lead to pressure rating agencies or others to provide the required information.

2. Rating Agencies in a Speculative Episode

This section provides a broad discussion on the two issues highlighted at the end of the previous section. Calomiris (2008) introduces the literature on financial crises and sorts out new factors about the 2007/2008 crisis from traditional ones. Turning to ratings, this analysis brings forward investors' complacency as a striking feature about the current crisis and points out the critical role of the principal-agent relation between asset managers and final investors (see Calomiris (2008, pp.19-34)). In other words, with the end of the last section in mind, (ii) is the new feature while (i) is a quite traditional one.

The fact that rating agencies did not do that a good job at providing relevant information can indeed be seen as an unsurprising feature. The crisis that erupted in August 2007 is in no departure from an historical pattern highlighted by Kindelberger (1978). Market finance brings endogenous financial cycles and a crisis bursts out because financial fragility builds up inconspicuously in the euphoric stage of a financial cycle (see (Minsky (1975, 1982)). During that stage, cushions of safety are being eroded progressively in the balance sheets of the leading financial institutions and these mounting distortions fail to raise the consciousness of internal control systems, third party certifiers, and even the supervisors (see Kregel (2008)). If one faces the fact that financial fragility is inbuilt within market finance, it does not come as a surprise that excessive risk taking unfolds in a painful and long-lasting de-leveraging process once asset prices have turned down. With this in mind, (i) and more broadly the fact that rating firms did not help raise consciousness as risk was increasing is also unsurprising. The case against rating agencies is then introduced but one has to go beyond such a blame game and deal with the role of rating users (ii).

2.1 Investment banking at the heart of market finance and leverage

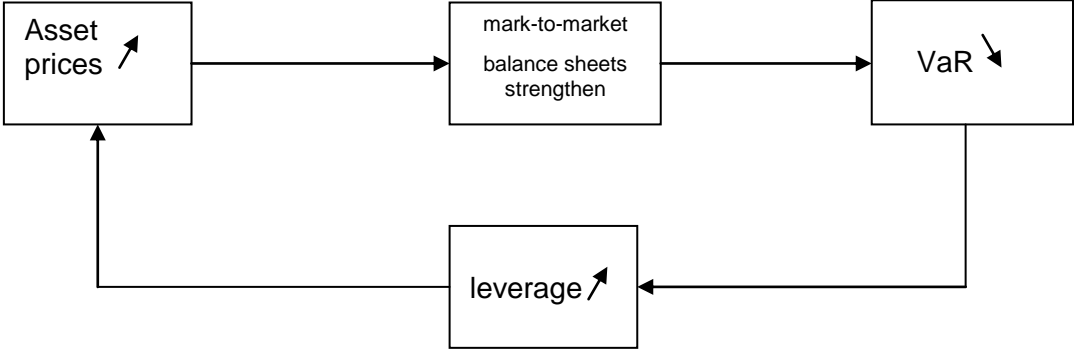
In the so-called "subprime" crisis a powerful procyclical dynamic was engineered by the intimate interaction of a host of financial innovations and changes in accounting rules: mark-to-market of a wide range of financial assets that has enhanced credit against collateral, widespread use of credit derivatives that has allowed the securitization of about any type of credit, internal models of credit risk control based upon the *Value-at-Risk (VaR)* principle that has immoderately propelled leveraged trading portfolios. Investment banks have captured the opportunity to link together those devices in order to generate a new "*originate and distribute*" model of credit that has hugely amplified the euphoric stage of credit expansion and asset price appreciation in the real estate sector.

Figure 1 exhibits the procyclical roundabout process of mark-to-market leverage that spurred the portfolio of securitized credit in the ascending stage of the real estate cycle. Financial market intermediaries finance the purchase of credits to be structured with market borrowing (repos and commercial paper issuance). They prod the surge of credit to households by a host of banks and unregulated credit brokers. The originators sell the credits to the arrangers of Mortgage-Backed Securities (MBS) for a fee. The process can be replicated with any credit eligible to pooling and repackaging in Asset-Backed Securities (ABS).

Feedback effects arise with asset price appreciation because higher asset valuation entails a larger capital in the marked-to-market trading portfolio of financial intermediaries for a given level of debt. The leverage ratio $I = A$ (total assets) / E (equity) becomes suboptimal: $I < I^*$ (desired leverage). Indeed, investment banks were out of the reach of Basle required capital ratios. They avoided at the utmost that capital gains sit idle on their balance sheets. Furthermore the desired leverage is a decreasing function of the *Value-at-Risk*. VaR is determined in credit risk models as a decreasing function of the distance to default which is augmented with a higher asset value for given debt outstanding. Therefore VaR is reduced

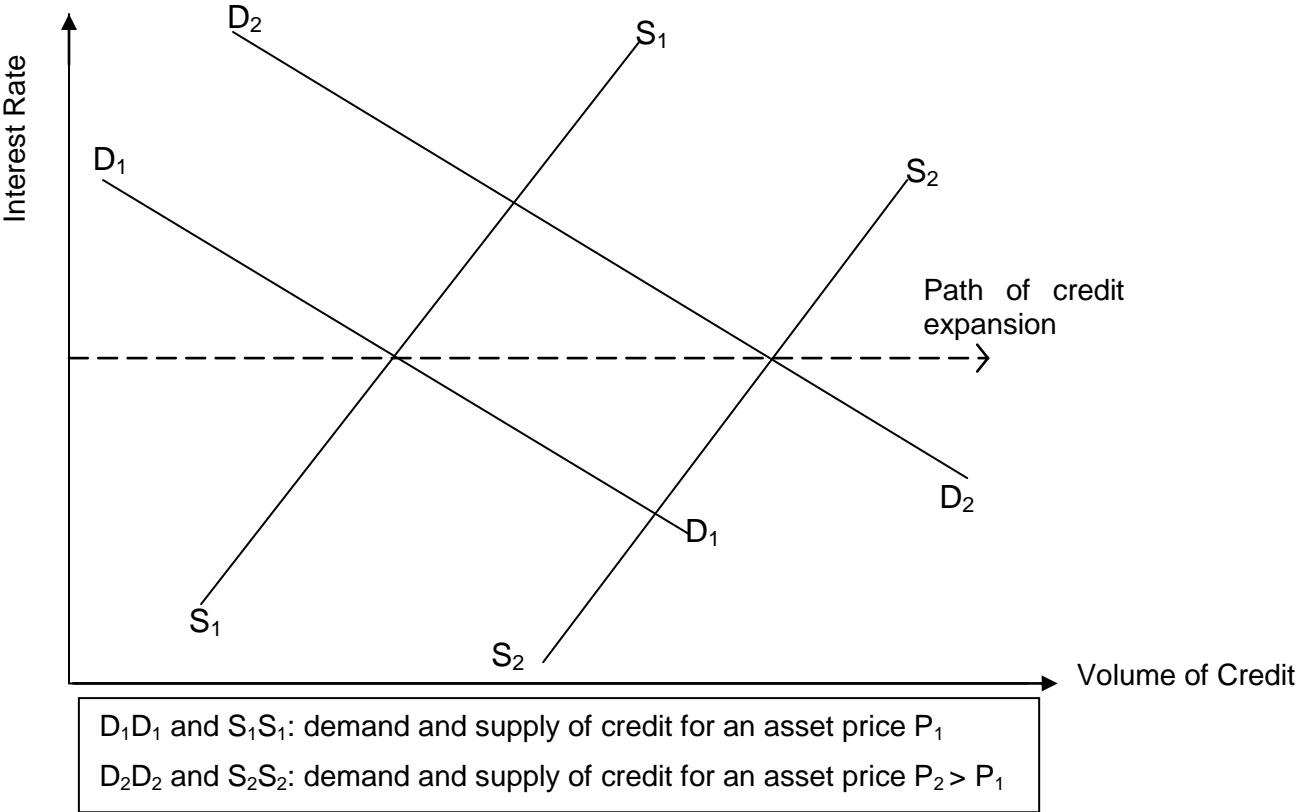
and $I^* = 1 / VaR$ is increased. Hence a rise in asset price boosts the leverage of investment banks and other market intermediaries compounding the shadow banking system (see (Tobias & Shin, 2008)). Practically, the financial intermediaries can pledge a higher value in the repo market that entails a lower haircut, thus a higher borrowing for a given amount of capital.

Figure 1 - Asset Price and Market Intermediaries' Leverage



Higher leverage gives an enhanced capacity to securitize credit while boosting asset prices, which in turn brings more favourable market conditions. On the supply side of mortgage credit, the originators have an incentive to supply more credit to borrowers at a given interest rate, because individual borrowers have a higher mortgage value with the rise in asset price. On the demand side households are eager to borrow more at a given interest rate because their equity value has risen. Therefore the aggregate demand and supply of credit are both positive functions of the asset price. They move up together with the asset price and feeds on the rise of the latter (Figure 2). This is the essence of the euphoric stage of the financial cycle where credit expansion and asset price appreciation reinforce one another in a roundabout process.

Figure 2 - Credit Demand and Supply Interaction



2.2 Ratings vs perverse incentives and crumbling market discipline?

Perverse incentives arose at all links in the chain of risk transfer from the originators of credits to the ultimate investors of multi-layered securitized assets via a tortuous and opaque process. An army of intermediaries took their toll: arrangers, off-balance sheet structures, hedge funds, rating agencies, lawyers and financial advisors. At origination the incentive to undervalue credit risk and to maximize moral hazard stems from the very nature of a model whose shortcomings were magnified by the aggressive behaviour of unsupervised credit brokers (Table 3).

Table 3 - Two Models of Credit Supply

Originate and hold	Originate and distribute
<ul style="list-style-type: none"> • The lender’s profit is an increasing function of risk taken • Incentive to value the borrower’s solvency • Info asymmetry reduced by monitoring of the borrower along the life of the loan • Supply of credit by commercial banks with a capacity to assess risk • Prudential control : provisions for default and regulatory capital 	<ul style="list-style-type: none"> • The lender’s profit is an increasing function of the volume of credits sold • Incentive to make credit against the expected collateral value • Info asymmetry augmented by the weak incentive to consider the risk profile of the debtor • Supply of credit by banks and non-bank credit brokers • No prudential control, no capital provision
Limited leverage and moral hazard	Maximized leverage and moral hazard

On top of a high volume and massive risk undervaluation that was strikingly demonstrated with subprime credits, arrangers and rating agencies make the most of an “incestuous” relationship to pool credits, offload the pools in leveraged off-balance sheet structures and tranche them into asset-backed securities. By contrasting what has been done with mortgage credits and what should be done according to the principles of well-managed securitization, one can figure out the damage inflicted by the investment bank-sponsored model of securitization (table 4).

The central role of rating agencies in structured finance brought a number of critics that preceded the wave of self-correcting actions introduced in section 1 (for example, see Partnoy (2005) and especially Mason & Rosner (2007)). With the coming of the crisis, blaming rating agencies became a favoured sport among editorialists and politicians. The base line would usually remain around assuming that rating agencies were guilty for the way they had rated structured finance securities. By the end of July 2007, some Moody’s’ shareholders had already filed class action proceedings arguing that the way management had let structured finance ratings be done was a major business failure threatening shareholder’s value; similar complaints have then been filed against the parent companies of the two other major rating firms. In September 2007, a US Congress committee held hearings on the role of rating agencies in *subprime* mortgage securitizations. The SEC was questioned on its implementation of the 2006 Credit Rating Agencies Reform Act while all participants were asked on the necessity of further regulatory proceedings (see U. S. Congress (2007)). In the “old” world, the European Commission asked the Committee of

European Securities Regulators to extend its scheduled review of rating agencies' business codes to their role in structured finance (see CESR (2008)).

Table 4 - Two Conceptualizations of Securitization

Benefits of properly managed securitization	Damages inflicted by the unsecured O&D model
<p><i>Benefits:</i></p> <p>Lower Financing costs</p> <p>More even risk dispersion</p> <p>Larger portfolio choices</p>	<p><i>Interests conflicts and information loss</i></p> <p>Securitization for regulatory arbitrage</p> <p>Incentive structure favours volume against quality of credit at origination</p> <p>Risk packaged in unconsolidated and unregulated off-balance sheet structures</p>
<p><i>Proper management:</i></p> <p>Credit to be packaged, secured and standardized</p> <p>Liquidity secured by secondary market or by regulating investment banks</p> <p>No deterioration of credit quality at origination</p> <p>Ultimate holders of risk able to make independent assessment and exert market discipline on intermediaries</p>	<p><i>Massive flaws in risk valuation</i></p> <p>Ratings are highly misleading as assessment of risk</p> <p>Investors deprived of information and failing to perform an independent evaluation</p>

These rating « agencies » are companies making business out of credit risk assessments published as ratings. Such particular business activity was born at the beginning of the twentieth century in the USA and then spread internationally particularly since the financial liberalization of the 1980's. It can be performed following two different business models: either by having investors pay for getting access to these privately issued opinions or by having issuers pay for getting their security rated. Overall the global rating business is however heavily dominated by three firms that earn most of their revenue by faring securities issuers (*Moody's, S&P and Fitch*). Basic cases against rating agencies have then focused on greed. Since the early 1970's, the three market leaders have chosen to be paid by the issuers of the securities they rate and then any of their major failures would bring charges against their inherent conflict of interest. This recurrent concern found the most fertile ground in the structured finance field: the complexity of structured products issuance would have facilitated collusion between a limited number of investment banks structuring the pools of credits and the "big 3" rating agencies giving the final structured products evaluations.

Postulating industry wide devious profit driven practices is however limited. First and foremost, the reputation of major rating agencies suffered on the wake of the 1929 crisis when they were all paid by investors at the time (see Harold (1938, chapter 6-10). Secondly,

official inquiries have overall failed to provide substantive back-up material for such an accusation³.

Acknowledging this point leads to focus on incompetence. Retrospectively, hypothesis on default and recovery rates were unrealistically low regarding two issues:

- Statistical tables were based on a period that was characterized by a strong rise in real estate prices. In this context, many debtors remained solvent thanks to a growth in their house value. In other words, the absence of downturn of the real estate prices in the statistics contributed to an underestimation of default rates. This strong dependence to real estate is also a matter of concern for recovery rates. In a plummeting market, loss given defaults are much higher than in a booming one (Calomiris (2008, pp. 19-23).
- The borrower quality dropped sharply since 2005 because the underwriting credit standards were not applied anymore. The increase of NINJA credits (No Job, No Income, no Asset) in subprimes pools implied a rise of the average borrower default probability that was not taken into account in the statistics tables (Ellis, 2008).

Turning to structured product valuation models as at the end of section 1, correlation is the factor that apprehends the dependence of credit risk to real estate cycle. This one is also likely to have been underestimated and most notably in the subprime case. For example, in the S&P *CDO evaluator* model, the maximum fitted correlation for MBS credits was a mere 30% (see S&P (2006)). Interest conflicts may have fuelled a failure to act against these bad hypotheses. Yet, again, there is no certainty that investor paid rating firms would definitively ensure against such unfortunate developments. Note that the SEC does not consider investor paid rating firms as purely exempt from potential interest conflicts (see SEC (2008b, note 55 p.10)).

Further, the previous part of this paper showed how investors failed to check on structured finance ratings. This leads to a key question: can rating organizations' lack of concern for a number of issues be truly isolated from a pervading market convention? From autocorrelation risk to "short memory" datasets and to legal or counterparty risks, can these mistakes be blamed solely on raters? For instance, the Cuomo "landmark" agreement on rating agencies did nothing else than securing loan level data communication between investment bankers, due diligence firms and rating agencies: the failure of raters to fully enforce loan level data communications could not be abstracted from what had been going on in the rest of the

³ Over the summer of 2007, New York Attorney General A Cuomo launched an inquiry on Wall Street's role in the mortgage boom and subpoenaed banks that had been major underwriters of mortgage securities, the three major credit-rating companies and due diligence firms (mortgage consultants, which vetted the loans). Connecticut Attorney General R Blumenthal began a similar review in late August and cooperated with New York prosecutors. In June 2008, "unprecedented" reform through a settlement with the "big three" rating agencies was announced... but was not made public, applied only to RMBS, and included a provision ending the agreement after three years. The investigation had mainly evidenced how investment bankers had been able to "shop" for rating by getting free rating previews from major rating agencies and how this situation induced "not so privy on due diligence report" raters. The deal required that every rating preview be paid and disclosed and that no rating be provided without due diligence reports.

From March to June 2008, the Department of Justice (DoJ) and the Federal Bureau of Investigation (FBI) joined their efforts into "Operation Malicious Mortgage", a national inquiry on mortgage fraud schemes that resulted in 144 fraud cases with involved losses estimated at 1 Billion USD. The DoJ said "anyone" involved in fraudulent mortgage loans had been targeted, from estate agents and appraisers to underwriters, developers, lenders and lawyers, though a focus was made on conspiracy cases (in which parties sought to engage in fraud for profit). In addition to fraud directly related to individual mortgages, the DoJ also investigated cases of mortgage-related securities fraud. On June, 19th 2008, the New York Eastern District Attorney's Office announced an indictment against two senior managers of failed Bear Stearns hedge funds, alleging that they marketed a low risk strategy while by March 2007 they believed these funds in grave condition and at risk of collapse and hence made misrepresentations to stave off investor withdrawal (the funds collapsed in the summer of 2007, with investors losing about 1.4 Billion USD). The FBI did not identify 19 large corporate companies also investigated in close collaboration with the SEC and the DoJ, but mentioned that the majority of these cases involved accounting fraud, insider trading and purposed failures to disclose securitized loans and derivatives proper evaluations. To our knowledge, none of the credit rating agencies has yet been indicted.

In early July 2008, the SEC published a much awaited report following a year long in depth investigation of the leading rating agencies. While major sources of concerns were outlined, the material disclosed provided no true case for fraud or devious profit driven internal procedures (see SEC (2008c))

origination chain (see, *supra*, note 5). Most importantly, this “optimistic” market convention reflected in passive regulators. A proof of this can be a Bank of International Settlements report welcoming the fact that rating agencies did not prove overly conservative in front of structured finance dynamism... a couple of pages after showing how difficulties with manufactured housing ABS had brought a crisis in 2004 (see BIS (2005, 2 p. 24, 3-4 p. 27 and appendix 5 p. 51)). To some extent, this report show how regulatory bodies failed to initiate reforms after such an episode that clearly evidenced unfortunate chains of events. More broadly, portraying rating organization as unaccountable standard setters for structured products can hardly fail to draw attention on an even more guilty passivity of US regulators (see Reiss (2006)).

Focusing on incompetence can lead to a radical denunciation of structured finance ratings. A structured pool of mortgage loans is fixed and bound to credit risk; hence, endeavouring to provide an *ex ante* rating that would prove stable over years and even over economic cycles is a far more challenging task than grading an issuer like a corporate⁴. So challenging that structured finance ratings may be found fundamentally misleading (Mason & Rosner (2007, pp. 34-47))⁵. Less vehemently, this explains why they were slow to move their grades in front of market developments and why they were too late in adjusting their methodologies against mortgage securitization dynamics. Overall, structured finance was a new field for rating organizations and it brought unprecedented fragility to the rating system. The self correcting actions introduced in section 1 confess how the consistency of this system suffered (across asset classes, geographical zones and time). Eventually, most of the mismanagements that brought rating firms there will be corrected either by the organizations themselves worried about restoring their reputation or by regulatory framework evolutions (see SEC (2008a) and EC(2008)). There is however no such certainty about more worrying questions. The second part of this text showed that responsible investors should have gone beyond ratings. Provided that investors had failed to perform such a control, regulators should have attempted to orchestrate it. Last but not least, financial regulators were also using ratings in the first place in a number of their rules and this practice should have induced a monitoring of ratings consistency.

Beyond tailored measures against mismanagements revealed by the 2007/2008 crisis, how can an informed use of ratings be secured? One may argue that recent events prove that such a task has to be institutionalized. Then three comments can be made. First, were regulators to agree on the creation of a public rating agency, this would likely be counterproductive since all agents would consider the evaluation as provided with a definitive seal of approval. Secondly and echoing interest conflicts arguments, this informed use could be fostered by a more developed use of investor paid ratings. Turning to the equity markets, distinguishing *buy side* from *sell side* has been most commented upon (for example, see (Goshen & Parchomovsky (2004))). Note that the 2006 Credit Rating Agency was above all meant to increase competition: it created a transparent and straightforward designation framework thanks to which ratings from new entrants would be treated as equal to the ones of the market leaders for regulatory purposes. To go one step beyond, any financial rule

⁴ The financial structure can evolve in order to face adversity and sustain payments against downfalls. It has even been theorized that the lack of reaction by rating firms would result in an implicit contract where management was left enough time to find a relevant strategy (see Boot *et al.* (2006)).

⁵ As a matter of fact, such a critique has had such a success that maybe the most agreed upon regulatory measure has been the requirement to better differentiate structured finance ratings from the traditional ones (see PWG (2008, p.4), FSF (2008, IV.4p.34), BIS (2008, pp. 14-15), IOSCO (2008, p.16), SEC (2008a, p. 96), EC (2008a, article 14 p. 18)). More broadly, in early July 2008, a bill “to direct the SEC to establish both a process by which asset-backed instruments can be deemed eligible for NRSRO ratings and an initial list of such eligible asset-backed instruments” was introduced to the U. S. Congress (see U. S. Congress (2008b)).

More episodically, in May 2008, doubts on rating agencies’ competencies were reaffirmed by revelations about Moody’s’ internal procedures aiming at checking flaws in their evaluation of highly complex securities known as Constant Proportion Debt Obligations (CPDO). S&P also confessed such procedures in July 2008, although to a lesser extent.

referring to ratings could state that each type of ratings should be used. That is any rule using rating would aim at fighting the current oligopoly structure of the rating industry. Thirdly, while the reunion of global securities regulators has focused on codifying business practices (see IOSCO (2008)), its implementation of international financial reporting standards could lead to the creation of a global database centralizing privately issued ratings (see (IOSCO (2007, p.7)). This is nothing more than pooling and archiving information that is already mostly publicly disclosed, yet this is critical. Not surprisingly the goal of democratizing the access to rating histories can be found in regulatory proposals on both sides of the Atlantic ocean (see SEC (2008a) proposing to require their disclosure on rating firms websites and EC (2008) proposing the creation of a central repository for ratings). A global public central database has the advantage of not necessarily involving disclosure of investor paid ratings and of requiring the birth of a body dedicated to provide tools for assessing how rating systems performs.

Concluding Remarks

When, as shown in section 1, rating agencies massively downgraded asset-backed securities in early 2007, institutional investors simply stopped buying them. The leveraged structures in the securitization chain were overloaded with assets that were no longer sellable and plagued by fast-increasing default risk. By August 2007, the supposedly liquid Asset Backed Commercial Paper (ABCP) market was deprived of any realizable market value. This triggered a general loss of confidence that closed a crucial source of financing at the heart of how market finance had come to play with leverage during the previous euphoric stage (section 2). Deleveraging started and is far from being completed in late 2008... it drives down the whole economy to standstill, baring an outright recession. The credit crunch in the financial system that goes with deleveraging was periodically worsened by rounds of liquidity stringency due to the management of counterparty risk. The leveraged entities (conduits, special investment vehicles and hedge funds) were under intense pressure from their prime brokers which imposed higher haircuts on new financing or demanded asset liquidation to redeem former borrowing. The inability of many structures to withstand the dire liquidity conditions forced the investment banks to re-intermediate the entities they had created to deconsolidate the credit risk in the pools of assets. Subsequently, investment banks were loaded with unknown future losses and scarcity of capital. The suspicion about the extent and the repartition of losses exacerbated counterparty risk and threatened to freeze the interbank market. This is why the Federal Reserve and other central banks have had to find innovative ways to provide liquidity: extending the maturities of their emergency lending, providing emergency facilities to financial institutions that were not under their supervisory power and buying high-risk assets.

Unsurprisingly investment banks bore the brunt of the crisis... two of the biggest Wall Street institutions went under: *Bear Stearns* and *Lehman Brothers* (respectively in March and September 2008). These episodes showed how fragile are the networks of counterparty risk when confidence has been wiped out and market liquidity is at a low ebb and does not recover despite extraordinary funding facilities provided by the Federal Reserve. Meanwhile, worsening credit risk conditions had contaminated the whole mortgage credit market. The two Government Sponsored Entities (GSE) that were supposed to regulate the market of mortgage credit came under fire in July 2008 because their capital was much too low to sustain the mounting losses on their huge portfolio of mortgage backed securitized credits and on the even greater amount of securities they have sold and guaranteed (respectively 1 845 Billion USD and 3 555 Billion USD). Because non-resident investors, mostly foreign central banks, hold nearly a trillion of the debt of *Fannie Mae* and *Freddie Mac*, the two GSE could not survive unscathed. In early September and using a shallow distinction to escape nationalization, these institutions were put under “conservatorship” by the Treasury.

Along the outbreak of financial difficulties, rating firms have had their share of the blame game. Focusing on the role of these private firms is nothing but yet another case of gatekeeper liability. The argument is that the very agents that were capable of checking the issuance of structured products should have been held liable for the harm that the fate of these securities brought: intermediaries should have been able to prevent the crisis. Such a line of discussion has to raise the next question: can a regulatory goal be efficiently enforced through a gatekeeper strategy? Kraakman (1984) shows how aiming at making whistle-blowers out of gatekeepers is a poor strategy: gatekeeper liability should be both restrained to major failures and targeted on a community of agents. The reforms adopted on the wake the 1929 crisis follow these points (Securities Exchange Act, section 11). There are high chances that the upcoming reforms will follow them as well.

Equipping investors with means of assessing risk and establishing an effective principal agent relationship with market intermediaries is a sure way to rebuild a better financial system. Section 1 showed how the implementation of basic structured product valuation techniques should have led to a better monitoring of structured product ratings. Here was a clue pointing to a relative passivity of long run investors in front of a financing model mainly devised by investment banks (section 2). Some have made sense of this passivity by focusing on the principal agent relationship between asset managers and final investors (see Calomiris (2008)). Considering this particular asymmetry and others (see Aschraft & Schuerman (2008)), it has been argued here that the most interesting challenge is to aim at institutionalizing the monitoring of rating firms. Interesting strategies have been introduced at the end of section 2. Yet, of course, no institutional mechanism will do for the ones who forget the lessons of History: speculation will come back and, somehow, “let the devil take the hindmost” will end up being the word of the day (see Chancellor (1999)).

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