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WHEN STATISTICS FAIL: EXTREME EVENTS IN FINANCIAL INSTITUTIONS

Maike Sundmacher, University of Western Sydney
m.sundmacher@uws.edu.au
Guy Ford, Macquarie University
Guy.Ford@mq.edu.au

ABSTRACT

Extreme value theory (EVT) is regularly put forwarded by academics, practitioners and banking regulators as a methodology for measuring the likelihood of operational risk losses that have a very low probability of occurrence, but which have the potential for catastrophic outcomes in terms of financial losses. Given the potential for extreme events to threaten the financial viability of a banking institution, these groups argue that it makes sense to allocate capital against the likelihood of extreme events, and EVT forms the basis for such a capital allocation methodology. This paper challenges this proposition, pointing to recent large losses in banking institutions that either maimed or destroyed the institutions in question. In all of these cases organizational risk culture was at the centre of losses, and more specifically, the incentives inherent in remuneration schemes. It is argued that EVT is inadequate when it comes to identifying adverse cultural or incentive issues in banking institutions.

INTRODUCTION

Operational risk measurement has gained an increasing focus on the part of national and international banking regulators over recent years. In June 2004 the Basel Committee on Banking Supervision (BCBS) published its revised framework for capital measurement and capital standards, known as Basel II. A major component of this framework is a formal capital charge against the operational risks in a bank's activities. Specifically, the BCBS suggests the calculation of an operational risk capital charge based on a spectrum of three increasingly sophisticated measurement methodologies, namely the Basic Indicator Approach, the Standardised Approaches and the Advanced Management Approaches. Over time financial institutions are expected to move along this spectrum of methodologies while developing better operational risk measurement techniques. The trade-off would be a supposedly lower capital charge.

One of the main motivating factors for including operational risk in the capital framework is recognition that many major losses in financial institutions, such as the collapse of Barings Bank or the $691.2m loss suffered by the Allied Irish Banks (AIB), have been attributed to operational risk. Most operational risk losses, like the aforementioned, can be classified as extreme events, with a low probability of occurrence, but potential for severe damage. In the discussion of operational risk management and measurement, academics and practitioners have turned their eye to a diversified range of sophisticated modelling tools, which are supposed to capture extreme events.

One such tool is Extreme Value Theory (EVT). Given the potential for extreme events to threaten the financial viability of a banking institution, bank regulators, academics and practitioners have argued that it makes sense to allocate capital against the likelihood of extreme events, and EVT forms the basis for such a capital allocation methodology. This paper challenges this proposition, pointing to recent large losses in banking institutions that either maimed or destroyed the institutions in question. In all of these cases organizational risk culture was at the centre of losses, and more specifically, the incentives inherent in remuneration schemes. It is argued that EVT is inadequate when it comes to identifying adverse cultural or incentive issues in banking institutions.

This paper is structured as follows. The next section provides an overview of the operational risk losses suffered at the AIB and their underlying causes. This is followed by an illustration of the general concepts of EVT. The paper then examines whether EVT can make a valuable contribution to operational risk management in financial institutions. The final section concludes.

OPERATIONAL RISK LOSSES AT THE ALLIED IRISH BANKS

In February 2002 the AIB announced a $691.2m pre-tax loss at its US subsidiary, Allfirst. The losses were attributed to the fraudulent and unethical behaviour of one of Allfirst's traders, John Rusnak. Rusnak was able to conceal accumulated foreign exchange trading losses between the years 1997 and 2002. The report following the investigation into the losses, known as Ludwig Report, examined the factors that enabled Rusnak to conduct the fraud and the reasons why he could conceal his losses. According to the Ludwig Report (2002, p.10) Rusnak suffered first substantial losses on his trading positions at some time in 1997. Instead of disclosing these losses, Rusnak concealed them through the creation of fictitious trading transactions. The structure of Rusnak's remuneration package provides clues as to why he did not expeditiously disclose losses in 1997. His annual compensation comprised two components, a fixed base salary and a bonus payment. The latter was an additional payment of thirty percent of Rusnak's net trading profits in case these profits exceeded his base salary by five times (Ludwig Report 2002, p. 8). Thus Rusnak's bonus payment was directly linked to the trading profits he generated, without any apparent adjustment for the risk taken in positions. This encouraged excessive risk taking on the part of the trader – indeed, it could be stated that he acted purely in accordance with the incentives set for him by senior management.

Notably, Rusnak was able to conceal the losses because of several deficiencies in AIB's/Allfirst's organisational structure. The control environment in Allfirst was poor. Personnel in key control functions had been reduced due to cost cutting initiatives on the part of the bank, clear reporting lines were missing, and Rusnak's supervisor had no expertise in Rusnak's primary activity (proprietary trading) and was thus inadequate in a supervision/monitoring role. According to the Ludwig Report, back-office staff was inexperienced and lacked understanding of the importance of independent dealer confirmations, providing Rusnak with scope for manipulation and misrepresentation of deals. Further, Rusnak was able to manipulate Allfirst's computer systems as he had access to the files that captured the value-at-risk calculations for individual traders.

The flaws in Allfirst's systems and procedures, and the incentives faced by Rusnak with respect to non-disclosure of losses, led to an excessive build-up in operational risk at AIB/Allfirst, which ultimately resulted in large financial losses in the subsidiary. In the realm of statistics, these losses may be classified as arising in the extreme tail of the distribution – an extreme event scenario.

EXTREME VALUE THEORY

EVT focuses on the extreme end of the tail of a probability distribution and thus captures low probability/high loss events. In its application EVT eliminates the underlying assumption of normality inherent in traditional value-at-risk models, and estimates losses in excess of the maximum possible loss for a chosen confidence level and time horizon that is calculated based on value-at-risk tools (King, 2001). The theoretical framework that forms the basis of EVT can be divided into two main streams, classical EVT and modern EVT. While classical EVT deals with the shape of limiting distribution, modern EVT focuses on the exceedance of certain loss thresholds. While EVT has only recently found its applications in finance (see Medova (2000), Medova & Kyriacou (2002)), it has been applied for some time in actuarial studies, weather forecasting and engineering applications (engineers, for example, must build structures to withstand extreme winds or water levels).

The genesis of EVT can be found in the book "The Law of Small Numbers", which was published by the Russian economist von Bortkiewicz in 1898. A significant advance was made by Fisher and Tippett in 1928, who found that any distribution in its extremes can take only one of three different forms. Type I is usually referred to as the Gumbel distribution, type II as the Fréchet distribution and type III as the Weibull distribution. The distinguishing characteristic of the distributions is their shape parameter, epsilon, which indicates the heaviness of tails. For a distribution to belong to the family of Gumbel distributions, epsilon needs to take a zero value, for Weibull-type distributions epsilon needs to take a value smaller than zero, and for Fréchet-distributions epsilon exceeds zero (see Embrechts, Kueppelberg & Mikosch (1997), Medova (2000)).

Modern EVT focuses on the times and numbers of exceedance of specified risk thresholds, and reflects the primary issue of interest to risk managers in financial institutions – the size, rather than frequency, of losses. Those modelling losses in financial institutions typically specify that losses below a pre-determined threshold belong to market risk or (market plus credit risk losses), and losses that exceed the chosen threshold are classified as operational risk losses. According to Medova and Kyriacou (2002), the number and severity of exceedances for a pre-determined time frame can be used to derive an operational risk capital charge that would act as a buffer against unexpected operational risk losses.

DOES EXTREME VALUE THEORY APPLY?

EVT suffers several shortcomings when applied to operational risk losses in financial institutions. First, as in case of any modelling approach, the modelling of data is dependent on the quality of the data set. In case of operational risk, many financial institutions are still in the process of collecting and collating data. While current operational risk databases might be advanced enough to allow the modelling of high probability/low loss events, such as process errors, it is doubtful that financial institutions have sufficient data to satisfactorily estimate low probability/high loss events.

Modern EVT uses the number and severity of exceedances of pre-set thresholds to estimate operational risk. The choice of the level of threshold, however, is subjective and depends on the risk

tolerance of a particular financial institution. If EVT is used for the purposes of deriving economic capital against operational risk in a financial institution, capital levels must be modelled for different threshold levels to accommodate the ambiguity of the number of exceedances based on a chosen threshold. In addition, the concept of EVT is build around a range of parameters, such as exceedance rates, that need to be estimated stochastically. The outcome of the modelling of these variables will heavily depend on the chosen modelling technique, and results may vary across a range of methodologies. Further, in applying EVT for capital allocation purposes, it is imperative to distinguish between market, credit, and operational risks – such a distinction, albeit easy to deal with in theory, is difficult in practise. For example, a financial institution might suffer a loss on its loan portfolio because of flawed underwriting standards, bad monitoring practices or the undervaluation of collateral. In such a scenario, the question arises whether this loss belongs to the category of credit risks or should be treated as an operational risk-related loss.

The most significant problem in applying EVT to extreme losses in financial institutions is that in most of the recent cases of banks incurring large losses due to operational risk, such as in the AIB, losses were triggered by the fraudulent and unethical behaviour of individuals or small groups – activities that may be almost impossible to measure statistically. The driver of such behaviour can be sourced to the incentives inherent in the structure of remuneration schemes offered to individuals in these institutions. In the case of the AIB, for example, Rusnak's total compensation consisted of a base salary and a performance-related bonus payment. The bonus component did not have any adjustment for the risk taken in positions, and thus motivated the trader to take risky positions (undercapitalised from the perspective of the bank) in order to earn the highest profits possible. While Rusnak acted in accordance with the incentives presented to him in his bonus structure, he chose to conceal losses in the hope that such losses could be recovered through gains on new trading positions. The actions of individuals, driven by their psychological characteristics, cannot be captured under EVT. Further, the concealment of losses was only made possible because of inadequate control mechanisms, ill-functioning back-office procedures, and poor management understanding of business activities – in summation, a flawed organisational architecture. Again, one must question whether poor organisational architecture can be captured in a statistical approach such as EVT. It would seem highly unlikely.

CONCLUSION

Unless statisticians are able to develop a statistical approach that enables risk managers to measure and predict, without bias, the intention of single individuals or individuals in small groups, even highly sophisticated tools for capital allocation, such as EVT, seem unlikely to prevent financial institutions suffering large losses related to operational risk events. A 'demystification' of operational risk is only possible if financial institutions shift their focus from quantitative approaches to the elimination of the underlying causes of operational risk. If financial institutions, and their regulators, are concerned about the potential for large losses arising from operational risks, it would seem more appropriate for them to 'stress test' incentive structures for gaming and excessive risk taking, and audit control mechanisms for organisational design flaws. If EVT is to play any role in the risk management function of financial institutions, it is to provide a framework for assessing the uncertainty that surrounds rare events. However, to blindly rely on such statistical

tools for the purposes of deriving a minimum level of capital necessary to secure the solvency of an institution is an operational risk in itself.

REFERENCES

Basel Committee on Banking Supervision (June 2004) International Convergence for Capital Measurement and Capital Standards, Bank for International Settlements.

Embrechts, P., C. Kueppelberg & T. Mikosch (1997), *Modelling Extremal Events for Insurance and Finance,* Springer-Verlag, Heidelberg.

King, J.L. (2001). *Operational Risk – Measurement and Modelling*, Wiley Finance, United Kingdom.

Kotz, S. & S. Nadarajah (2000). *Extreme Value Distributions: Theory and Applications,* Imperial College Press, London.

Ludwig Report (2002). "Report to the Boards of Directors of Allied Irish Banks, P.L.C., Allfirst Financial INC., And Allfirst Bank Concerning Currency Trading Losses", *Promontory Financial Group and Wachtell, Lipton, Rosen & Katz*.

Medova, E.A. (2000). "Measuring Risk by Extreme Value", *Technical Paper, Risk,* November 20 -26.

Medova, E.A. & M.N. Kyriacou (2002), "Extremes in Operational Risk Management", in M.A.H. Dempster, ed.: *Risk Management: Value at Risk and Beyond,* 2nd ed., Cambridge University Press, Cambridge.

Pfeifer, D. Aon Re Jauch And Hübener 2001. Extreme Value Theory in Actuarial Consulting: Windstorm Losses in Central Europe, in R.-D. Reiss and M. Thomas, ed.: *Statistical Analysis of Extreme Values with Applications to Insurance, Finance, Hydrology and Other Fields*, 2nd ed., Birkhaeuser Verlag, Basel.

Tsay, R. 2000. "Extreme Values, Quantile Estimation and Value at Risk", Graduate School of Management, University of Chicago.

BASEL II: A RESEARCH AGENDA FOR BANKS

Guy Ford, Macquarie University
Guy.Ford@mgsm.edu.au
Maike Sundmacher, University of Western Sydney
m.sundmacher@uws.edu.au

ABSTRACT

In June 2004 the Basel Committee on Banking Supervision of the Bank for International Settlements issued its revised framework for the international convergence of capital measurement and capital standards. In developing the framework the Committee has sought to determine risk-sensitive capital requirements that are conceptually sound and which incorporate greater use of assessments of risks provided by bank's internal systems as inputs into capital calculations. The revised framework also provides a range of options for determining the capital requirements for credit risk and operational risk to allow banks and supervisors to select approaches that are most appropriate for their operations and their financial market infrastructure. In this paper we identify a research agenda for banks arising out of the revised capital framework, and set this agenda under the perception that governing boards and senior bank executives intend to move beyond simple issues of regulatory compliance to strategic goals related to maximising return on risk measurement and management activities.

INTRODUCTION

In June 2004 the Basel Committee on Banking Supervision of the Bank for International Settlements issued its revised framework for the international convergence of capital measurement and capital standards. Over recent years many financial institutions have invested resources in modelling the credit and operational risk arising from their business operations, with the intention to quantify, aggregate and manage credit and operational risk across geographic, business and product lines. In developing the framework the Committee has sought to determine risk-sensitive capital requirements that are conceptually sound and which incorporate greater use of assessments of risks provided by banks' internal systems as inputs into capital calculations. The revised framework also provides a range of options for determining the capital requirements for credit risk and operational risk to allow banks and supervisors to select approaches that are most appropriate for their operations and their financial market infrastructure.

In this paper we identify a research agenda for banks arising out of the revised capital framework. Our focus is not on matters related to data collection and collation, nor technical issues related to capital allocation methodologies, but rather, issues of strategic relevance to governing boards and senior executives in banking institutions. We write under the assumption that these players seek to maximise returns on their risk measurement and management activities, rather than

viewing capital requirements as a binding constraint on their activities, and an issue of simple regulatory compliance. We address each research agenda item in turn in the rest of this paper.

IMPACT ON BANKING BUSINESS

The Basel II proposals represent a significant change in the methodology for the determination of minimum capital requirements for banks. The most pressing issue for banks, other than implementation, will revolve around the implications of the proposals for banking business: capital planning, product/service pricing, risk management and securitisation opportunities.

RISK CULTURE: INCENTIVES AND REMUNERATION

Operational risk is defined by the Basel Committee as the risk of loss arising from inadequate or failed internal processes, people and systems, or from external events. Interestingly, while this definition includes legal risk, it excludes strategic and reputational risk. As a consequence, much operational risk measurement efforts in banks have centred on high volume activities, such as transaction processing. However, losses related to these activities tend to be low in financial terms and unlikely to place strains on the capital base of the bank. An examination of the causes of large financial losses in banking institutions over recent years that can be linked to operational risk shows that the actions of a single individual, or a small cohort of individuals, are often at play. A common factor has been unauthorised trading or the implementation (and misrepresentation) of large, undercapitalised positions. In the majority of these cases individuals acted in response to the incentives set before them, as reflected in the structure of their remuneration schemes. This suggests that operational risk – of the form likely to result in significant losses to a bank - is conceived in incentives in remunerations schemes, which in turn embody the risk culture of a bank. While a bank can set in place policies, procedures and internal controls in an attempt to mitigate excessive risk-taking on the part of individuals, this may be of limited consequence if individuals are incentivised to take risky positions that are undercapitalised through gaming or misrepresentation.

A systematic and ongoing investigation/risk-audit of the remuneration schemes employed by banks, including the basis for the realisation of bonuses (sales targets, profit targets, market share, etc) should be required as part of an operational risk management strategy. It appears in many institutions that limited assessment of the risk-adjusted performance of individuals (and the implications for operational risk) is taken into consideration when goals are established in employee compensation schemes. It is well established in the psychology literature that the reference point (or hurdle), in terms of goals or performance benchmarks, will drive the risk attitude of individuals depending on whether or not they perceive themselves as operating below or above the reference point. It is how the risk appetite of individuals changes in response to perceived performance that is an underlying source of operational risk. In the recent case involving foreign exchange losses in the National Australia Bank, traders substantially increased the risk exposure of the bank after their initial positions took losses following a gamble on a depreciation of the AUD/USD. This was done in an attempt to recover the initial losses, and trades were unauthorised and misrepresented.

ROI: RISK MEASUREMENT SYSTEMS

In accordance with requirements under the revised Basel capital framework, many banks have been increasing their efforts in data collection for both operational risk and credit risk. Despite these efforts, this information may be of little use, other than for regulatory compliance purposes, unless banks attempt to measure the return on investment in their risk measurement and management activities. Given the Basel framework incorporates a range of options for determining capital requirements for credit and operational risk, it would appear that decisions regarding the choice of methodology cannot be taken without an appropriate assessment of the costs and benefits associated with the spectrum of approaches. For example, it may not necessarily the case that the internal models-based advanced measurement approaches are the most appropriate methodology for all banks (particularly smaller financial institutions). These approaches require considerable investment in risk measurement systems. In the case of operational risk, this may result in the collection of data that is superfluous to the risk management needs of the bank. In the case of credit risk, the advanced approaches require the construction of a large database of default rates and collateral recovery rates.

While a growing number of banks have begun to amass large databases on loan and operational risk loss rates, the next step is the development of statistical models to facilitate analysis of this data. Of even greater strategic import is the question of how banking institutions should integrate their existing credit and operational risk measurement tools into business decision-making, such as for pricing, performance measurement and resource allocation decisions.

The need for timely measurement of the return on investment in risk measurement and management activities cannot be understated. The Basel Committee has established prudential floors under its revised proposals for operational risk that establish a minimum capital requirement – regardless of the capital level determined by banks under the advanced measurement approaches - following implementation of the framework. The floor is based on capital levels that would apply under the 1988 Capital Accord, and ranges between 95% and 80% depending on the measurement approach and year of implementation (see Basel Committee on Banking Supervision, 2004, p.13). This is of significance in light of a recent Basel study that shows, for example, that Australian banks would reduce their capital requirements, on average, by 30% under foundation measurement approaches and 36% under advanced measurement approaches but increase their capital requirement by 2% under the Standardised approach (Basel Committee on Banking Supervision, 2003). The existence of prudential floors and the costs associated with advanced measurement systems indicates that moves towards a more sophisticated measurement methodology may not be as worthwhile as first thought, despite the considerable capital relief indicated by studies referred to above.

DEFINING AND MEASURING RISK APPETITE

The PA Consulting Group (UK) finds that while 90% of banks claim to understand the risk appetite of their organization, less than 50% of banks actually quantify it. The risk appetite of a bank defines its tolerance for unexpected outcomes, and is typically measured in terms of a target credit rating on the bank's senior debt. For example, a AA-credit rating is normally associated with a

0.03% probability of loss over a one year time horizon. This has implications for the cost of wholesale funds for the bank and the amount of economic capital the bank must hold to protect against unexpected losses. In turns out that a high target credit rating may not be optimal for a bank, depending on its volume of retail funding and the sensitivity of retail funding costs to the credit rating of the bank. A higher credit rating requires a bank to hold more economic capital, and the costs associated with this may not be offset by the reduction in wholesale funding costs associated with the higher credit rating. This is explored in more detail in Ford and Sundmacher (2004).

The PA Consulting Group also reports that only 33% of institutions have a single enterprise-wide risk report that consolidates all risk exposures across all risk types and lines of business. There are two key issues with respect to enterprise-wide risk measurement. The first is banks must measure and adjust for correlations against risk types when consolidating risk exposures for firm-wide capital measurement. This would require banks to demonstrate to supervisors that they have modelled the impact of, say, large credit losses on market risk (liquidity) and operational risk (legal and reputational issues), and built necessary adjustments into the calculation of economic capital. However such correlations may be unstable through time, and need to be constantly revisited, and the methodology used to identify correlations is critical. The second issue relates to differentiating across risk types. The Basel proposals define distinct measurement bases for credit, market and operational risk. However, it may not always be clear when a loss event is attributable to any one of these risk types. For example, credit risk losses may be due to poor security valuation, poor pricing (model risk), documentation errors or failure to execute documents. The source of these losses may be operational risk-related, even though the losses may be recorded as credit-related from an accounting or regulatory perspective.

OPERATIONAL RISK IN STRATEGY

The Basel Committee's definition of operational risk tends to place focus on risks in existing operations. However operational risk is also directly connected to the strategic priorities of a bank. Consider bank strategies related to revenue diversification and cost reductions. Revenue diversification typically involves a bank moving into new geographic regions or new product/service lines, and is typically motivated by a desire to reduce reliance on interest income. Such activities, however, create operational risk for banks such as increased product knowledge requirements for staff and the need for appropriate control mechanisms. Cost reductions, driven largely by a focus on reducing the cost-to-income ratio, may also result in an increase in operational risk if cost reductions are occurring in the areas of audit, monitoring or staff training. Banks, and perhaps regulators, need to determine a minimum 'safety threshold' for the cost-to-income ratio, representing the point where any efficiency gains associated with cost reductions are likely to be matched increases in operational risk exposures. Operational risk may also exist in acquisitions, particularly in terms of costs attributed to poor business integration.

LEADING INDICATORS OF OPERATIONAL RISK

Banking institutions may find that specific non-financial measures prove robust leading indicators of operational risk losses. This does not appear to have been explored in the academic

literature. Examples of potential leading operational risk indicators are product complexity indexes, the ratio of back office to front office staff, the number of trades executed by individual traders/trading groups per day, and the level of expenditure on training per employee. Consider the ratio of back office to front office staff in a trading operation. A bank engaging in trading activities should ideally have sufficient resources in the back office to ensure compliance with internal policies and speedy confirmation of trades. A low ratio might reflect an increased likelihood for errors in back office processes: deals might not be processed properly or might be settled late, dealer confirmations might contain inaccurate transaction details. Further, breaches of dealer limits may not be identified, leading to an excessive concentration in trading exposures. A high ratio of back office to front office staff could indicate underutilisation of resources and the potential for under monitoring in the sense that staff in the back office might incorrectly assume that other employees are monitoring traders' activities, particularly if a clear assignment of responsibilities is missing. A suitable benchmark of back to front office staff will be subject to a bank's specific characteristics and influenced by other factors, like the level of training, support and product knowledge in the back office, and the scope of trading operations in the front office.

CONCLUSION

The revised framework for the internal convergence of capital measurement and capital standards creates heavy demands on banks with respect to the measurement of credit and operational risk-related information. A danger lurks – banking institutions may become so preoccupied with data collection and collation, they become blind to strategically managing their risk management function. We have identified a number of research agenda items for banking institutions that emanate directly from the Basel Committee's revised framework for the measurement of bank capital.

REFERENCES

Basel Committee on Banking Supervision, (2004), "International Convergence of Capital Measurement and Capital Standards – A Revised Framework", Bank for International Settlements.

Basel Committee on Banking Supervision, (2003), "Quantitative Impact Study 3 – Overview of Global Results", Bank for International Settlements, May.

British Bankers' Association, ISDA, RMA and PWC, (1999), "Operational Risk – The Next Frontier".

Ford, G. & M. Sundmacher (2004). A Loan Pricing Model: The Influence of the Lender's Credit Rating, Presented at the Emerging Financial Services in Asia Pacific Conference, Sydney.

Moody's Investor Service, (2002), "Bank Operational Risk management – More Than an Exercise in Capital Allocation and Loss Data Gathering", *Moody's Special Comment*, June.

PWC Report, (2004), "Investigation into Foreign Exchange Losses at the National Australia Bank", PricewaterhouseCoopers, 12 March.

BANK FAILURE PREDICTION IN A STABLE MARKET

Richard T. Henage, Utah Valley State College
henageri@uvsc.edu

ABSTRACT

Bank failure prediction was a hot topic in the late 1980's and early 1990's. For the ten year period from 1984 through 1993, there were 1,330 bank failures costing the FDIC in excess of $180 billion. Over the last ten years (1994-2003), there have been only 57 bank failures at a cost barely exceeding $7 billion. Clearly, the last ten years has provided a much more stable market for the banking industry.

Several models were developed during the early 1990's to identify bank failures from published financial data. Every bank failure prediction model has the potential of two types of errors: 1) Type I errors, in which failed banks are not identified; and 2) Type II errors, in which non-failed banks are classified as failed banks. The model chosen for this study was developed in 1995 to minimize the total number of errors.

The results of this study show that while the model may be able to identify bank that are undergoing financial distress, the model is not effective in minimizing total prediction errors. Indeed, with an average of less than 1 failure per 1,000 federally insured banks over the past ten years, a naïve model that states that no bank will ever fail would be 99.93% accurate. The predictive ability of the model applied to banks over the period from 1994 through 2003 falls significantly below the accuracy of the naïve model.

HOW HAVE INSTITUTIONS THAT SURVIVED THE S&L CRISIS FARED?

Patrick J. Larkin, Fayetteville State University
plarkin@uncfsu.edu
Baeyong Lee, Fayetteville State University
blee@uncfsu.edu
Thomas G. E. Williams, Fayetteville State University
tgewilliams@uncfsu.edu

ABSTRACT

An examination of a sample of publicly traded savings and loan institutions that survived the crisis in the S&L industry is conducted. The large number of failures in the industry has been attributed to fraud and mismanagement (Akerlof & Romer, 1993); rising interest rates and changing economic conditions (Barth, 1991); and weak internal governance mechanisms (Williams, 1998). Firms that survived the crisis are associated with superior internal governance mechanisms. Specifically, Williams reported differences in the board composition and equity ownership of board members between those institutions that survived and those that failed. If the firms that survived did in fact have superior internal governance mechanisms, we should expect them to flourish during the post crisis period. The analysis will include a review of the financial performance of these firms during and after the crisis period. The crisis period extends from 1983 through 1992 and the post-crisis period includes 1994 through 2001. The post-crisis period is characterized by major acquisitions within the industry. Additionally, preliminary analysis indicates that the internal governance characteristics of these firms remained unchanged between the crisis and post-crisis periods.

INTRODUCTION

The savings industry underwent a major transformation during the 1980s, due in part to deregulation and changing economic conditions. Many institutions converted from mutual to stock ownership, others changed charters (mostly to federal charter), and some investors formed new institutions, mainly in states with less restrictive asset powers. During this period the number of institutions also dropped from 3,150 in 1983 to 2,390 in 1992. The industry's share of total financial assets declined to $1,030.2 billion (or 23 percent of total assets held by commercial banks, savings institutions, and trust companies). The transformation of the savings industry was, in part, due to changes in the economic and regulatory environment.

A large number of failures, resulting from fraud and mismanagement (Akerlof & Romer, 1993), rising interest rates, and changing economic conditions (Barth, 1991) are blamed for the contraction in the industry. Beyond those factors, Williams (1998) identifies weakness in the internal governance mechanisms as a contributing factor to the failures in the industry. Specifically,

Williams reported differences in the board composition and equity ownership of board members between those institutions that survived and those that failed. The association of superior internal governance mechanisms with firm survival suggests that those institutions that were still in existence at the end of the crisis should be poised to prosper in the more stable environment that prevailed throughout later half of the 1990s. To decipher whether the superior mechanisms that navigated some institutions through the crisis translated into prosperity during the post-crisis period we study a sample of 55 publicly traded institutions that survived the crisis in the savings and loan industry. The focus is on the post-crisis period, which extends for eight years, from 1993 through 2001. The period we investigate begins in 1993 since the last year that a publicly traded institution failed during the crisis period is 1991. In addition, the introduction of Financial Institutions Reform and Recovery Enforcement Act (FIRREA) in August 1989 and Federal Deposit Insurance Improvement Act (FDICIA) in 1991 signaled the end of the crisis period. Furthermore, several studies that examined the problems in S&L industry cover a similar period suggesting that the crisis was all but over by 1993. Among the studies that analyzed the crisis are Kane & Yu (1996), Brewer (1995), Strahan (1995), Blalock, Curry & Elmer (1991), and Horvitz & Lee (1994). The earliest year for any of the sample periods covered in those studies is 1984 with the latest year being 1990. In addition, Garcia (1995) reports that the number of critically undercapitalized thrifts fell from 417 in December 1990 to six in September 1993.

We analyze the characteristics and performance of the publicly traded savings institutions that were able to successful navigate the perilous period for the savings and loan industry that extended from the 1980s to the early 1990s. Our sample includes publicly traded savings institutions that were in existence throughout the crisis period, had governance data available in proxy statements, and for which some financial data is available in the Computstat database.

DESCRIPTION OF SAMPLE

The sample includes 55 publicly traded institutions that survived the crisis in the S&L industry during the 1980s and into the early 1990s. During the study period 42 of the institutions were either acquired by or merged with other firms. Some institutions were acquired by other savings institutions, which in turn were also acquired by other firms. Fifteen of the acquisitions were undertaken by savings banks and 26 institutions were acquired by commercial banks. The one institution acquired by a non-financial firm, Temple Inland Inc., was then merged with Guaranty Savings Bank, which was already owned by the Temple Inland. The reduction in the number of institutions was concentrated in the immediate post-crisis period. Ninety percent or 38 of the acquisitions occurred between 1993 and 1998. The disproportionately large number of acquisitions undertaken by commercial banks and the clustered in this period appears to be related to the passing of the Interstate Banking and Branching Efficiency Act (IBBEA) of 1994. The IBBEA allowed banks to acquire and merge with out-of-state banks. The characteristics of sample, therefore, mirrors the consolidation witnessed in the wider financial services industry during this period. Between 1992 and 2002 the total number institutions dropped from 13,852 to 9,354 in 2002. Similarly the number of savings institutions fell from 2,390 to 1,466 over the same period. However, there was a marked difference from the crisis period, when some acquisitions were consummated with government assistance. Our review finds that none of the 42 acquisitions in our

sample received any government financial assistance. In fact, as could be determined from public records, all institutions that were acquired appear to have been in sound financial condition at the time of the acquisition.

Table 1

Sample of 55 publicly traded savings institutions that survived the crisis in the S&L industry during the 1980s through the early 1990s. The table shows that the majority of these institutions were acquired between 1993 and 2001, primarily by commercial banks.

	Acquired By			
Year	Savings Bank	Commercial Bank	Total	Balance
				55
1993		5	5	50
1994	3	7	10	40
1995	6		6	34
1996		6	6	28
1997	4	3	7	21
1998	3	1	4	17
1999		2	2	15
2000		1	1	14
2001		1	1	13
Total	16	26	42	

The information for the board characteristics were copied from proxy statements were available, and financial and other company-specific data was taken from annual reports, the Computstat database, *Moody's Banking & Finance Manual,* and the *Directory of Savings and Loan Associations*. Based on the information in the proxy statements we listed and classified the members of the board of directors. All board members are classified as inside, affiliated outside, or independent outside directors. Inside directors include all directors who are current and former employees of the institution, and the immediate relatives of these officers. The affiliated director classification was suggested by (Baysinger & Butler, 1985) and has been used in subsequent research such as (Weisbach, 1988), (Gilson, 1990), (Hermalin & Weisbach, 1991), (Byrd & Hickman, 1992), (Lee, Rosenstein, Rangan & Davidson, 1992), (Shivdasani, 1993), and (Williams, 1998). The affiliated outside directors include officers of firms or individuals having substantial business relationships with the institution, financiers and financial professionals, management and financial consultants, and lawyers. All other directors including professional directors, private investors, educators, government officials, members of the clergy, and medical practitioners are classified as independent outside directors.

The equity owned by the board members was also copied from the proxy statements. In addition, the owners of 5 percent or more of the company's stock were recorded separately, as either affiliated or unaffiliated block holders. A block holder is an affiliate if the holder is also an inside or affiliated director, or had a substantial business relationship with the firm.

ANALYSIS OF SURVIVING FIRMS

Forty-two of the institutions held a federal charter, with the remaining 13 firms holding state charter. Nineteen institutions were located in one of five states characterized by Cebenoyan, Cooperman & Register (1996) as having liberal asset and liability powers. The five states are California, Florida, Louisiana, Ohio, and Texas.

Table 2

Distribution of sample firms by charter and location between states with restrictive and those with less restrictive asset and liability powers. The five states identified as having less restrictive asset and liability powers are California, Florida, Louisiana, Ohio, and Texas.

	Type of Charter		
Description	Federal	State	Total
Institutions located in states with liberal asset and liability powers	15	4	19
Institutions located in states with less restrictive asset and liability powers	27	9	36
Full Sample	42	13	55

Table 3 presents descriptive statistics of governance characteristics for 34 institutions during the first two years of the post-crisis period. Board sizes average 9.6 members with independent outside directors occupying approximately 50% of the seats on the boards. Inside directors owned 10.85% of the equity of the institutions, with independent outside directors holding 3.13%. Affiliated outside directors owned less than one percent of the equity. These statistics are quite similar to those for the full sample of 55 firms, during the crisis period from 1983 through 1992.

Table 3
Summary of Board Composition and Ownership Data

Summary of board size, board composition, and board ownership data for sample of publicly traded savings and loan institutions that survived the S&L crisis through the end of 1992. The statistics are based on data for 34 firms and reflect their status at the beginning of the study period. The data for 32 firms are for 1993, and for the other two that did not have data available for 1993 we use 1994.

	Mean	Std Dev	Median	Maximum	Minimum
Panel A					
Board size	9.58	2.65	9.00	16.00	6.00
Number of inside directors	2.94	1.63	3.00	8.00	0
Number of affiliated outside directors	1.68	1.70	1.00	6.00	0
Number of insider-controlled directors	4.62	2.10	4.00	11.00	2.00
Number of independent outside directors	4.97	2.68	4.50	14.00	1.00
Panel B					
Proportion of inside directors	0.32	0.18	0.32	0.86	0
Proportion of affiliated outside directors	0.18	0.17	0.12	0.67	0
Proportion of outside directors	0.51	0.20	0.50	0.86	0.14
Panel C					
Inside directors' equity (%)	10.85	15.06	5.47	72.56	0.01
Affiliated outside directors' equity (%)	0.89	1.70	0.21	8.32	0
Insider-controlled equity (%)	11.73	15.01	8.37	72.88	0.05
Independent outside directors' equity (%)	3.13	3.20	1.60	9.91	0.01
Affiliated block holders' equity* (%)	18.36	16.79	10.73	72.50	5.63
Unaffiliated block holders' equity* (%)	17.46	9.52	17.01	35.34	5.40

* For some firms there were no block holders, therefore, the number of observations for affiliated block holders' equity is 22 and 27 for unaffiliated block holders' equity.

During the post-crisis period the total assets of sample firms range from $190 million to $242.5 billion. The average size of these institutions increased during the period, primarily through acquisitions.

Table 4
Summary of Financial Data

Summary of key financial variables for a sample of publicly traded savings and loan institutions that survived the S&L crisis through the end of 1992. The number of firms for which information is available on Compustat ranges from 36 in 1993 to 11 in 2001. Not all variables are available for each firm throughout the sample period. N represents the number of firm-years of data used to compute the corresponding statistics.

	N	Mean	Std Dev	Median	Maximum	Minimum
Total assets (Billions $)	181	10.69	26.66	0.61	242.51	0.19
Return on Assets (%)	181	0.77	0.74	0.88	2.27	-5.28
Return on Equity (%)	180	12.96	28.08	12.58	362.85	-67.37
Net Interest Margin (Millions $)	176	3.33	0.68	3.30	5.34	1.77
Non-performing Assets/Total Assets (%)	158	1.96	2.98	1.19	26.14	0.06
Capital Ratio - Tier 1 (%)	170	7.18	1.77	6.66	13.87	4.14
Reserve for Loan/Asset Losses (%)	179	88.81	215.34	17.04	1404.00	0.50

CONCLUSION

The analysis of the characteristics of publicly traded institutions that survived the crisis of the 1980s and early 1990s reveals a consistency, which transcends the crisis and post-crisis period. Our focus is on firm characteristics that are have been associated with the survival of savings institutions during a period of turmoil in the industry. The period immediately after the end of the crisis is characterized by rapid consolidation with in the industry brought on by the acquisitions of apparently financially sound institutions. Most of the acquisitions were undertaken by commercial banks. With less than 25 percent of the original sample of firms remaining as independent firms at the end of the study period, two primary areas remain to be examined. First, we will delve into the financial performance of the institutions that survived. This will be supplemented with a comparison between these firms and other institutions that are either new or converted to publicly traded firms.

REFERENCES

Akerlof, George A., and Paul M. Romer, 1993. Looting: The economic underworld of bankruptcy for profits," *Brookings Papers on Economic Activity, Macroeconomic Issues*, 1-73.

Barth, James R., 1991. The great savings and loan debacle, *The AEI Press*, Washington, DC.

Barth, James R., Phillip F. Bartholomew, and Michael G. Bradley, 1990, Determinants of thrift institution resolution costs, *Journal of Finance* 45, 731-745.

Baysinger, B. D. & H. N. Butler (1985). Corporate governance and the board of directors: performance effects of changes in board composition. *Journal of Law, Economics, and Organization* 1(1), 101-124.

Blalock, J.B., T.J. Curry and P.J. Elmer, 1991, Resolution Costs of Thrift Failures, *FDIC Banking Review* (Spring/Summer), 15-26.

Brewer, E., III, 1995, The Impact of Deposit Insurance on S&L Shareholders' Risk/Return Trade-Offs, *Journal of Financial Services Research* (March) 27-41.

Byrd, J. W. & K. A. Hickman (1992). Do outside directors monitor managers? *Journal of Financial Economics* 32(2), 195-221.

Cebenoyan, A. Sinan, Elizabeth S. Cooperman, and Charles A. Register, 1996, Ownership structure, charter value, and risk-taking behavior for thrifts, *Financial Management* 28(1), 43-60.

Garcia, G., 1995, Implementing FDICIA's Mandatory Closure Rule, *Journal of Banking and Finance*, (June), 723-725

Gilson, S. (1990). Bankruptcy, boards, banks, and blockholders: Evidence on changes in corporate ownership and control when firms default. *Journal of Financial Economics* 27(2), 355-387.

Hermalin, B. E. & M. S. Weisbach (1991). The effects of board composition and direct incentives on firm performance. *Financial Management* 20(Winter), 101-112.

Horvitz, P.M. and I. Lee, 1994, Abnormal Returns in Post-FIRREA Acquisitions of Failed Thrifts, Journal of Financial Services Research (December), 269-281.

Kane, Edward J. and M. Yu, 19960, Opportunity Cost of Capital Forebearance During the Final Years of the FSLIC Mess, *Quarterly Review of Economics and Finance* (Fall), 271-290.

Lee, C. I., S. Rosenstein, N. Rangan, & W. N. Davidson, III (1992). Board composition and shareholder wealth: The case of management buyouts. *Financial Management* 21(Spring), 58-72.

Strahan, P. E., 1995, Asset Returns and Economic Disasters: Evidence from the S&L Crisis, *Journal of Monetary Economics* (August), 189-217.

Weisbach, M. S. (1988). Outside directors and CEO turnover. *Journal of Financial Economics* 20(1-2), 431-460.

Williams, Thomas G.E., 1998, Corporate Control and Failure at Publicly Traded Savings and Loan Associations, Unpublished doctoral Dissertation, Texas A&M University.

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