

The Treatment of Credit Risk in the Basel Accord and Financial Stability

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ABSTRACT

This paper discusses the Treatment of Credit Risk in the new Basel Accord that aims at improving financial stability in the world. It addresses the issue of the procyclicality effect of the new framework and the consequences on corporate financing. It then specially focuses on the treatment of maturity in the credit risk measurement and shows that it has a perverse effect leading banks to lend short for industrial assets and takeovers, which might be a factor of instability. The choice of the Value-at-Risk as a measure of credit risk and linked liquidity aspects are discussed to conclude that the new Basel Accord should encourage A-rated banks to act as liquidity providers in economic slowdown phases.

JEL Classification: F34, G21, G28

Keywords: Credit Risk; Maturity; Basel Accord; Liquidity

I. INTRODUCTION

Following the important amendment of 1996 on the capital requirement to face market risks, the Basel Committee on Banking Supervision has worked on a process for revising the International Accord on Banks Capital Adequacy “to arrive at significantly more risk-sensitive capital requirements” with the fundamental objective to “further strengthen the soundness and stability of the international banking system”.

The final version: “International convergence of capital measurement and capital standards” has been published in June 2004 and should be implemented by banks on January 2007. It takes into account results of the Quantitative Impact Study, QIS 3, published in May 2003, and comments from banks, and the March 2004 modification to specify that the capital requirement addresses to unexpected loss only, the expected loss being covered by specific provisions.

We thus find interesting to analyse main criticisms addressed to this new framework, which is conceived to improve financial stability in the world. This paper is organized in four sections. The first section gives a summary of the treatment of credit risk in the New Basel Accord. Section II discusses the procyclicality effect of this framework. Section III shows how to treat maturity and Section IV studies the Value-at-Risk as a measure of credit risk in that context.

A. The Treatment of Credit Risk in the New Basel Accord

In its first pillar, the New Basel Accord allows banks to choose between two broad methodologies for calculating the risk weighted assets and thus the capital requirement for credit risk:

- A standardized approach where banks use external ratings to rank borrowers in seven risk scores categories associated with weights. The capital required is simply 8% of the weighted total exposure (exhibit 0),
- An internal rating based approach (IRB) where banks determine internally the following risks components:
 - the Probability of Default (PD),
 - the Loss Given Default (LGD),
 - the Exposure at Default (EAD),
 - the effective maturity (M).

The capital requirement for credit risk amounts to the unexpected loss calculated with these inputs through a risk loss function $K = f(PD, LGD, M)$ adapted to main categories of loans, given in exhibit.

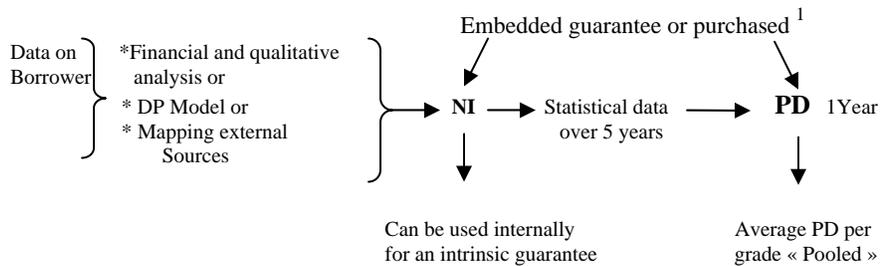
Under the foundation approach, banks only estimate PDs and rely on supervisory estimates for other components. Under the advanced approach, they provide their own estimates of PDs, LGDs, EAD and their own calculation of M.

Probabilities of Default (PD) are the average default probabilities determined on a year basis over an historical period of 5 years minimum according to the process described in Diagram 1. Thus the rating of the borrower external or internal

determines the probability of default and the LGD (see Diagram 2) needed to calculate the capital requirement.

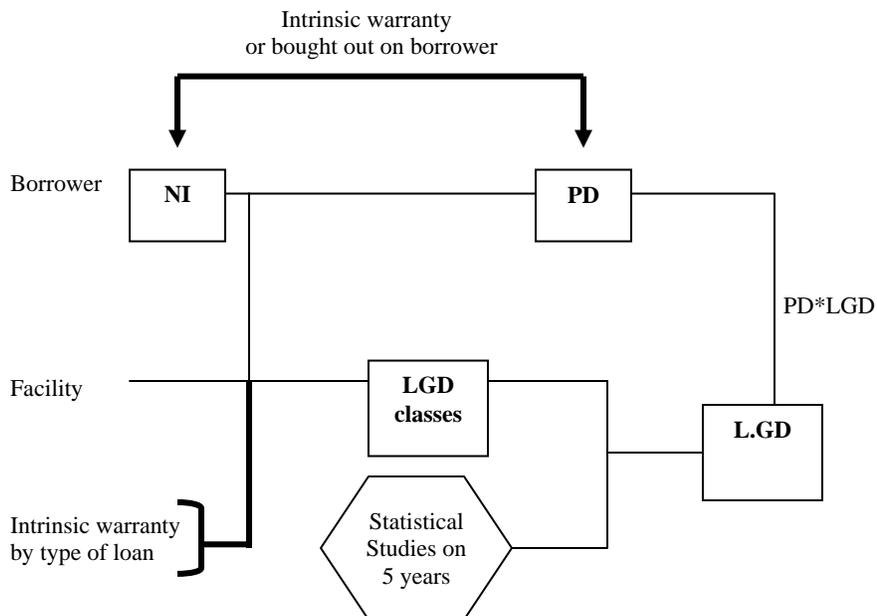
Diagram 1
Process for determining PD's

$PD = \text{Max} (1YPD ; 0,03\%)$ $PD = 100\%$ for defaulted loans.



1. There is full substitution of the warrant NI to determine PD or, there is a weighted average calculation in case of partial warranty. 2 NI for corporates consists in: 10 grades for performing loans and 3 grades for unperforming loans.

Diagram 2
Process for determining LGD



II. THE PROCYCLICITY EFFECT OF THE REVISED FRAMEWORK

The most frequent criticism of the New Basel Capital Adequacy frame is that it will increase procyclicality with a negative consequence on firm's financing since credit will be scarce on economic slowdown phase.

Of course, during adverse cycles of growth, ratings of firms collapse:

- According to Standard and Poors, a category concerned 70% of issuers in January 2001 and only 46 % in march 2003,
- According to Société Générale, corporate spreads were of 50 – 60 basis points beginning 2002 and 150 basis points beginning 2003 to come back to 40 – 50 basis points beginning 2004.

Following the described process, a large migration from NI top categories to a medium-low categories should have occurred in 2003, provoking higher PD's and capital requirement, followed in 2004 by another migration with upgrading in NI and lower PD's.

To avoid brutal changes in ratings, the accord specified that ratings should be assigned on rather long period including adverse economic conditions. This smoothing by the use of an average rating over a 5 to 7 years period should prevent a total shortage of financing for firms downgraded brutally which cannot issue on monetary or bonds markets without paying high spreads. Nevertheless, the capital requirement for banks will increase notably resulting in higher margins or fewer volumes of lending to these corporates. This will undoubtedly add to firm's difficulties, at a time when A-rated banks enjoy a very favourable access to bond markets due to a flight to quality movement and thus have the ability to lend at reasonable margins.

Thus the Basel Committee apparently counts on two corrections from agents:

- 1) That banks will resume lending to corporates, analysing case by case the credit risk and fixing relevant margins, and will consider firms' ratings on a sufficiently large period to counter balance recent downgrading due to adverse economic conditions, thus feeding the economy with the needed liquidity,
- 2) That they will therefore use their capital cushion (they enjoy rates in the range of 12% versus the 8% compulsory level) to buffer the linked rise in capital adequacy requirement and will not waver to look at their capital ratio as a flexible tool and no as an intangible limit,
- 3) That Standard and Poors, Moody's and Fitch and other agencies will consider this strategy of banks as legitimate and as just adapted to bad economic conditions and likely to generate future increase in the bank net product since these fundings should favour economic growth and prevent unemployment and not downgrade those banks in spite of the decrease of their capital ratio.

It is worth noting that the capital adequacy ratio of banks is not simply a solvency ratio but becomes a strategic tool aimed at allowing banks to correctly analyse their risks and gear them on all main activities and cycles of economy.

Therefore, agencies should rate banks according to the soundness of their strategies and performances and the quality of their risks management on their main activities rather than on their sole capital ratio level.

A survey during the transition period of the behaviour of agents and of the financing of corporates will indicate if the Basel Committee is right in forecasting that adaptation of agents to these new rules will prevent adverse effects on financial stability of the procyclicality of the new approach of credit risk based on rating.

III. THE TREATMENT OF MATURITY

The treatment of maturity in the credit risk measurement appears to us as presenting a negative effect for the financial stability. The capital requirement is calculated for an effective maturity of 2.5 and adjusted to lower the requirement for shorter maturity and to increase it for longer maturity by the scaling factor $[1+(M - 2.5) b(PD)]$, where $b(PD)$ is the maturity adjustment :

$$b(PD) = [0.11852 - 0.05478 \times \log(PD)]^2$$

The effective maturity is given for any investment subject to a determined cash-flow schedule as:

$$M = \frac{\sum_{t=1}^n t \times CF_t}{\sum_{t=1}^n CF_t}$$

which is close to the Macaulay duration calculation.

This standard 2.5 maturity corresponds to 6.0 years for a loan reimbursed with constant annuities, under present range of rates. This means that banks have an incentive to lend short in order to avoid credit risk, following a basic assumption that the longer is the loan, the riskier it is.

It has been discussed by Robert C. Merton, "contrary to what many might believe, the relative riskiness of the debt can decline as either the business risk of the firm or the time until maturity increase".

This assumption is just dangerous since it does not take into account the necessary adequacy between the lengths of the cash flows derived from the financed asset and the length of the loan, since the capital lent will be reimbursed from this cash flow. Thus financing too short an asset can lead the bank to provoke the non-reimbursement of the loan. Moreover, to finance with very short maturities large takeovers can lead to default as the analysis of the Vivendi Universal and Alstom cases shows. This second case is commented below.

Thus, we consider that the way maturity is treated for corporates and special lendings can lead banks to an herd behaviour to lend short, say on a maximum 5 year basis for industrial assets or cross borders takeovers, which might create a financial instability factor since such a short maturity is not adapted to most industrial investments. Borrowers will tend to boost forecasted cash flows to get their financing.

Since we believe it is less risky to have all classes of duration for assets rather than a single duration by category, we think that this maturity treatment can have adverse consequences and should be carefully surveyed during the transition period to be amended if needed, which could easily be done by taking a higher standard than this 2.5.

IV. THE VAR AS A MEASURE OF CREDIT RISK

Some authors have criticized the use of VAR calculation derived from credit risk mark-to-market modelling in the risk weight function, M.Bezard (2004) M.Aglietta (2004), Moumni (2002). These mark-to-market models rely on the assumption that assets are saleable on a liquid market at a price, which is relevant, the market being efficient.

This assumption reveals false on debt market where a crisis provokes very rapid liquidity squeeze and spreading of the financial crisis through debt markets and crashes on equity markets over the world as in 1997 / 1998. Capital being scarce, credit spreads and other spreads increase rapidly because of this lack of liquidity, and prices are no more indicative of credit risk, but mainly of a premium to be paid for liquidity.

Were the market efficient, some large investors should invest to benefit of those high spreads and thus provide the market with liquidity. To be able to act as liquidity providers, banks must enjoy a significant capital cushion to eventually face a final loss which might be estimated through stress test, a cash situation allowing them to stand over a year without selling positions (see Myron Scholes, "Crisis and Risk Management, April 2000), and be allowed by the regulation authorities to use this position in capital to provide the market with liquidity.

As on the debt market price formation is not simply the result of the asset valuation by investors but also of the liquidity situation of borrowers and investors, the VaR cannot give a good representation of capital requirement to stand a crisis.

So the Basel Committee encourages banks to develop stress test and again, the idea to allow banks to use the cushion capital in a dynamic strategy of gearing risk appears as way to lead them to provide liquidity to markets to avoid too high volatility and even markets shocks due to herd behaviours in bad economic conditions.

V. CONCLUSION

The objective of the New Basel Capital Accord is to allow banks to manage their risks with a dynamic approach of capital adequacy. The use of a risk formula, derived from Mark-to-Market models, using VAR to determine the capital requirement for credit risk in the Internal Ratings Based Approach, is close to methods used by banks to allocate economic capital on their main activities.

The chosen methodology of continuous improvement of the proposal through Quantitative Impact Studies and Exchanges with Banks and institutions has led to significant modifications and simplifications of the initial scheme, as the decision of

removal of the expected loss from the capital calculation, since specific provisions are usually constituted.

We still believe that three main issues are to be addressed to ensure an improvement of financial stability through the New Accord:

- 1) The procyclicality of the calculation of capital requirement for credit risk which relies on rating of borrowers is only counterbalanced by a 5 years average calculation for the probabilistic loss calculation,
- 2) The treatment of maturity is on accordance with this assumption that shorter maturities are less risky which is not true for industrial assets and could lead to inaccurate durations for some financing,
- 3) The VAR calculation derives from a price formation assuming perfect liquidity on markets. Crisis on bonds markets have shown that markets become rapidly illiquid on crisis time. To provide liquidity on market on such times and take advantage of spreads, banks need to enjoy high capital cushion and the ability to use it.

Considering these elements, we think that to contribute with efficiency to financial stability, the New Basel Accord should encourage A rated banks to use their capital cushion to inject liquidity in markets through active lending and investing at counter-cycle after a thorough risk analysis of specific case without being penalized by a down-rating.

During the transition period, a survey must be implemented to measure the impact and relevance of the maturity treatment and the volatility of bonds and monetary markets. The behaviour of banks in their financing strategies must be closely followed during at least this transition period to measure the impact of the accord on financial stability.

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APPENDIX
The ALSTHOM case

In March 1999, Alsthom and ABB started a Joint Venture ABB Alsthom Power to produce and sell large gas turbines from an ABB technology. In order to reach 50 % equity Alsthom paid in cash 1,485 Millions euros (1,538M\$) partly financed by the sale of its stake in a JV with GE (982 M\$).

The same year the group has acquired Cegelec from Alcatel with a goodwill of 1,462 Millions €

On May 2000, Alsthom bought out the ABB share for 1,250 Millions € in cash, and consolidated its acquisition with a total goodwill of 3,953 Millions € to be depreciated over 20 years.

The Group also faced others acquisitions in 2000: 51% of Fiat Ferroviaria for 149 Millions € (goodwill 109) and smaller firms: Sunvic in Germany, Norweb contracting and Scottish Power in UK.

Over two years, 1999 and 2000, the total capital investment amounted to 3,500 Millions euros net of sales. These acquisitions have been financed by: In 1999, Bond issuance of 650 Millions, fixed rate of 5% to be reimbursed July 2006. In 2001, Bond issuance of 550 Millions € fixed rate 5,625% to be reimbursed February 2004, TSDI issuance of 250 Millions € and Preferred shares for 205 Millions to be reimbursed.

Considering the dividend paid in 2001, only half of the burden is financed and a third longer than 3 years! Alsthom planned to compensate the cash outlays of these acquisitions on a short term financing thanks to a positive working capital owed to payments in advance on commands, and a program of one year notes of 2,500 Millions € plus banks credit lines (Table 1)

Table 1
Alsthom's debt in March 2001

	3/31/1999	3/31/2000	3/31/2001
Bonds	1.5	651.2	1,200
Banks loans	837.4	1 465.8	1 679.8
Notes	-	622.0	1 611.3
Bank overdraft	446.9	820.7	161.8
TOTAL	1,285.8	3,559.7	4,652.9
of which Long Term	98.4	998.9	1,522.5
of which Short Term	1,196.4	2,560.8	3,130.4

The 2000/2001 cash flow amounted to 564 Millions € (204 M of after tax results + 360 Millions of depreciation of assets and goodwill) of which the dividend flow of 120 left 440 Millions of free cash flow to finance the acquisitions of 1999/2000.

Forecasting a yearly cash flow of 700/900Millions € and a dividends flow of 120 Millions €, Alstom has chosen to finance only 1/3 of 1999/2000 acquisitions on a 5-7 years bond issuance and the remaining with one year corporate papers and banks' credit lines, which should have represented 5 years of free cash flow, excluding the 2002 acquisitions.

But as soon as 2001/2002 period the group has suffered losses, consequences of huge penalties mainly on the large gas turbines which costed 2,700 Millions € in 2001-2002, 1,070 M€ in 2002/2003 and 1,245 M€ in 2003/2004.

Unable to draw on its short term notes program, due to its down-rating, and facing a collapse of payments in advance the Group defaulted on the reimbursement of the expiring 550 Millions € bond in 2004 and has to renegotiate completely its financing with its 30 banks (Table 2)

Having overcome its technical issues, Alstom should have recovered but this liquidity squeeze due to a short term financing of a long-term major acquisition of ABB power activity, which accounted for half of the turnover in 2000/2001, has put the group default situation. In our opinion this situation derives mainly from the financing structure: 1/3 only 7 years maturity, 2/3 below 1 year, when the goodwill is depreciated over 20 years.

It is worth noting that banks have been committed to refinance the group on a longer term adapted to operational cash flow in order to save the lent capital, and this case shows that they have been put in danger through accepting to lend too short an international acquisition. This comes in contradiction with the hypothesis underlying the capital requirement formula, assuming that the shorter is a loan, the less risky it is for the bank

Table 2
Refinancing scheme – shareholders report 2003/2004

Le tableau suivant présente les échéances de remboursement de nos dettes (y compris les créances futures titrisées) et de nos lignes de crédits disponibles au 31 mars 2004 :

(en millions d'€)

	1 ^{er} trimestre 2004/05	2 ^e trimestre 2004/05	3 ^e trimestre 2004/05	4 ^e trimestre 2004/05	Exercice 2004/05	Exercice 2005/06	Exercice 2006/07	Exercice 2007/08	Exercice 2008/09	Après l'exercice 2008/09
Actions préférentielles remboursables	205					(205)				
Titres subordonnés	250						(250)			
Prêt subordonné à durée déterminée	1 563								(1 563)	
Titres subordonnés à durée déterminée	200									(200)
Titres subordonnés remboursables en actions (TSDD RA) ⁽¹⁾	300									(300)
Emprunts obligataires	650						(650)			
Prêts syndiqués	722							(722)		
Prêts bilatéraux	260					(27)	(33)	(200)		
Billets de trésorerie	420			(420)	(420)					
Découverts bancaires et autres emprunts ⁽²⁾	320	(278)			(278)	(14)	(6)	(3)	(3)	(16)
Sous-total	4 890	(278)	0	0	(420)	(698)	(246)	(203)	(1 566)	(516)
Titrisation de créances futures ⁽³⁾	265	(68)	(69)	(68)	(60)	(265)				
Total	5 155	(346)	(69)	(68)	(480)	(963)	(246)	(203)	(1 566)	(516)
Dettes financières	4 372									
Lignes disponibles	783									

⁽¹⁾ Les Titres Subordonnés à Durée Déterminée Remboursables en Actions (TSDD RA) ne seront remboursés en espèces que dans le cas où la Commission Européenne n'approuverait pas leur remboursement par des actions. Cf. "Avancement de notre plan d'action et principaux événements de l'exercice 2003/04 – Accord de refinancement 2003".

⁽²⁾ Les lignes de crédit obtenues par les filiales ont été classées comme étant immédiatement dues étant donné que de telles lignes de crédit ne sont généralement pas allouées.

⁽³⁾ Excluant les remboursements effectués directement par le client à l'établissement financier auquel nous avons cédé notre droit à paiement.

Le total des lignes de crédit disponibles non utilisées et de la trésorerie disponible dans le Groupe s'élevait à € 2 249 millions au 31 mars 2004, par rapport à € 2 370 millions au 31 mars 2003.

Les montants se décomposaient ainsi :

- Les lignes disponibles au niveau du Groupe, étaient de € 783 millions au 31 mars 2004 (constituées de 420 millions de billets de trésorerie et pour € 363 millions de la tranche B de l'emprunt subordonné (PSDD)), par rapport à un crédit relais de € 600 millions au 31 mars 2003 ;
- La trésorerie disponible au niveau de la société mère s'élevait à € 532 millions au 31 mars 2004, par rapport à € 610 millions au 31 mars 2003 ;
- La trésorerie disponible au niveau des filiales à hauteur de € 934 millions au 31 mars 2004, par rapport à € 1 160 millions au 31 mars 2003.

ALSTOM, la société mère du Groupe, peut avoir facilement accès à des liquidités détenues par des filiales à cent pour cent par le biais du paiement de dividendes ou en vertu d'accord de prêt entre sociétés du Groupe. Certaines restrictions locales peuvent cependant retarder ou limiter un tel accès. De plus, bien que nous ayons le pouvoir de contrôler les décisions des filiales dans lesquelles nous avons un intérêt majoritaire, nos filiales sont des entités légales distinctes, et le paiement de dividendes et l'octroi de prêts, d'avances et d'autres paiements par lesdites filiales à notre société peut faire l'objet de restrictions légales ou contractuelles, dépendre de leurs bénéfices ou être sujets à d'autres restrictions. Ces limitations comprennent les règlements locaux relatifs à l'assistance financière, les lois sur les bénéfices des sociétés et d'autres restrictions légales. Notre politique consiste à centraliser les liquidités des filiales au niveau de la société mère dans la mesure du possible, et nous continuons à progresser par rapport à cet objectif. La trésorerie disponible au niveau des filiales était respectivement de € 2 609 millions, € 1 160 millions et € 934 millions en Mars 2002, 2003 et 2004.

Exhibit
Standardized approach: risk weights

Credit 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 %	20% or 50%	50% or 100%	150%	50%
Corporates	20%	50%	100%	BB+ to BB- 100%	Below BB- 150%	100%
Retail						35%
Real Estate Others						75%

Capital requirement 8% of weighted assets.
Importance of ECA (Export Credit Agencies) and Rating.

Internal rating based approach: Risk-weighted asset formula

Capital requirement factor

$$K = \frac{[LGD \times N[(1-R)^{0.5} \times G(PD) + (R/(1-R))^{0.5} \times G(0,999)] - PD \times LGD] \times (1 - 1,5 \times b(PD))^{-x}}{(1 + (M - 2,5) \times b(PD))^{-x}}$$

Correlation:

$$R = 0,12 \times \frac{(1 - e^{-50 \times PD})}{(1 - e^{-50})} + 0,24 \times \left[1 - \frac{(1 - e^{-50 \times PD})}{(1 - e^{-50})} \right]$$

Maturity Adjustment:

$$b(PD) = (0.11852 - 0.05478 \times \log(PD))^2$$

Risk weighted assets :

$$RWA = K * EAD * 12,5$$