
Opinion piece

An empirical approach to Basel II

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Abstract The author argues that not only did the quantitative models utilised by many banks miss an 'extreme' risk event in the subprime crisis, but more generally over-reliance on quantitative methods using market data seems to have blinded market participants and regulators to the obvious risks inherent in a business model for financial institutions focused on originating and trading assets for which there is little or no specific information. In view of the failure of quantitative models, the author uses the example of public data benchmarks for the top-level factors of Basel II to suggest that it is possible to create risk-sensitive estimates of economic capital and the other factors defined in Basel II without the use of quantitative models employing market data.

Keywords: *Basel II, credit risk, quantitative models, safety and soundness, banks, subprime*

'Basel II is a modern, risk-sensitive capital standard that will protect the safety and soundness of our large, complex, internationally active banking organizations.' (Ben Bernanke, Chairman, Board of Governors of the Federal Reserve System)¹

Late on Friday 2nd November, 2007, as the Dow Jones Industrial Average was plummeting downward under the weight of investor concerns about the solvency of some of the largest US banks, the Federal Reserve Board finally approved the New Basel Capital Accord, also known as Basel II, some two years after the original adoption

date. Regulators in the USA and around the world proclaim that adoption of Basel II will help financial institutions to avoid the type of financial contagion seen during 2007. But did not the very same quantitative models and ratings agency methods specifically incorporated into the Basel II framework *cause* the subprime disaster?²

The Basel Committee on Banking Supervision (BCBS), in its October meeting, stated that implementation of the Basel II capital framework would go some distance to alleviate the current global credit crunch which has resulted from the subprime lending crisis. Nout Wellink, the chairman of the Basel

Committee on Banking Supervision, observed that the accord is designed to combat liquidity risk and would have improved the robustness of valuation practices and market transparency for complex and less liquid products.

Unfortunately, neither the implementation of the Basel II proposal nor anything that looks remotely like it would have alleviated the ongoing collapse of the market for complex structured assets. Not only did the quantitative models utilised by many banks miss an 'extreme' risk event, in this case the embedded market risk of complex structured assets containing subprime mortgages, but more generally over-reliance on quantitative methods that employ market data as primary inputs seems to have blinded risk managers and regulators to the obvious dangers inherent in a business model for financial institutions focused on originating and trading assets for which there is little or no specific information. Efficient market theory, after all, assumes that participants possess data with which to assess risk and return.³

Saying that Basel II would have helped avoid the subprime crisis seems, to this writer at least, another way of suggesting that, if the largest banks play along and support implementation of Basel II, global bank regulators somehow will make the world safe for derivatives and complex structured assets.⁴ It is clear to this writer, and to many colleagues in the risk management community, that Basel II does not require banks to measure the *specific* risks of *specific* exposures, but instead merely mimics the business approval processes of the largest banks, systems which are intended first to process new financial transactions and, as a secondary matter,

manage risk based upon a portfolio basis or asset class. Such a regime seems to ensure that the regulators will never achieve their goal of a proactive supervisory framework that enhances safety and soundness.

The Basel II framework has three pillars: (1) minimum capital requirements, (2) supervisory review and (3) market discipline — to promote greater stability in the financial system. Greater transparency regarding on and off-balance sheet liabilities might have helped ameliorate the growing number of bank insolvencies and market turmoil seen during 2007, but the fact remains that the two central analytical pillars of Basel II — namely quantitative models and external ratings agency methods — have been badly discredited by the collapse of the market for complex structured assets. Not only does the subprime crisis indicate that contemporary risk methodologies are ineffective with respect to such market risks, but it also suggests strongly that the selection by banks of opaque, derivative asset classes as a growth area for their business activities is ill-considered.⁵

During 2007, US banks saw a more than 50 per cent drop in their market values compared with the start of that year. Leading figures of the financial world have been forced to resign in disgrace, large depository institutions in the USA, UK and EU have been rendered insolvent or are on the brink of failure, and public authorities from Florida to Norway to China have taken severe losses on investment funds containing structured assets. As the present paper was finalised, US regulators were attempting to gain 'voluntary' agreement from banks to freeze interest rates on millions of

subprime mortgage loans. If such a result is anything less than a complete failure of contemporary risk measurement tools, not to mention internal systems and controls of financial institutions, a worse outcome would be difficult to imagine.

In some respects, the structured asset crisis in the USA stems not simply from a fixation by the risk management community on generalised quantitative models, but from the fact that market price data is the most widely available data class from which to construct risk models. As financial statement data has lagged far behind market data in terms of reliability, completeness, timeliness and affordability, particularly for researchers and students of finance, the risk management and academic communities have naturally gravitated toward more accessible, less expensive market data solutions in seeking to solve the problems of pricing risk.

Traders and analysts can only work with the available data, thus it is no surprise that the risk analytics landscape is predominantly populated with solutions dependent upon market data — or derivative indices. This historical bias in favour of quantitative risk factors over fundamental measures of counterparty risk, for example, is a little-remarked but potentially significant underlying cause of the subprime crisis. Even global regulators exhibit a disturbing fascination with and dependence upon market data indicators to judge the condition of the banks they regulate.⁶

Doubts about the efficacy of quantitative models and the judgment of the external ratings agencies are hardly a new revelation, yet prominent observers continue to express ‘surprise’ at the magnitude of the subprime crisis. As most of Basel II is based upon

quantitative models and rating agency methods which arguably enabled the subprime crisis in the first instance, it needs to be asked whether there is not some better way to achieve the goals of Basel II, namely enhancing the ability of regulators and bank managers to understand all types of bank business model choices, without excessive reliance on quantitative measures.

To get a sense of the problem facing global regulators and banks in actually implementing Basel II, look no further than the proposal itself. In the draft Notice of Proposed Rulemaking approved by the Fed in November of 2007, it states:

‘The framework outlined in this proposal (IRB framework) is intended to produce risk-based capital requirements that are more risk-sensitive than the existing risk-based capital rules of the agencies (general risk-based capital rules).’⁷

The Basel II proposal seeks to utilise contemporary portfolio risk management tools such as ‘value at risk’ (VaR) models that are currently used by large banks to manage both market *and* credit risk. But the notion that such methodologies actually enhance the risk management process seems laughable in view of the subprime debt collapse, not to mention earlier events such as Amaranth and Long Term Capital Management. In each case, VaR models and other ‘derivative’ shortcuts that rely primarily upon market data employed by the risk management vendor community in tactical support for portfolio risk analysis caused bank managers to miss huge specific risks that would eventually doom their institutions to massive losses and even failure.

Because VaR models do not measure specific market or credit risks, it can be argued that such methods do little to enhance current regulatory measures of capital adequacy. Harvard professor Eric A. Helfert noted in his classic textbook, *Techniques of Financial Analysis*:

'It is vital that the student look upon the *selection* of given tools in a situation as the important art to be mastered . . . In this connection, it should be noted that the main purpose of financial analysis is to provide reasonable clues and answers to *specific questions* posed by problems of interest to the analyst. It cannot be overemphasized that financial analysis (the use of analytic tools) is not an automatic or standardized process; rather, it is a flexible approach tailored to the needs of the specific situation. Some have called one of the key attributes of effective management "the art of asking significant questions." Likewise, the work of financial analysis will become much more meaningful and efficient if the financial manager or outside analyst practices this art to *focus* his investigation.'⁸

Unfortunately, the analysis of specific risk exposures has become the rare exception in the global marketplace. Most risk-taking transactions rely upon derivative models which generalise the degree of risk contained in different types of asset classes, not the risk from specific transactions or exposures.

The example of the market for collateralised debt obligations (CDOs) is a case in point. Whereas the purchaser of a loan or even a traditional mortgage-backed security has the ability to analyse the value of the underlying collateral using various types of specific data and peer comparisons, with CDOs the

investors have almost no information about the composition of the collateral and even less insight into how these extremely complex structures will perform over time. Investors instead rely upon third-party ratings purchased by and opaque models from the sponsoring dealer to make their investment decisions and manage the risk of these instruments — this within a larger portfolio and more often than not using models such as VaR.

At their essence, VaR models assume a high degree of consistency and regularity in financial markets and events, and consequently, the frequency of such events has a relatively normal statistical distribution. VaR models explicitly take as a given that all of the assets in a portfolio are liquid and that markets are efficient, two assumptions which the subprime crisis seemingly rebuts. The assumed extreme rarity in large loss events allows banks to pretend that these events will never occur at all and thus does not threaten profitability or even solvency. By pretending that the worst case has an effective (if not actual) probability of zero, financial institutions believe that they can rely upon generalisations about the behaviour of portfolios (and thus, indirectly, about the behaviour of individual obligors) to manage risk.

Ironically, the collapse of the market for complex structured assets seems to have illustrated the weak points of quantitative analysis tools such as VaR, but this is hardly news. Many market participants and academic researchers have long believed that financial events tend not to be normally distributed and that these large, rare events individually contribute significantly to financial losses, especially in banks which derive a

large portion of their revenue from the 'trading book'. The experiences in the subprime market of Countrywide Financial (NYSE:CFC), Merrill Lynch (NYSE:MER) and Citigroup (NYSE:C) seem directly to call into question the utility of generalised measures such as VaR explicitly employed by Basel II to ensure the safety and soundness of global financial institutions.

Nassim Taleb states the problem succinctly in his book *The Black Swan*: 'Risk management is a serious business. Accordingly, the production of a risk "measure" must be subjected to the question "how do you know what you claim to know" — in other words, epistemology.'⁹ The Basel II framework seems to violate one of the most basic rules of the scientific method described by Taleb's quote, namely, 'how do you know what you know?' By relying upon a false assumption that financial market events tend to follow a random, normally distributed pattern, global regulators have adopted one of the most specious, dangerous and widely-held misconceptions in the financial world.¹⁰

The US version of Basel II has as one of its core assumptions that banks estimate the level of 'unexpected loss' in their portfolios up to a 99.9 per cent confidence level over a period of one year. The draft Basel II regulation states:

'If capital is available to cover losses up to and including this percentile level, then the bank will remain solvent in the face of actual losses of that magnitude ...

Typically, the choice of confidence level or soundness standard reflects a very high percentile level, so that there is a very low estimated probability that actual losses would exceed the unexpected loss amount

associated with that confidence level or soundness standard.'¹¹

Even a slight error in the VaR models used to generate such a probability analysis, however, could mean that the bank's capital levels will be inadequate to cover the actual losses, that the institution could become undercapitalised or even insolvent. Indeed this seems to be the case today. While the Basel II framework relies upon a number of academic sources in justifying reliance upon VaR models, it needs to be said that these studies were conducted during a period of relatively benign credit market conditions, begging the question as to whether quantitative models employed widely in the banking industry today accurately detect risk — or simply had little risk to detect.¹²

The collapse of the market for complex structured subprime assets illustrates why a rational implementation of Basel II arguably should require *increased* capital for large universal banks. These are institutions which emphasise unpredictable business lines such as principal trading, creating and selling over-the-counter (OTC) derivatives, and investment banking, but also take risks in lending and other traditional banking activities. No matter which large global bank one may choose, the portion of bank earnings attributable to capital markets activities is neither stable nor predictable, especially when derivatives (and investment bankers) are involved. Even a bank with a relatively small banking business like Bank of America (NYSE:BAC) can take a 'surprise' hit from the trading book.¹³

It must be acknowledged that a 99 per cent one-day VaR implies that asset

values will fall by more than the VaR on around 2.5 trading days per year. This assumed rate of variance is understood by regulators and thus the market risk capital required is a multiple of VaR to account for this assumption. What neither regulators nor bankers nor ratings analysts nor sell side researchers seem willing to admit, however, is that periodic 'surprises' are increasingly the norm for universal banks and are therefore likely to occur far more than 2.5 trading days per year. This rise in the number of 'surprises' seems related to the growing emphasis on the trading book in many large Basel II banks.

To understand the need for scepticism about the ability of banks to manage their trading books 'safely and soundly', particularly using derivative tools such as VaR and Merton models which populate the Basel II framework, consider the words of physicist Stephen Hawking from his lecture *Does God Play Dice?*:

'The idea that the state of the universe at one time determines the state at all other times, has been a central tenet of science, ever since Laplace's time. It implies that we can predict the future, in principle at least. In practice, however, our ability to predict the future is severely limited by the complexity of the equations, and the fact that they often have a property called chaos. As those who have seen Jurassic Park will know, this means a tiny disturbance in one place, can cause a major change in another. A butterfly flapping its wings can cause rain in Central Park, New York. The trouble is, it is not repeatable. The next time the butterfly flaps its wings, a host of other things will be different, which will also influence the weather. That is why weather forecasts are so unreliable.'¹⁴

CAN PUBLIC DATA BENCHMARKS AUGMENT BASEL II?

From an analytical perspective, the single biggest difficulty in making Basel II a truly workable capital adequacy framework is that participating banks will be preparing the metrics for probability of default etc, using the models and rating agencies described above, but each will employ a slightly different internal ratings method, thus rendering the resulting disclosure to the public and regulators an inconsistent 'chopped salad'. Even assuming that the quantitative methods specified in the accord are effective in pricing specific risk exposures, the metrics disclosed by each bank to regulators and the public will not be comparable and thus will be useless for safety and soundness purposes.

It must be noted that the Basel II accord represents a radical departure from past practice by US regulators to ensure the safety and soundness of US banks. For more than half a century, US regulators have gathered extensive financial statement and general ledger data using a single mandatory accounting taxonomy to support capital adequacy and safety and soundness analysis. The Basel II framework changes this deterministic reporting regime by substituting a subjective and entirely inconsistent set of metrics, albeit with the same general definitions. Fortunately, the adoption by the FDIC in 2005 of a variant of XML to govern bank reporting provides a highly sophisticated transmission and validation mechanism to gather additional portfolio-level data to enhance the effectiveness of Basel II capital adequacy analysis. It is hoped that US regulators will, in the future, augment the

collection and public disclosure of supporting data for Basel II risk factors.

One tangible example of how the Basel II process might be improved using public data comes, ironically enough, from the consistent, portfolio-level data gathered by the FDIC in the USA. The structured financial data collected each quarter from all FDIC-insured banks in the USA enables regulators and investors to gain a better understanding of the business model choices made by banks. Unfortunately, none of the other nations currently participating in Basel II gather, let alone make available to the public, the type of detailed, portfolio-level financial statement data that is publicly available in the USA.¹⁵

Is it possible to create risk-sensitive estimates of economic capital and the other factors defined in Basel II without the use of quantitative models to achieve some of the goals of the BCBS?¹⁶ Three

years ago, my colleague Dennis Santiago and I asked this very question. Using financial statement and portfolio level loan data from the Federal Deposit Insurance Corp, we constructed a series of consistent public data benchmarks for the major Basel II factors, in aggregate for the consolidated institution, by operating unit and by loan category within each operating unit. Benchmarks were also created to measure the amount of economic capital required to keep a bank's external credit rating stable in the face of a serious loss to the trading book, an assumed three to four standard deviation loss event.

Table 1 presents a summary of the economic capital model in the Institutional Risk Analytics (IRA) Bank Monitor for 20 of the largest US banks by total assets. Those institutions whose ratio of economic capital to tier one risk-based capital (RBC) exceeds one standard deviation from the average for

Table 1: The IRA Bank Monitor – economic capital (30th June, 2007)

Holding company	Economic capital (US\$)	Tier one RBC (US\$)	EC/tier one RBC	RAROC (%)
Bank of America	170,849,433	101,563,808	1.7	4.61
JP Morgan Chase & Co.	388,382,823	81,198,866	4.8	-0.20
Citigroup Inc.	284,168,148	75,483,168	3.8	2.35
Wachovia	70,733,476	46,474,166	1.5	6.80
Wells Fargo & Company	16,649,759	32,234,093	0.5	1.34
US Bancorp	8,959,327	13,649,929	0.7	12.59
Suntrust Banks, Inc.	5,265,465	12,967,989	0.4	14.09
HSBC Holdings plc	36,245,822	10,988,698	3.3	0.02
Royal Bank of Scotland	4,341,184	10,283,536	0.4	25.91
National City	3,082,904	8,756,505	0.4	6.81
Regions Financial	3,526,945	10,797,012	0.3	29.34
Capital One Financial	12,927,621	11,478,612	1.1	-2.14
BB&T Corporation	3,100,025	8,252,506	0.4	27.24
PNC Financial	20,785,231	7,989,002	2.6	2.75
ABN AMRO Holding NV	4,964,140	11,061,257	0.4	22.78
Fifth Third Bancorp	2,139,933	10,885,837	0.2	-1.30
Banco Santander	1,509,600	5,941,599	0.3	56.34
Keycorp	3,529,781	6,849,028	0.5	2.40

Source: Federal Deposit Insurance Corp/The IRA Bank Monitor
EC, economic capital; RAROC, risk-adjusted return on capital; RBC, risk-based capital

all banks over US\$100bn in total assets are shown in italics. The standard deviation for this large bank group was 1.7 : 1, while the mean was 1.3 : 1. A low or negative risk-adjusted return on capital (RAROC) may indicate an institution with excessive risk and/or inferior asset and equity returns.

These economic capital profiles reflect not only the on-balance sheet assets of the subsidiary banks of these holding companies, but also off-balance sheet derivatives dealing, and include an analysis of trading, investing and lending activities. These economic capital profiles include separate factors for trading, investing and lending, and, when combined with a value for operational risk, would provide an empirical benchmark for measuring the business model choices made and risks taken by each institution. Yet such real work measures, which employ public data, are virtually absent from the Basel II framework.

In theory, at least, as market or credit risks increase, firms will be required to hold more capital — that is how Basel II is supposed to work. But this approach assumes that banks can actually measure factors such as market risk, an assumption which the subprime crisis seemingly calls into question. A better approach, and one which can be verified using existing public data, may be to suggest that as the trading book risk of the largest banks is increasing, requiring more capital to support these high-risk activities is prudent.

If measuring market risk is problematic, should not institutions such as Citigroup and JP Morgan (NYSE:JPM), which engage in extensive derivatives dealing with and lending to hedge funds, and/or off-balance sheet

financial activities using structured investment vehicles (SIVs), be given higher ratios of economic capital/tier one RBC, subject to credible mitigation? Or, to restate the question in terms of VaR, if the assumed number of trading days in which a ‘surprise’ occurs due to market risk is increased 10-fold from say 2.5 days to 25 days per year, then obviously the amount of economic capital that must be maintained would also rise substantially. Were regulators to take such a view, it seems reasonable to suggest that VaR models would quickly fall out of favour.

While many large banks appear to need additional capital due to a preponderance of trading book risk, it is worthy of note that the average ratio of economic capital to tier one RBC for the other 8,000 plus banks in the USA is well-below 1 : 1. Even some large banks such as Wells Fargo (NYSE:WFC), which have relatively small trading books compared with their lending activities, show less than a 1 : 1 ratio of economic capital to tier one RBC using this methodology. This suggests that smaller, less complex banks could get by with far less capital and thereby significantly boost equity returns.

Looking at economic capital based upon published regulatory disclosure seems a basic point of departure for making Basel II a truly useful tool for maintaining the safety and soundness of all banks. While the larger players in the banking industry once saw Basel II as a means of further increasing leverage and risk-taking, the subprime crisis may provide regulators with a lever to compel banks to hold more capital against visible and contingent risks such as SIVs. But do bodies like the BCBS have the courage to fight that battle?

RISK MEASURES VS TRANSACTION SPECIFIC FACTORS

Consider another example from the Basel II template. An early draft version of the Basel II framework of the regulatory guidance for calculating exposure at default (EAD) is shown below. The definition of EAD contained in the final Basel II Notice of Proposed Rulemaking (NPR) is even more complex and contains far more qualifications and opportunities for institutions to render the measure opaque, arguably making it useless for safety and soundness purposes:¹⁷

$$\text{EAD} = \max \{0, (\text{CE} + 0.4 \times \text{PFE} + 0.6 \times \text{NGR} \times \text{PFE} - \text{CA})\}$$

Where: CE = current exposure; C = current value of collateral; CA = volatility adjusted collateral amount ($C - C \times \text{HC}$); PFE = potential future exposure; HC = haircut appropriate for the collateral type, adjusted for minimum holding period (10 days for OTC derivatives); and NGR = net replacement cost to gross replacement cost ratio.

In its simplest form, EAD measures the maximum net amount that a bank can lose when a borrower defaults, essentially adding current exposures to the remaining unused portion of the committed credit line, etc. The risk to the bank is that a borrower could access these amounts and expose the institution to additional losses just before filing bankruptcy, for example. A bank's ability to contain this exposure via contractual covenants varies by loan or line of credit type, but the basic exposure is quantified by the CE measure.

Even though EAD is one of the more

straightforward calculations in the Basel II framework, the addition of the 'risk adjusted' factors to the basic CE measure gives banks enormous leeway to manipulate their risk profile to suit their business needs. For institutions heavily involved in CDOs or subprime lending, a serious outlier in terms of EAD can be 'managed' by manipulating what are essentially secondary factors to give regulators an inaccurate picture of the bank's overall risk profile. While the regulators may be guilty of over-complicating the Basel II template, it is the large banks which have added the additional factors to calculations such as EAD in an attempt to gain maximum advantage in the marketplace.

Public data benchmarks for EAD using existing financial statement information from the FDIC allow regulators to characterise the behaviour of all banks, large and small. For example, IRA's Bank Monitor benchmark for EAD uses the simpler CE definition tracking exposure based on measuring outstanding unused commitments that all classes of obligors can access the day before they belly up. Allowing banks to include transaction-specific measures in the basic calculation of risk measures such as EAD is like allowing EDGAR filers to 'adjust' their reported financial results using data that really belong in the footnotes. But this is precisely the choice made by global regulators in designing the Basel II framework.

Instead of allowing banks to muddy the risk picture by including the additional factors shown above, regulators should instead start with the basic CE measure, then allow banks to privately make their case regarding the final 'net' treatment for capital adequacy

purposes. To do otherwise is not only bad risk methodology, but bad public policy. Table 2 is a summary showing the primary Basel II factors derived from the portfolio level data collected by the FDIC, including:

- *Defaults*: Observed loan and lease defaults in basis points versus the reported loan and lease base. The *benchmark rating* is defaults shown as bond equivalent using Standard & Poor's breakpoints.
- *Loss given default (LGD)*: Percentage loss after default less recoveries in the same period per dollar lent.
- *M or WAM*: Weighed average maturity in years for the aggregate lending portfolio. Note: The Office of Thrift Supervision does not release portfolio or aggregate maturity data for thrifts to the FDIC.
- *Exposure at default*: Amount in aggregate which obligors could borrow immediately prior to default expressed as

percentage of existing credit available. Computed by analysing as-reported unused lending commitments.

The metrics shown in Table 2 are based entirely on public data and can be manipulated using a variety of assumptions to support various tasks. It is possible, for example, to calculate EAD, LGD and default metrics for each subcategory of loan and security held by a given bank. The point of using such public data metrics is not to test compliance with the notional rules or reporting schedules of the final Basel II NPR, but instead to examine the relative business model choices made by each institution and thus the safety and soundness of an institution compared with its peers. This is, after all, what the risk management and bank supervisory processes are really about: understanding individual subject behaviour, not to autocorrelate to a notional target point

Table 2: The IRA Bank Monitor – Basel II by the numbers (30th June, 2007)

Holding company	Benchmark rating	P(D) bp	LGD (%)	M (yrs)	EAD (%)
Bank of America	BB	87.2	82.3	7.0	169.5
JP Morgan Chase & Co.	BB	93.5	82.0	3.4	216.1
Citigroup Inc.	BB	111.0	77.2	3.9	212.6
Wachovia	BBB	20.7	70.6	5.7	63.1
Wells Fargo & Company	BB	79.1	79.6	3.6	65.9
US Bancorp	BB	65.1	75.2	3.9	93.3
Suntrust Banks, Inc.	BBB	29.9	77.0	5.5	63.6
HSBC Holdings plc	BB	137.0	77.6	2.7	295.6
Royal Bank of Scotland	BB	51.4	81.1	7.1	49.6
National City	BB	58.9	72.8	4.1	56.3
Regions Financial	BBB	32.3	65.3	2.8	43.1
Capital One Financial	BB	241.9	67.7	4.4	246.8
BB&T Corporation	BBB	26.4	71.6	4.8	38.1
PNC Financial	BBB	26.9	74.8	4.9	72.4
ABN AMRO Holding NV	BBB	20.2	82.2	3.5	63.4
Fifth Third Bancorp	BB	57.7	77.7	4.2	58.9
Banco Santander	BBB	35.0	65.4	9.4	36.1
Keycorp	BBB	38.1	71.3	3.8	57.6

Source: Federal Deposit Insurance Corp/The IRA Bank Monitor

dictated by the assumptions in a VaR model or Monte Carlo simulation.

Readers may object that such a methodology would result in a framework where regulatory capital would be based solely on the exposure taken, but this is not the case. An empirical approach to Basel II using public data benchmarks as the point of departure for a capital adequacy analysis would adhere to the very same relationships defined in the Basel II framework, albeit in simplified form. Exposures to the US Government and credit card loans to low-income borrowers would have different capital changes based upon the expected loss and maximum probable loss, which are functions of both historical experience and metrics such as EAD. Thus does this writer cautiously employ the label 'empirical' and look forward to comments from the readers of the Journal.

Investors and regulators need a transparent and verifiable way to monitor risk through real market pricing, not ersatz derivative models and ratings agency opinions for which prices and the underlying data are not readily available to the public. Betting the safety and soundness of US banks on the quantitative risk measurement tools and credit rating agencies which arguably contributed to the CDO debacle is entirely reckless. One hopes that over the next few years, as both bankers and regulators come to realise that the current Basel II framework is practically unworkable in terms of ensuring bank safety and soundness, the merit of including in the Basel II framework transparent, consistent, public data benchmarks such as those discussed above will become self-evident. Specifically, US regulators should

consider enhancements to the public reporting of US financial institutions regarding the portfolio attributes of different asset classes and counterparty risk exposures. Such enhancements are already being considered in the modernisation of the Shared National Credits survey.¹⁸ Given additional financial statement data regarding specific risk exposures, researchers, investment analysts and risk managers will then be able to further enhance non-quantitative methods of analysis using publicly available data and thereby create some benchmarks to enhance current methods.

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- subprime lending market and related issues. Rosner, in particular, provided a fascinating discussion of the formation of the 'Partnership for Affordable Housing' in the early 1990s.
- 3 Most complex structured assets are issued in unregistered form and there is little information, public or private, to allow investors to actually model the specific probability of default or expected loss of a given structure.
 - 4 Global regulators have been attempting for years to cajole the largest universal banks to take notice of the financial and operational risks from dealing in complex structured assets, but so far to little avail. See Board of Governors of the Federal Reserve System (2007) 'Interagency statement on sound practices concerning elevated risk complex structured finance activities', press release, 5th January, available at: <http://www.federalreserve.gov/newsevents/press/bcreg/20070105a.htm> (accessed 3rd December, 2007).
 - 5 For an excellent discussion of the history of the ratings agencies and their role in the subprime debacle, see van Deventer, D. (2007) 'The history and future of the rating agencies', available at: www.riskcenter.com. Writes van Deventer: 'In the mortgage backed securities market, one can argue that tranching securities by the maturity of the cash flow does create economic value for the investors even if ratings are correct. In the collateralised debt obligation market, however, what economic value comes from tranching losses from four percent to six percent of notional principal? None. Some say CDOs create more AAA securities to buy but that fact, while true, means nothing. One might as well create AAA risk by putting \$99 million in US Treasuries and \$1 million in a BBB-rated bond. That creates no value at all because it's 100 percent transparent. Value to the structurer comes when either the end investor or rating agencies or both make errors in valuation, and that is easiest to do when the transaction is complex.'
 - 6 On 18th November, 2004, the International Association of Financial Engineers (IAFE) met at the offices of Goldman Sachs Asset Management in Lower Manhattan to discuss whether the financial industry's heavy reliance upon equity market prices as a measure of a firm's risk of default is still a valid approach to risk management. Participating were Dale F. Gray, President, Macro Financial Risk, Inc; Stephen Kealhofer, Moody's KMV; Robert Selvaggio, Managing Director/Head, Risk Analysis and Reporting Structured Credit Risk Analytics, Ambac; and Jorge R. Sobehart, Vice President — Senior Analyst, Risk Analytics, Citigroup Risk Architecture. The event was moderated by Evan Picoult, Managing Director, Citigroup Risk Architecture. All of the speakers confirmed, in one way or another, that equity market prices are not sufficient to predict defaults. Some said a good deal more. IAFE noted prior to the meeting: 'An alternative approach argues that equity market prices reflect not only the credit worthiness of a firm but also unrelated information such as changes in the market participants' appetite for risk, liquidity risk, uncertainty about the economy, and supply and demand effects. This would suggest that equity prices are insufficient to accurately estimate the PD of an obligor. One alternative is to model obligor's default probability by a hybrid model that integrates equity market and financial statement data with other relevant information.' This writer took detailed notes of the meeting, but the IAFE subsequently asked that these notes be removed from the IRA website due to the nature of the statements made by the participants. Less than a week later, the head of Moody's KMV was fired.

- 7 See Board of Governors of the Federal Reserve System (2006) 'Notice of Proposed Rulemaking (NPR) and Supporting Board Documents', 30th March. See also Federal Register (2007) 'Proposed Supervisory Guidance for Internal Ratings-Based Systems for Credit Risk, Advanced Measurement Approaches for Operational Risk, and the Supervisory Review Process (Pillar 2) Related to Basel II Implementation', 28th February.
- 8 Helfert, E. A. (1967) 'Techniques of Financial Analysis', Richard D. Irwin, Homewood, IL, p. 1.
- 9 Taleb, N. 'The Black Swan'.
- 10 Burton Malkiel argues that stock price changes follow a 'Brownian motion' and are thus normally distributed — see Malkiel, B. (1996) 'A Random Walk Down Wall Street'. Virtually every textbook on advanced finance takes the Brownian motion description as its starting point. The celebrated Black-Scholes formula for option prices as well as VaR models depend upon a Brownian world view. However, researchers starting with Benoit Mandelbrot in the 1960s have demonstrated that market price movements and other financial events are not random or normally distributed, and that these departures from normality may be accounted for by using distribution functions with infinite variance, that is, 'fat tails'. Extreme financial default events such as Enron, Long Term Capital Management and Parmalat also illustrate the fact that these events tend to be large in size and rare in terms of frequency. Most recently, the failure of the hedge fund Amaranth in September 2006 illustrates the specific dangers of using risk management tools such as employ VaR models and other types of statistical methods to understand market risk and other real-world finance risks.
- 11 For example, the Basel II proposal in the US states that '[a] bank must use a 99th percentile one-tailed confidence interval, a minimum five-business-day holding period for repo-style transactions, and a minimum 10-business-day holding period for eligible margin loans' in haircutting collateral. In the world of complex structured assets, such methodologies are meaningless. See *Federal Register*, 28th February 2007, p. 9136.
- 12 As Alan Abelson recently wrote in *Barron's*: 'we've had three decades of mostly bull markets fed by cheap and abundantly available credit and an insatiable lust for leverage'; it is thus small wonder that derivative risk measurement tools appeared to function quite well. See Abelson, A. (2007) *Barron's*, 2nd December
- 13 See *The New York Times* (2007) 'BofA chief sees no investment-banking retreat', DealBook, *The New York Times*, 1st November.
- 14 Hawking, J. 'Does God Play Dice?'
- 15 Analysts may now download full call reports for all US banks from the FDIC website in a variety of industry-standard formats. It is also possible to obtain 'as filed' data for all US banks and bank holding companies in a variety of formats.
- 16 See Federal Deposit Insurance Corp (2004) 'Economic capital and the assessment of capital adequacy', available at: http://www.fdic.gov/regulations/examinations/supervisory/insights/siwin04/economic_capital.html (accessed 3rd December, 2007).
- 17 See Federal Reserve Board (2006) 'Basel II Capital Accord: Notice of Proposed Rulemaking (NPR)', available at: http://www.federalreserve.gov/GeneralInfo/Basel2/NPR_20060905/ (accessed 3rd December, 2007).
- 18 See Federal Register (2004) 'Shared National Credit Data Collection Modernization', 20 December, p. 76034. Officials at the Fed, OC and FDIC are currently in discussions about when to launch the SNC modernisation.

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