Limitations of the Anglo-American methods of credit risk monitoring: A root cause of US subprime loan crisis

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Abstract*: Many critics believe that credit rating agencies failed to act promptly enough to warn banks and investors about the risks of investing in securities backed by the US subprime mortgages, the sector whose troubles triggered the recent global market volatility. This paper aims to review the codified assessment of credit risk developed by US banks, in which credit rating agencies play the pivotal role as the providers of credit ratings as well as important inputs for the assessment. This paper discusses the role of convergence to standardized credit risk modelling as a root cause of the US subprime crisis, given that it creates a misleading homogenization of information flows and can contribute to undermining financial stability by amplifying herd behaviour in lending and investment. We suggest that the Anglo-American model has problems that critics from Keynes onwards have identified.*

Introduction

Structured Finance in terms of *mortgage securitization* and *asset securitization* has expanded rapidly in the United States. During 2006 there were more than $2 trillion of mortgage-backed securities issued in the US compared to only $500 billion in 1996, while there were $1.5 trillion of asset-backed securities compared to $480 billion in 1997 (Caouette *et al.* 2008; p.478). But it appears that structured finance has a dark side that emerged as a major challenge in 2007 – the US subprime crisis. As was mentioned by Charlie McCreevy, the EU internal market commissioner, the US securitized mortgage market would not have grown to the extent that it did without the favourable ratings given by some credit rating agencies (*Financial Times* dated on 15 August 2007). The US Securities and Exchange Commission (SEC) pointed out that US credit rating agencies, that rated securities converted from subprime junk mortgages positively, failed to manage properly their conflicts of interest. The rating agencies were paid by the issuers of the securities they rated and the analysts doing the number-crunching were often managed by the same people who run the business side of the firms (*Finfacts* dated on 8 July 2008).

A logical development for managing risk for bank shareholders was the increasing codification of risk in the decision-making process of banks. The codified assessment of credit risk developed by US banks aimed to estimate their portfolio's Probability Density

Function (PDF) of credit losses by calculating the amount of capital needed to support their credit risk activities. The process for determining this amount was analogous to *value at risk* (VaR) methods, which were used in allocating economic capital against market risks (volatility risks), a common financial methodology used in the United States in the late eighties. In other words, US banks applied the financial technology and engineering developed for calculating volatility of financial market products and derivatives such as swaps and options to quantify credit risks as well. In these exercises, banks expressed the risk of the portfolio with an *algorithmic* measure of unexpected credit loss (i.e. the amount by which actual losses may exceed the expected loss), such as the standard deviation of losses or the difference between the expected loss and some selected target credit loss quantile (see BCBS 1999a, 1999b, 2000, 2001).

Other critics believe that credit rating agencies such as Standard & Poor's (S&P's) and Moody's failed to act quickly enough to warn banks and investors about the risks of investing in securities backed by the US subprime mortgages, the sector whose troubles triggered the recent global market volatility. In order to investigate one of the root causes of the recent financial crisis, this paper aims to review the codified assessment of credit risk developed by US banks, in which credit rating agencies play a vital role as the providers of credit ratings, as well as important inputs for the assessment.

Section 1 begins with an overview of the expanded role of the Basel Committee on Banking Supervision (BCBS) as the institution responsible for globally applicable standards for banking regulation and supervision. Section 2 critically assesses the codified assessment of credit risk developed by US banks and points out the crucial limitations of standardized credit risk modelling. Section 3 argues that the over-reliance on ratings services can amplify the volatility of market sentiment, causing euphoric over-lending in upturns and a severe credit crunch in reversals. Section 4 consists of concluding comments, suggesting that the Anglo-American model has problems that critics from Keynes onwards have identified.

1. Credit risk modelling standardized under the Basle regime

We begin with an overview of the expanded role of the Basel Committee on Banking Supervision (BCBS) as the institution responsible for globally applicable standards for banking regulation and supervision ("a global standard setter", see Cornford 2001; p.6) during the 1990s, and of the standard credit risk modelling which has been promoted accordingly.

The most important regulatory objectives for any regulatory banking/financial authority are (1) to maintain financial stability, in particular, to preserve the stability of

the banking system by preventing contagious *bank runs*; and (2) to improve sound

financial intermediation, including in particular the acquisition and accumulation of skills

and knowledge for credit risk management in the monitoring process. The introduction of

a capital adequacy requirement (the 1988 Basle Accord with its 8 percent capital

adequacy requirement) was designed to strengthen the international banking system by

making internationally active banks maintain an acknowledged buffer to cover a variety

of risks and unexpected losses. The Basel Committee on Banking Supervision (BCBS)

explains that the 1988 Accord was expected to be the cornerstone of the international

financial architecture and its overriding goal was to promote safety and soundness in the

international system (BCBS 1999b; p.9).

In the subsequent New Accord framework, the Basel Committee has urged

banking regulators to adopt an internationally accepted model for quantifying and

aggregating credit risks (see BCBS 1999a; p. 8). At the same time, standard Credit Risk

Modelling has become increasingly important in banks' risk management and

performance measurement processes, including performance-based compensation,

customer profitability analysis, and risk-based pricing even for domestic banks. Although

there are a range of practices in conceptual approaches to modelling risk, the Committee's

focus is on models that estimate a portfolio's current value and the probability

distribution of its future value at the end of the planning time horizon. In general, a portfolio's expected credit loss can be defined as the difference between the two, and the key issue is how to determine the expected probability of default (often termed the expected default frequency or EDF), which is a critical model variable.

In the Anglo-American financial system, the internal credit risk rating for each client firm of a bank is determined by the bank's credit staff and this is used in calculations of EDFs. Thus, the EDFs adopted in each bank may vary according to its own circumstances and credit strategy. But the Basel regime has also encouraged lenders to utilize external rating systems, such as Standard & Poor's or Moody's ratings for corporate bonds, to justify their own EDFs. The Basel Committee has decided, in its New Accord framework, to promote the replacement of existing approaches with a system that would use external credit assessments for determining risk weights. The Committee wants to ensure that the regulatory capital charge under the internal rating-based approach is determined in a manner that ensures accuracy and consistency with the standardized approach based upon external credit assessments (BCBS 1999b; pp. 37–40). The standardization of the basic methodology in credit risk models promoted by the BCBS has also been driven by US regulators' pursuit of a "level playing-field" for US banks subject to the constraints of Anglo-American financial rules.

The question that arises is, how would the convergence to the Basel Accord conditions affect financial stability and financial intermediation? Apparently, the US Sub-Prime crisis of 2007 tells us that the idea of promoting convergence to international standards would not necessarily improve the trade-off between financial liberalization and financial stability.

2. Limitations of the Anglo-American methods of credit screening and monitoring

According to Weale (1992; pp.62-65), *homo economicus* is intentionally and instrumentally rational and calculates how to maximize preference satisfaction, typically appearing in neoclassical economic theory as a maximizer of utility. The main activity of *homo economicus* is to calculate preference satisfaction within the available freedom of manoeuvre. On the other hand, *homo sociologicus* is introduced in the process of investigating how this freedom of manoeuvre might be bounded by prevailing technology and/or by the preferences of others. In particular, this introduces constraints on human action through "norms". The associated sociological concept of a role shows how *homo sociologicus* is educated from childhood to adulthood, thereby encoding norms and conformity to norms into roles that become immediate motives of behaviour. Norms make the calculation tasks easier, but actions based on prevalent social norms will

typically be difficult to justify in terms of instrumental rationality. If all individuals reason in a role- or rule-bounded way, their collective action may fail to maximize, or even achieve individual or collective benefit. This type of approach that looks at the tension between computational costs and collective interests allows us to identify conceptual limitations and arbitrariness in any codified assessment of credit risks as under the Basel rules.

To see how the algorithmic approach works, consider the credit rating transition matrix in Table 1 provided by Standard & Poor's, which shows the probability of migrating to another rating within one year as a probability percentage. S&P calculates this probability as well as the Expected Default Frequency ("EDF"), which is the probability of a particular credit facility defaulting during a time horizon based upon statistical data available at a particular point in time. An EDF can be interpreted as a loan's probability of migrating from its current rating grade to default within the credit model's time horizon. This likelihood is frequently expressed in terms of a rating transition matrix similar to that depicted in the table. Given the customer's current credit rating (in each row), the probability of migrating to another grade (shown in the columns) is shown in the intersecting cell. Thus, in the table, the likelihood of a B rated loan migrating to a default state within one year would be 5.58% (see BCBS 1999a; p.20).

Table 1: Sample credit rating transition matrix

| | | **Credit rating one year in the future** |
		AAA	**AA**	**A**	**BBB**	**BB**	**Been**	**CCC**	**Default**
Current credit rating	*AAA*	87.74	10.93	0.45	0.63	0.12	0.10	0.02	0.02
	AA	0.84	88.23	7.47	2.16	1.11	0.13	0.05	0.02
	A	0.27	1.59	89.05	7.40	1.48	0.13	0.06	0.03
	BBB	1.84	1.89	5.00	84.21	6.51	0.32	0.16	0.07
	BB	0.08	2.91	3.29	5.53	74.68	8.05	4.14	1.32
	B	0.21	0.36	9.25	8.29	2.31	63.89	10.13	5.58
	CCC	0.06	0.25	1.85	2.06	12.34	24.86	39.97	18.60

Source: BCBS 1999a, p.21 (The original source is; Gupton, G., Finger, C and Bhatia, M., *CreditMetrics – Technical Document*, Morgan Guaranty Trust Co., New York).

The most crucial limitation of the EDF is that it is not appropriate for calculating the probability of default in a long-term loan. The author interviewed an ex-Long-Term Credit Bank of Japan (LTCB) staff member who surveyed the so-called "KMV model", which was provided by KMV Co. and was widely used as a model for calculating the EDF. The KMV Co. was established in 1989 by three key individuals: Stehen Kealhofer (K), John McQuown (M), and Oldrich Vasicek (V), and it has now merged with Moody's. The model defines a situation where the asset value of a firm falls below the nominal amount of debt as constituting a default. The KMV model calculates the firm's probability of default based on the trend of the firm's stock price as an indicator of the firm's value. According to the ex-LTCB staff member, KMV provided banks using the model with a one-year EDF estimate. KMV was confident of the significance of their one-year EDF, but admitted that it would be difficult to use even a 3-year EDF in real applications.

Daisuke Nakazato, an ex-Industrial Bank of Japan (IBJ) staff member, reported an almost identical problem with the model in an interview with KMV (Ohno and Nakazato 2004; pp.182-190, see also FISC 1999).

Other key inputs in algorithmic monitoring models are the external ratings provided by rating agencies such as S&P's and Moody's. These inputs are provided at the discretion of the ratings agencies and the detailed criteria for credit risk assessments and ratings are not fully disclosed. Here we can also refer to an interesting research report showing how Japanese listed companies see the credit rating and rating process. This report was published in 2003 by Nikkei Research in collaboration with the Japan Investor-Relations Association (JIRA), financially supported by the Ministry of International Trade and Industry (MITI). The research was based on questionnaires sent to all the publicly listed companies, 3,615 as of December 2002, and it received effective answers from 1,344 companies. Of these 1,344 companies, 33 percent requested the rating agency to evaluate their credit ratings, 11.8 percent were rated without having requested it, and 53.8 percent had not yet been rated. A larger proportion of companies in the finance and insurance sectors as well as other non-manufacturing sectors (excluding services) acquired credit ratings than in the agriculture, fisheries, wholesale and services sectors.

Companies were also asked if they had any objection to their credit rating being assessed by the agency. Most, 72.8 percent, of those who answered replied "never," while only 26 percent had objections. As for the agency's response to objections, 37.5 percent answered that they were satisfied by the reply given by the agency although their objection had been rejected, while 47.3 percent answered were dissatisfied with the agency's response, as well as the fact that their objection was rejected. Companies were also asked about the kind of information the rating agency asked for in the process of the credit rating evaluation. The top five answers (multiple answers were allowed) were as follows: (1) Consolidated financial statements (87 percent); (2) Prospective operating profits for the next fiscal year or later including mid- and long-term business plans (83 percent); (3) Unconsolidated financial statements (79 percent); (4) Business strategy and management strategy statements (78 percent); and (5) Information from operating units (77 percent). As many as 59 percent of the effective answers revealed that firms did not fully disclose information to the agency, mainly due to their own internal rules about confidentiality. This shows that some critical information was not fully reflected in the credit assessment by the external agencies. Besides, the listed companied had problems with the rating agency's evaluation, as follows: (1) 45.4 percent thought that the rating evaluation criteria were vague; (2) 24.3 percent were dissatisfied with the agency's

accountability to the firm in explaining the results; (3) 15.1 percent believed that the

agency's capacity to carry out risk assessment was not sufficient; and (4) 13.7 percent felt

that the competition between rating agencies was too constrained.

Undoubtedly, some risk management instruments become necessary as

economies become more complex. Intensified internationalization and technological

change make it more difficult for lenders to undertake the role of monitoring investments,

for instance because lending now involves making judgements about the viability of

different firms to carry out innovations and develop new products. Bounded rationality

accordingly encourages lenders to use *codes* for measuring credit risks and to use external

sources of risk assessment whenever possible, instead of trying to rely on in-house skills

and knowledge for monitoring. But the codified assessment of credit risks under the

Anglo-American system does not necessarily solve the problem of uncertainty. As a

complete set of risk markets is necessarily absent, it is impossible in theory to determine a

definite value of the EDF without risk of error, even using all available data sets. Thus,

even if the credit rating transition matrix (the probability of migrating to another rating

within one year) provided by external rating agencies is statistically significant, it cannot

indicate in which direction a particular customer will be migrating. As Herbert Simon

reminds us, our existing knowledge cannot provide a basis for the precise calculation of

mathematical expectation:

> No number of viewings of white swans can guarantee that a black one will not be seen next. … Reasoning processes take symbolic inputs and deliver symbolic outputs. The initial inputs are axioms, themselves not derived by logic but simply induced from empirical observations, or even more simply posited. ... The processes that produce the transformations of inputs to outputs are also introduced by fiat and are not the products of reason. (Simon 1983; p. 190)

> When it comes to evaluating innovations as opposed to observing swans, the indeterminacy becomes significantly greater. Nevertheless, regardless of the arbitrariness of the rules of inference applied to financial data sets, lenders may be persuaded to use statistical EDF and external ratings based upon it for measuring credit risk because they are required by their banking regulators to adopt normative procedures for calculating capital adequacy requirements, as well as for risk-based pricing. In the past, bankers were considered professionals in screening and monitoring, and banks played important roles in mediating

stable flows of long-term funds to new industries and enterprises. External-rating agencies played a very limited role in providing credit profiles of bond issuers for non-professional investors who had limited capacities to assess credit information. As lenders came increasingly to rely on the statistical EDF provided by external rating agencies for publicly rated corporate bonds, bank lending began to conform to investors' behaviour in bond markets driven by external risk assessment.

3. A Prelude to the US Subprime Loan crisis

The definition of capital in the New Framework remains unchanged from that of the original Accord as amended and clarified since 1988. The BCBS, however, proposes to clarify and broaden the scope of application of the current Accord to improve the way regulatory capital requirements reflect underlying risks (BCBS 1999b: Summary), and it sets forward various approaches for making the Accord more sensitive to credit risks. The new risk weighting scheme increases the reliance of regulators on external credit assessment institutions. The BCBS identifies the following criteria as the minimum requirement for the eligible external assessment agents; Objectivity, Independence, Transparency, Credibility, International Access, Resources and Recognition (*ibid*.; p.34).

The BCBS seems to have endorsed the effective power of the external rating houses that already have a vested interest in the industry and a track record in credit assessments.

The risk weighting system in the 1988 Accord aimed in part at ensuring that banks were not deterred from holding low risk assets (for example, sovereign debt) by risk-weighting loans according to the institutional nature of the borrowers (see BCBS 1999b; p.8). At the same time, the immediate concern of banking regulators was to force internationally active banks to set a *buffer* to cover a variety of risks, including unquantified ones. Therefore, the risk weighting of assets has been arbitrary at best, resulting in a crude measure of economic risk. The most salient feature in the new framework is to suggest a more extensive use of external credit rating and assessments as a standardized approach for applying the risk weights to respective exposures. In particular, the ratings offered by Standard & Poor's Corporation using its methodology are emphasized by the BCBS as useful for extracting risk weights of booking assets (The BCBS (1999b) explains that Standard & Poor's credit ratings are used as an example only. It says that Moody's or Fitch IBCA's rating structure or that of some other agency could be equally used). Subscription to the IMF's Special Data Dissemination Standards (SDDS) is described as another important method for applying risk weights to exposure to *sovereign* debt. For sovereign risk this new approach would have the result of ending

the reliance under the 1988 Accord on the distinction between OECD and non-OECD

exposures (Cornford 2001), which has been controversial. A broad summary of the codes

based upon S&P's credit assessment scheme for risk weightings for claims is described in

Table 2.

Table 2: Risk weightings for claims proposed in the New Basel Accord

Claim	Assessment					
	AAA to AA-	**A+ to A-**	**BBB+ to BBB-**	**BB+ to B-**	**Below B-**	**Unrated**
Sovereigns	0%	20%	50%	100%	150%	100%
Banks	20%	50%	100%	100%	150%	100%
Corporates	20%	100%	100%	100%	150%	100%

Source: BCBS 1999b; p.31

The BCBS points out the possible negative incentive effects of a more extensive use of

external assessments on the agencies themselves (BCBS 1999b). However, the BCBS

seems to leave the problem behind without giving any suggestions on how to deal with

the potential negative effects, implicitly expecting each banking regulator to devise

systems to prevent banks from using external assessments in a problematic or mechanical

fashion. Meanwhile, the New Accord framework encourages a number of arbitrary

developments:

1) The proposed matrix of risk weightings (Table 2) in the framework is too crude. For instance, exposures to corporations that are rated by S&P's as between "A+" and "B-," including un-rated borrowers, are categorized as having the same risk-weight (100%). For most commercial banks that have loan portfolios including these categories of exposure, this matrix is frequently likely to become not very meaningful for assessing their corporate finance and lending business. (The revised risk weights of the New Accord, issued in 2001, propose that a weight of 50 per cent be added for entities with credit assessments in the range A+ to A-. Meanwhile, the 100 per cent weight for un-rated corporations is still retained).

Table 3: Proposed risk weightings for asset securitization

AAA or AA-	A+ to A-	BBB+ to BBB-	BB+ to BB-	B+ or below or unrated
20%	50%	100%	150%	Deducted from Capital

Source: BCBS 1999b; p.36

By contrast, the matrix of risk weightings for setting capital charges for *asset securitisation* (collateralized debt obligations) as proposed is more sensitive to external credit ratings (Table 3). This proposal may create an externality by enhancing the presence of major external rating houses in loan securitization and secondary loan

trading business. According to the BCBS, the securitisation market is a global one in which a significant number of internationally active banks participate. Furthermore, asset-backed securities issued in the international market typically have a credit rating.

2) The recovery ratio (the expected ratio of the principal recovered with the liquidation of pledged mortgage or collateral) has nothing to do with the choice of the proposed risk weighting framework. According to the *Financial Times*, there was a conflict between the United States and Germany until the last moment on the proposed framework. One issue was to what extent external ratings and assessments should be applied for the calculation of an adequate *buffer*. The other was how to deal with commercial mortgages for capital purposes in the new framework. Each regulator was motivated to protect its own practices in supervision. The final proposal seems to have reflected the political conflicts and compromises between the two. The 2001 revised consultative paper proposes alternative approaches, a "comprehensive" and a "simple" one. Under the former approach, the underlying risk exposure will be reduced by a conservative estimate of the value of the collateral (see Cornford 2001, pp.17-19 for the details).

3) The BCBS does not propose to take the *maturity* of claims into account for capital purposes (BCBS 1999b; p.33). Assume that there are two borrowers with equivalent credibility. In principle, an exposure to one borrower with longer final maturity (for

instance, three years) should be considered riskier than that to the other with shorter final maturity (for instance, three months). Needless to say, the maturity or remaining period of claims is an important factor for banks making decisions for granting credits.

4) The BCBS does not take the portfolio effect by concentration or diversification into account for capital purposes. In portfolio theory, a portfolio concentrating its investment in particular firms (for example, granting $100million each to ten firms) would be considered riskier than a diversified portfolio (for example, granting $1million each to thousand firms), if these firms have the same credit rank.

5) The Basel Accord involves possible effects on regulatory arbitrage (Cornford 2001), leading to a vicious circle. For instance, the 1988 Accord gave lenders the incentive to arrange collateralization with securities or to get guarantees from selected OECD public-sector entities to reduce the risk weights of their exposures.

These types of arbitrage, in turn, led the BCBS to expand the scope of application of the Accord so that it could capture residual risks. However, the New Accord has unavoidably become a source of new opportunities for arbitrage, particularly in the field of loan securitization or credit derivatives. The Committee recognized, on the one hand, that asset securitization can serve as an efficient way to redistribute a bank's credit risks to

other banks or non-bank investors. On the other hand, the Committee was concerned with

some banks' use of structured financing or asset securitisation to avoid maintaining

capital commensurate with their risk exposures. Therefore, the Committee proposed to

revise the Accord to make use of ratings by eligible external credit assessment institutions

for setting capital charges for asset securitizations. The Committee proposed risk

weightings for claims on securitization tranches that might result in a special purpose

vehicle (SPV) issuing papers secured on a pool of assets (BCBS 1999b; p.36) (Table 3).

The BCBS also claimed that bank guarantees in the form of credit derivatives had gained

widespread usage. These developments have had important effects on the credit risk

profile of many banks. (BCBS 1999b; p.42). This is a never-ending *vicious circle.*

Although the regulation appears to encourage financial innovation in mitigating and

hedging risks, more accuracy would be at the cost of more complexity.

Credit markets deal not only with intertemporal trade but also with promises

whose fulfilment is uncertain. In general, uncertainty in the process of credit risk

management is likely to drive lenders to watch others and seek a shared standard for

justifying their decisions. Bikhchandani & Sharma (2000) suggest several reasons why a

profit maximizing investor should be influenced by the behaviour of others. First, others

may know something about the return on a particular investment, and their actions reveal

this information. Second, individuals may have an intrinsic preference for conformity.

Third, the compensation schemes and terms of employment of money managers may be

such that imitation is rewarded. According to Bikhchandani & Sharma (2000; p.10), if an

investment manager and his employer are uncertain about the manager's ability to pick

the right stocks, conformity with other investment professionals preserves the "fog" – that

is, the uncertainty regarding the ability of the manager to manage the portfolio. This

benefits the manager and, if other investment professionals are in a similar situation, then

herd behaviour occurs. Keynes (1963; p.176) observed, "a 'sound' banker, alas!, is not

one who foresees danger and avoids it, but one who, when he is ruined, is ruined in a

conventional and orthodox way, along with his fellows, so no one can really blame him."

For instance, a protective institutional framework in the Japanese traditional "convoy"

monitoring system may have created a "lock-step mentality" among the Japanese banks,

in terms of following the crowd under the regulator's administrative guidance. This may

have induced the Japanese banks' herd behaviour in rapidly expanding mortgage loans in

the new situation confronting them in the financial bubble of late-1980s.

The over-reliance on rules of thumb, ratings services and analyst's reports can

amplify the volatility of market sentiment, causing euphoric over-lending in upturns and

severe credit rationing in reversals, as in Minsky's financial fragility hypothesis (Minsky

1975, 1977, 1986; Kindleberger 2000).

The mechanism by which homogenized credit information flows lead to financial fragility can be described as follows. When external rating agencies such as Standard & Poor's provide a rating category for a particular borrower (or country) the codified assessment of credit risk (the statistical EDF or the external ratings based upon it) may cause lenders to adjust their subjective probabilities toward the statistical or codified ones. As a result, lenders may be more inclined to take risks even if subjective ex ante risk premiums are not fully reflected in pricing. Needless to say, herd behaviour in lending does not necessarily reduce the asymmetric information problem typically observed between lenders and borrowers. In addition, uncertainty is not just due to asymmetric information but has a fundamental component that affects all investments with returns in the future. In this context, the codified assessment of credit risks with homogenized information flows reduces lenders' incentives to monitor borrowers on their own. The stronger their confidence in the external information, the weaker their incentive to collect and process their own information from direct credit relations with borrowers.

When external rating agencies offer a positive outlook or move towards an upgraded category, the codified assessment of credit risks may drive lenders to reduce risk premiums further. Expectations of better ratings may encourage competition for

greater loan exposure, because the expected risk-adjusted return on the current EDF can be expected to shift favourably. This process may lead to euphoric speculations *à la* Minsky. There also ensues a game of chicken, in which players assume that they can exit just before the bubble crashes.

When external rating agencies assume a negative outlook, in particular when they downgrade a borrower unexpectedly, the codified assessment of credit risks may lead to panics in which all lenders call in their loans. To the extent that codified assessment with homogenized external information attenuates lenders' incentives to monitor borrowers on their own, sudden reversals in external risk assessment ratings may amplify panics. This is because the actions of other lenders may have negative feedback effects on the financial viability of borrowers that further reduce their creditworthiness. Lender panics may also be explained in terms of loss aversion. If a sudden reversal causes actual losses to banks, lenders may act sharply to reduce their exposure, and the result may be a negative spiral or trap in which no lender is willing to take risks in that sector, even if a very high risk premium is offered (see also Suzuki 2005).

Keynes (1936) had already pointed out in the 1930s that certain classes of investment are governed by the average expectation of those who deal on the Stock Exchange as revealed in the price of shares, rather than by the genuine potential of

entrepreneurs. The inducement to invest comes to depend more on waves of optimistic and pessimistic sentiment fluctuating according to the highly volatile mass psychology in the market. The professionals in banks could be expected to possess better knowledge and capability in risk assessment and monitoring than average investors. The competition among expert professionals could then be to play a role in correcting the volatility of fund allocations, an objective of financial deregulation. However, in reality, "the energies and skills of the professionals are occupied otherwise" (Keynes 1936; p.154). "Most professionals are concerned, not with making superior long-term forecasts of the probable yield of an investment over its whole life, but with foreseeing changes in the conventional basis of valuation a short time ahead of the general public."

Financial techniques, such as loan securitization, secondary loan dealing and credit derivatives are methods of quantifying and trading credit risks which have further fuelled a convergence of opinion in loan (debt) markets. This trend may have given some professionals in banks an incentive to prefer short-run speculative profit-making and opportunistic trading. This trend has also diverted resources from long-term and stable debt markets, which used to provide funds for firms with the underlying rationale of improving long-run production possibilities.

4. Uncertainty: concluding comments

Since the consequences of actions extend into the future, accurate forecasting is essential for making objectively rational choices. But in the real world, most choices take place under conditions of uncertainty. Frank Knight (1921) drew a famous distinction 'between "measurable uncertainty" or "risk", which may be represented by numerical probabilities and "unmeasurable uncertainty" which cannot' (see Ellsberg 1961). Numerical probabilities are in turn based on the possibility of repeated observation of an event that allows the calculation of a statistical probability for that event. In contrast, many events in the economic domain are not of this type. There is no repeated observation that can give us an objective probability for the success of an innovative process. Here, the risk involved is a subjective judgement, and this can vary across persons making the judgement based on their experience and knowledge of subtle and unquantifiable aspects of a situation. The formulation of subjective probability judgements is what Knight described as decision-making under uncertainty.

Uncertainty may be more or less ignored or, alternatively, subjective probabilities may be applied, together with a risk premium to cover unspecified adverse events. Since there is no precise economic theory of how decisions are made under uncertainty, agents tend to observe each other's responses and do not deviate widely from the norm regarding

which factors should be taken into account and how much weight should be assigned to them. But, "when the crowd is wrong *ex-post*, there is the making of a financial crisis" (Davis 1995; p. 135).

Uncertainty makes decision processes complex and volatile. In particular, volatility stemming from lenders' uncertainty, in terms of subjective probability in credit risk management, is a crucial factor contributing to the systemic fragility of financial markets. Uncertainty often encourages agents to adopt rules of thumb because standardization and coordination may be more effective than individual prediction (Simon 1996; p.42, Koppl 2002). However, such standardized rules of thumb can themselves become constraints on our decision-making: if they acquire the status of norms, they can reduce us to mere engines of procedural rationality. In international banking and credit operations, a codified assessment of credit risk in purely quantitative terms by inference from the statistical Expected Default Frequency or EDF is now a widespread practice. The codified rule of thumb encourages lenders to measure expected credit losses mathematically and to maintain a capital buffer against unexpected credit losses. An important example of this paradoxical response to uncertainty is the gradual adoption of the Basel conditions in international credit markets. To promote the stability of international banking and credit markets, banking regulators at the Basel Committee on

Banking Supervision (BCBS) established a required capital ratio of 8 percent as the international norm for a capital cushion. Lenders are discouraged from assuming credit liabilities that cause their capital ratio to fall below this threshold. But we see that the convergence to standardized credit risk modelling creates a misleading homogenization of information flows and can contribute to undermine financial stability by amplifying herd behaviour in lending.

As far as the securities market was concerned, US regulators accepted a much more market-oriented framework (see Antoniewicz 2000). The securities markets were not only competitive and rule-based, they were also regulated by a much less protective framework. The key players in this market were *financial intermediaries* who developed capabilities in credit risk screening and monitoring functions by specialization and division of work. Ultimately, credit risks and uncertainty in this framework were absorbed by a large and diversified base of private investors in the US market who could afford to take credit risks on their own as fund providers, having assessed the information packaged by investment bankers or venture fund managers. This large and diversified base of relatively small investors in securities markets is a critical foundation of the Anglo-American financial system.

Keynes' theory of *expectations* pointed out that while objective calculations of

"risk" were not possible for investments, he also rejected the idea that investments or stock markets were entirely based on mass irrational psychology. The bridge between the two was his concept of *animal spirits*. Stock markets and investments more generally required animal spirits in individual initiatives that supplemented and supported reasonable calculations of risk. If prevailing animal spirits were such that no investor could afford to absorb "down-side risks" for a firm, it would not be able to raise capital. The existence of a large and diversified base of investors with a broad range of animal spirits was therefore essential for financing the entire range of economic activities in a growing and changing economy. As long as the base as a whole retains the strength and capacity to absorb many different types of risks and uncertainty, the financial market backed by such a base of investors can be dynamic and powerful. The Anglo-American financial system relies on banks financing a limited range of capital requirements and a diversified base of investors, with a range of animal spirits financing the difficult areas of long-term investing through securities markets. We, however, should ask; to what extent can the US system continuously rely on its broad-based investor base with some diversity of opinions and appetite for risk, as has made the financial model workable for some time in the past? If the number of "animal spirits" among the investors should shrink, it would exacerbate the crowd psychology in lending and investment, and consequently have a

deleterious effect on the mediation of financial resources. We should note that the

Anglo-American model has problems that critics from Keynes onwards have identified.

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