

Mortgage Credit Scoring

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Abstract

The application of credit scoring techniques to assess the credit worthiness of borrowers is a well-established practice in consumer credit. However, the use of credit scoring to provide credit decisions for mortgage loans is a new application of this method of assessment. This thesis is concerned with whether the application of credit scoring to a mortgage loan portfolio affords business benefits.

A review of the literature relevant to both credit scoring and mortgage default is presented. Following a review of the literature, the methodology and research design are described. Thereafter this thesis reports the findings of a range of empirical research.

Chapter Four reports the findings of the initial industry survey, which examines mortgage credit scoring. Chapter Five reports the findings of the interview programme conducted to augment the survey. Chapter Six describes a case study undertaken, which facilitated the development of a bespoke mortgage scorecard. The development and subsequent performance of the scorecard are examined. Chapter Seven provides the findings of a pilot study in which mortgage lender performance is benchmarked.

This principle conclusions of this thesis are; (i) A range of organisational factors require to be controlled if scoring is to afford the risk, process and cost benefits sought by those who adopt it either as an alternative to judgmental evaluation, or to augment such a system. (ii) Subject to those controls being in place, credit scoring can outperform judgmental evaluation in predicting mortgage default.

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Declaration

I declare that the contents of this thesis have been composed entirely by myself, that the work contained is my own, and that all contributions from others have been clearly indicated and have been given due reference.

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Chapter One

1. Introduction

1.1. Introduction

“Credit scoring is an empirical technique that uses statistical methodology to predict the probability of repayment by credit applicants”, (Hsai, 1978). The credit scorecard provides the lender with an empirically derived risk ranking. Risk is defined as *“chance of loss....exposure to loss”*, (Oxford English Dictionary, 1997). The particular risk considered by this thesis, is the risk of an applicant for mortgage credit failing to repay the debt. Credit scoring is used to create empirical decision making tools, which are acknowledged to outperform judgmental loan evaluation when applied to personal loans and credit cards. However, the application of scoring technologies to mortgage loans is a recent development in the UK financial services market. This thesis is concerned with the application of credit scoring in order to assess applicants for residential mortgage loans in the UK.

1.2. Aims of the Thesis

This thesis examines a new application of credit scoring; the application of scoring to the mortgage loan. In doing so, this thesis intends to identify whether credit scoring can offer benefits to those lending organisations, which choose this method of decisioning. Additionally this thesis aims to identify how credit scoring must be used within the operating environment if the benefits achievable are to be delivered. Finally, this thesis intends to identify whether credit scoring can outperform judgmental evaluation of mortgage loans.

In order to introduce the subject area, both the credit decision and the mortgage loan are now considered in more detail. The layout of the thesis is then presented.

1.3. The Credit Decision

According to Myers and Forgy, (1963), "*The problem of determining credit risk has been with the businessman, since he first consummated a business transaction without receiving immediate payment for his goods and services*". It is interesting to note that forty years hence, the problem of managing credit risk continues to consume the lender. The management of credit risk has gained even more prominence over the past decade, and this is evidenced by developments both in industry and in academia. Within lending organisations credit risk has now attained functional status, and credit risk departments are now commonly found alongside other more traditional departments such as finance and human resources. The management of credit risk at acceptable levels has gained prominence, and within the financial press evidence of lenders debt levels and thus credit quality is posted as one indicator of the value of the firm. Within academia, a body of research has developed which examines the techniques by which credit risk can best be identified and minimised.

The nature of credit decisioning has undergone a fundamental change over the past twenty years. The traditional lending environment was one in which a customer, who wished a credit facility, called in person to a "local" bank or building society branch and met either the manager or a senior member of staff. The decision as to whether or not to lend was then made subjectively based on what were traditionally called the 4 C's of credit. These were a subjective assessment of the applicant's character, collateral, and capacity to repay, combined with economic "conditions" which prevailed at the time of application. This method of lending served the banks well, and they maintained a prudent approach to lending with a focus on minimising bad debts, and ensuring that all monies advanced were repaid in full.

Developments in banking at the end of the twentieth century, required that lenders revisit their lending policies and procedures. Described as a "New Retail Banking Revolution" by Gardner, Howcroft and Williams (1999), a combination of increased competition, technological innovation, increased customer service demands, and reduced customer loyalty forced the banks to endeavour to become more efficient.

The entry into the UK retail lending environment of American competitors, and the demutualisation of traditional building societies presents the banks with new competitors who can maintain low cost structures, and are able and willing to accept lower profit margins on a variety of products. Additionally, the introduction of telephone and Internet banking means that many customers no longer require an interface with a local office or local manager.

In combination, these changes forced the banks to reduce costs, and also to offer lending products via remote lending channels. These trends resulted in lenders adopting credit scoring technologies, which have been described as one of the most successful applications of statistical and operational research approaches to management ever. Credit scoring allows lenders to predict likely loan outcomes based on the use of statistical techniques, which allow objective predictions as to whether a loan will produce a good or bad outcome. The predictive capacity is derived from analysis of data representative of the lenders own previous lending experience. The scoring models are used to compare the characteristics of each new applicant to the characteristics of previous applicants. Those who present the same characteristics as previous bad applicants, are identified as being likely to be bad, and those the same as the good are considered likely to be good.

Credit scoring offers many benefits to both lender and borrower. The assessment of each application is wholly objective. Credit scoring complies with the requirements of six UK acts of parliament namely, the consumer credit, sex discrimination, race relations, fair-trading, employment protection and data protection acts. This ensures that applicants for credit are not discriminated against. It is this “fairness”, that led to the suggestion that *“all lenders should be encouraged to establish and operate a workable credit-scoring system. Such a system, if universally in use, would remove many of the problems of the present system”* Church of Scotland (1988).

In addition to ensuring objectivity, credit scoring also offers speed to decision, consistency across a variety of customer interfaces and application channels, control

of lending quality and cost savings. These benefits, in combination, make scoring a very desirable means by which to evaluate loan applications.

However, credit scoring is not without its critics. The most vociferous of these is Capon, whose 1982 critique lambastes the “*brute force empiricism that characterizes the development of credit scoring systems*” and leads to “*a treatment of the individual applicant in a manner that offends against the traditions of our society*”. Capon is not alone in criticising scoring, but it is accurate to say that within the literature support for credit scoring significantly outweighs criticism.

Credit scoring has for twenty years, been used to make credit decisions on consumer loans and credit cards and is now entering a new domain. Lenders are now introducing credit scoring in order to make decisions on mortgage loans. It is this new application of scoring which this thesis examines.

1.4. The Mortgage Loan

Successive UK Governments have supported the expansion of home ownership in a manner, which is persuasive and explicit. The changing face of home ownership in the UK has resulted in an increasing proportion of the UK population taking responsibility for housing provision by owning their own homes. Sixty seven percent of the UK housing stock is now owner occupied, an increase of twelve percent since 1979, and this “*acceleration is a direct result of government policy*”. As a result the “*responsibility for housing provision and finance now lies with the market, where issues become ones between individual consumers and suppliers*” (Doling & Ford, 1991). The UK now has one of the highest levels of home ownership amongst western industrialised nations. The desire for home ownership which has been driven by government housing policies, has resulted in new types of applicants requiring access to housing finance. Previously “*owner occupation had been seen as a tenure for the middle classes*”, Spicker (1996), however new entrants to the sector now come from a wide variety of social backgrounds, age groups and income levels.

A mortgage loan is the vehicle by which providers of housing finance offer individuals the funds to purchase domestic property. Mortgage loans have several characteristics which make them significantly different from other consumer loan products. The value of the mortgage loan reflects that a mortgage is typically the largest single investment undertaken by an individual. The term of the mortgage loan is typically twenty five years, and this reflects the high value of the transaction as it takes a considerable time to repay the initial loan sum plus the interest thereon. The property, which is the focus of the transaction, is the truly unique feature of the loan. The property being purchased forms a security for the lender, and to an extent mitigates the risk inherent in the loan transaction. However, this introduces a risk for the borrower. Should the loan fail to be repaid, the ultimate sanction by the lender is to apply for a possession order, thus transferring ownership of the property from borrower to lender. The property can then be sold in order to repay or reduce the amount of the loan, which is outstanding.

It is this specific aspect of mortgage lending that requires lenders to ensure that they make an accurate assessment as to the likelihood of loan failure. The cost of mortgage loan failure is not a solely financial cost, although both the lender and the borrower face the risk of financial loss. Mortgage loan failure can result in a considerable social cost, and this does not apply to the same extent to other loan products. The social cost of loan failure can result in individuals becoming homeless, and as a result having to “downgrade” their property owning aspirations or transfer to the public or private rental sector. The “vulnerability of home ownership” and the relationship between this vulnerability and changes in income structures, employment patterns, economic conditions and banking practices is the subject of a developing body of research.

Loan providers are mainly, but not exclusively profit driven. However, when creating mortgage lending policies they must balance the requirement to generate profits with the broader social implications of “getting it wrong”. At an individual borrower level, lenders “getting it wrong” can result in homelessness. However, at

an economic level, the mismanagement of portfolio risk can result in bank failure, the cost of which is often borne by the economy as a whole.

This thesis considers the application of scoring technologies to mortgage loans. These loans are significantly different to other loan products. Mortgage loan failure has wider economic and social implications than failure of other loans, and this heightens the requirement for mortgage lending to be closely scrutinised to ensure that policies and procedures are efficient and equitable.

1.5. Layout of Thesis

In Chapter two of this thesis a review of the literature is presented. The literature reviewed presents the development of scoring, and also considers the range of techniques applied to scoring and their relative performance. In order to place mortgage lending in context, the operating environment and the mortgage product are also introduced. The literature which examines predictors of mortgage default, is also considered at this time. In conclusion chapter two identifies the current gaps in the literature which this thesis addresses.

Chapter three outlines the research methodology which underpins the work undertaken. The research methods, which are used in pursuit of the research goals are presented and discussed in turn. In conclusion, chapter three confirms why a mixed methods approach is considered to be the most suitable means by which to meet the aims of the thesis.

Chapter four presents the first empirical study of the thesis, and reports the findings of the initial industry survey, which was undertaken in July 1997. The survey sought to identify the extent of usage of credit scoring, the drivers for introducing scoring, the way scoring is being used and the benefits anticipated and achieved by lenders as a result of introducing scoring. The survey achieved a 56% response rate, and achieved its goals. In conclusion, chapter four presents several research questions which are generated by the results of the survey analysis.

In Chapter five the next phase of the research is described and analysed. An interview programme was undertaken during July and August 1998, in order to answer the research questions generated in chapter four. Whilst mindful of confidentiality issues, the interview participants are introduced, and a précis of some of their views and insights is presented. The analysis of the interview transcripts provides useful new insights into the manner in which credit scoring is being integrated into the mortgage lending process. In conclusion, chapter five presents the findings of the interview analysis and makes some suggestions as to how credit scoring might be operationalised in order to improve the benefits being achieved.

Chapter six introduces the case study phase of the research which followed the interview programme. The case study commenced formally in May 1999. The case study was undertaken in order to gather application data, which allowed the development of a mortgage scorecard. Chapter six describes the case study organisation and the mortgage process of that lender. This chapter then goes on to describe the data gathering and analysis, which facilitated the development of a bespoke mortgage scorecard. In conclusion chapter six presents the performance of the various scoring models that were developed.

Chapter seven of this thesis describes the final empirical work undertaken in order to answer the research questions that had developed. This chapter reports the findings of a benchmarking survey, which was undertaken in December 1999. The benchmarking survey sought to determine whether business measures would confirm if those lenders who use credit scoring do exhibit improved levels of performance. In conclusion, chapter seven summarises the key findings of the benchmarking study, and presents some suggestions for process improvements, which might assist lenders to improve performance.

In conclusion, chapter eight summarises the findings of all the work undertaken in support of this thesis, and makes some suggestions for future areas of research, which might build on this work.

1.5.1. Summary

The outline of the research presented confirms a multi-method approach being adopted in order to answer the research questions. These questions which will be developed during this thesis are outlined below.

- ❑ To what extent and how is credit scoring being used by mortgage lenders?
- ❑ Why is credit scoring introduced into the mortgage loan environment?
- ❑ Once adopted, how do lenders utilise scoring?
- ❑ How successful is credit scoring at delivering the desired benefits to lenders?
- ❑ How must scoring be used if maximum benefit is to be gained?

Chapter Two

2. A Review of the Literature

2.1. Introduction

In order to examine the subject area of this thesis, a diverse range of literature is reviewed. The literature reviewed is presented in two individual sections for clarity.

Within the first section credit scoring is introduced. The development of scoring, the variety of techniques used, a comparison of techniques and a critique of scoring all seek to provide a rounded view of the research literature to date. Additionally the literature which examines the perceived benefits of scoring, and the means by which a lender might use credit scoring to “add value” to the lending process is presented. Significantly less literature is presented in this area, as little research has been undertaken on “operationalising” scoring prior to this thesis.

In the second section the mortgage market and product are introduced. The importance of the mortgage market, and the unique features of mortgages that require mortgage scoring be considered as a “stand alone” subject area are presented. A review of perceptions regarding the “drivers” of mortgage default is also examined. Much of the literature in this field is derived from US experience and from research relating to options pricing. This literature, provides useful material, not only when considering what determines whether borrowers default, but also whether borrower behaviour in relation to a mortgage loan differs from behaviour in relation to an alternative consumer loan product. Finally, an examination of the incidence and impact of mortgage default are outlined in order to express the importance of mortgage default, not only from the perspective of the lender, but also to show that social and economic links need to be considered.

In conclusion the author summarises the key points relative to this thesis, and presents the “gaps” in the literature which this work seeks to address.

2.2. Credit Scoring: Overview

“The problem of determining credit risk has been with the businessman since he first consummated a business transaction without receiving immediate payment for his goods or services” (Myers & Forgy, 1963). Despite this observation having been made almost forty years ago, the problem is as acute today as ever. This is due in part to the new remote delivery channels, which distance the loan officer from his applicant. Lenders still struggle to find the most efficient and accurate method of measuring and managing credit risk. It requires to be a method that is legal, economically viable, timely, and perceived by customers and intermediaries as being “fair”. One method, which has gained favour and appears to meet all criteria is credit scoring. Even such luminaries as the Church of Scotland (1988) suggest that *“every lender should be encouraged to establish and operate a workable credit-scoring system”*. Credit scoring is a term applied to a variety of statistical techniques which are used to predict aggregate borrower behaviour. In the case of this thesis the behaviour which requires to be predicted relates to loan outcomes. Credit scoring determines the likelihood of an applicant for credit defaulting during the fixed term of the loan being granted. Credit scoring is used at two levels, application scoring and behavioural scoring.

Application scoring is used to make an assessment as to whether to grant credit to an applicant for whom you have no previous record of account performance. Application scoring does not include information regarding the credit behaviour of the applicant, except that information provided by credit bureau (secondary data). Such scorecards may be used in one of two circumstances. The applicant may be a non-customer of the organisation to whom the application has been made. Alternatively the applicant may be an existing customer of a lending organisation that does not gather data on account performance in a manner which enables such data to be used formally in making new lending decisions.

Behavioural scoring is also used to make decisions about granting or extending credit facilities. In this circumstance the lender can augment his credit decisioning

procedures with primary evidence of prior borrower account behaviour. The focus of this thesis is on application scoring, applied to mortgage loans.

2.2.1. Lending Decision-Making pre. Credit Scoring

Prior to credit scoring being developed with a view to predicting borrower behaviour, all lending decisions had been made subjectively. Individual lenders used criteria commonly referred to as the 4 C's of credit, and somewhat ambiguously as the "*four horsemen of credit*" by Churchill, Nevin and Watson (1977). This required that individual loan officers make a subjective analysis of the applicant's character, collateral, capacity to repay, and economic conditions at the time the loan was granted. Whilst such analyses were perceived by lenders to work well, a level of local knowledge was required by the loan officer in making his decision. This necessary intervention of the loan officer was recognised by Churchill et al who suggested changing the 4 C's by dropping "*conditions*" and instead using the "*common sense*" of the loan officer as the fourth C. During this time, developments in the banking sector meant that fewer small local banks existed, and thus local knowledge diminished. Additionally increasing competitiveness drove banks to seek economies of scale. One side effect of seeking cost savings, was a "de-skilling" of banking personnel by some banks during the 1970's. This resulted in the relatively specialised loan officers being retained centrally within the organisation, rather than being at each individual branch where the customer interface occurred. These changes helped to promote the application of credit scoring technologies in the retail lending environment. It should be highlighted that the application of scoring technologies was not adopted by all lenders, or for all products on offer. This is particularly true of mortgage loans, as will be evidenced later within this thesis. However, at a macro level, it is clear that since the 1970's credit scoring has been increasingly applied to consumer credit, both loans and credit cards. This change in the consumer loan market has seen a move from judgmental to empirical decision making over the past thirty years. This thesis considers why credit scoring technologies which allow lenders to reach empirically based lending decisions, have not been readily adopted for mortgage loans to the exclusion of judgmental evaluation methods.

2.2.2. The Development of Scoring

For a review of the development of credit assessment through time, Wahl (1997), presents a study commencing in the period 2250 BC. However, to retain a focus on credit scoring, the relevant literature relates to the past sixty years. The first scoring systems were application scoring systems. The earliest published study reports a system developed by Durand (1941), for the US National Bureau of Economic Research. Following Durand's study, scoring was then quite swiftly adopted by mail order companies throughout the US.

Many of the early papers consider scoring applied to consumer loans only. Application in a new area is considered by Orgler (1970), who uses the term "heuristic process" to describe credit evaluation. He then presents one of the early applications of credit scoring to existing commercial loan decisioning. As early as 1970 Orgler cites the "*lack of standard review systems and time pressure on bank regulatory agencies*" as reasons why scoring models are "*necessary*". It should be noted that the method in his 1970 paper is substantially critiqued. Haslem and Longbrake (1972), charged that the method by which the dependent variable was determined was fundamentally flawed. Developing his work, Orgler (1971) moves from application scoring to behavioural scoring, this time applying techniques to consumer loans. Orgler develops models which can be useful when applied to the portfolios of more than a single lender, thus presenting early variants on today's generic scoring models offered by a variety of commercial scorecard developers.

One of the earliest papers to apply scoring techniques to residential mortgages is presented by Rakes (1973). Again confirming the need to provide "*scientific assistance to the usual heuristic process*", Rakes cites a concern for "*better credit evaluation in the mortgage loan industry*". This is particularly interesting in view of more recent governmental concerns regarding the potential requirement for regulation in the UK mortgage market. The model presented does not examine default per se, but instead examines late payment, and, like models presented later within this thesis uses regression techniques. Interestingly, variables examined include some which would currently cause some consternation. Rakes reports that

where the husband is older than the wife, the repayment habits are worse than households where the wife is older than the husband. In today's environment a lender found to be using such criteria would be likely to receive some fairly negative publicity, regardless of the predictive ability of the variable. The model did however confirm that "*more attention to fewer but more discriminating financial relationships will result in a better allocation of a credit analysts efforts*". This refers to some "double counting" which was evidenced when judgmental decisioning was used, concerning variables which are strongly correlated. This finding is reflected within the work conducted later in this thesis relating to overriding scoring systems, and will be discussed later within this thesis.

In an early review of the role of scoring in the lending organisation Churchill et al (1977) summarise the advantages which scoring offers the firm:

1. Gains in management control
2. Benefits in training new personnel
3. Reduction in processing costs
4. More legally defensible system
5. Increased input into the firm's management information system

All of the foregoing remain relevant in today's lending environment, and, with the exception of items two and four above, were cited during the empirical research which underpins this thesis as being "drivers" for introducing mortgage scoring in the 1990's.

2.2.3. A Comparison of Techniques

A variety of papers combine observations on development, with a comparison of the performance of alternative techniques. Myers and Forgy (1963), provide an excellent overview of the process involved in developing a credit scorecard. They conclude that the early development techniques using "weights of evidence" were as effective as the application of techniques such as regression and discriminant analysis. Broadening the field further Bierman and Hausman (1970) examine trade

credit. They consider not only a “good” or “bad” outcome, but also profit, probability of collecting sums owed, and revision of these probabilities over the loan term in the decision making process. This leads them to develop new and more dynamic models in an effort to establish an “*optimal credit granting policy*”. This prompts consideration of some of the issues that continue to consume lenders, such as the potential conflict of goals between loan officer and the organisation. Such issues continue to impact on the adoption of credit scoring by organisations today. A further review presents the limitations of discriminant analysis. Eisenbeis (1977), suggests that the technique requires large samples if it is to present unbiased results.

Scoring’s popularisation continued with applications in the specialist field of agricultural finance where Chhikara (1989) reflects on the limitations of scoring when applied solely to minimise default. Reviewing a variety of alternative scoring techniques, he concludes that serious deficiencies in existing models arose from this single focus, and that profitability considerations required to be addressed. Chhikara also alluded to the fact that the credit decision cannot be viewed in isolation without taking account of the interaction between the outcome of a single decision and the impact on the remainder of the portfolio. The narrow focus of scoring on distinguishing those who will repay from those who will default, also receives criticism from Boyes, Hoffman and Low (1989). The authors provide an early model which addresses profitability, using estimates of likelihood of default. This paper also presents a view of an optimum model, accounting for “time to default” which would improve the lenders ability to measure expected earnings over the life of the loan. This type of model is now being considered, examples of such are presented by Banasik, Crook and Thomas (1997) and Thomas and Stepanova (1999), in applying survival analysis methods to personal loan data.

Work such as that by Crook, Hamilton and Thomas (1992) also addressed some of the concerns raised by authors such as Chhikara, in developing models which examined not whether an applicant would default, but how badly they default. By considering the extent of the default, so the authors began to consider issues relating to credit performance, and hence profitability. The focus on profitability continued

as Brennan (1993) confirms that “*credit scoring systemshave evolved into helping lenders predict profitability*”. Whilst evidence presented within this thesis does not support this statement as reflecting current practice in the domain of mortgage loans, it is certainly a statement of desire for most lenders.

A more holistic review of techniques is considered within the survey produced by Rosenberg and Gleit in 1994. This comprehensive paper, considered discriminant analysis, decision trees, expert systems, dynamic programming, linear programming and Markov chains in a variety of applications. In presenting the review the authors also highlighted the many applications of credit scoring techniques in the 1990’s, confirming that usage had gone beyond the initial decision as to whether to extend credit or not. New applications include, increasing or decreasing credit available to existing customers. Beyond the traditional credit role, scoring had also been utilised by marketing departments to aid customer targeting, and by arrears departments to develop arrears management strategies which reflected the risk profile of applicants. However, in concluding Rosenberg and Gleit confirm that the accept/reject credit decision is the most “*mature branch of quantitative methods*”, with new applications remaining “*much more of an art*”.

A further study comparing predictive performance, considers discriminant analysis, neural networks, genetic algorithms and decision trees. The focus is on predicting slow payment rather than default. In this paper Yobas, Crook and Ross (1997), apply all four techniques to the same dataset. Their findings, which found linear discriminant analysis to perform well, were not entirely in concert with findings from alternative studies. No single technique has been found to consistently outperform others across a broad range of applications.

Hand and Henley (1997) present a further review of the variety of statistical classification methods. In presenting their conclusions the authors confirm that due to the complexity of credit decisioning, the range of data used, the various objectives and desired outcomes of the lender “*there is no overall best method*”. However, the

very real benefits of scoring in the areas of “*classification accuracy, speed of classification, and revision of lending policy*” are reinforced.

Thomas (1998), presents an overview of the variety of methodologies available for classifying applicants for credit. The title of this work “The Art and the Objective”, alludes to the fact that scoring is not an exact science. Judgements require to be made throughout the process, and these judgements may alter depending on the objectives of the scorecard developer and user. Whilst highlighting the similarity of outcomes from various techniques “*all wolves are grey in the dark*”, Thomas suggests that even small differences in result are worthy of pursuit. This is because of the very high volume of credit being managed by lenders, which makes every percentile point of improvement financially valuable. In considering the future of scoring, Thomas again confirms the desirability of profitability scoring rather than risk scoring.

2.2.4. Performance of Empirical V’s Judgmental Systems

Despite the existence of a considerable volume of literature reviewing the development of scoring and considering the performance of techniques relative to each other, little literature exists which compares empirical decisioning with traditional judgmental decisioning. One such paper by Chandler and Coffman (1979), summarises the findings of several small experiments in which the outcome confirmed that the “*empirical models outperformed their judgmental counterparts on the average*”. In addition to the marginally better decisioning performance, they confirm the additional benefits relating to improved information and surety of legal compliance. They also highlight an issue that is relevant at a later stage in this thesis, confirming that individuals exhibit better payment behaviour in respect of their mortgage loan, than their other obligations. A further comparison, this time in the domain of commercial lending, is presented by Srinivasan and Kim (1982). In reviewing the performance of the statistical models against experts, they find that the statistical classifications provide slightly superior classification results. However, they suggest that this is due to the complexity of the data chosen for analysis, and suggest that the statistical model be used to complement rather than replace the

expert. Regrettably within the existing literature no data was uncovered which compared empirical and judgmental decisioning systems applied to mortgage loans. This gap in the literature is therefore addressed later within this thesis.

2.2.5. Credit Scoring - The Techniques Operationalised.

The focus of much of the foregoing literature is on the discovery of new applications for statistical techniques. The role of the “end user” in adopting and adapting the various techniques, is all but ignored in the early literature. This is one area that this thesis has sought to address. Regardless of the predictive ability of the individual scorecards, unless they are utilised efficiently the benefits anticipated will not be delivered. Statisticians and mathematicians are to be applauded for the work put in to developing predictive models. However a “gap” exists, which requires to be addressed. In order to address this gap which exists, qualitative research which considers the operating environment must combine with quantitative research on loan outcomes, to offer those who apply credit scoring techniques the means by which to utilise them effectively.

An early paper by Reichart, Cho and Wagner (1983) highlights the need for credit managers to fully understand “*the limitations of the decision tools*”. Echoing others, Reichart et al suggest that the real benefit of scoring may not be derived from predictive capabilities but from the “*highly consistent, objective and efficient manner in which such predictions are made*”. Overstreet (1986), elaborates the control advantages of empirical systems in the lending environment. Providing what is described as a “benchmark” for management to test the rationality of the credit process, Overstreet provides an insight into the credit process within the lending organisation. This leads him to confirm that regardless of the method of reaching lending decisions, “*only through strong managerial control systems, is the goal of consistent, defensible credit-granting achieved*”.

As the application of scoring became more commonplace in the financial services environment, a small amount of literature began to consider the “softer” operational aspects of moving from judgmental to empirical decisioning techniques. A paper by

Leonard (1996), taking this perspective, recommends “*measures which describe the scoring impact on the rest of the organisation*”. A combination of measures presented provides ten means by which the lender can “measure” the benefits delivered by scoring. Leonard considers the strategic objectives of introducing scoring to be the start point for those who use scoring. This important point is not addressed in the statistical literature. The minimising of bad accounts is “assumed” to be the key objective. This assumption ignores the profitability and relationships, which underlie each transaction. Within the 1996 article, Leonard addresses the issue of information sharing in the credit industry, stating that “*benchmarking must be introduced*” if the credit industry is to adopt the principles of TQM. In chapter seven of this thesis the results of a benchmarking initiative developed during the course of this research will be presented.

Considering the development of scoring, specifically for small business loans, Mester (1997), states that competition amongst lenders would increase, and suggests that credit scoring provides an information advantage to lenders. By collating large volumes of non-geographically specific data about credit risk, lenders can evaluate loan proposals without necessarily “*maintaining extensive branch networks*”. Again this is a particularly salient point in UK banking in the millennium as lenders seek to close unprofitable branches.

It is not until 1998 that the way credit scoring is actually used within the organisation is addressed in the literature. Sangha (1998) confirms that “*banks can maximise the benefits of using a scorecard by establishing clear scorecard policies and procedures, and by developing adequate management information systems support to monitor scorecard usage*”. Sangha goes on to address the issue of overriding the decision of the empirical system. This is the first point in the literature where a conflict becomes clear. In adopting the premise that prediction of outcomes based on statistical information provides better aggregate lending decisions, the lender then must compromise this premise by overriding the statistical imperative. Within this article Sangha specifically states, “*a well specified and monitored override strategy*”

can provide benefits beyond the statistical predictive ability of the scorecard". This assertion and the rationale which underpins it, are addressed later within this thesis.

2.2.6. Credit Scoring - The Operating Environment

In considering how credit scoring requires to be operationalised in order to add value, it is necessary to understand the environment in which lenders operate. Gardner, Howcroft and Williams (1999) present a comprehensive review outlining the developments which combine to create the current operating environment. The authors echo many of the issues found to be important by the empirical work underpinning this thesis. Confirming that the *"influence of technology is ubiquitous"*, they also highlight that technology is increasingly used as a strategic driver. Going further, they confirm technology to be a *"major cause of change"*. This confirms that the development of mortgage credit scoring is likely to have far reaching consequences beyond credit risk management. The traditional importance placed on lending skills is also confirmed, as is the need to improve cost efficiency ratios. Identifying the issues which are gaining in importance, the paper reflects findings of the interviews which will be discussed in detail within Chapter five of this thesis. In particular the move towards securitisation is confirmed. The paper also explicitly cites the influence of credit scoring on developments in retail banking.

The nature of financial service organisations is highly complex, this fact is confirmed by the foregoing literature, and is also evidenced later within this thesis. The complex nature of such organisations is reflected in the variety of issues which require to be considered when taking the decision as to whether or not to adopt scoring. The decision as to whether or not to adopt new technology in financial services is a theme found within literature in a variety of different fields. Issues surrounding the incorporation of new products into the banking environment are directly addressed in the existing marketing literature. When using such literature it must be remembered that credit scoring is not itself a product, but a technological application. However using scoring can alter the features of the underlying product, in this case the mortgage loan.

The literature which addresses issues on introducing new products which have technological aspects, highlights many issues relevant to this thesis. Howells and Hine (1991), examine the adoption of EFTPOS technologies. The authors confirm that the decision to adopt is influenced by a variety of issues. In the case of EFTPOS the strategic nature of the decision is highlighted. Competition, delivery channels, costs, business relationships and the uncertainty attached to new technologies were all found to be influential, and without exception these issues are reflected within this research as being important considerations when considering introducing scoring. A more recent study in a similar field outlines the development issues relating to Mondex. Howcroft and Hamilton (1999), interview lenders to ascertain their perceptions about this new technology based product. Highlighting the fact that cost considerations often outweigh service considerations, this paper reflects the fact that both cost dimensions, and service dimensions are important, and this viewpoint is confirmed within their study. Within this thesis business benefits are categorised as being risk related, process related or cost related. Using these definitions process might be considered as a proxy for service dimensions, as the improved processes can result in improved customer service. What is interesting is that these studies confirm that a new application of technology has far reaching implications.

The operating environment comprises several different types of lender. Banks, building societies and "other" specialised lenders. As will be shown later within this thesis, the numeric majority are building societies. Whilst addressing the competitive nature of the sector, Ashton (2000), sets some of the traditional difference between banks and buildings societies in context. He also confirms that at the current time, the mortgage market provides similar competitive challenges to both.

What becomes clear is that the literature relevant to credit scoring is multi disciplinary in nature. In addition to the more technical literature focusing on improving scoring outcomes, literature considering new technology implementation, banking strategy, and customer service issues complement each other in providing an

understanding of the operating environment. This literature review provides confirmation of the key issues in the financial services operating environment. These will be addressed in greater detail within the empirical aspects of the research presented in subsequent chapters.

2.2.7. Credit Scoring - A Critique

The literature which seeks to determine new applications for statistical techniques, which can offer considerable improvement in risk management is to be commended. Literature considering the wider implications of combining statistics with “best practice” in lending, allows the debate surrounding the application of statistics to business problems to be accessed by a wide variety of organisations. However, at a fundamental level, criticism is levelled at the notion that it is rational to be empirical. The seminal critique of scoring was produced by Capon (1982). The critique rests on several aspects of scoring. The first concern expressed is that *“any individual characteristic that can (legally) be scored has potential for inclusion in the scoring system”*. The concern with the inclusion of any variable, is the lack of explanatory relationship between the variable and the outcome (default/not default). This concern is not diminished for Capon following a Senate hearing relating to scoring. During the hearing, the then Chairman of Fair Isaac, a leading scorecard developer, confirmed that at that time, Fair Isaac felt that they should be allowed to use variables such as race, gender, age, ethnic origin and marital status in scorecard development. Obviously concerns arose as to the potential for scoring to discriminate against minorities in the community. Such discrimination on the basis of race, gender, age, and ethnic origin are now prohibited under the terms of the Equal Credit Opportunities Act in the US. Legislation in the UK which seeks to prevent discrimination, includes the Race Relations Act, the Equal Opportunities Act, and the Consumer Credit Act.

Capon then presents a scoring table of a major retailer and critiques scoring on several other points. Firstly he notes that there are no economic variables such as income, debts, expenses etc. As will be evidenced later within this thesis these variables have a role to play, and thus the criticism on this point is valid. Capon also

criticises the lack of variables relating to credit history, again an important omission from the scorecard under review. He also criticises the scorecard as the relationship between length of time in employment and address, and improved credit performance are not presented as being linear. This criticism is invalid, as will be proven later, these relationships are not necessarily linear. The scorecard being critiqued also contains coding attached to employment which is considered no more valuable for some occupations than the status unemployed. The work of this thesis shows that the employment variable does provide considerable predictive capability. The development data used on the scorecard being critiqued may or may not have confirmed this trend. Capon critiques the fact that evidence of previous borrowing results in borrowers being penalised. This would not necessarily be true of every scorecard. Capon also found that failure by the applicant to answer questions within the credit application, offered the applicant more points than provision of certain answers. This author would suggest that scorecard development based on datasets with significant volumes of missing answers would compromise the predictive ability of the card. The critique goes on to examine a second system, and again picks up many points about the performance of various variables.

When considered relative to the work undertaken in support of this thesis, much of Capon's critique based on the variables included is proven to be unfounded. Many of the relationships which he finds irrational, are in fact found to exist. An example is income. Capon criticises that the points awarded for income do not increase monotonically rather they "fluctuate wildly". The experience of this author is that whilst the relationship does not "fluctuate wildly", nor is it strictly monotonic.

However, a second aspect of the critique remains a problem for lenders in the present day. That is the bias inherent in the scoring system. This is because the development of the system is based on those applications approved and on whom the developer has performance data. This provides a one sided view. The scorecard is developed on those who were expected to be good, and are then either good or bad. However, a whole body of relevant data is not available. That is, data on those declined credit, on whom it is not possible to confirm whether or not the decline

decision was the correct one. This problem, inferring the behaviour of the rejects or “reject inference” is tackled using a variety of statistical techniques (Kelly, 1998). However, regardless of the technique adopted, the true behaviour of rejects had they been accepted is never known with certainty. The only way around this problem is for lenders to “open up” the lending book, lending to every applicant for a period. This enables them to establish empirically how those they “would/should” have rejected actually performed. The downside of such an approach would be the increased credit risk, and levels of loss, from having a non-selective approach to all applicants.

Other problems of scoring presented by Capon include multi collinearity between variables, sample sizes used in development and judgmental aggregation of data by developers. Many of these problems can be overcome by having knowledgeable developers using adequate samples, and conducting thorough coarse classification of data without “cutting corners”.

The final methodological concern is also valid, and is again addressed within the findings of this thesis. Capon considers that the “*use of the overriding procedure is a statement that the system is not doing the job it was designed to do, (and that) it is a discriminatory procedure against those who are less vociferous following credit denial*”. As will be discussed later, a scientific approach to overriding augmented by rigorous appeal procedures can go a long way towards overcoming this concern.

Despite the fact that Capon’s critique “stands alone” against a wealth of data in support of scoring, many of the points he made were valid at the time of writing. However, as more empirical work on the development and performance of scoring models has become available, and as procedures around credit scoring have become more “transparent”, so many of his fears have been assuaged. This is not to suggest that credit scoring has been adopted by all lenders and receives wholesale support from borrowers. A wealth of negative publicity about seemingly “senseless” credit scoring decisions is presented in the press. However, much of the negative comment stems not from the inefficiency of the credit scoring model, rather from a

misunderstanding of the abilities and limitations of the mechanism, and a failure by lenders to have in place credit policies which reflect these.

2.3. Overview Mortgages - The Market and Product

This thesis seeks to determine whether credit scoring is a suitable means by which to evaluate mortgage loan proposals. In order to address this issue it is necessary to have some understanding of the dynamics of the UK mortgage market. Therefore an outline of the UK market is now presented. It is acknowledged that to fully investigate the dynamics of the mortgage market would require a separate thesis. However, this outline is presented in order to contextualise some of the issues. This is followed by a consideration of the mortgage product itself, in order that the unique nature of the product relative to other forms of consumer credit is clarified.

2.3.1. The UK Mortgage Market in the 1990's

In order to fully understand the dynamics underlying the market it is necessary to consider the influence of Government policy on the home ownership profile of the UK population. Two opposing political factions have dominated the UK political stage. The Labour and Conservative parties have influenced home ownership, based on two opposing ideological premises. Traditionally the Labour party supported the provision of housing via the public sector. Their financial policies supported this premise, and funding was directed to local authorities for the provision of housing. However, in complete contrast, the Conservative Party supported the ideal of the individual as the home owner. As early as 1955 the Conservative Party was fighting elections under the banner of the "property owning democracy". The policy shift by the Labour party, from a commitment supporting state provision of housing, towards support for the individual owner, has been well documented by many authors including Birchall (1992), Doling (1993), Balchin, (1995). This shift may in part have been prompted by a populist policy shift which reflected Balchin's (1995) findings for the Thatcher government, that next to food, humankind's most important material need was housing. Since the mid 1970's, when the Labour party's endorsement of home ownership outweighed its support for Council

provision of housing, the party in government has supported home ownership with a variety of initiatives.

Booth and Crook (1986) summarised earlier strategies employed by successive UK Governments to encourage a property owning democracy. These initiatives included, right to buy, shared ownership, mortgage guarantees, sale of land, and sales under licence. These public strategies were supported by fiscal interventions to ensure that the property owning democracy became a reality. Initiatives such as guaranteed loans (1954-57), loans to Building Societies (1959-62), option mortgages for low income buyers (1968), tax relief on mortgage interest rates (1971 -2000), were all intended to make home ownership more accessible, and thus more attractive. The initiatives outlined are not intended to summarise every government activity which influenced the desire of UK residents to own their own homes. Rather they are presented to highlight the persuasive campaign conducted over the past fifty years, which in part influenced individuals to aspire to own their own homes. It is within the context of the desirability of home ownership that we must view the literature relating to mortgage default, and it's rationality or otherwise.

2.3.2. Mortgages and Default Risk

A substantial body of default literature is presented which examines the propensity of a borrower to default on his mortgage loan. Much of the literature is based on US experience. It is worthy of note that the US mortgage market differs from that of the UK in one key respect. Within the US, a very active secondary market in mortgage backed bonds exists. In support of this three Government backed agencies are chartered by an Act of Congress. These are, the Government National Mortgage Association (Ginnie Mae), the Federal Home Loan Mortgage Corporation (Freddie Mac) and the Federal National Mortgage Association (Fannie Mae). Ginnie Mae is a fully fledged government agency which exists to provide liquidity in the market by swapping securities for loans, providing a guarantee for an annual fee of 6 basis points (OECD 1995). Freddie Mac a quasi governmental agency is described as "*a secondary mortgage market conduit, whose vision it is to provide low-cost, reliable mortgage credit to home buyers*" (MacDonald & Makuch 1995). Fannie Mae's role

is described as “*providing financial products and services that increase the availability and affordability of housing for low-, moderate-, and middle income Americans*”, (Homer 1994). No equivalent to this role currently exists within the UK, although a secondary market is beginning to emerge. Within the last few years lenders have begun to see the potential advantage of securitising their mortgage portfolio’s in this way, and gaining access to low cost finance via such a mechanism.

The difference in markets is highlighted within this review, as it cannot be assumed that UK experience on default will reflect US experience. The ability to securitise the debt, and the expectation that the debt will be securitised may impact on the risk behaviour of US lenders and borrowers.

2.3.3. Mortgage Features

Another aspect that justifies considering mortgage scoring independently is the unique nature of the product. Whilst credit scoring has been used in the credit decisioning of personal loans and credit cards for several decades, it remains a relatively youthful pursuit in mortgage lending. Given the potential advantages of scoring, it may be that the unique nature of the product has impacted on the rate of development in this area. A mortgage loan is typically the largest financial purchase any individual makes. The importance of the purchase is particularly relevant if we consider the aspirational nature of the purchase. As discussed previously this may in part result from government intervention, which created the desire within individuals to be part of the “property owning democracy”. That the mortgage loan, is significantly different from other consumer loan products, is confirmed within the literature by Brennan (1993). He confirms that three key features, which differentiate the mortgage loan from other consumer loans, exist. These are summarised as collateral, term and amount and are now considered;

- Collateral - the mortgage loan is secured in favour of the lender. The property underlying the loan forms the security. The risk is therefore mitigated by the security to some extent. Making a mortgage loan decision is therefore considerably more complex than making a decision on an unsecured loan. The

value of the underlying security may vary, both upward and downward. Therefore the financial risk is mitigated to an extent by the property value, but the property value changes. As will be evidenced within the empirical work, which supports this thesis, characteristics of the property do influence propensity to default. This adds a new group of variables, which the loan officer must consider when making his lending decision. This increases the complexity of the decision, from solely a consideration of applicant stability and ability to repay, to include property characteristics.

- Term - A mortgage loan is typically for a period of twenty five years. This extended term, makes prediction of outcomes more complex. A consumer loan is normally for one or two years. Thus, when decisioning consumer loans, the prediction of future behaviour only requires to be correct over a 24 month time span. Predicting up to twenty five years ahead is more difficult. In reality the planning window is more typically seven years. This is the typical term used by lenders to calculate profitability profiles on mortgage loans. Lenders confirmed that they anticipate that a high proportion of mortgages will migrate at around this time. Migration might mean replacing one mortgage with a new mortgage at the same lender, or moving to an alternative mortgage provider. Additionally, the type of “life style” events which are related to mortgage default, are often impossible to predict in advance. Again increased complexity. And finally the term, when combined with the importance of the underlying property value means that economic cycles may require to be considered. Certainly the level of interest rates has been found to be influential on propensity to default. Thus the mortgage decision now comprises stability, affordability, property and product characteristics.
- Amount - the value of the mortgage loan is normally significantly greater than other types of consumer loan. Thus the risk of loss, which can result from each incidence of default is potentially greater. This requires very accurate prediction of outcomes if risk is to be managed and maintained at acceptable levels. As indicated earlier the amount of the loan is secured against the collateral. However, the fluctuating value of the collateral, and the ability to realise it, mitigates the reduction in risk achieved via the existence of the collateral.

In summary Brennan observes “*mortgage lending is not a milieu that has lent itself to automated review and approval*”. The validity of this statement will be tested within this thesis. In addition to the unique nature of the product which Brennan addresses, it is also worth examining the product at a profitability level. Whilst work contained within this thesis did not uncover product profitability profiles, it was found that the mortgage product often contains an “enticement” or a requirement, to participate in a “bundle” of associated products. Thus the profitability of the mortgage sale, may be derived from the profitability of the mortgage and/or from the profitability of associated products such as buildings insurance, home insurance, payment protection insurance, endowment policies and mortgage indemnity guarantee.

A final differentiator of the mortgage, not discussed by Brennan, is the existence of Mortgage Indemnity Guarantee (MIG) policies, which protect the lender in case of mortgage default. MIG’s were a compulsory element of mortgage purchase by borrowers where the loan to value ratio was above a certain level which varied by lender. This was typically between sixty and eighty percent. During 1998/9 these were mainly phased out by the lenders, as being an “up front” cost to the borrower. Interview evidence confirms that these are still required by lenders, and the cost is being borne by borrowers but more discreetly placed. Again the MIG provides another facet to an already complex product as far as risk assessment is concerned.

2.3.4. Predictors of Default

A wide variety of studies have sought to examine those variables, which are most closely related to default. Attention is drawn to the fact that the studies are often looking at very specific products, and that the definition of default varies from lender to lender. However, the breadth of literature was useful in identifying a start point from which to commence an examination of default on an UK mortgage portfolio.

Von Furstenberg’s (1969), study examined mortgages which were insured via a government scheme. As such they differ from a “typical” UK portfolio in that they were “*financed on more liberal terms*”. Acknowledging limitations within the data

used, loan to value ratio (LTV), age of the mortgage, term of the mortgage, mortgagor income, and mortgagor age were found to account for most of the difference in default rates. In particular the emphasis on the “stake” or equity in the home (indicated by LTV), is suggested as *“being the true cause of a high rate of default”*. LTV is presented as the principal variable explaining high default rates. At a policy level, Von Furstenberg suggested that a small grant to home owners to reduce the LTV and give them a “stake” in the property would be more efficient and more socially desirable than insuring mortgages with high LTV ratios. This, an interesting observation when considering the role of such insurance, which in the UK would be the mortgage indemnity guarantee premiums (MIG). MIG’s relationship with default is considered later within this thesis.

A considerable amount of literature is devoted to considering the risk of alternative types of mortgage instruments, particularly between fixed and variable rate products. Vandell, (1978) examined the impact on default risk that resulted from the product interest structure and supported Von Furstenberg in the conclusion that *“equity accumulation appears to be the dominant factor in determining risk of default”*. Providing additional insight on the performance of mortgages with low initial costs, a type of product that is often used in the UK market to attract borrowers, Vandell asserts that *“lowering the initial payment level to attract additional households to the home ownership market is not unambiguously desirable”*. This finding is reflected in the performance of discounted mortgages examined later within this thesis.

Developing the range of variables considered, Campbell and Dietrich (1983) consider broader externalities and include economic variables such as local unemployment, and mean housing prices. Their empirical study considers two propositions. One that default is determined by the current “equity shield”, (which may be significantly different from initial LTV), and the other that default is determined by the ratio of mortgage payment to disposable income. The findings confirm the relationship between default and the economic variables, particularly unemployment. Building on this and earlier work, Vandell and Thibodeau (1985) conduct further analysis which includes economic variables with financial, borrower,

loan and housing market data. Results presented confirm the importance of LTV in predicting default, but also include some new non-loan related variables as being statistically significant. Neighbourhood quality (subjectively rated) was introduced for the first time, and proved significant. Additional new insight is derived via the notion that the subjective manner of loan appraisal is relevant, when attempting to build empirical models to predict default. Vandell and Thibodeau suggest that some of the relationships evidenced were likely to result from “*stricter appraisal standards*” applied to certain groups of variables.

The influence of economic issues on mortgage default is confirmed by Cooperstein, Redburn and Meyers (1991). The authors suggest that modelling default during turbulent financial cycles presents new challenges and requires new techniques. Again confirming the importance of the equity shield, they also conclude that interest rate levels have a strong influence on default. However, the potential relationship that may exist between interest rates and property values is not fully addressed within the paper, and this leaves unanswered the question as to whether both variables should be included in a single model.

Gau (1978), considers the risk rating of mortgages in the secondary market. Whilst consideration of this particular product is not directly relevant to this thesis, his approach is useful in that he examines sixty four variables which might impact on default. Using these variables Gau creates a taxonomic model for predicting mortgage default. Additionally, in categorising the determinants of default risk as Financial, Property, and Borrower, he presents a model for work presented later within the thesis, in which the mortgage variables are grouped categorically in this manner.

The presentation and discussion of two key theories of default are a recurring theme within the literature. The equity theory suggests that a rational comparison of the financial costs and returns of continuing the mortgage obligation drive the default decision. The ability-to-pay theory maintains that mortgagors do not default as long as they can meet their repayments. The theories are formalised by Jackson and

Kaserman in 1980, who conclude that “*the equity theory dominates*”. The implications of this confirm the importance of economic factors in the mortgage market. At a credit decision level this suggests that trends in housing prices, may be a valid inclusion. However, it also suggests the importance of the role of the LTV ratio when quantifying default risk, which will be tested later in this thesis. Webb (1982) confirms the element of choice attached to the default decision, and also re-introduces the influence of the nature of the product on the behaviour of the individual. “*Faced with a reduction of income a borrower may choose not to pay some other obligation rather than become delinquent on his mortgage loan*”. Such a statement reinforces the complexity of managing credit risk, where the nature of the product influences the behaviour of the individual. However, the nuances of individual behaviour and actions are often ignored within the literature, particularly by those authors such as Kua, Keenan and Kim (1994), who see default as being “*the cost-minimising response to adverse changes within an uncertain economic environment*”. The notion of borrowers “exercising options” with regard to default is based on economic principles. However, the economic principles may require to be augmented by a consideration of the “emotional” aspects of the default decision by any lender actively managing default.

The issue of borrowers electing to default as a “choice”, receives further attention from Ambrose, Buttner and Capone (1997) who conclude that there are several “benefits” to borrowers who chose to default. In suggesting that default is undertaken in order to eliminate negative equity, the paper does not reflect UK experience where negative equity remains the borrower's responsibility and the debt is not in fact “eliminated” until it is fully repaid. A further “benefit” of default is considered to be living rent free during the default period. The paper considers the policy implications for lenders if we attribute “default” a value, suggesting that lenders can minimise these “benefits” to borrowers by the use of default penalties.

Providing a useful synthesis of the evidence on mortgage default, Vandell (1995), suggests that more work requires to be undertaken. In particular Vandell brings the importance of trigger events such as divorce into the debate. Additionally the role

and influence of the lender on the default decision are highlighted as requiring study. This more holistic approach to examining default had been offered in part by Waller (1988). His “clarifying analysis” examined the final decision to default once delinquency had been established. Separating the events (delinquency and default) might seem to be an unusual approach, since intuitively they appear to be inherently linked. Conducting an empirical analysis, Waller found, not surprisingly, that the equity shield is the key determinant as to whether borrowers sell their homes to avoid default rather than defaulting. What is interesting within the study is that no borrower characteristics taken from the initial application were significant factors on the final default decision (as opposed to the delinquency decision). If this were found to be the case in repeated studies, a mortgage scorecard that predicted delinquency, such as that presented later within this thesis, might potentially be more useful than one attempting to predict default if as Waller suggests the default data is unrelated to the application data.

Viewing mortgage default from a completely different perspective, Doling, Karn and Stafford (1985), consider the impact of the “desirability” of owner-occupation. In doing so they provide the first UK evidence regarding mortgage default. Showing concern about the rising level of mortgage default in the UK, the authors highlight some important issues. Firstly, the presentation of evidence on default in the UK is often via figures for property possession by lenders. This can be highly misleading as many borrowers in difficulty may resolve the problem via other means. Thus focus on possessions presents only the “tip of the iceberg” regarding mortgage default. A consideration of the outcomes of default show the options of the individual to include, moving “down market”, and returning to the rental sector. Doling et al suggest a “*scale of mortgage repayment difficulties which go far beyond the traditional view of the financial well being of the owner-occupier*”. The second issue presented is the likely future trends in the UK market, suggesting that “*quite high rates of default are here to stay*”. Whilst the paper is written more in relation to government policy than lender policy it is interesting to note that the concerns are more socio economic than solely economic. Considering the role of the lender Spicker (1996), again presents social concerns. Discussing relationship breakdown

and the impact on the home owner he asserts, *“the current arrangements are a mess. Lenders need to exercise a flexible approach”*. He goes on to say that more information is needed in the public domain about lending policies and practices. There is little evidence of default as a “rational response” within this perspective.

The more socio economic focus is also evident in a comprehensive review of home ownership in the UK undertaken by Ford (1998). Confirming that *“home ownership remains the preferred tenure of the majority of households”*, Ford identifies several important issues resulting from the alteration of labour patterns. Commenting that *“difficulties in paying for housing are common”*, potential consequences for lenders are cited as *“mortgage arrears and continuing possessions”*. Recommendations include *“consideration of private insurance for mortgage payment protection to provide a comprehensive safety net”*, and *“more flexible models that offer the potential to assist mortgage borrowers who experience difficulty to sustain home ownership”*.

2.3.5. Incidence and Impact of Mortgage Default

As evidenced in the preceding section, much of the literature on default is strongly focused on the lender’s ability to predict default rates. This exercise is conducted in order to manage default rates at levels, which maximise portfolio profitability. It is worth noting that the term “default” is not a generic one, it has a variety of meanings when used by different lenders at different stages of “lateness of payment”. An account may be designated as “in arrears” when one or two payments are missed and then “in default” when three payments are missed. Alternatively an account may remain “in order”, until a certain percentage of the whole sum outstanding is “late”, at which point it may be transferred straight in to the category “default”. For the lender, these categorisations allow risk profiling and ultimately financial provisioning. For the borrower, these categories reflect the seriousness of their financial situation, and the likely actions being taken by the lender to manage the arrears situation. Thus as terms are used interchangeably and inconsistently, it is difficult to establish what “typical” levels of default and arrears are across the UK.

One useful measure of UK default within the literature is provided by the Council of Mortgage Lenders, who provide statistics based on arrears as a percent of all loans by volume as well as by value. Figures provided show that in 1993, 5.03% of all mortgages (by volume) were in arrears. This figure declines each year until 1998 when the arrears level stood at 2.15% CML (1998). Very little is produced within the literature which provides absolute confirmation of these facts, however arrears of 5% to 6% are presented as being a mid 1980's position by Doling (1990), and this ties in with falling rates since then. Within the same article Doling provides evidence of US default levels at 5.4% in the 1980's, which mirror UK levels. These facts are supported by evidence provided by the Mortgage Bankers Association of America (MBA). The MBA present themselves as being the pre-eminent association of the US real estate industry. Total default rates for all US loans confirms the general statistical trends. The total US default range is from a 1979 level of 4.77%, to a 1995 high of 6.07%, and a subsequent decline to a 1999 level of 4.13%.

Whilst it is outwith the scope of this study to provide a European analysis, Doling (1990), also confirmed a considerable variance in arrears experience between the UK and US levels when compared to Finland. The implication of this work is that due to traditional institutional and community relationships maintained by banks in Finland, their actions result in arrears levels of less than one percent. Whilst this data was gathered at interview, rather than via published statistics, it highlights the potential for altering perceptions as to how best to manage default. Whilst data on national arrears levels is not readily available, a study by Potter and Drevermann (1988), conducted within the German Republic highlighted the volatility of mortgage default levels. In the Federal Republic possession increased by 102% between 1980 and 1985. No overall level of arrears is presented which allow a comparison with UK, Finnish or US data. However, in conclusion the authors recommend measures, which remain valid in the UK market today. They highlight the need for preventative measures such as mortgage insurance, simplified mortgage payment schemes and the need for correct cost calculations at the outset. They additionally suggest several remedial measures such as improved debt counselling, abolition of penalty clauses, and the appointment of a receiver as a mediator who has no financial interest. Whilst

the UK equivalent is unlikely to be a receiver in the official sense, a non financially involved mediator might be a useful addition to the default management process. The existence of such literature provides an illustration of the scope of the topics relevant to this thesis. Additionally the extent of cohesion amongst many of the issues discussed, suggests that a European wide study into mortgage default would be of value to participants in the mortgage market.

The causes, trends and concerns about mortgage default are framed within concerns about government policies to encourage home ownership, fiscal changes in support of home ownership, availability of funds, relative interest rates, housing prices and levels of unemployment. The importance of mortgage default is shown by its far-reaching impact. Not only are the lender and borrower affected, but the government and society are also affected by the requirement to provide alternative accommodation for those rendered homeless by mortgage repayment difficulty.

The ultimate consequence of mortgage default is possession by the lender of the property. Possession is the point at which the lender takes legal redress in order to take over the security which was underlying the loan. At this point the property ownership is transferred from mortgagee to mortgagor, in full or partial repayment of the debt burden of the loan. The CML also produce data on number of possessions, which ranged from a 1982 level of 6,860 properties or 0.11% of all loans by volume, to a 1991 high of 75,540 (0.77%) properties. In line with default this figure continues to decline to a 1997 level of 32,770 properties which represented 0.31% of all loans held by lenders. In 1998 the downward trend appeared to cease with possessions quoted in the financial press as being up by 9.5% on the equivalent period of the previous year, Adams(1998), amounting to an increase of one percent. However, as the economy is seen to "heat up" so evidence is presented in the financial press that "*analysts note some evidence of deteriorating credit quality ... and an uptick in short term mortgage arrears*" Brown Humes (1999).

The statistics presented relative to possessions hide an underlying volume of mortgage failure. Mortgage possession statistics, provide evidence of those

properties whose ownership has been transferred as a result of a lender induced court appeal. However many borrowers “voluntarily” sell their homes, or “give up” possession in favour of the lender. Thus the statistical gap between those 5 - 6% who are in arrears and the 0.31% who eventually lose their homes via possession orders, comprises those who have restored their financial position, and those who have selected to extricate themselves from the property and the loan transaction prior to possession. Worthy of note is that borrowers who extricate themselves from their property, may not realise enough capital from the sale of the property to repay the mortgage loan in full. Additionally a group of borrowers exist who remain in properties, which have a current value lower than that required to repay the loan were the properties to be sold. This “negative equity” situation is encompassed within the literature relating to the rationality of the default decision, and additionally receives much press attention

Commenting on trends in possession Ford (1998), highlights that changing possession levels may result from factors beyond the economic, such as stricter arrears management to fend off shareholder criticism. This highlights that statistics presented in relation to arrears and possessions, present something of a “black box” to the observer. Much needs to be known about the credit and arrears policies which underpin the statistics, as well as the broader economic environment if statistics are to provide meaningful insight into the state of the UK mortgage market.

2.4. Issues Influencing the Adoption and Application of Scoring

The organisational aspects of scoring considered within the credit scoring literature were reviewed in section 2.2.5. The literature presented in this area is less extensive than the more technical literature which comprises the majority of scoring literature. It is therefore necessary to examine a range of literature outwith the traditional domain of scoring which examines the problems organisations face, when seeking to adopt new processes and technologies.

Doling and Ford (1991), allude to the complexity of the mortgage market place. Highlighting trends in the building society movement, they present a picture of societies struggling to maintain their share of a highly competitive market. They make a strong link between increased competition and impact on lending policies, suggesting that *“in order to find customers they have been forced to become less conservative in their lending”*. Gardener, Howcroft and Williams (1999), provide an update on the situation facing UK banking today. Providing evidence on the key issues they present an industry where changes over the previous three decades have indeed been something of a “revolution”. Within the mortgage loan market, these changes have had considerable influence. The advantage gained via new technologies is evident. New players are entering the market often utilising new distribution channels. Such organisations have an advantage over the “traditional” lenders in that they can maintain lower cost bases. Anecdotal evidence from such lenders confirms that they maintain cost income ratios of between 20 - 30%. This compares with cost income ratios of traditional lenders which have fallen towards 45% within the past ten years from a previous level often around sixty percent. Empirical evidence within this thesis will consider this issue in more detail. The lower cost base allows competitive pricing, and attracts borrowers to the new lenders. Additionally new delivery channels for mortgage loans utilise new technologies (credit scoring), and can offer a decision in principle in nine minutes, again comparing very favourably with the traditional lender where the decision can take from forty five minutes to several days. Thus as will be evidenced, credit scoring can offer risk, process and potentially cost benefits to lenders. This thesis examines why credit scoring has not at this time been adopted as the exclusive means by which to make mortgage decisions.

In considering the non-adoption it is necessary to acknowledge the traditionally conservative nature of bank management in the UK. As evidenced in the credit scoring literature, lending skills relative to the 4 C's of credit were a valuable resource. Staff who held lending “mandates” were senior in authority to those without, and higher lending authorities rose almost monotonically with staff grading. Thus when credit scoring was first introduced there was considerable resistance from

management who were aware that the introduction of such a system would result in a “de-skilling” of the workforce. This de-skilling in terms of specific retail lending expertise, is presented by Gardener et al as “re-skilling,” emphasising the changing nature of skills required.

We therefore see organisations with a long tradition of judgmental lending, being forced by external influences to compare themselves with organisations that are achieving the benefits and advantages offered by empirical lending. A change such as this can bring changes that are dealt with as being evolutionary in nature within some of the more traditional lending environments. However, that the benefits of scoring support something of a revolution amongst the new lenders is not surprising. What is evident is that as credit scoring usage becomes more commonplace, a greater understanding of the purpose and ability of the scorecard allows it to be implemented and used more effectively. No longer solely used for “ranking risk”, credit scoring is becoming a means by which lenders can gain risk, process and cost benefits across their loan portfolio.

2.5. Conclusion

A wealth of literature exists which examines credit scoring as a decision making tool. The range of techniques that lend themselves to the problems to be solved, and the many issues that face those developing credit scoring models are well documented and are mainly in the public domain. However, no evidence was uncovered that compared the performance of an empirical decision making tool for mortgages to that of the judgmental decision maker.

- This thesis provides such a comparison. This is intended to contribute to the existing literature which compares the performance of decision making tools, but which does not currently consider mortgage loans.

Additionally, little information was uncovered that presents empirical evidence of the incidence of credit scoring usage in the UK market place. As it is unclear how

widespread the practice is, or the results achieved by such organisations a clear gap was identified within the literature.

- This thesis presents empirical evidence of levels of scoring usage. This data is augmented by the evidence from a benchmarking study. It is intended that this new data provide a useful contribution to the literature in the field.

Additionally, should a lending organisation wish to consider adopting empirical decisioning technologies little informative literature exists which addresses the operational aspects which require to be considered. The means by which the organisation should operationalise credit scoring in order to reap cost, risk and process benefits are not broadly discussed within the academic literature.

- An aim of this thesis is to address these issues, and to open up the debate as to whether and how mortgage credit scoring should be adopted to meet organisational needs.

Finally much of the literature which relates to mortgage default is based mainly on US experience. Very little published data exists which determines the applicant characteristics which are most closely related to the propensity to default in the UK market.

- This thesis presents an UK empirical study which provides this information, thus contributing to the UK literature within the field.

Chapter Three

3. Methodology and Research Design

3.1. Introduction

This chapter will set the research within the context of the methodological approach taken. In doing so it will consider the two traditionally opposing research paradigms. The overall research design utilised will then be outlined. In each subsequent section each of the research methods used will be presented, justified and where appropriate critiqued. In presenting firstly the research methodology, and then the research methods it is intended to avoid the confusion that can occur when the terms are used erroneously in an interchangeable fashion.

3.1.1. Shamelessly Eclectic (i)

The research methodology adopted, is one which “purists” in either the traditional positivistic paradigm, based on a natural scientific forms of enquiry, or interpretative researchers from a purely social scientific background might traditionally have challenged. In setting the research within a synthesised epistemology, this author intends to gain the benefits offered by both the traditionally opposed paradigms. In considering the epistemological dichotomy often presented to researchers, this author will provide evidence that an alternative proposition grounded in a more eclectic approach can offer the best opportunity for understanding and resolving complex research problems.

3.1.2. Considering the Paradigms

The first paradigm under consideration is positivism. Positivism is a product of natural scientific enquiry. Natural science can be described as “*research firmly based upon one or more past scientific achievements, that some scientific community acknowledges for a time as supplying the foundation of it’s practice*”, (Kuhn, 1970). The basic tenet of such work is the emphasis on research designs and experiments

that were repeatable, recreating identical results in a variety of conditions that would then be recognised as “truths”. This led to a view that science was universal and objective. However, it is worthy of note that positivism itself is not a generic term. Twelve varieties of positivism were presented by Halfpenny (1982), and whilst these were subsequently reduced to three by Outhwaite (1987), the scope and nature of positivistic forms of enquiry are extensive.

Rather than viewing a positivistic approach to be rigid to the point of detracting from the research, this author finds value in a positivistic approach. The benefit of positivism in allowing comparisons of outcomes from repeatable experiments allows new techniques and applications to be validated against some pre-determined measures. Confirmation that structure in scientific study is a desirable and fluid force rather than restrictive, is provided by Frankfort-Nachmias (1996), “*scientific methodology is first and foremost self-correcting*”. This suggests that despite the presentation of natural scientific enquiry as being framed within “rigid” structures, the variety of applications evidenced over time ensure that positivism continues to evolve to meet the needs of the researcher.

A natural scientific approach to enquiry was selected for part of the research study which this thesis reports. In order to consider one aspect of the benefits of credit scoring, i.e. risk benefits, it was necessary to create an empirical model with the ability to predict outcomes. Having created a model, it was then necessary to examine how the outcomes of an empirical approach to decision making compared to outcomes obtained when judgmental evaluation was undertaken. Thus empirical observations as to the behaviour of data allowed scientific statements to be made regarding the empirical outcomes. Unless a positivistic form of enquiry had been followed, the empirical data could not have been examined with necessary rigour. However, despite the empirical evaluation of outcomes, even this aspect of the research enquiry was not solely positivistic. The nature of the data under examination was such that legislation prevented a purely positivistic approach being taken. Thus some data with strong correlations which were empirically worthy of inclusion were in fact excluded. This compromise of the empirical imperative is

necessary if study in this field is to be conducted within the legislative requirements which prevail. However, legislation is not the only reason why a positivistic approach was considered to be inadequate as the sole means by which to address the research problem. Within industry, credit scoring models of the type created within this thesis are commonly created, utilised and systematically compromised by overriding. This compromise of the empirical imperative is one of the reasons why a positivistic discourse is an insufficient means by which to conduct this research. A requirement to understand not only what the empirical models can offer, but how they must be utilised if benefits are to be achieved is the purpose of the research. To gain this understanding requires that the alternative paradigm be included in the research.

The alternative research paradigm often presented as being diametrically opposed to positivism is the interpretative alternative. The benefit of Verstehen (interpretative understanding), is illustrated by Abel (1948) who explains that "*the sense of relevance is the result of personal experience; the connection has been established by me, so I am certain of it's possibility*". Interpretation considers the role of "human actors" in social scientific enquiry. Human action and expression are subject to interpretation. Thus a body of research exists which suggests that whilst positivism allows us to quantify what occurs, the only facility it offers to the researcher is observation of events. Whilst conducting such experiments allows us to become aware of what happens in a given circumstance, we do not become enlightened as to the reasons (causation) which underpin our observations.

Within the context of this thesis, it was necessary to examine and provide evidence which not only recorded observable key changes and issues in mortgage credit decisioning, but also to provide a deeper understanding of the underlying reasons underpinning them. In order to understand the reasons why certain phenomena were found, it was necessary to invite those most closely involved to give their own views on certain industry events and trends. These views were often subjective in nature, and resulted from the interpretation an individual had placed on events. However, to deny the validity of the "lived experiences" of participants and

practitioners in the field would have limited the value of the research. That is not to suggest that experience and understanding of events endow knowledge with greater significance. However, to preclude such qualitative data from the research study would have provided a much more limited study of events. Thus an approach combining the potential benefits of both paradigms was adopted.

3.1.3. Shamelessly Eclectic (ii)

That scientific study should be grounded in that which we know to be true, is clearly desirable. However, to frame research entirely in a single paradigm is not always desirable. Combining quantitative and qualitative research has won the support of several authors. Highlighting the complexity of the issues, Bryman (1984), considers the means by which certain research techniques have become associated with particular epistemological positions. He suggests that much of the debate which purports to discuss combining methodologies, mistakenly focuses on technical rather than epistemological issues. Examining both traditions, Bryman confirms the role of qualitative research methodologies in conducting research, as undertaken within this thesis. Bryman suggests that undertaking qualitative research in this way sends the researcher on a “*voyage of discovery, rather than one of verification*”. In considering quantitative methodologies he highlights the use of the survey document in research. Viewing the survey as a “positivist tool”, he makes the important link to the attached epistemological assumption that the survey allows an element of objectivity, replicability and causality to be established. Identifying a “*blurring of the lines between the two styles*”, Bryman remains cautious about the true possibility of reconciling the two stances at a methodological level due to the “*fundamentally different views about the nature of social science*”.

Rossmann and Wilson (1985), confirm the development of a polemic between the perspectives of qualitative and quantitative researchers. Reporting on developments over the previous thirty years, they focus on methods rather than the philosophical premise of the researcher. They argue that combining methods allows the researcher to improve the accuracy of his conclusions. They suggest that methods can be combined for purposes of corroboration, elaboration and initiation, and they provide

examples of each of these. Confirming that by combining “numbers and words” we can “*produce richer and more insightful analyses of complex phenomena than can be achieved by either one alone*”.

Providing an outline of the two traditions of positivism and phenomenology, Easterby-Smith, Thorpe and Low (1991), confirm the clear dichotomy which exists between the constructs. However they confirm that “*the reality of research involves a lot of compromise between these two positions*”, suggesting that many researchers “*adopt the pragmatic view by deliberately combining methods*”. Whilst pragmatism is sometimes necessary in order to progress research, it must not be used as an excuse to ignore the underlying methodological issues in favour of debate about methods.

It is in 1994 that Rossman and Wilson revisited the debate about combining “numbers and words”. Whilst they focus on methods rather than methodology they provide evidence of the value of combining methods drawn from US research. In confirming their support of mixed methods, they cite Lortie (1982) who called for researchers to be “shamelessly eclectic” in combining concepts from various disciplines. They conclude that the research community requires to be “shamelessly eclectic” in our use of methods if we are to “*understand the intractable and persistent problems of today*”.

Acknowledging the debate, and considering issues of methodology in accounting research, Laughlin (1995) presents an historical overview of the development of such seemingly opposing themes. Summarising the work of the great philosophical thinkers, Laughlin suggests that there is a place for what he refers to as “middle range thinking” where the accounting tradition of empirical research is augmented by more descriptive research.

In several fields of research, it is acknowledged that whilst at a methodological level there remain two distinct paradigms, support is growing for allowing more flexibility for the researcher who moves between paradigms in order to meet the demands of the research. This approach coined as being “eclectic” is perhaps better described

as being a synthesis of methodologies, putting together a variety of individual elements to make up a complex whole.

3.2. Research Design

Continuing the theme presented in support of the synthesised methodological stance, the research design presented uses multi method research. Each method utilised will be considered independently in subsequent sections of this chapter. However, it is initially worthwhile to put the combination of methods used within a context. The research comprised elements that were highly exploratory. In particular the attempt to understand how credit scoring was operationalised within the organisation is an area that has not previously been addressed. A major concern at the commencement of the research was that raw data would not become available. Thus at an early stage it became clear that more than one method might be required in order to conduct an investigation with necessary rigour. This early understanding was supported by the view that mixed methods research offers the benefit of triangulation of results. The concept of triangulation is based on the assumption that “*any bias inherent in particular data sources, investigator, and method would be neutralised when used in conjunction with other data sources, investigators and methods*” (Jick, 1979). The further benefits of triangulation are summarised within Creswell (1994), as offering:

- benefits, of overlapping different facets of the phenomena
- development, allowing the first method to help to inform the second method
- initiation, when contradictions and fresh perspectives emerge
- expansion, where mixed methods add scope and breadth to the study

Within this research design each phase of the research is conducted using the most appropriate method. These methods differ, but by using multiple methods it is intended that bias be avoided, that the results will be enriched, and that some of the benefits of triangulation be achieved.

The initial phase of this research was exploratory. No information was available which confirmed the method of decisioning used by mortgage lenders. The first requirement of the research was that a broad overview of the current situation in the market place be established. This required that a high volume of data be gathered from a research population, which was geographically dispersed. In combination with the dispersion, some resource constraints existed. Considering the exploratory nature of enquiry required, and taking into account the limitations which existed, it was decided that the postal survey method was the most appropriate means by which to gather data.

The initial survey provided data at the exploratory stage of the research. This primary data provided a unique view of the position of credit scoring within UK mortgage lending.

However, following analysis of the initial survey, several interesting features arose within the data gathered that required further explanation in order that a deeper level of understanding is achieved. For this exercise it was decided that a follow-up survey so close in timing to the initial survey would not be well received. Additionally it was clear that the complexity of these new issues did not lend themselves to survey analysis. It was therefore determined that a representative subset of the population should be invited to take part in interviews. An interview programme was therefore conducted, and the data gathered was analysed to further enrich the research

The interviews conducted had provided a wealth of useful data. However, an important research question still required to be addressed. This led to a further research initiative, the undertaking of a case study. The case study allowed the gathering of loan application and performance data from a lender who agreed to take part in the case study. By using the case study approach it was possible to gain valuable insight into the credit process in a mortgage lending environment. By gathering application and performance data it was possible to compare the performance of judgmental and empirical decisioning applied to mortgage loans.

This phase of the research required that the development of a bespoke credit scoring model be undertaken. The purpose of the model was to compare the performance of empirical and judgmental loan decisioning applied to mortgage loans. This was particularly desirable as no previous comparison was available in the public domain, and because within the literature it had been suggested that mortgage loans did not “lend themselves” to credit scoring.

The final phase of the research undertaken involved undertaking a benchmarking study. Within the literature it was suggested that benchmarking must be introduced. However, the study was also undertaken with a view to triangulating the results of the earlier research. The study intended to identify whether those who use credit scoring achieve levels of performance, which exceeds that of non-scorers. This study was undertaken via a postal survey. This final survey provided some useful data, which offers potential for the future development of the research.

Multi-method research such as this, enables the researcher to examine the research problem from a variety of perspectives. Additional benefit results from the substantial volume of primary data generated, which can support significant advances being made to knowledge in the field of research. This thesis will present the findings of the multi-method research design, and the contribution to knowledge that resulted. The sections which follow within this chapter, consider each of the research methods utilised.

3.3. Survey Method

Due to the exploratory nature of the initial stages of the research project, the survey method was identified as the best means by which to gather data. The intention was to gather data via a cross-sectional questionnaire based survey, the results of which would allow inferences to be made. Due to the geographic dispersion of the population being considered, a postal survey was deemed to be most appropriate. The advantages of surveys, which include the economy of the method, and the quick turn around in data collection are confirmed by many authors such as Fowler, (1984),

and Babbie (1990). These benefits played a part in selecting the method, but were augmented by other valid reasons. Limited resources meant that interviewing every member of the research population was logistically impossible. Additionally it was the intention of the initial survey to gather data which was both quantitative (data about the organisation), and qualitative (providing reasons, circumstances and background information). Requiring this range of data suggested that a survey which allowed the respondents to gather and provide data "at their own pace", would be better received. Additionally at this early stage of the research the likelihood of gaining access to individuals within the organisation was considered to be low. Thus it was decided to use the survey document and to ensure that it was managed in a way which would maximise response rates.

3.3.1. The Survey Instrument

A single survey document was required which would facilitate data gathering from two distinct groups within the population, those who had access to some form of credit scoring and those who did not. It was decided to produce a sectional document, with one common first section and then direct the respondent to the one appropriate section which related to his scoring status. This resulted in the document appearing to be rather larger at first sight than might be considered desirable. However, this problem could not be avoided, and again it was hoped that techniques to maximise response rates would help to overcome any reticence on the part of potential respondents.

The questionnaire was designed to gather the raw data, which would produce an overview of the status of credit scoring in the mortgage market. It would confirm whether scoring was being used, for how long it had been used, and how scoring had been introduced and developed within the individual organisations. Additionally and equally importantly the questionnaire sought to determine how scoring was being managed, and for what business purposes it was being utilised. Finally the business benefits which were being sought, and achieved, were to be identified by use of the questionnaire. It is acknowledged that this is a large task using a single research tool. Respondent information requested from all respondents comprised

10 questions. Those who did score were invited to answer a further 24 questions. Non scorers were directed to a section comprising 6 questions. A full draft of the questionnaire in its final format is provided in Appendix A.

Acknowledging the work of Berdie & Anderson (1974) who confirm that a “*a well-planned and carefully constructed questionnaire will increase the response rate*”, and seeking a reliable questionnaire which “*consistently conveys the same meaning*” it was deemed necessary to pre-test the questionnaire. Berdie and Anderson suggest we aim for a “*sensuous questionnaire*”, suggesting that the very appearance of the questionnaire determine whether it is completed or not. With this in mind a high quality document was sought. In accordance with the recommendations of Churchill, Nevin and Watson, (1977), draft versions were pre-tested. Pre-testing involved two groups. Five fellow academics were invited to participate, as were three industry experts. This two-fold process of pre-testing was intended to meet the following objectives. Firstly, the academics were asked to critique the questionnaire with regard to presentation, ease of use and general clarity. The industry experts were invited to critique the questionnaire at a second stage with a view to confirming not only the appearance and ease of use to be appropriate, but also to confirm that language and terminology used was common to those within the financial services industry. The industry experts were also invited to examine the range of data being requested in order to identify whether the data was commonly available in the format requested. The academics were selected on the basis of proximity and research experience. The industry experts were selected on the basis of their knowledge of mortgage decisioning, their industry knowledge, and as having had previous working relationships with the researcher.

Within the questionnaire, questions asked required a variety of answer formats. Where limited options of response existed, the questions were closed. The format presented for response was that of “ticking a box”, to allow speed and ease of completion. However in order to allow flexibility to the respondent, where any doubt existed as to whether “other” responses may have been desirable, the category “other” was included, and space left for additional information to be provided.

Several questions were intentionally presented as being open ended. Respondents were provided with lots of space to explain various procedures via narrative responses, using their own words. Tick boxes were considered and rejected for these sections as they may have limited the variety of responses given, and thus much of the richness of the data gathering exercise would have been lost.

3.3.2. The Survey Population

Selecting a survey population was assisted by the provision of a paper based database by the Council of Mortgage Lenders (CML). The CML was formed in 1989 to provide a single representative voice for all mortgage lenders. CML members are responsible for “98% of total residential mortgage lending”, CML (1996). The database comprised addresses and telephone numbers of the corporate headquarters of one hundred and twenty five mortgage lenders. Of the 125 lenders identified seven were not surveyed. This was because these organisations were identified as being “nominal” head offices of overseas organisations and undertook no lending within the UK. This left a population of 118. The population surveyed comprised banks, building societies and specialised mortgage lenders. The basis of these categories will receive more attention later within this thesis. However it is relevant to consider the categories numerically in figure 3.1, as the numbers involved influenced the decision to survey the whole population.

Figure 3.1: Survey Population

	Members of CML	Not Surveyed	Population
Banks	25	3	22
Building Societies	75	1	74
Specialised Lenders	25	3	22
Total	125	7	118

As evidenced above, banks and specialised lenders were numerically small groups compared to building societies. Acknowledging that low response rates are common

in research surveys, it was decided that surveying the whole population was the best means by which to obtain a representative and usable dataset. Given that the whole population was relatively small numerically this posed no real problem.

3.3.3. The Survey Procedure

Managing the response rate upward was the objective of many elements of the actual survey procedures now outlined. In accordance with acknowledged best practice in research, and summarised by Hunter and Earp (1999), eighteen variables are presented in figure 3.2, which potentially influence response rates, and these were considered and managed.

figure 3.2: Managing Response Rates

Variable	Action Taken
Advance warning	<i>Not undertaken</i>
Explanation of selection	Advised population selected were members of CML
Sponsorship - make details overt	Highlighted that the research was sponsored by ESRC and University
Envelope - avoid junkmail look	Professional look adopted by use of pre-printed named labels
Publicity - use local media	<i>None undertaken</i>
Incentives - small or future	Feedback report offered to participants as incentive
Confidentiality - give assurance	Assurance given
Reminders - after cut off	Reminders used
Anonymity	Not anonymous, required to identify respondents
Appearance - professional, uncluttered	Sought this, and believe this was achieved
Length	Confirmed as satisfactory at pre test
Topic - interest	Presumed to be of interest as key area of jobs of respondents
Return envelopes	Stamped addressed return envelopes provided
Inclusion of covering letter	Included
Endorsement - from local figure	<i>None sought</i>
Donations to charity	<i>Not considered</i>
Type of questions- constraints that exist	Used open ended questions wherever appropriate
Location of receipt - home or work	Work was considered appropriate



Only four of the eighteen variables were not considered in depth. These were endorsements, gifts to charity, publicity in the local media and pre-notification. Of these, the first three were considered inappropriate for exploratory research underpinning a thesis. The fourth, pre-notification was not undertaken for two reasons. Firstly the cost of producing and mailing a pre-notification tool could not be justified as there was little hard evidence that pre-notification would significantly alter the response rate. Secondly, bearing in mind the volume of correspondence individuals receive it was decided that notification of future correspondence might serve to make recipients aggrieved about the forthcoming survey, rather than encouraging them to anticipate it with relish. A further variable, anonymity, was considered but not offered, as it was necessary to identify the responses as being from specific lenders by type. Also, anticipating the progression of the research, it was intended to develop and maintain relationships with those lenders interested in the field of work. As a result, being able to contact them in future was considered to be desirable.

Having determined the key features in maximising the response rate, it was decided that a named individual should be identified within each organisation to be targeted as the survey recipient. Each organisation was telephoned in order to identify the individual who had responsibility for credit decisioning. This was a difficult task due to the diverse range of individuals who might hold this responsibility. Relying on researcher knowledge of the field, responsibilities were tracked to Chief Executives and Company Secretaries in smaller building societies, and to a variety of staff members within Mortgage or Credit Risk departments in larger lending organisations. The raw database containing address information on the population was amended to show name, designation and salutation using the new personalised information. This new database was considered a valuable research resource and facilitated the use of mail merge tools, easing the considerable administration involved.

The completed survey document along with the covering letter (see Appendix B), and prepaid return envelopes were mailed in July 1997. Non-respondents received a

follow up telephone call during early August asking if they had received the survey document and intended to complete it. This yielded some additional responses. At the end of August all target respondents received a further communication. Those who had responded received thanks and notification of the likely timing of feedback (Appendix C), and those who had not responded received a final invitation to take part in the research (Appendix D). This final letter prompted a further organisation to call, and ask to be part of the survey, claiming not to have received the initial communication. They received a copy of the survey document with a covering letter (Appendix E). Full details of the response rates are provided within chapter 4 of this thesis.

3.3.4. The Benchmarking Survey

Following the initial survey, semi-structured interviews and a case study were conducted, and these will be discussed in the sections which follow. However, within this survey section it is important to record that a second survey was conducted. This took the form of a benchmarking survey, which was conducted in December 1999. The population surveyed were the same as those surveyed in 1997, and the reasons for conducting the survey will be elucidated within Chapter 7 of this thesis. The process of developing the survey document followed procedurally on the development of the initial survey, and it is not intended to cover each stage in detail again. The best practice procedures were again followed in order to manage the response rates upwards. However, the response rate was not as successful as that received in the initial survey. This, and other issues relating to the benchmarking survey will be covered in full depth within Chapter 7. The benchmarking survey document is included as Appendix K.

3.4. The Interview Procedure

Following the completion of the initial survey and subsequent data analysis, several issues remained unresolved. Some inconsistencies had become apparent within the data, which suggested that further insight was required. For this reason it was decided that interviews be conducted, to gather further data which would hopefully

clarify and resolve the inconsistencies. This element of the research was qualitative in nature, and this is confirmed by the research meeting the assumptions of Merriam (1988):

- ❑ the primary concerns were about processes
- ❑ the main interest was in meaning, how people made sense of the phenomena
- ❑ the researcher was the primary instrument of data collection
- ❑ the research involved fieldwork, the researcher physically going to the institution
- ❑ the research was descriptive, the understanding gained through words
- ❑ the research built abstractions and hypothesis from the data

3.4.1. The Interview Population

The interview population was determined via analysis of questionnaire respondents. Three types of organisations were identified, banks, building societies and specialised lenders. Within each category three distinct “status” existed relevant to credit scoring. Those were, currently scoring, not scoring and developing scoring. The respondent organisations were selected based on a grid represented in figure 3.3. Due to the assurances of anonymity provided to respondents, numbers of organisations rather than names, are provided indicating those who were interviewed.

figure 3.3: Interview Population

	Bank	Building Society	Specialised Lender
Does Score	4	2	1
Does Not Score	2	1	1
Developing	0	2	0
	6	5	2

Following analysis of the data derived from the initial survey, it had become apparent that the size of respondents (measured by volume of lending) varied greatly. It therefore seemed appropriate to interview one large and one small lender in each organisational type, and in each of the categories “scoring”, “not scoring” and “developing scoring”. Where possible this procedure was followed. However, as can

be seen in figure 3.3 this was not always possible for each category, as not all categories could be filled. The category “developing” could not be filled for banks or specialised lenders. Additional interviews were undertaken in the banks who are using scoring category, as several of these lenders were very interested in the research and volunteered their involvement.

Similarly not all categories had a large and small lender, and for these categories only one interview was conducted. From the initial breakdown a target number of eleven interviews had been identified. As it was intended that all interviews would be conducted within a three week period, organisations were also chosen in order that a sole researcher could feasibly carry out the interview programme. This involved selecting organisations based firstly on the necessary categories identified in figure 3.3, and then considering geography as a sub category.

At each of the eleven organisations initially targeted, the staff member who had completed the survey document was firstly invited to take part in the interview process by letter (Appendix F), and then via follow-up telephone call. Of the eleven targeted, ten agreed readily. One organisation declined on the basis that the information was likely to be too sensitive to discuss. This decline led to another lender, identified in the same category, being invited to participate, and they readily agreed. Two bank lenders who had communicated their interest in the research also volunteered for interview, and these offers were gratefully accepted. Therefore thirteen semi-structured interviews were conducted mainly during July and August 1998. One lender was interviewed in October due to scheduling difficulties.

3.4.2. The Interview Instrument

Driven by the data gathered in the survey, an interview agenda was developed. The development of the script was formed, based on the sometimes contradictory findings of the initial survey. The agenda was augmented by some topical issues of the day. This being the case the interview format was semi-structured. The agenda was formalised and an interview outline was developed. This interview outline for credit scorers is presented in Appendix G. This was then adapted for each category,

to include non-scorers and developers. This script was not intended to be followed “slavishly”, rather it was used to ensure that each point was covered. The interview was seeking to elicit a range of factual information about the participant organisation, as well as to gain lender perceptions about the development and application of scoring within individual organisations.

3.4.3. The Interview Procedure

At the commencement of each interview, the researcher requested permission to tape record the interviews. This was granted on all but one occasion, however on a single other occasion the tape failed to work. Thus two interviews were recorded via notes. One set of notes recorded as the interview was being conducted, the other recorded immediately upon leaving the interview and checking the tape. Taping and then transcribing the interviews was the preferred method of gathering and analysing data for the following reasons. Taping was selected over note taking to ensure accuracy, and improve the “flow” of the interview. Taping also allows the researcher to return to the raw data of the fieldwork on as many future occasions as may be required. This was deemed to be important, as the research being undertaken was at a very early stage. It was anticipated that as the research matured, the researcher might wish to “revisit” the data and therefore maintaining it in a raw format could prove to be useful in future.

3.4.4. Interview Analysis

Transcribing the interviews was selected as a necessary precursor to analysing the data. The data was analysed manually using colour coding. Colour coding allows the researcher to structure the analysis of the transcripts. The process of coding is similar to using a computer package such as Ethnograph, and is suitable for relatively small numbers of interviews. Each interview is reviewed, and themes within the text are highlighted in a particular colour for which an index is kept. This process ensures that the research outcomes are drawn objectively from the research data, rather than subjectively from “impressions” gained by the researcher. This was considered to be vital, as the researcher had previously been involved in credit scoring within industry. This previous exposure to the issues could have led to some

preconceptions being held, and these might have found their way into the research analysis had a formal structure of analysis not existed. Following the completion of the identification of themes, a summary of the interview outcomes (Appendix H) was produced and forwarded to the participants involved in this phase of the research along with a covering letter (Appendix I). This procedure was conducted in order to maintain good relationships with participants, and to offer some benefit to those who continued to be involved with the research.

The outcomes of the analysis of the interview research will be presented in full in Chapter 5 of this thesis.

3.5. Case Study Method

Following analysis of the interview data it became clear that a further research method required to be introduced to deal with the complexity of the research problem. Within the credit literature, and following the early stages of the research it was established that no evidence existed, which confirmed scoring's performance, when applied to an UK mortgage loan portfolio. As the research progressed, and relationships with lenders improved, informal discussions were progressed with a view to obtaining loan application and performance data. These initial discussions took place over a five month period between October 1998 and February 1999.

It became clear that the case study method might be the most appropriate means by which to conduct the next phase of the research. The discussions surrounding research method have frequently placed case studies at the top of a hierarchy of approaches. This research hierarchy view is expressed by Platt (1992), who suggests that case studies be used at the exploratory phase, surveys at the descriptive phase and only experiments can be used to provide explanatory enquiry. However this analysis is hotly contested by Yin (1994), "*this hierarchical view is incorrect*". Yin suggests that case studies may be exploratory, descriptive or explanatory. In particular he suggests that case studies can usefully be used to answer *how* and *why* questions, where the focus is on contemporary events. Within the context of this

thesis, the case study was intended to fulfil two roles. Firstly it was intended as a means by which to answer the questions as to *how* credit policies and decisions operated in the lending environment, and *why* they were used in certain ways. Secondly the case study was also chosen as affording the best means by which to obtain empirical data. Due to the sensitive nature of the work being undertaken, both within the individual organisation and in the broader market place, it was recognised that a “partnership” with a single lender was the best means by which to obtain the data. This would afford the researcher the best opportunity to obtain the data by offering a very focussed research design to a single lender who would benefit from obtaining the results of the research undertaken.

3.5.1. Designing the Case Study

The design of the case study required discussions with potential participants. The selection of those with whom discussions were undertaken was a function of their “non-scoring” status. What was intended was that a review of the application processes and subsequent account performance would be undertaken in a non-scoring organisation. This data would be combined with data gathered in other phases of the research, allowing a comparison between lenders using empirical and judgmental methods of credit evaluation.

According to Yin (1994), a single case study is appropriate where the researcher wishes to test a proposition or theory. A single case study was also desirable due to the requirement that the volume of data being generated remain manageable. Two organisations were identified as being suitable as case study participants. Both were invited to participate in discussions about the proposed research. A research outline document was produced and submitted to the lenders, providing an outline of the research plan (Appendix J). This document was intended to meet the requirements of a good case study design, whilst meeting the commercial expectations of the lenders. The draft document was well received. However, it was agreed that the scale of the proposal was over-ambitious. Finally the larger of the two interested lenders was formally approached with a tailored research plan. After several subsequent meetings the scope of the project was reduced. Following several more

meetings and the formalisation of a confidentiality agreement, the data to be gathered became available.

3.5.2. Data Gathering Procedure

Within the case study organisation data was gathered from several sources. Documentation was provided to the researcher in the form of “staff manuals and guides”. This information provided evidence of the formal written procedures, which were issued to staff involved in mortgage application and evaluation. Members of staff (identified by the organisation) were then designated to assist the researcher by providing evidence as to how the various systems and processes operated. Unstructured interviews were held with a variety of staff members within the organisation. This allowed the credit processes to be documented. Information was also obtained from staff on an “ad-hoc” basis, as the researcher required specific information relating to specific cases. The remainder of the data gathered within the case study organisation was drawn from paper based files. The source of this data and sampling methods will be discussed in full later within this thesis.

However, relative to the procedure involved, a data-gathering instrument was required. A specific instrument was favoured over notes in order to ensure that all the data required would be accurately and systematically recorded. The data-gathering instrument was created empirically, and an outline of this process will be provided in Chapter 6. Having prepared the data gathering tool, it was then necessary for the researcher to work at a variety of sites belonging to the case study organisation in order to gather the data. The time required physically obtaining the files, recording the data, and returning the files within a large warehouse had been underestimated. Thus during the data gathering phase, a considerable amount of time “slippage” occurred. However, gathering a large volume of application and performance data on mortgage loans within the UK mortgage environment, allowed the research to produce evidence about the suitability and performance of credit scoring applied to mortgage loans. The data gathered has been retained and is considered a valuable resource, which will support future research.

3.6. Conclusion

A considerable amount of effort went in to creating a research design, which allowed a new perspective to be introduced into credit scoring research. Whilst the synthesis of methodologies may be challenged at a philosophical level, the research outcomes are believed to justify the approach. The main body of work is based in the domain of positivistic endeavour. However, the recognition of the importance of gathering data from participants which allows them to “interpret” events, places aspects of the research in the interpretative paradigm.

The mixed methods research also allowed a wealth of data to be gathered, viewing complex problems from a variety of perspectives. It is intended to show within the findings of the research, that the mixed methods approach offered a means by which to triangulate the research findings. This triangulation provided considerable richness to the study, which is believed to be reflected in the research outcomes.

Chapter Four

4. Mortgage Credit Scoring – Survey Evidence

4.1. Introduction

This chapter presents an account of the findings of the initial postal survey, which was undertaken in order to provide empirical evidence on credit scoring applied to mortgage loans in the UK. Specifically, this chapter will provide evidence on the extent to which credit scoring has been adopted, and the role of scoring within the mortgage function of the organisation. Additionally the benefits anticipated by organisations as a result of scoring being introduced, will be compared with the benefits which are being achieved. In conclusion this chapter will summarise the key findings of the initial survey, highlighting several issues which arose, and the contradictions which became apparent. It is these issues and contradictions which form the basis for the next phase of the research.

4.2. The Survey Population and Respondents

As outlined within the research methods chapter, the survey population is identified as the members of the Council of Mortgage Lenders. One hundred and eighteen organisations received a postal survey during July 1997. This was during a time of significant change in the financial services market place. Several mutual societies were in the process of converting their status to that of public limited companies. Others had recently changed. In order to ensure consistency, it was determined that organisations should be categorised by type according to the KPMG retail financial sector database produced in July 1997. By adhering to the categories determined by KPMG, a consistent view was taken as to status. Thus organisations in the process of change retained their previous status, those who had converted or formally merged adopted their new status.

Of the 118 companies who received the initial postal survey, ten responded in writing confirming that they would not be completing the questionnaire. Of the ten,

six indicated that they felt that the questionnaire was not relevant to their circumstances. Three stated that it was not company policy to take part in surveys, and one did not provide a reason. Of the remaining 108 companies, 64 responded by completing and returning the questionnaire following the first letter inviting them to do so (Appendix B). On receipt, the completed applications were formally acknowledged with a letter thanking respondents, and confirming that they would receive a copy of the findings in due course (Appendix C). In an effort to improve the response rate a second letter (Appendix D) was sent to non-respondents in August 1997. This resulted in contact being made by two further organisations, which claimed not to have received the first letter and questionnaire. These organisations requested a copy of the survey document, and did take part in the survey. This produced an overall total of 66 usable responses from a population of 118, giving a response rate of 56%. In order to measure the success of the survey relative to others, a comparison with similar surveys was sought. Whilst not a direct comparison, a similar population is surveyed annually in the US via the Home Equity and Loan study. This study, which in 1998 was in its twelfth year, is conducted by the Centre for Financial Service Studies at the University of Virginia. Whilst the survey tool is more extensive, this established study reported a 1998 response rate of 28%. Whilst only providing a single example in comparison, this helps to confirm that the UK study received a “good” response rate. It is believed that the high response rate generated within the UK survey results in part from the actions taken to maximise response rate, which were presented within the research methods section of this thesis. Additionally, the high response rate suggests a high level of practitioner interest in the subject of mortgage credit scoring.

4.2.1. Respondent Bias

The profile of those who responded was examined in order to determine whether or not it was a representative sample of the whole population. According to Donald (1960), *“the efforts taken to achieve small non response rates are of much greater importance than the particular procedures used to make small adjustments for the non response that does occur”*. The most common protection against non-response bias is *“attempting to increase the response rate”*, Lambert and Harrington (1990), and this has been done. Despite the high response rate which was generated,

consideration was given to the various methods of measuring for bias in the respondent population. The preferred method would have been to conduct independent t-tests on the non-respondents based on characteristics relevant to the enquiry such as volume of mortgage business. This proved to be impossible, as data was not available from the non-respondents which would facilitate such testing. An alternative method was selected. This involved comparing the composition of the respondent group with the non-respondent group based on the available characteristics which are relevant to the study. The groups were compared, the first analysis being that of organisational type. The results presented in figure 4.1, show that the respondent population was largely representative of the overall population, based on organisational type. Banks are slightly over represented to the detriment of the building society group.

figure 4.1: Survey Respondents

	Number Surveyed	Org. type as % of Population	Number Responded	Org. type as % of respondent population	Respondent type as % of population type
Bank	22	18.64%	16	24.24%	72.72%
Building Soc.	74	72.71%	38	57.57%	51.35%
Other	22	18.64%	12	18.18%	54.54%
	118	100.00%	66	100.00%	

A further examination of the respondent population was conducted. This second analysis sought to determine how influential the respondents were within the population. This was done by examining the proportion of UK mortgage loans granted by the respondents, as a proportion of all mortgage lending. Using statistics for the period July 1997 to June 1998, CML (1998), it was determined that 1.39 million loans had been approved. Within the respondent population 1.15 million loans had been approved, almost 83% of the total loans approved. Considering each category individually, we see that the respondent bank figure represents over 79% of all loans granted by banks. The building society figure for loans approved by respondents, is considerably higher than that recorded in the statistics for the whole building society population. This results from the fact that the CML building society

figure does not include re-mortgage advances. The CML categories of bank and “other” figures do include re-mortgage advances. With regard to the large variation in the “other” category, it is worth noting that of the twelve respondent organisations, two failed to provide data on lending volumes.

figure 4.2: Volume of Mortgage Loans Granted

	No. of loans approved population	No. of loans approved respondents
Bank	1,013,000	805,009
Building Society	258,000	325,849
Other	120,000	22,183
	1,391,000	1,153,041

Taking into account the variations noted above, the respondent sample is considered to be a representative sample of the financial services sector in the context of mortgage lending. The population who responded conducts a very high proportion of mortgage lending in the UK market. It is acknowledged that the representation is less conclusive for “other specialised lenders” when considered by volume

4.3. Level of Usage of Mortgage Credit Scoring

In order to obtain a broad overview of mortgage credit scoring, lenders were asked to categorise themselves into one of six categories reflecting their scoring “status” as follows:

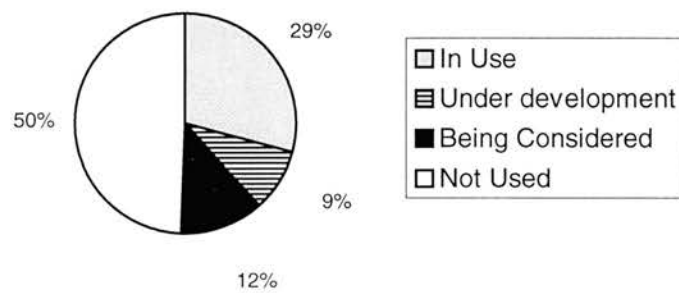
- not applicable
- not used
- being considered
- under development
- in use (any capacity)
- previously used - no longer used

4.3.1. Level of usage based on organisational status

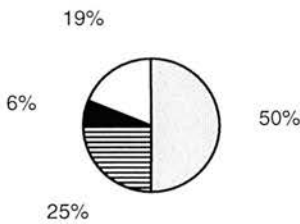
A descriptive overview of usage based on organisational types is presented graphically. The first chart in figure 4.3 depicts usage across all organisations. This is followed by three individual charts based on individual organisation by type. The results highlight that banks are by far the most advanced in levels of adoption of credit scoring, followed by the smaller group of other lenders and then finally by building societies. All respondents are included in these categorisations. The figures presented therefore depict results from sixteen banks, thirty eight building societies and twelve other lenders. This represents the total population of sixty six respondents.

figure 4.3: Scoring Usage - Organisational Type

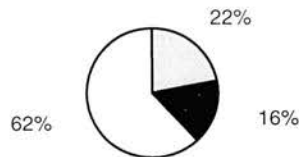
All respondents



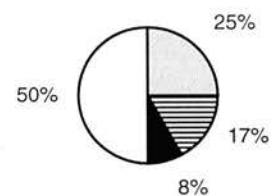
Banks



Building Societies



Others



The pie charts in figure 4.3 provide an overview of the situation, and reflect the actual scoring status of lenders at the time of the initial survey. Within the

questionnaire, lenders were also asked to assess whether they thought it “likely” that they would use scoring in future. Forty five percent of those not formally considering scoring at the time of the survey, agreed it was “likely”, that they would use scoring in future. This belief may have been influenced by increased business imperatives requiring low cost base and improved service levels, which can make scoring an attractive option. Overall there seemed to be a general view that scoring was very much a tool which would be increasingly utilised in the mortgage market.

4.3.2. Levels of usage based on loan volumes

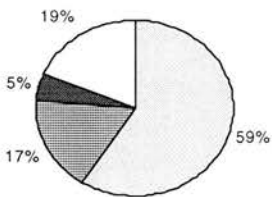
Having considered the levels of usage by organisational type, it is also pertinent to consider the levels of usage by number of mortgages granted. This analysis identifies the proportion of all mortgage loans that are processed via lenders who have access to mortgage credit scoring. This is perhaps a better indicator of the influence of credit scoring in the market place.

figure 4.4: Scoring Usage - Volume of Loans Granted

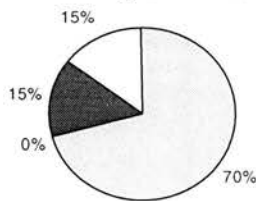
All respondents



Banks



Building Societies



Others

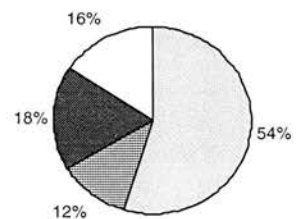


Figure 4.4, confirms the significance of mortgage scoring. Sixty two percent of all mortgages granted have been processed by organisations that are using mortgage scoring. If we project this to reflect volumes of loans from organisations who are currently developing mortgage credit scoring we present a view more representative of today which confirms that seventy four percent of loans by volume are being processed by organisations using scoring technologies.

This substantial volume of mortgages that are being processed by organisations using credit scoring makes it imperative that research is conducted which considers the means by which effective utilisation of scoring technologies can be achieved. The role and purpose of credit scoring as a method of credit assessment require to be clearly understood. Additionally the equity of credit scoring as a means of credit decisioning for mortgage loans, requires to be established and communicated to participants and stakeholders in the mortgage market.

4.4. Maturity of Credit Scoring

In order to test the assertion within the literature that mortgage scoring was a less developed genre than scoring of other consumer credit products, lenders were asked to categorise their scoring status on a variety of products.

Once again the initial categories utilised were:

- not applicable
- not used
- being considered
- under development
- in use (any capacity)
- previously used - no longer used

However, due to the small numbers in some categories, the analysis which follows combines responses in the categories under development and in use as being one single category. The category "not applicable", is intended to be used where the

product is not offered by the lending organisation, and is therefore presented in the figures which follow as “not offered”. When reviewing results it should be noted that eight lenders failed to provide data relative to both personal loan and credit card scoring, and thus the responses presented total fifty eight in both of these categories.

4.4.1. Personal Loan Scoring

figure 4.5: Scoring Usage - Personal Loans

	Bank	Building Society	Other	Total
not offered	4	28	8	40
not used	1	4		5
under development/in use	9	4		13
	14	36	8	58

As evidenced in figure 4.5 above, banks are the most prolific users of personal loan scoring. The banks that provided the “not applicable” response comprise two whom had recently converted from building society status, and two others. Ninety percent of banks offering personal loans confirm that they use scoring, compared to fifty percent of building societies and no others. When the length of time that personal loan scoring has been in place is considered, all banks have been scoring for six years or more. Building society usage is more recent with 25% of respondents introducing loan scoring in the previous 2 - 5 year period, with the remainder having scored for six years or more. When all organisations are considered as a single group ninety two percent have used personal loan scoring for six years or more, with the remainder using personal loan scoring for between two and five years.

4.4.2. Credit Card Scoring

figure 4.6: Scoring Usage - Credit Cards

	Bank	Building Society	Other	Total
not offered	6	32	8	46
not used		2		2
under development/in use	8	2		10
	14	36	8	58

All banks that offer credit cards use credit scoring. Fifty percent of building societies which provide credit cards, are also using or developing scoring. The specialised mortgage lenders are not in this market. Again the maturity of the banking sector in scoring usage is evident, as eighty seven percent of users have been scoring for more than six years with the remaining twelve percent experienced in card scoring for between two and five years. Both building societies have been using or developing scoring for less than one year. When viewed as a single user group, credit card scoring has been used by seventy percent of lenders for six years or more, by ten percent for between two and five years, and by the remainder for up to one year.

4.4.3. Mortgage Scoring

figure 4.7: Scoring Usage - Mortgages

	Bank	Building Society	Other	Total
not used	3	24	6	33
being considered	1	6	1	8
under development/in use	12	8	5	25
	16	38	12	66

Figure 4.7 presents the raw data used to create the graphic images in figure 4.3. As mortgage lending is applicable to all respondents, the numbers of respondents has increased to comprise the whole population. As a result the categorisation in figure 4.7 is slightly different. Increased volumes of respondents allowed those who are currently “considering” using scoring to be shown as a separate category. Seventy five percent of banks are currently developing or using scoring for mortgage loans. This is a significantly higher proportion than the twenty one percent of building societies, that are developing or using scoring. Of the other lenders forty one percent are using or developing scoring systems. When the population are viewed as a single group mortgage scoring is confirmed as being less well established than other applications of scoring. Only fifteen percent of lenders have used mortgage scoring for six years or more. The majority, (78%) have between two and five years experience with the remainder exhibiting less than one years experience.

4.4.4. Summary - Lender Experience of Mortgage Scoring

Viewing lender experience as a function of the length of time they have been using credit scoring to offer decisions on a range of different lending products, mortgage scoring is confirmed as being a less well developed genre than both personal loan and credit card scoring. The relative immaturity of scoring as an organisational tool for mortgage lenders confirms the need for research to be conducted at this time. This relative immaturity also helps to explain the lack of literature specifically addressing mortgage scoring issues.

4.5. Scoring as a Function of Size

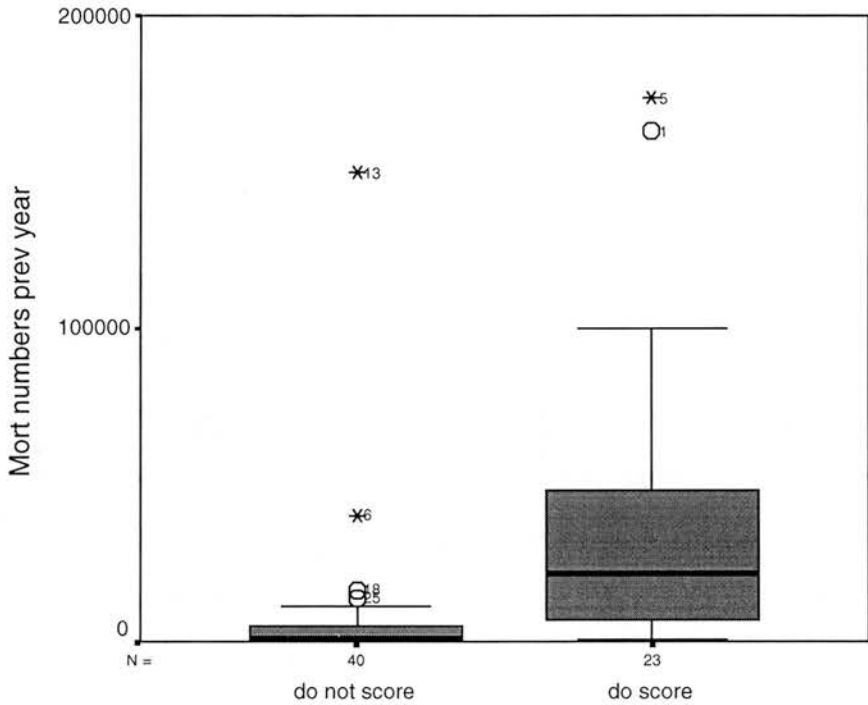
As evidenced previously 1.15 million loans were granted by the sample during the twelve month period preceding the survey. The next stage of analysis is intended to identify whether there is a direct relationship between the decision taken to adopt mortgage scoring technologies and volume of mortgage lending conducted. Organisations were sub-classified into two groups for this analysis. Those who were actively using or developing credit scoring, were classified as those who “do score”, and all others were categorised as “do not score”.

Using a box plot in figure 4.8 to depict the distributions we can see that those lenders in the category “do score” display a higher mean number of loans granted, than those who do not use scoring. Additionally we can see that the spread amongst scorers is considerably greater than amongst non-scorers. We also observe that several outliers, indicated by the small black circles, are evident in both groups. The outliers comprise those organisations which have loan values which are between 1.5 and 3 box-lengths from the edges of the box. Also observed are some extreme values, indicated by asterisk. The extreme values indicate organisations, which have loan values more than three box lengths from the edge.

The presence of outliers and extreme values within the categories scorers and non scorers, show that the relationship is not solely a function of size. Several lenders who have very high volumes of lending do not use credit scoring, whilst others with relatively low volumes do score. This interesting outcome, highlights that credit

scoring is not adopted solely relative to the volume of loans being granted. Additional considerations must impact on the method of credit decisioning utilised. It is intended that this thesis will help to identify these additional determinants by identifying the circumstances in which credit scoring can be used to add value to the mortgage lending process.

figure 4.8: Scoring Status - Number of Mortgages Granted



A further test was conducted to identify differences in population means between the two groups, those who score and those who do not. For the purposes of this test those currently scoring and developing were categorised as “credit scoring”, and all others were combined to form the category “not scoring”. Due to the evidence of extreme values and outliers, a non-parametric test was sought to test the null hypothesis that the two sample groups are from identical populations. The Mann-Whitney test was selected as it presented a suitable means by which to test the hypothesis. Organisations were ranked relative to the number of mortgage applications processed with the highest number ranking at one, and the rankings increasing as the volumes fell. Thus a low ranking value relates to a high mortgage

volume. The results of the Mann Whitney confirm that the scorers exhibit a lower mean rank, confirming the higher volumes being processed. Results confirm that the null hypothesis can be rejected at a level of significance of 0.05, and are presented in figure 4.9 as follows:

figure 4.9: Mann Whitney - Volume of Loans Processed

	N	Mean Rank	Sum of Ranks
Credit Scoring	25	19.84	496
Not Scoring	41	41.83	1715
	66		
$Z = 4.0978^1$			

4.5.1. Scoring activity related to mortgage loan value

Having examined scoring activity based on organisational type, and by lending volumes, a final test was conducted. The data was further analysed in order to test the assertion that credit scoring was most suitable for those lenders who conduct lending which comprises a high volume of applications with low loan values. This view was reported by some of those who participated in the interview phase of the research. If this view holds true, the implication might be that lenders believe that loans of higher value require the “specialised knowledge” offered by an underwriter to assess the risk profile of the applicant. The first part of the assertion has been tested in part by the preceding section, which confirms that high volume lenders make more use of scoring than those managing low volumes. The second part of the assertion requires the mean financial value of mortgage applications being processed by each lender, to be established. Again to test this the Mann Whitney test is used. A mean mortgage loan value was calculated for each lender who provided data in this category. This resulted in sixty-three respondent organisations being compared.

¹ $U = 41*25+(41*25)/2 - 1335 = 202.5$, $E(R_1) = 41(41+25+1)/2 = 1373.5$, $Var(R_1) = 41*25(41+25+1)/12$, $E(U) = (41*25)/2$, $var(U) = 41*25(41+25+1)/12$, $Z = U - E(U)/\sqrt{varU}$, $Z=-310/75.6499 = 4.09$

Each mean loan value is then ranked. Rankings are based on organisations with the highest loan values being ranked from a value of one, with the rankings increasing as the mortgage values fell. Thus the lower the mean ranking, the higher the loan values. Respondents were then divided into two categories based on their scoring status, and the sum of the mean value of the rankings is then compared. Again groupings are based on those scoring and developing being categorised as “credit scoring”, and all others being categorised as “not scoring”. Following analysis the null hypothesis that the two populations are identical is again rejected. Results contradict the popularly held belief of scoring’s relationship with low value lending. The analysis confirms empirically that the organisations which do score, process loans which have a higher mean value than those organisations that do not score. Confirmation of these results is presented in figure 4.10.

figure 4.10: Mann Whitney - Value of Loans Processed

	N	Mean Rank	Sum of Ranks
Credit Scoring	23	25	567
Not Scoring	40	36	1449
	63		
$Z = 2.42$			

4.5.2. Scoring activity related to cost:income ratio

One of the benefits of credit scoring which is accepted within the literature, is the potential cost savings which those adopting scoring technologies can derive. Low costs generally are reflected in a low cost base. A measure, which reflects a low cost base relative to earnings, which is commonly used and reported in retail financial services, is the cost:income ratio. Using data presented within the KPMG retail financial services database, cost:income ratios were identified for fifty-two of the sixty-six respondents. Again respondents were categorised as being in one of two groups, those who do score and those who do not. Results of the analysis confirm that the mean cost:income ratio of those who do use credit scoring is lower than those who do not. However the lowest value overall is exhibited by an

organisation which does not score. Whilst this result is interesting, and provides some confirmation of the assertion made within the literature a note of caution is sounded. This analysis does not provide evidence that the cost:income ratio of the various lenders which took part, result solely or directly as a result of using a particular method of credit decisioning. The proportion of income derived from mortgage lending, varies between lender organisations. For some, mortgage loans form a major source of income, however this is not the case for all lenders. Thus, further investigation utilising additional data would be required if the link between cost:income and scoring were to be established in a less tenuous manner. However, the results of the analysis do provide an interesting observation. The supporting figures are now presented in figure 4.11.

figure 4.11: Scoring Status - Loan to Value Ratio

	Minimum	Maximum	Mean	N	std. Dev.
Do score	41.59	66.72	55.54	19	8.47
Do not score	32.96	79.21	58.91	33	10.32

4.5.3. Summary - scoring as a function of size

It is clear that a relationship exists between lending volumes and the decisioning system used. However, this relationship should not be imbued with more significance than merited by the data considered. In considering the whole issue of mortgage lending many more attributes need to be considered. Whilst the data considered by the survey is valuable, it has been gathered with a particular research focus in mind. It is therefore important that lending volumes are not attributed a sole “causal” value, relative to the decision to adopt mortgage scoring based on this data. Other potential influences on the decisioning mechanism are likely to exist. Amongst these are delivery channels used, levels of technology in place, and existing management information systems available. However, what is clear is that those with high volumes of mortgage applications are more likely to be using credit scoring.

When loan values are considered, the fact that scoring organisations process loans with a higher mean value, presents some interesting questions that cannot be answered at present. When considering mortgage credit risk, the mean value of the loan is less critical than the proportionate loan to value ratio of the transaction. Unfortunately this data, which would provide more insight, was not available within the current study. However, the notion that credit scoring is only suitable for high volume/low value lending has been tempered by the presentation of this empirical evidence, which refutes this fact.

Supporting the assertion that scoring offers cost benefits, it has been found that on average, scoring organisations do have lower cost:income ratios than non-scoring organisations. Again the finding is interesting but not conclusive. This is due to the complex range of variables that comprise the cost:income relationship. These go well beyond the mortgage decisioning mechanism and even the mortgage product. For many of the lenders concerned, a multiplicity of products make contributions to the overall profitability of the organisation, and each absorb a proportion of the costs.

Finally, whilst mindful of the cautionary notes, empirical evidence has been presented that confirms mortgage scoring is adopted by high volume, higher value lenders who on average display lower cost:income ratio's than non scoring organisations. When these features are presented in combination, they might indicate that credit scoring is allowing some lenders to reap the benefits of economies of scale.

4.6. Developing Mortgage Scoring

As has already been established, credit scoring is relatively new to mortgage lenders. With this in mind, it was unclear how scoring had been developed within the respondent organisations. The first question presented sought to identify where the impetus for introducing scoring had come from. Respondents were asked to nominate members of the organisation as “drivers for change” in introducing credit scoring. Twenty-two organisations provided data, of which twelve confirmed that

the Director of Credit had been key in ensuring scoring was implemented. Taking individual responsibilities into consideration, this suggests that for the majority of respondents, scoring was introduced with a focus on improved risk management. The remainder of respondents cited the categories IT director, “other”, and multiple “drivers” as those responsible for the introduction of scoring.

As mortgage scoring is relatively youthful, it was unclear whether respondent organisations had the expertise to develop and introduce scoring without external help. Organisations were therefore asked directly whether scoring had been developed “in house”, externally or jointly with external help. Twenty-three respondents provided data of which only three had developed their systems “in house” without assistance. The majority, sixteen, had worked jointly with external developers of whom ten had worked with Scorex. The remaining three had placed responsibility totally outwith the organisation, devolving development entirely to the external organisation.

4.7. How scoring is used in the organisation

As the survey was exploratory, lenders were invited to provide non-prompted narrative responses, presenting their perception of the role of scoring within their own organisation. The responses are subjective in nature, and provide an insight into the dynamics of selecting an appropriate decisioning system within a lending organisation. The responses were analysed by identifying repeated themes and responses within the text. Where appropriate these were then grouped. This data was not gathered with a view to providing a scientific resume of all possible issues surrounding the selection or rejection of scoring. Rather it is an attempt to gather as much data as possible that will support the generation of hypotheses about scoring usage, and determine the way forward for the research.

4.7.1. Systems prior to scoring and reasons for change

The alternative and predecessor to credit scoring is judgmental evaluation of lending proposals. Within the judgmental evaluation process two main modes of operation

were identified within the responses. One group of lenders outlined a hierarchical system of lending authority. In such a system the loan value determined the level of seniority of the staff member making the decision whether or not to lend. This system suggests a formalised career path attached to mortgage underwriting which provides associated training and remuneration. The hierarchical approach can be critiqued at several levels. With this approach, some difficulty can occur in matching the loan applicant to the necessary lending authority. Thus for example, an individual requesting a high value loan may find his application being forwarded to an appropriate member of the hierarchy. This process can result in delay of response. Additionally no evidence was uncovered that proved loan value is directly related to the risk profile of the loan. Within the literature, and empirically within this thesis, it is proven that the loan amount to property value (LTV) ratio is strongly correlated to risk of default. It is therefore reasonable to observe that any hierarchical system might be more efficiently based on LTV ratio than loan amount.

The second group identified were those organisations where decision making was mainly driven by “policy rules”. No data was gathered about how such policy rules were developed or by whom, but traditionally policy rules are determined by a centralised risk department and then cascaded throughout the organisation. Where lending is managed by policy rules, there is likely to be a less formal structure of seniority attached to loan decision making. Policy rules also contain some major deficiencies. An example is the common policy rule that the upper lending limit, be set at three, three and a half, or even four times the applicant’s salary. No empirical evidence has been found which justifies or explains how values such as these are determined, or how they came to be accepted as “commonly” set limits. The use of this “mortgage multiplier” was also critiqued by Howcroft and Hill as early as 1992, who stated that *“the current practice of using the mortgage multiplier to assess how much a customer can borrow on a mortgage, needs to be reassessed”*. Whilst not approaching the issue from an identical perspective, new empirical evidence presented later within this thesis addresses this issue. Findings confirm the diminishing credit risk linked to increasing basic income. However, the relationship found between risk and monthly net income, which is discussed later within this

thesis, is not monotonic and thus not easily explained. Therefore Howcroft and Hill's desire for the influence to shift from annual basic income, to include a consideration of existing commitments would appear to be justified. This helps to illustrate that historical policy rules may not be the best means by which to create lending policies that accurately reflect mortgage credit risk.

4.7.2. Rationale for changing from judgmental to empirical decisioning

Respondents were then asked to provide the reasons underlying the decision to change to credit scoring. These are presented ranked from the most commonly cited, to the least commonly cited.

- I. The key reason for introducing credit scoring was to achieve improved risk management. This was presented in a number of guises, including a desire to reduce arrears, reduce losses and generally as a desire to "improve credit quality". Due to the lack of publicly available data on the performance of mortgage scoring, it must be inferred that each lender undertook the creation and testing of a credit scoring system. We must then infer that the system was found to provide improved lending outcomes. That an empirical mortgage scoring system can provide better lending outcomes than judgmental evaluation is proven later within this thesis. However, the point must be enforced that achieving improved performance is not an automatic outcome of adopting credit scoring. The improved performance which can be evidenced at the test stage of scorecard development, assumes strict adherence to the system decision outcomes. Otherwise the empirical imperative and thus risk management is compromised. This presents the first contradiction found in lender's responses. Despite adopting scoring in order to improve risk management, they fail to apply scoring in a consistent fashion. Further evidence within the survey responses confirmed that all lenders who have mortgage scoring systems, over-ride the system generated lending decisions in an ad-hoc fashion. Thus the desire for improved risk

management is compromised to a degree by the method by which credit scoring appears to be managed at an operational level.

- II. Consistency of decisioning was the next most commonly cited reason to introduce scoring. Consistency is confirmed within the literature as being afforded by a centrally managed scoring system. The judgmental alternative is to have a variety of individuals decisioning based on policy rules. The application and adherence to such rules can vary between individual lenders, thus inconsistency occurs within such a system. Consistency is desirable for two main reasons. At a risk management level, consistency is required if risk exposure levels are to be maintained. Credit policy rules are set in an effort to ensure a pre-determined level of risk is borne. At a customer service level, consistency is required to ensure that individuals are treated in an even-handed manner, regardless of the channel by which they apply for credit. Again, achieving this desired consistency is not an outcome of adopting credit scoring. It is only achieved where scoring outcomes are applied and adhered to in a steadfast fashion. Again, a contradiction where the desire for consistency appears to be compromised by the method by which credit scoring is managed at an operational level.
- III. The next most common reason for introducing scoring was the perceived objectivity of scoring. The objectivity is derived from the empirical methods by which scorecards are developed. Again, a desire compromised by the practice of over-riding, where the over-riding is conducted in a subjective manner. Evidence that this is the case resulted from the follow up interviews which took place and will be discussed in full later within this thesis. The legislation which governs scorecard development may also compromise objectivity to an extent. Not all variables most closely related to default risk are necessarily included in a final scorecard. This is because legislation, which seeks to protect individuals from discrimination precludes the inclusion of certain data. Thus the data included is not wholly objective. The legislation itself could in certain circumstances prove to be discriminatory. An example might be a dataset on which male and female borrowers exhibited different loan performance outcomes. By not allowing gender to be

included in the scorecard, the better performing group is negatively discriminated against. However, at another level, objectivity from a system based approach is ensured. Much of the concern about subjectivity may result from the difficulties of understanding the decisioning process. This is a particular problem when decisioning is conducted by a large number of individuals on a judgmental basis. Scoring provides a scientific basis for understanding why applications should be accepted or rejected

- IV. The next most common reason cited was “speed”. Speed refers to the time taken from receipt of the application form, to the borrower receiving agreement in principle that he can borrow the desired sum. Credit scoring can improve the speed to decision, as the system can evaluate the data gathered efficiently and very quickly. Evidence supporting this statement is presented within the benchmarking chapter of this thesis. Again improvements in how quickly decisions are made, are dependent on how scoring is operationalised. The data gathered on over-riding meant that the benefit of improved processing speed would not necessarily be achieved, due to the influence of the additional underwriting time which was found to be part of the mortgage scoring/over-riding process. Additionally the variety of locations of scoring within the mortgage process impact on the speed improvements achieved. A point of sale system, might offer substantial improvements in speed, whilst a centralised system would less able to improve speed as significantly.
- V. General improvement in the mortgage process, and improved levels of customer service were the next most common responses. Without being explicit, lenders referred to “process improvements”. This could be derived from a wide combination of the earlier responses of consistency, objectivity, risk management and speed. Likewise customer service improvements could result from various aspects of the issues already raised.
- VI. Fewer responses were received for the final group of reasons, but these are some of the most thought provoking. Three lenders stated that they had introduced credit scoring to “aid” the underwriting staff. This suggests that they did not intend to move from judgmental to empirical decisioning. These

lenders explicitly intended to combine judgmental and empirical methods. No rationale for doing this existed in the existing literature, and this was one area which was subsequently investigated at interview. Only two lenders cited the improved management information which is derived as a result of credit scoring. One key aspect of management information is the score value itself. When evaluating loans the score value provides a risk ranking for each applicant. The score can be used to profile the lending portfolio with a variety of other foci. Marketing strategies, arrears management and risk pricing can all be influenced by the risk ranked score values. Only one lender introduced scoring on the basis of reduced costs. Unfortunately the response was not specific in highlighting which aspects of costs would be directly impacted on. However, the cost benefits anticipated augment the previous risk and process benefits already identified. Three different individual lenders introduced the more strategic dimension of the decision to change to the new system. One simply stated “strategic reasons”, the others more explicitly stated a desire to move to point of sale decisioning and a desire to introduce risk pricing. Both benefits are realisable as a result of credit scoring. However, both could be and are achieved by other means. Many of the participant lenders have judgmental point of sale decisioning in place, and are moving from that to the centralised control offered by scoring. Additionally risk pricing already exists in mortgage lending albeit only tacitly acknowledged. Risk pricing results from mortgage borrowing rates being determined to a large extent by the loan to value ratio. As previously stated the LTV is strongly associated with propensity to default and is therefore a useful proxy measure by which to determine price based on risk.

4.7.3. Summary why lenders change to empirical decisioning

Lenders clearly have an agenda when they decide to move from judgmental to empirical decisioning systems. The key components of improvements in risk management, processing efficiency and customer service were evident within responses. Additionally, more strategic influences were identified which suggest that

lenders might introduce scoring as part of a broader plan such as to change delivery mechanisms, or product positioning.

However, conflicting goals have been identified. Whilst improved risk, process and service benefits are desired, the method by which scoring is operationalised limits the extent to which these benefits can be achieved. Only three lenders had explicitly introduced scoring to augment the judgmental process. However, in effect all lenders are combining empirical and judgmental decisioning systems. A question is raised as to whether using scoring to augment the skills of the underwriters differs significantly from using underwriters skills to augment the scoring system. Further analysis presented later within the case study section of the thesis suggests that the underwriters are not successfully augmenting the lending system. However, as will be evidenced this may have resulted from the nature of their involvement in the process, rather than from their abilities.

The findings of the case study determined the need to conduct interviews in order to understand two things. How aware are the lender organisations of the compromise of the initial goals, and why is this compromise deemed necessary? These issues are addressed in the review of the interview findings presented in chapter five.

4.8. Why Lenders Compromise the Empirical Imperative

Respondents were explicitly asked how they used scoring in the decision process. Twenty-one lenders provided a response. Responses were invited in three categories:

- a lending officer makes a decision, the score value is considered
- credit scoring system provides a decision which is always accepted
- credit scoring system provides a recommendation, which may be overridden

The figures confirming the response numbers and organisational types are presented in figure 4.12.

figure 4.12: Scoring Usage - Empirical, Judgmental, Combined

	Bank	Building Society	Other
1. Judgmental (considers score)	45% (5)	25% (2)	
2. Empirical (accepts score)	9% (1) (response indicative as intention not practice)		
3. Empirical & Judgmental together	45% (5)	63% (5)	100% (2)
4. Multiple response		12% (1)	
	100% (11)	100% (8)	100% (2)

Category one reflects that the lending officer makes a decision, and *considers* the credit score value. This suggests a judgmental system augmented by an empirical system. Seven of the twenty-one respondents confirmed this to be the case. Category two presents a credit scoring system providing a decision that is always *accepted*. This suggests a wholly empirical approach to credit decision making. Initial analysis confirmed that three lenders were in this category. However, closer examination of the survey document provided contradiction from two of these who then went on to provide a variety of over-ride reasons. This disproved the *always accepted* assertion, and thus these lenders were transferred in to category three. The remaining lender asserting that they always accepted the score recommendation was in fact developing the system rather than using. Thus they *intended* to always accept rather than are currently always accepting a system generated decision.

Figure 4.12, confirms that no single lending organisation utilises a wholly empirical decisioning process. All lenders who have scoring experience used a combination of empirical and judgmental decisioning methods. Category three comprised those lenders who confirmed that the credit scoring system provided the lending decision, but this decision could be subsequently overridden. This approach suggested the overt combination of empirical and judgmental systems. In total twelve lenders, more than half of the group, is in this category. A final respondent confirmed that they were in all three categories. This may well have been the case, as alternative delivery channels may have been used within the organisation, and each could have

used a different method of decisioning. No additional information was available that confirmed this fact.

4.8.1. The Circumstances Which Prompt A Compromise

The compromise under consideration is the practice of overriding a credit score generated lending decision. No differentiation was made within the survey which distinguished between the two main categories of override. The decision can be either to accept an application which the credit scoring system declines, or alternatively to reject an application which the credit scoring system has accepted. The section addressing overriding is gathering data on both types of override.

Many examples of the circumstances in which a credit scoring generated lending decision can be overridden are offered. Responses are presented ranked from the most common to the least common responses.

- I. Ten lenders cited the most frequent reason given, all of whom confirmed that they would override a decision for an existing customer. Depending on the lender's source of business this could result in almost all being overridden, or almost none at all. "Existing customer" is likely to be only a partial explanation of the override decision. What is being implied is that due to the fact the lender knows the potential customer, additional information is known. This suggests two things, both of which are somewhat contentious. Firstly, it assumes that those making the lending decisions are aware of the variables and weightings utilised within the credit scorecard. This is unlikely. Lenders guard the scorecard content closely for fear that knowledge of scorecard content might lead to abuse of the system. Such abuse might result from either potential customers becoming aware of the required characteristics and falsifying data. Alternatively staff members, some of whom receive financial incentives to lend money, might falsify application data themselves to improve their lending rates. The second somewhat contentious issue is the assumption that underwriters can use this additional information, should it exist, in a manner which allows them to rank risk

effectively. Recalling the goals for scoring to provide consistent, objective, risk-ranked lending decisions, it seems that a conflict exists if varying amounts of unspecified “information” are being used to augment decisions made by the scoring system. This is particularly true where the unspecified data is being combined with data based on evidence of aggregate past loan performance, such as the data in the scorecard. Again this anomaly required to be discussed with lenders at the interview stage, if an understanding as to why this practice was common place was to be gained.

- II. “Information held which is outwith that which the scoring system utilises” is the second most common reason cited. This category could therefore be viewed in the same way as the previous reasons. Can the lender be sure the information is in fact “additional”? How can the lender use such information in a fair, consistent and objective fashion, which more accurately ranks the associated risk?
- III. The next most popular reason for overriding was half as popular as the belief that additional information needed to be considered. Four lenders confirmed that overrides occur “*whenever a specialist underwriter deems it necessary*”. These responses were received from lenders who used the empirical system, solely to augment the judgmental evaluation which was the primary decision making tool. The potential for scoring to “add value” based on the potential benefits which lenders intended that scoring would deliver, is significantly reduced when scoring is used in such an extemporised manner.
- IV. Three lenders confirmed that they override the credit scoring system based on the criteria “loan to value ratio”. During the case study phase of the research reported in chapter six, loan to value ratio is found to have a monotonic relationship with default. As LTV increases so does likelihood of default. Two observations are made about overriding based on LTV. Firstly, LTV is so strongly correlated to risk of default that it would normally be included in the credit scorecard. This leads to lenders overriding based on “double counting” of data already contained within the lending decision. Thus the overriding may be either penalising or enhancing the risk profile of the applicant, by reconsidering data which has already been used to rank the risk

of default. However, the second observation records an anecdote and brings a new dimension to a review of overriding. Anecdotal evidence presented by a single lender suggested that loans with LTV ratio's of below eighty percent rarely result in a loss to the lender subsequent to default. The "equity shield" being adequate to compensate for the cost of the default. This suggests that LTV as well as being an indicator of risk, is also an indicator of the underlying profitability of the transaction should default occur. This brings an important new focus to the consideration of lender actions. Credit scoring applied to mortgages is currently producing a risk ranking. However, the scorecard is not considering profitability, nor as was evidenced earlier, does it consider the value of the relationship. This suggests that overriding in certain circumstances may usefully augment the risk ranking, by considering these new dimensions. What is harder to establish is how successful a subjective consideration of profit and relationship values can be when used to augment an empirical value of risk?

- V. Only two lenders confirmed they considered overriding the empirical decision based on customer or intermediary driven appeals. This low number is somewhat surprising as the industry's own Guide to Credit Scoring (1993), confirmed that following an appeal "*lenders should reconsider the application if supported by additional verifiable information*" and that "*the review should be conducted by a different lending officer*". As around "*thirty percent of those who apply for mortgage credit are refused*" (Brown-Humes, 1997), it could be presupposed that all lenders would override as a result of appeals. However, as lenders are responding using their own definitions, it should be noted that the reasons in categories one and two could result from the appeals process.
- VI. The remaining responses were as follows. Two lenders confirmed that policy rules existed which allowed them to override the score outcome. This response could perhaps be aligned with responses citing "additional information". However, the basis for such policy rules would require to be established prior to effective evaluation of the benefit of such actions. A single lender confirmed that the credit score would be overridden where a

guarantor was willing to underwrite the loan. This is certainly a circumstance where the risk is mitigated by data external to that considered by the scoring system. The scorecard considers the applicant profile, and does not consider the guarantor profile. Augmenting the scorecard to consider the guarantor data would be complex but possible. The presence of a guarantor may or may not affect the likelihood the applicant will default. Additionally the relationship between risk and the presence of a guarantor, would require to be established to ascertain to what extent, if any, the guarantor mitigated the risk. A further lender confirmed that procedures surrounding the overriding of the score outcomes had not been formally drafted. This suggests a truly ad-hoc approach to combining empirical and judgmental methods.

4.8.2. Summary - The Circumstances Which Prompt A Compromise

Evidence is provided which confirms that the empirical imperative is compromised for a variety of reasons. Whether the empirical system is augmenting the judgmental methods or visa versa, overriding takes place. What is less certain is the impact of such overriding on the effectiveness of the system. Can a credit scorecard deliver the goals of consistency, objectivity, speed and risk management whilst being combined with subjective overriding?

A new dimension is considered. Granting mortgage loans obviously requires a consideration and quantification of the risk inherent in the transaction. However, profitability or the “return” on the transaction is also of considerable importance to the lending organisation. If a scorecard is only predicting risk, this suggests that overriding based on profitability could be a valuable process. However, this would require that the risk:return relationship could be combined to produce a lending decision which is better than a solely risk based decision. The question as to whether lenders base lending decisions on risk or return was taken to the interview section of the research, an analysis of which is presented in the next chapter.

4.9. Business Benefits Derived Via Credit Scoring

The survey identified the expected benefits of changing from judgmental to empirical decisioning. The survey then sought to identify which of the anticipated benefits had actually been delivered, and whether any unexpected benefits had been achieved. Respondents were asked to outline the business benefits that had been “derived from the use of credit scoring”. Again no prompts were given to respondents, and they were free to answer as they wished. The responses were all in narrative form, and these were again analysed by identifying themes and quantifying responses. Responses are presented ranked from the most common to the least common responses.

- I. Speed is the most commonly derived benefit of credit scoring. Seventeen respondents confirmed this fact. Expanding the response, it became clear that some respondents are deriving speed by “fast-tracking” applications. This process involves applicants which achieve credit score values indicative of a low level of risk being processed differently. The improvements in processing speed can be achieved in a variety of ways. These include undertaking no manual underwriting, requesting less supporting documentation, or point of sale decisioning as opposed to centralised decisioning. Additionally by fast-tracking the lowest risk applicants, lenders confirm that they also benefit by improving the utilisation of their “scarce underwriting resource”. This confirms that for many lenders, credit scoring is delivering benefits in all of the categories of risk, process and customer service benefits. It is also possible that speed was the most commonly cited benefit, as it is the current focus of many lenders. They are seeking increased speed in order to match the new entrants to the sector who offer speedy mortgages via telephone and Internet delivery channels. These lenders offer lending decisions in principle, in times of around ten minutes. Therefore processing and decisioning time is a particularly important performance measurement at the present time.
- II. Ten lenders confirmed that consistency was being achieved. Echoing earlier comments, this perception may be somewhat misleading due to high levels of over-riding. However, what is clear is that consistency is certainly improved,

even if not absolutely achieved. All applicants are being assessed within an identical and consistent process, and all are achieving an initial decision in a wholly consistent fashion. Only the minority that are being over-ridden, may be inconsistently dealt with. The inconsistency can be removed by the development and implementation of credit policies specifically dealing with over-riding. This suggests that empirical decisioning may be used as the key decisioning method, augmented by judgmental for a few cases that merit additional consideration.

- III. The next most popular benefit achieved was confirmed to be reduced levels of arrears. This benefit confirms that the goal of improved risk management is being achieved. It is interesting to note that this risk benefit, has ranked behind process and service benefits. A particularly useful observation when related to the literature, and much of the research to date. Until now both have focused mainly on credit scorings ability to reduce arrears and improve risk management. This benefit is also confirmed by additional work within this thesis, which confirms that a bespoke mortgage scorecard can have the capability to predict arrears more effectively than a large number of individuals making judgmental assessments.
- IV. The ability to handle greater volumes of lending, with no reduction in credit quality is cited by five lenders. Whilst scoring can handle greater volumes, due to speed of processing, introducing scoring would not directly influence volume of applications received. This finding suggests that scoring must have been introduced to coincide with a strategy which increased volumes of business handled. Whilst it cannot be confirmed for all lenders, for some this was certainly derived via using scoring as a mechanism for decisioning within new delivery channels such as telephone call centres. During the interview phase it became clear that some lenders had different credit management strategies for each delivery channel. However, this response suggests that credit scoring was introduced as a strategic tool, to allow lenders to access new markets and attract additional business. It would seem that this strategy had worked satisfactorily.

- V. Improved management information was recorded. Building and maintaining a credit scoring system requires high volumes of good quality data. Therefore good data management is a prerequisite of scoring. The output data when the system is operational allows lenders to track the performance of the loan portfolio very closely. Examples of improved management information included levels of arrears, maturation patterns of arrears, performance of over-riden applications relative to the rest, and performance of individual underwriters. Many of these data outputs are new to lenders. In particular the ability to track override performance provides useful data about the credit policies in place. Lenders also cited the benefit of tracking overrides as these cases are perceived as “marginal business”. Lenders confirmed that they believe opportunities may exist to conduct marginal business very profitably. This is partially due to the size of the sector, (thirty percent of applicants are declined), and may also be due to the belief that there is potential to use risk pricing in this sector.
- VI. The ability to use the credit score as a means to introduce risk pricing was presented by three organisations. Risk pricing is at present based on the LTV ratio, which is a single risk variable. By using the credit score to set the price, a more holistic view of the risk underlying the transaction would be presented. Receiving the same level of support lenders confirmed the credit score’s role in supporting the work within a judgmental underwriting department. They stated that the benefit of the score was its use in setting the level of underwriter. This reflects the traditional hierarchical structure, whereby the more senior underwriters deal with “riskier” business. Thus when the application has been scored, the score value determines the level of seniority of the individual who then manually underwrites the business. This suggests the organisation does not believe that the scoring system they use contains adequate information by which to predict mortgage outcomes. Whilst it may seem something of an anomaly to both utilise and then disregard a credit scorecard, many valid reasons might exist for doing so. As has been discussed earlier, mortgage scoring is in its infancy for the majority of these lenders. Additionally the majority did not have “in house” expertise

in scorecard development. The lack of in-house skills, may have resulted in a generic scorecard being purchased rather than a bespoke card being developed. This would limit the effectiveness of the outcomes. Lenders may therefore be rationally utilising an integrative approach to introducing the technology to the organisation. This allows them to test the performance of the scorecard, whilst managing the risk using the existing underwriting resource. Such an approach allows the effectiveness of the system to be established, prior to a more convincing move to empirical decisioning.

- VII. The final response which received support from more than a single lender, confirms the earlier assertion that policy rules may not be the most effective means by which to manage risk. Two lenders confirmed that dependent on the score value, they relaxed the salary multiples that normally determine the maximum loan value. This suggests that applicants can borrow more or less depending on their risk profile. Salary multiples allow all individuals to borrow the same maximum amount regardless of perceived risk. Lenders are convinced sufficiently of this to suggest they will “*optimise profit by relaxing the salary multiples*”. This is potentially a risk management benefit, and a customer service benefit also. Additionally by differentiating themselves on the means by which they determine maximum loan amount, they may attract a new group of applicants.

4.9.1. Summary - Business Benefits Derived Via Credit Scoring

A range of benefits is identified as being derived via the introduction of credit scoring. As a result of the confirmation of benefits sought and derived, the benefits of credit scoring can now be placed into a variety of categories which can be differentiated. Risk benefits, process benefits, customer service benefits and cost benefits are all identified. This provides a new perspective on credit scoring research. The potential benefits achievable go beyond improved risk management, which until now has been the focus of credit scoring research.

4.10. Response of those who do not credit score

The final section of the questionnaire was directed at those organisations who are neither using, nor developing scoring. Forty-one respondents were in this category; four banks, thirty building societies and seven other lenders. The profile of these organisations is that of smaller lenders. This is confirmed by examining the mean number of mortgages processed. The non-scoring respondents exhibit a mean number of 7,433 applications per annum. This compares to a mean number of 37,203 for those who do use scoring. The building society lenders are mainly small “local” societies and this should be borne in mind when examining responses. The intention was to gather a range of data, which outlined why organisations chose to maintain their judgmental evaluation systems. No response options were offered within the questionnaire. Respondents were invited to provide their explanations in narrative format and in their own words. Reasons are presented ranked from most common response to least common.

4.10.1. Business reasons for using judgmental evaluation

I. The most common reason provided was the “flexibility” offered by judgmental evaluation. Several organisations allude to the fact that this flexibility is linked to using a broader range of data than a traditional scorecard. Many specifically stated that they “*considered all relevant data*”. They were not specific about the nature of all the additional data. However, some aspects of the range of data used were cited, and include many references to “*in depth knowledge of the customers*”, and strong “*customer relationships*”. This reflects the local nature of the customer base of many respondents. This view of judgmental evaluation as being flexible, ignores the fact that most underwriters are governed by a set of policy rules. Policy rules are themselves rigid. As an underwriter can waive policy rules, so a credit scoring organisation can override a scorecard. The views presented about the wide range of data, and the customer relationship, disguise the fact that in many of these instances the lenders are in fact referring to behavioural data, e.g. behaviour of associated current account. Such data can usefully be included in a scorecard. The one area of expertise that cannot easily be

included in a scorecard is local knowledge. Where the local knowledge referred to is knowledge of the local economy, the information is likely to prove valuable. Within the literature review, evidence was provided which supported the inclusion of local unemployment rates and house price indices in the US market. Thus the perception of increased flexibility of judgmental evaluation could be challenged at all levels with the exception of the potential value of economic data.

- II. The performance being achieved by judgmental evaluation was the second most common reason. Lenders confirmed that they achieved levels of arrears and debt which satisfied them. Several asserted that the levels they achieved are lower than industry average. This is an area which requires more detailed examination. It is difficult to determine the “optimum” level of debt which maximises profit. Data is not available in the public domain which presents the trade off between debt levels and profitability. However, due to the nature of the mortgage loan the trade off is not a simple one. Mortgage debt results not only in potential financial loss for lender and borrower, but also a social cost as the borrower loses his home. Whilst lenders have traditionally maintained low debt levels, the increase in awareness of customer profitability profiles, means that lenders are aware that they could in some cases allow debt to rise, and at the same time increase profitability. However, it is likely that organisations which pursued such a strategy openly, would be accused of “profiting from human misery” within the popular press. Nonetheless, having debt levels which are lower than average may not be to the lenders benefit.
- III. Size was reported in two ways. Lenders suggested that low volumes of lending which they conduct, meant that judgmental evaluation was the most cost-effective means by which to assess applications. They also reported that low volumes of data, and very little “bad” experience made it impossible for them to build scorecards which would be accurate predictors of bad debt. These are valid observations. Whilst some lenders purchase generic scorecards, the best performance is derived from a bespoke scorecard. Small sample sizes are also acknowledged to be a potential problem. However,

within the literature several scorecards which performed well were developed on small samples, as was the scorecard which is presented later within this thesis.

- IV. The remaining responses were varied. Lenders confirmed a lack of knowledge and lack of research relative to credit scoring mortgage loans. A single lender alluded to the fact that they focused on quality not quantity. This confirms the popular belief that scoring is suitable for high volume, low value lending. As was already evidenced this popular belief is somewhat contradicted by the survey evidence gathered. On a completely different tack, one lender confirmed that they employ “case ownership” where the lending employee is tacitly responsible for the loan outcome over time. They considered that their arrears management was facilitated by this “case ownership”, as their employees had a responsibility to “chase up” potential debtors. A perspective which is perhaps possible for this organisation which processes almost seven thousand applications per annum, but would be unrealistic for a large lender to consider.

4.10.2. Summary - Business reasons for using judgmental evaluation

From the perspective of smaller lenders, it is acknowledged that lending volumes are a valid constraint. With little bad experience, small sample sizes make building a scorecard more challenging. However, the key issue of flexibility of judgmental evaluation is not as convincing. As evidenced, only the economic data is likely to be of real value. No information was evidenced which suggested that underwriters do in fact consider economic factors.

4.10.3. Benefits Which Scoring Could Deliver

When non-scoring organisations were asked about the benefits which scoring could deliver, the benefits identified almost mirror those presented by those who have adopted scoring. Speed of processing, consistency and improved risk management were most common. Next most commonly cited is the ability to risk-price based on the credit score. This was a surprising result, as risk pricing based on the credit score value is not common. No evidence of such pricing has been uncovered in practice. Lenders are obviously aware of the potential to improve margins by accepting higher

risk business. Reduced costs and the ability to fast-track low risk applicants are also reported by two lenders each, as is the improved management information, which is derived from scoring. The final categories were the ability to centralise decision making, and the ability to improve product penetration rates via improved marketing information. The responses show that even those who reject scoring as a mechanism, are well aware of the potential benefits that can be achieved when circumstances are apposite.

4.10.4. Why Credit Scoring is Unsuitable for Certain Organisations

The key reasons why scoring is considered unsuitable reflect the responses as to why the lenders current system is viewed as preferable to scoring. Most important were the strength of the customer relationships, and the perceived inflexibility of scoring. It was not clear from the responses why scoring was believed to be detrimental to relationships. However, looking at the previous responses it seems likely that this issue is linked closely to the perception of inflexibility. The lack of suitable data on which to create a scorecard was also reported, as were the costs of both introducing and maintaining a system. Both of these appear to be valid reasons why scoring may not be suitable. However, it does raise the question as to whether smaller societies could conceivably “pool” data in order to develop effective scorecards, and at the same time manage development costs. The remaining responses highlight the depth of feeling about scoring. Two organisations stated that they felt scoring would not fit their “culture”. No explanation was provided. This may reflect the historical autonomy of decision makers and also the hierarchical nature of lending authority, where those who lend are ranked in order of seniority relative to the level of their individual lending mandate. The cultural conflict between scoring and lending hierarchies can in part be driven by an unwillingness to relinquish seniority to a computer; a fact recorded by another lender who reported that “*we employ people who think, not just follow a computer programme*”. This viewpoint is reflected by another lender, who states that scoring is unsuitable as “*we have highly skilled staff.*” On the same theme two lenders suggested that scoring was a negative force which “*clouded peoples judgement*”, by providing a risk ranking. The suggestion here is that the scorecard is not a good indicator of risk, to the detriment of the underwriter

who is. Scoring was also considered unsuitable by lenders who considered themselves to lend to a very specialised market. The public profile of these lenders was not supportive of the view that they operated in a specialised niche market.

4.10.5. Negative Experience of Credit Scoring

The most common negative experience came via anecdotal evidence from mortgage intermediaries who had confirmed to lenders that they had “bad experience” of credit scoring. Those lenders who rely on mortgage intermediaries for a high proportion of their mortgage business are those who are most sensitive to intermediary perceptions. Lenders also had first-hand experience of lending successfully to those who had been declined by organisations who conduct credit scoring. They confirmed that this “marginal lending” was an attractive market for them.

4.11. Conclusion

The survey provided a wealth of informative data. However following analysis of the survey data, an apparent dichotomy seemed to exist. Lenders were adopting empirical methods of decisioning, whilst continuing to undertake judgmental evaluation. This led to the generation of several hypotheses;

- Despite assertions that the introduction of scoring is driven by risk management, lenders are aware that their scoring system does not contain enough data to predict mortgage risk
- Organisational culture determines the rate and means by which lending policy alters from judgmental to empirical
- Lending decisions are being made based on profitability profiles of customers, rather than risk profiles.

In order to test the hypotheses, more detailed investigation and understanding was deemed necessary. It was determined that the best means by which to achieve a

deeper understanding was by means of a follow-up interview schedule. An outline and analysis of this interview data is now presented, in chapter five.

Chapter 5

5. The Lenders Perspective - Interview Evidence

5.1. Introduction

As evidenced in the foregoing chapter, the industry survey provides a wealth of data. However inconsistencies were found within the responses. The main reasons that lenders had introduced scoring were confirmed as a desire for objectivity, consistency, improved risk management and speed of decisioning. Yet no single lender was adhering to the credit decisions recommended by the scorecard in all cases. A wide variety of reasons for overriding the decisions, which are generated by the scoring system, were provided. These anomalous responses had prompted the generation of several research questions as presented in Chapter 4 and now reiterated:

- Do the credit scoring systems used contain sufficient data to be able to predict mortgage default risk?
- Does organisational culture determine the rate and means by which lending policy alters from judgmental to empirical decisioning?
- Are lending decisions made based on the profitability profiles of customers, rather than risk profiles?

An interview schedule was undertaken to present these questions directly to lenders, in order to ascertain their level of awareness, and to obtain their views on the issues. This chapter presents an account of the interviews, which were undertaken during July and August of 1998. The participants in the interview programme are profiled, along with a review of the interview content. Thereafter the interview findings are presented. In conclusion this chapter provides answers to the research questions

presented, and highlights some issues for credit policy and the management of credit scoring.

5.2. Participants

As introduced within the outline of the research design presented in chapter three, thirteen organisations were selected for interview from the respondent population of sixty-six . As participants were assured of complete confidentiality, no single lender will be identified. However, whilst not compromising the confidentiality agreement reached, the organisations are classified by several categories. The organisations were selected on the basis of organisational type and credit scoring status. Additionally where possible a large and small volume lender was selected in each category of lender type and scoring status. By selecting on this basis, it was intended to identify lenders who would represent a diverse range of views. Looking at the lenders in more detail, six banks, five building societies and two specialised lenders agreed to be interviewed. The scoring status of these lenders is as follows:

figure 5.1: Scoring Status

	Bank	Building Society	Other	Total
In use	4	2	1	7
Being Considered		2		2
Not Used	2	1	1	4
Total	6	5	2	13

5.2.1. Participant Profiles

When examining the scale of mortgages processed by interview participants, the diversity in mortgage volumes processed is exhibited in the range. The lowest number of mortgage applications approved per year was found to be 250 with a

maximum number for a single lender of 173,600 applications. Such an extreme range, makes it understandable that the processes and attitudes presented during the interviews might not necessarily result in a consensus of opinion. Figure 5.2, presents the volume of loans, organisational type, and scoring status in more detail.

figure 5.2: Value of Loans

Volume of Loans per annum	Organisational Type	Credit Scoring?
173,600	bank	yes
149,711	bank	no
53,000	building society	yes
16,310	bank	yes
12,000	bank	yes
12,000	other	yes
11,000	building society	no
6,830	building society	yes
5,500	building society	no
1,200	bank	no
750	other	no
250	building society	no
withheld	bank	yes

This confirms the survey findings that the selection of a decisioning system is not wholly related to size. Whilst one lender interviewed processes slightly under 150,000 mortgages per year without scoring the applications, another who is processing 6,000 mortgages does use credit scoring. That one group can derive value from scoring, whilst the other chooses not to use scoring reflects one of the themes of this thesis. What benefits do lenders derive, and what conditions must exist if these benefits are to be achieved? Figure 5.2, also confirms that the majority of interviewees who are not currently using credit scoring are smaller lenders. This also reflects the findings of the initial industry survey, and confirms

that, in this regard, the profile of the interview participants generally reflects the profile of the whole population.

A further comparison, which compared the interview participants with the survey population was undertaken. This was a further attempt to determine whether the interview population could be considered representative of the whole population. On this occasion the cost:income ratios of lenders being interviewed were compared with the population ratios. The interview population is found to be in a range slightly lower than the population as a whole. The minimum cost:income ratio found across the whole population is 32.96%. This value is also the lowest value of the group interviewed. The maximum ratio found across the whole population is 79.21%. This is higher than the maximum within the interview population, which is 64.47%. The lower maximum value in the interview group, is reflected in a lower mean value of 52.94%, which compares to a population mean of 57.67%.

Having selected the interview participants by organisational type and scoring status, and having compared volumes of mortgages processed and cost:income ratios no serious anomalies were found between the profiles of the interview participants and those of the population as a whole. Therefore the views of the interview participants, are believed to reflect the range of views likely to be found across the mortgage industry at the time the interviews were conducted.

5.3. Interview Outline

The interviews were conducted at the office of the interviewee, and typically lasted for approximately one hour. The interview outline, which is presented in Appendix G was based on the findings of the initial survey and augmented by topical issues of the day. The interview outline was amended depending on scoring status, but the areas covered remained similar. Topics were grouped and broadly follow the structure of the survey questionnaire. It should be noted that as the interview format was semi structured, the discussion ranged outwith the predetermined topics on some

occasions. Any additional material is reported accordingly. The topic groupings are as follows.

5.3.1. The Mortgage Process

The mortgage process was discussed with a view to determining the variety of different “application flows” that might exist. The impact of the process on time to decision, and the variety of locations for credit scoring to take place within the application process were discussed. Additionally the source of mortgage applications was discussed at this time. This sought to determine the influence of the intermediary on both the mortgage application process, and on the method of credit decisioning. As this section of the interview was an exploratory “fact find” and overview, the questions are presented in the same way to all organisations regardless of scoring status.

5.3.2. Introducing Scoring

Those lenders who use scoring were invited to discuss all aspects of the development and implementation of scoring within their organisation. Much of this questioning related to topics, which are commercially sensitive. This included an attempt to determine how the scoring decision output is presented to staff, and how the staff are incentivised to adhere to the system generated decisions. Additionally it was hoped that lenders might be able to confirm the groups of variables included in the scorecard, and present their intuitive belief based on their own experience about what actually causes mortgage default. Within this section of the interview the management of overriding is discussed. As the existence and prevalence of overriding is one of the key findings of the initial survey, some time was spent on this issue. Lenders who did not use scoring were invited to expand on the responses given in their survey document as to why they chose judgmental evaluation. They were then invited to outline the decisioning process followed. All lenders were also invited to discuss the lending which they conduct which is outwith credit policy. For non-scoring organisations this is the near equivalent to overriding. For organisations which do credit score, the relationship between credit policy rules and credit scoring requires to be understood.

5.3.3. Measuring the Success of Scoring

Within the survey, lenders had identified the benefits anticipated and achieved via adopting credit scoring. The interviews sought to identify the tangible measures that lenders used to quantify the success of their mortgage activity. This included an attempt to identify the variables that might underpin the (then) potential future benchmarking survey, which is reported in chapter 7 of this thesis. Additionally the method of measuring profit on mortgages, and the level of staff awareness as to where mortgage profitability derives from were discussed. These topics sought to address the hypothesis that the mortgage decision was in fact based on profitability and not risk alone. No major differences in presentation of these questions were required to reflect scoring status.

5.3.4. Appeals Against System Decision

This area of discussion resulted partially from the survey findings, and also from researcher experience. Only two lenders within the survey confirmed that they override based on customer appeals. This confirmed researcher experience that the appeals procedure is at best relatively unstructured within most lending organisations. It was hoped to gain more understanding of the appeals procedure offered to those declined access to mortgage credit. Those not scoring were asked about the appeals process in place which allowed appeals to be made against the judgmental loan evaluations.

5.3.5. Other Issues

Other issues were discussed informally towards the end of the interview, and were presented to all lenders regardless of status. These included the existence or otherwise of mortgage indemnity guarantee insurance (MIG), which protects the lender against default. Mortgage Guarantee Certificates, which provide a guarantee to applicants that a pre-agreed sum will be advanced to them (subject to certain criteria being fulfilled) were also discussed. The existence of, and market views on, risk pricing were also considered within this section of the interview, as was organisational readiness for, and involvement in the securitisation of mortgage loans.

5.4. A Synopsis of Interview Participants

Due to the confidentiality assurances given to participants, the full transcript of each interview has been withheld. In order to render the transcripts anonymous, much of the relevant data would have required to be removed. This would have resulted in the accuracy of the transcripts presented within the thesis being unacceptably compromised. Instead a brief synopsis of each interview is reproduced below, paraphrasing snatches of the interview material. This is intended to exemplify the diversity amongst participating organisations.

- I. A building society who use credit scoring. Processing over 50,000 mortgages annually. Mortgages introduced via many different channels. Came into scoring for risk management reasons, and are only now awakening to the benefits of scoring. *“Scoring actually hampered the process for several years”*, although the quality of the loan book has now improved. Provide decision in principle within one day, although the final decision takes about two weeks. Aiming to move to a two stage process with decision in principle in fifteen minutes and final decision in forty minutes. The interviewee introduced the subject of the *“morality”* of lending, and of the *“macho culture”* in the lending environment. They confirmed that they *“discourage appeals”*. Looking back over the history of the organisation they confirmed that they had a 150 year history of *“zero credit risk”* and had come into a 1990’s recession where they had *“very little control of the lending book”*. Confirmed the general trend identified in the literature of a de-skilled workforce, where staff knew that they were being *“consistently outperformed”* by the scorecard. Also confirmed the product influence on risk, stating that people with fixed rate loans *“generally perform better than those on flexible rates”*.
- II. A bank who use credit scoring. They receive eighty five percent of their mortgage business via linked insurers. Processing just over sixteen thousand mortgages every year, they have thirty underwriting staff. They differentiate the mortgage process between intermediary introduced and direct business.

For a single intermediary company they conduct the credit reference search prior to accepting the application, suggesting that they anticipate poor quality business via that source. Confirmed that service level agreements are in place between themselves and mortgage intermediaries, suggesting a very close commercial relationship. Scoring is used to highlight poor quality business. They confirm that they actually approve a high proportion of the credit score “reject” recommendations. Alluding to the hierarchy attached to lending limits, they confirm that underwriting is one of the “*higher level competencies*” within the organisation. Profitability of the mortgage is derived from the mortgage interest, plus the associated fees and insurance premiums which are part of the mortgage “bundle”.

- III. A bank who is not currently scoring. All applications come via branches, even those being introduced by intermediaries. Branch acts as a conduit. Currently process numbers in the low thousands. Four underwriters available, but only use two at a time. If the loan is outwith underwriter sanction level, they make recommendation and pass to second underwriter. Average LTV 68%. Twelve page mortgage application form. Confirmed substantial amounts of training given to underwriting staff, and that underwriting is seen as a career “*springboard*” to management. Stated that staff incentives are “*dangerous*” in a lending environment. Also sceptical about the intermediary’s ability to evaluate proposals, stating that they do not pre-screen applications they merely “*tart them up*”. When asked about appeals highlighted that the customer cannot appeal directly, only the branch can appeal against a decision. Also confirmed that they don’t securitise the mortgage book due to “*weak management information systems*”.
- IV. Building Society who do not use credit scoring. Ninety percent of business is received direct from customers. Majority of business is conducted on properties within a fifty mile radius of own office. Not comfortable doing LTV of 95% or above. All customers interviewed for approximately one hour and a half at first interview, with a follow up second interview. Every

- application signed off by either chief executive or company secretary. From application to formal offer takes fifteen days, which has reduced from twenty nine days in the past two years. Confirmed underwriter has ongoing responsibility for loan performance. If loan goes into arrears underwriters do home visits, *“they can’t just walk away, they have responsibility throughout the mortgage’s life”*. Insist that all borrowers have insurance against unemployment. Always give a reason for a declined application.
- V. Other lender who is not scoring. Currently processing just under 1000 applications per year. This figure is down from 20,000 , which was boosted by market conditions and council house sales. Six or seven underwriters. Application sent to District Office where it is double checked by Manager prior to being send to processing office. There passed to underwriter for checking and each application reviewed by supervisor. Supervisor and underwriter sign-off each offer. From application to offer in approximately ten days. Confirmed that they offer mortgages not *“to make huge profits”* but instead to *“give a service to our customers”*. Mortgages considered a peripheral rather than core product.
- VI. Building Society, not currently scoring but is actively considering adopting scoring. Would like to credit score, but this is currently low priority on IT list of tasks. Branch officer make the initial lending assessment of each application, and each branch has lending authority. Application sent to head office for the preparation of formal offer papers. Head office does a random quality check on applications. Application to offer in ten to fourteen working days. Staff involved in underwriting require to pass an *“in house”* competency exam. Confirm a building society ethos whereby they take *“lower profits in order to deliver high interest rates and low mortgage rates”*.
- VII. Other lender. Scoring for three years. Currently processing twelve thousand applications per year with fifteen underwriters. Delivery channel via telephone banking. Decision in principle using scoring system. If the

telephone application is approved a paper based application is sent to the customer for completion. Paper application is then scrutinised against telephone details on receipt. Stated they are not really underwriting, just “*checking papers*”. Confirmed that default levels are much lower as a result of scoring. Stated that the underwriters “*consider themselves*” to be in a career path, and that they “*think themselves*” to be better judges than the credit scoring system. Highlighting some organisational tension between the underwriters and the scoring team, confirming that underwriters are “*fighting it*” when presented with evidence that their overrides perform badly.

VIII. Bank using credit scoring. Twenty staff with underwriting authority, processing about twelve thousand applications per year. Branch based application form. If branch “*does not like it*” they phone central underwriting function for advice. Also if the application is outwith credit policy it is referred to central underwriting team. Depending on circumstances the branch may take up references. Application then sent to central processing. Documentation examined for conformance with credit policy and lending decision made. Application then retrospectively credit scored. Allow five percent of total lending to be in the overridden category, and no more than fifty percent of loan portfolio should be above ninety percent LTV ratio. Evaluate portfolio performance by market share, arrears performance, and profitability. Believe that scoring offers them the facility to write “*high risk business, and keep it okay*”.

IX. Building society that is currently using credit scoring. Processing just under 7,000 applications per annum. Sixteen staff with authority to lend, fourteen of whom use their “*discretion to lend*” fairly regularly. Maximum LTV 95%, excepting negative equity applicants who are existing customers. Branch based interview, and application subsequently sent to central processing. Following receipt of references, application is underwritten. Underwriters split into geographic teams, with the exception of one group who deal with high volume mortgage intermediaries. Following lending decision

application is then “*shadow scored*”. Score not used by organisation but sent to external agency who conduct analysis on performance of loan portfolio. Also have a telephone application channel. The details are input to computer system from an abridged application. No credit score built into telephone application. Paper application sent to customer, then per lending process at branch. When asked about target turnaround times from application to offer confirmed that “*we look to do it within twenty eight days*”. Agreements exist with volume introducers to process offers within fifteen days. Suggested that underwriters are not aware of mortgage profitability, stating that “*they don’t really think like that*”. Also confirmed that they are aware that they “*are not getting full value*” from their scoring system as they “*don’t use the information as well as we should*”.

- X. Building society not currently scoring. Branch network of 120 offices. All business (including intermediary) processed via branches. All lending authority is centralised. Currently processing 20,000 new loans per annum, up from a previous year figure of 11,000. Paper based application for each customer. Branch then takes up necessary references. On receipt of references, application and references sent to central lending department where application is underwritten. Application to offer in fifteen days. Confirmed that they try to differentiate themselves from other lenders by providing a better service. The mortgage process is such that they don’t run an affordability test on everybody! When asked if staff were aware of the profitability profile of mortgages, interviewee responded in the negative stating “*absolutely not, I wouldn’t want to go down that route at all*”. The focus of lending is on the credit risk management, rather than profitability.
- XI. Bank, recently converted from Building Society status and not using credit scoring. Processing almost 150,000 mortgages per annum. Multiple delivery channels and a range of credit policies each relevant to a single channel. A wide range of credit processes takes place within their Group. Anecdotal evidence about the decision to drop the requirement for MIG. Suggested that

a single lender had dropped MIG as a marketing tool intending it to be a temporary move. This lender was then shocked when other lenders followed the initiative and was effectively “bounced in” to permanent removal of MIG. Branches currently given targets for volume of sales, rather than quality of sales. Currently streamlining processes.

- XII. New bank, recently moved into the mortgage market using credit scoring. Scorecard created without data, based on previous developer experience. Payment behaviour scorecard based on bureau data, being combined with affordability data. Staff incentives likely to be linked to profitability of products. Maximum LTV 90%. Delivery channel is via telephone banking.

- XIII. A bank lender, currently credit scoring and processing almost 17,000 mortgages per annum. Mortgages received from customer base via branches and also direct from intermediaries. A single credit policy exists, but a variety of credit processes are in place. For own customers, the application is scored at the customer interface. The initial decision for these cases is reached in about ten minutes, following completion of the first half of application. If this is favourable the “second phase” of application is completed. If affordability is under strain, application is passed to underwriters. Second decision in principle is reached in about twenty four hours. For intermediary introduced business a centralised decisioning process is used. Loans are scored separately and underwritten by underwriters who are grouped by the volume of business which the intermediary introduces. The bank confirmed that management information regarding performance of overrides needs to be improved. System is better at “*recording narrative data rather than coding*”.

5.5. Analysis of the Interview Data

At the commencement of each interview the interviewee was asked whether a tape recording of the interview might be made. Eleven interviews resulted in tape

recordings being available. Each interview was subsequently transcribed and a transcript was mailed to each interviewee, in order that they could confirm the accuracy of the transcript. The eleven transcripts and two sets of interview notes were then analysed using a colour coding technique. Coding facilitates the identification of themes within the responses. Colour coding was selected in preference to a computer driven package such as Ethnograph or Nudist, due to the relatively small number of interviews being examined.

The key themes that resulted from the interview analysis are now presented grouped by topic, and where appropriate are considered relative to the existing literature and survey findings.

5.6. Interview Outcomes

5.6.1. The Mortgage Process

Lenders express a desire to improve the application and decisioning processes, in order that customer service might be improved. The impact of the mortgage process on overall processing costs led to a focus on the number of “actions” required with each new application. The process varied enormously between lenders, and determinants of the number of “actions” required included the existence or otherwise of lending mandates, the delivery channels in use, and the level of technology in place. The relationship between the process efficiency and customer service is highlighted in the variations found in both time to decision and time to offer.

The source of applications also impacted on the mortgage process. Organisations with multiple sources of mortgages often operated a variety of processing systems, and a variety of credit policies were found to co-exist within a single organisation.

There are several implications evident from an examination of the mortgage process. Most importantly, the credit scoring organisations are confirmed not to be deriving the full benefits of speed, consistency and risk control due to the management of scoring within the mortgage process. Anecdotes, such as credit scoring being

carried out “*retrospective*” to the lending decision being made, and a lender who confirmed that the score “*formed no part of the decision to lend*” reflect the difficulty in adapting new technologies in a “value adding” way. This confirms the survey findings that scoring is operationalised in a manner which compromises its ability to add value. What is evident is the dilemma for organisations which have traditionally placed value on personnel with lending skill, now considering such skills to be “redundant” for all but the “marginal” cases around the cut off score. The cut off score is the numeric score value selected by the organisation, above which applications would normally be approved and below which they would normally be declined. The cut off score is set in order that the lender accepts a pre-determined level of risk. Those cases closest to the “cut off” value, are hardest to predict outcomes for, and are in a “grey area”. Lenders often chose to manually underwrite those applications that have score values close to the “cut off”.

A further observation resulting from considering the mortgage process, is the implication of using multiple credit strategies as were found to co-exist in several organisations. Multiple strategies may compromise the ability of the lender to ensure consistency. If the delivery channel selected by the potential customer is the determinant of the credit policy rules being applied to their application, applicants may find that applying via one medium results in an application being accepted, whilst choosing another might result in a reject. It may be possible for the lender to confirm statistically that “typical” applicants via each delivery channel exhibit different risk profiles. However, at a customer service level, it would be difficult to justify such an approach to applicants. A further compromise in customer service was evident in the service level agreements, which were found to be in place between lenders and intermediaries. These ensured that applications via the intermediary channel are subject to faster turnaround times than those coming directly from applicants in many cases.

Finally the focus on the number of “actions” involved in the mortgage process, finds lenders attempting to reduce the volume of supporting “evidence” which they typically request from applicants. The requirement by lenders for applicants to

provide verifying data slows the process considerably. Lenders confirm that they are considering which pieces of the “data jigsaw” they could omit gathering extra data on. Examples of items that may be considered superfluous in future might include the employer’s salary reference, or even the property survey document for certain categories of property or loan. However “smoothing” the mortgage process in order to improve customer service, might ultimately have a negative impact on risk management.

5.6.2. The Credit Decision

Many variations on the processes which support the evaluation and decisioning of mortgage loans exist. The credit decision is variously taken centrally or within the branch network. It is also made based on some combination of judgmental, empirical or combined decisioning methods. As the process is so varied, various flow charts are used to present the range activities which surround the credit decision making process. These are now presented in figure 5.3.

figure 5.3: The Credit Process

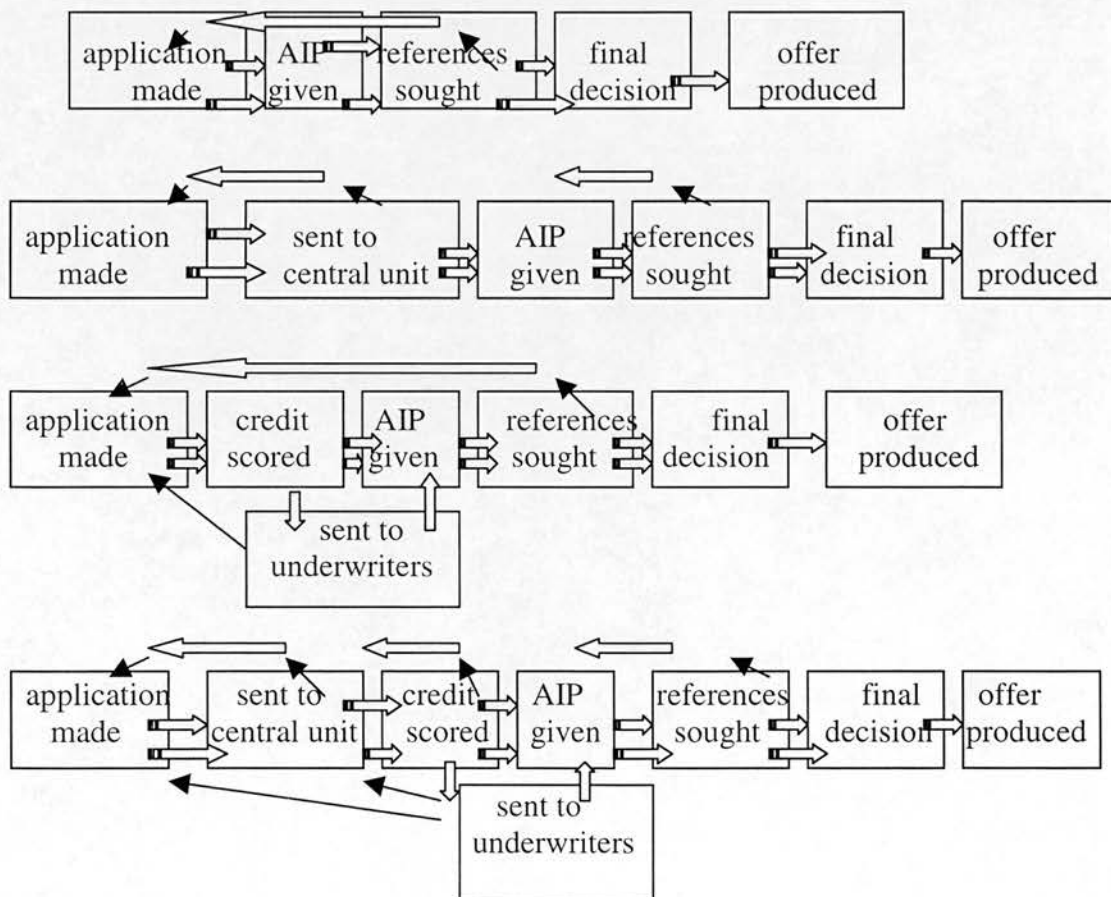


Figure 5.3, appears complex and unwieldy, but does in fact reflect the many process flows which are found to exist in mortgage lending organisations. By necessity of space limitations, a range of interactions are excluded from the process flows identified. Liaison with both customer and intermediary for example are not shown. However, the arrows which indicate iterations back to the “application made” stage are intended to indicate liaison with applicant over references, etc. The omission of customer liaison is important, as more than one lender confirmed that they contacted each applicant once per week within the application period to let them know how the application was progressing. Additionally the box for references sought could have more exit arrows, as lenders make second and third requests for data. Despite the necessary omissions from the model, it does present an indication of the complexity of the process of reaching a credit decision.

During the interviews all participants were keenly aware that the “time to decision” requires to be driven down in order to meet the demands of higher expectations of customer service. It is interesting to note that lenders who receive a high proportion of mortgage business via intermediaries, have service level agreements in place with those intermediaries. As a result, the agreements offer the intermediary better service than that offered to the average customer who came direct to the lender. Time to decision is commonly agreed to mean the time taken to offer the customer an “agreement in principle”. Agreement in principle does not become a binding agreement to lend until the necessary supporting evidence is presented. Hence the dilemma arises as to how lenders decide which supporting evidence can be dispensed with without compromising risk management. An important issue which this thesis is unable to address, is at what point the customer believes he has received a commitment from the lender to approve the mortgage loan. If the customer is satisfied that a commitment has been made when he receives “agreement in principle”, then the key objective for lenders must be to drive down this timescale. Credit scoring can substantially reduce the time to agreement in principle, by processing and analysing the necessary data in a much shorter timescale than a judgmental analyst might take. However, achieving speed is dependent on the location of scoring within the mortgage process.

Where lenders have a credit scoring system at the customer interface the time to the agreement in principle decision is greatly reduced. However, the majority of those who credit score have a centralised scoring system, with paper based applications being sent to a central processing centre. In such a circumstance scoring offers no real time advantage to the lender in terms of processing days. The ability of the scorecard to offer a speedy decision is also mitigated by the means by which organisations input data entry. Again where this occurs on a “twilight shift” basis, valuable time may be lost whilst waiting for the data entry to take place. Thus the manner in which scoring is absorbed into the mortgage process, might compromise the “speed” benefit which lenders seek to achieve.

A common perception presented is that a scoring system considers fewer variables than a credit underwriter might in reaching a credit decision. However the subjective nature of underwriting means that this fact cannot be confirmed. What became clear from interview data is that organisations are aware that the scorecard can outperform the judgmental evaluation. Despite knowing this, they continued to allow the underwriters to override the system based decisions on a fairly ad-hoc basis. This is partly due to the way that the output of the scoring system is presented within the organisation. Whilst the system decision derives from a numeric score, the system output is often in the form of a graded recommendation. This might take the form of accept, reject or refer to the underwriting department. One lender confirmed that up to twelve graded outputs existed. Another confirmed three outputs, accept, decline and fail. He then went on to confirm that decline was “*a misnomer*”, and that they did in fact grant “*a high percentage of them*”. That such anomalous responses and actions are considered to be the norm, confirms the highly unstructured nature of the process. Typically lenders proceed to subjectively underwrite accounts which are not a clear “system reject” Some lenders also underwrite those accounts which are marginally above the “cut off” score with a view to potentially rejecting “system accepts”. This is clearly a policy decision to review all cases around the margins of the “cut off score”. Lenders do however provide a consensual view that it is desirable to drive down the number of applications being referred to underwriters, along with the associated costs and process delays.

The manual underwriting of mortgages and the existence of credit policy rules, were the two key foci of the credit decision discussions. Such is the importance of these topics they are now both reviewed in more depth.

5.6.3. Manual Underwriting of Mortgages

The requirement to retain members of staff to undertake underwriting is confirmed by all lenders, even those with considerable scoring experience. Between organisations the underwriting process varies considerably. Methods of grading the underwriters are managed in several ways. Some are simply graded against a loan value. Thus the more experienced underwriters make decisions on the larger value loans, and the junior staff take decisions on the lower value loans. Alternatively underwriters may be graded on criteria such as loan to value ratios. As LTV ratio more accurately reflects the underlying risk, this method, used in combination with loan value might provide a better method of grading. However, others are graded against “policy rules”. Lending policy rules dictate key criteria that require to be met, e.g. salary multiplier. The junior underwriters being permitted to grant loans which meet all criteria, and those more experienced lending officers being permitted to grant loans which are for a variety of reasons outwith criteria.

Underwriter training is largely in-house. However, no evidence was found which suggested that any training is given which recognises that over-riding the scorecard requires specific skills. That the underwriters within scoring organisations receive no training on the specifics of credit scoring and overriding, was a surprising finding. This might also suggest that the very subjective nature of underwriting might also compromise scorecard efficiency. When specifically asked about tracking underwriter performance, lenders variously had the ability to do so or not. Those who could not track individual underwriter performance, cited poor management information as the cause. Others had simply not got around to tracking “*it's one of those things that we've always said we need to do and we should do*”. Those who could and chose not to suggested that as they “*haven't had to, we haven't had a problem with underwriting*” stating that “*if we had a problem we'd go back and do some navel gazing*”. This suggests a somewhat reactive approach to risk

management rather than a proactive avoidance of risk. Peculiarly, even where underwriters were subject to a performance management system, lenders confirmed that it “*does not relate to the quality of their underwriting*”. Lack of further questioning, left unasked the important question as to how underwriter performance might be evaluated if not related to the quality of their underwriting. However, others did track performance believing it to be a form of “*internal policing*”. The underwriting discussion presented some new information on risk perception as to the responsibility of the underwriter at a period “post completion” of two or three years. One lender suggested that events, which occur at a period two years post completion could not have been predicted at the time of application. If indeed this were found to be true, it would have implications for the data used in scorecard development, and indeed on the purpose of the scorecard. This premise generally alludes to the belief held that most default is caused by “lifestyle events”, such as relationship breakdown and unemployment. However, these events may not preclude analysis that allows prediction. They might merely require that lenders ask new questions of applicants, in an effort to build models that might include some element of prediction of lifestyle changes. This seems to be some way off for mortgage lenders. A subsequent examination of the types of data collected on application forms, presents no evidence of “lifestyle data” being recorded by lenders. However, evidence within the literature confirms that new areas can successfully predict default, such as the neighbourhood analysis conducted in the US, which produced a successful predictor variable.

5.6.4. Mortgage Policy Rules and Policy Overrides

All lenders confirm that they have in place mortgage policy rules, which are also referred to as credit policy rules or as mortgage lending criteria. These criteria are normally issued to those at the “front end” of the delivery channel, both internally within the lending organisation, and externally to intermediaries. An attempt to uncover the foundations on which the policy rules were established was unsuccessful. When asked the basis of the rules, lenders suggest they are mainly “historic” rules, but no evidence was uncovered that provided a definitive data source for the rules. Thus the rigour of the process by which mortgage policy rules are

established, is unknown. The criteria are intended to indicate fairly broadly, the profile of applicants which the lender is willing to consider. Policy rules typically include the mortgage multiplier, i.e. a multiple of the annual salary which is equated to a maximum loan value. Policy might also dictate maximum borrower age, rules regarding previous credit behaviour and the types of property which can form the security on a mortgage loan.

Some conflict was found to exist between having credit policy rules and using credit scoring. As one scoring lender confirmed "*the majority are declined before they've even got to the stage of filling out an application form*". Confirming that despite the presence of a scoring system the initial interview would "pre-screen" applicants and that "*a typical reaction would be a verbal reaction*". Again, conflict with the desire for consistency and objectivity, and evidence that the empirical imperative underpinning a move to credit scoring is not wholeheartedly adopted or understood. In order to build and maintain an effective scorecard the organisation requires to be fully cognisant with the profile of applicants. In limiting the applications which are processed, by making a subjective decision about which applications should be credit scored, so the organisation is losing potentially valuable data. However, developments in the integration of policy rules and scoring were evident. One lender confirming that "*we are developing credit systems to not only calculate the credit score, but increasingly to make policy decisions*".

However, in concert with credit score decisions, policy rules are frequently overridden for variety of reasons. Exceptional circumstances are often mooted as being reasons why policies such as the mortgage multiplier are varied. The credit policy rules form the basis for applicants to be pre-screened. This pre-screening might actually preclude a formal application being taken, or a credit score being sought. Within the case study phase of the research more consideration is given to enquiries which fail to convert to mortgage applications, perhaps as a result of the pre-screen instigated by policy rules. What is not clear is the value of these policy rules. If we consider risk, profitability and customer service, it is difficult to find a strong relationship with a policy rule such as salary multiplier. An individual

wishing to borrow four times his salary, based on a loan with a forty percent LTV ratio, is difficult to compare to an individual wishing to borrow three times his salary based on a loan with a one hundred percent LTV ratio. For staff at the customer interface, who might not be trained mortgage underwriters to be able to make such complex judgements subjectively, and in the light of only partial information about the applicant presents something of a challenge.

The issue of policy rules was presented to lenders as something of an anomaly in the overall credit process . In response they suggested that removing the credit policy rules would involve them in costs of reviewing cases that were obviously “bad”, e.g. those with previously bad credit history and evidence of court judgements being made against them. When asked to consider whether some of the other credit policy rules might be usefully reviewed, lenders were not convinced of the value of such a review, preferring to retain existing rules and continue to make exceptions. This approach again conflicts with the desire for consistency which lenders stated they wanted to achieve. If the credit policy rules are based on evidence which suggests they are related to risk profiles of applicants, then the way they are currently applied might also have a negative impact on risk management objectives. Additionally for organisations that elect to use credit scoring, the existence of policy rules is still harder to validate. Given that the credit scoring system was built on previous applicant and performance data, and is believed to predict default, why would it be necessary to pre-screen applicants against still more rules? Any data known to be predictive of risk should be built into the scoring system, particularly as the data which comprise policy rules are the type of data commonly found in the system, i.e. salary levels, age and credit behaviour. Some property characteristics might be one exception to this rule, but they too have the potential for inclusion. In the scorecard this might be presented as a variable related to construction materials, or as a variable reflecting a surveyor’s recommendation regarding the property.

Mortgage policy rules often also govern the matter of affordability. Affordability calculations are dealt with via a variety of approaches. Some lenders conduct a manual calculation of affordability which is drawn up and examined by the lending

officer. Others have affordability models built into the credit scoring system. Affordability in some cases drives the amount of the loan being offered, rather than the traditional approach using mortgage multipliers. Not all lenders interviewed conducted an affordability test on all applicants, which would appear to be in conflict with the voluntary mortgage code which exist. The Code of Mortgage Lending Practice, (CML 1997), states that “*all lending will be subject to our assessment of your ability to repay*”. Evidence gathered during the case study phase of the research, confirms that the calculation of affordability is often fairly haphazard and inconsistent. Additionally, many credit scoring systems do not include an analysis of affordability. This requires that detailed income and expenditure data be maintained, and that affordability ratios be calculated and subsequently related to loan outcomes. Alternatively, more general affordability calculations might be made based on data from family expenditure surveys. What is clear, is that if lenders who use credit scoring are to comply with their industry code, they must consider how to combine the need for an affordability assessment into the credit process in a manner that does not compromise the need for objectivity, consistency and speed. The nature of the system output, and the question of providing staff with incentives to lend also require consideration as they are relevant to this issue. Where a system generates an “accept” decision, and staff are incentivised to lend, their ability to provide an impartial assessment of affordability might be affected. This is confirmed by one interviewee who suggested that “*there is a sales culture, and they want to (lend)*”, going on to say that “*they might have met the customer and given the warm words and so on*”. This highlights the potentially opposing aims of the risk manager being interviewed, and the sales team responsible for conducting the lending.

In considering the importance of policy rules and their management, the interviews sought to identify the performance of loans granted outwith policy guidelines. The level of data available varied considerably between lenders, and no lender had a system that did not require some refinement. Much of the data captured by lenders was in a text format, which does not lend itself for analysis. Often lenders do not record details of the reasons why a loan was identified as being outwith normal

lending criteria, nor the reasons for the subsequent override. This limits their ability to perform subsequent performance analysis. Where responses as to how the non-policy loans performed were available, they conflicted directly. Some lenders could produce evidence that the policy overrides performed as well as the rest of the loan portfolio, whilst others confirmed that they performed worse than the rest of the book. These contrasting experiences may result from differences in the mortgage process, or in the rules and procedures which are adopted to authorise and manage the loans which were overridden. What remains unclear, are the foundations on which the credit policy rules have been established. Therefore the true role of credit policy rules and their relationship with risk management was not clearly established.

5.6.5. Information Used in Reaching the Credit Decision

Addressing some issues raised within the literature, an attempt was made to identify whether the categories of data used to reach the credit decision varied between empirical and judgmental decisioning systems. Lenders were cautious in providing this information, and the results are indicative rather than conclusive. This line of questioning was intended to verify whether the groupings identified within the literature which are confirmed as being related to propensity to default are reflected in lending practice. Are borrower stability, affordability, economic conditions, property data and product data, commonly recognised as being necessary considerations in predicting mortgage behaviour?

When addressing this issue with those who use credit scoring various interesting observations resulted. Generally the scorers confirmed the use of all groupings of variable identified within the literature, with the exception of economic conditions. One lender confirmed that they had previously used regional economic indicators, but had dropped their usage as their market became broader and their scorecard had become "*badly misaligned*". Several lenders confirmed the influence of the product, and the differences exhibited in behaviour between fixed and flexible rate products. The influence of payment protection insurance was also confirmed as being correlated to propensity to default, with those seeking or agreeing to take protection insurance exhibiting worse risk behaviour. However, the lender who confirmed this

suggested that *“we wouldn’t dare put it in the scorecard”*. This confirms that the actual ability of the scorecard to predict risk can be compromised by business needs. The lender in question confirmed they were concerned about the potential negative publicity should the inclusion of such a variable become common knowledge.

When addressing the issue to those who use judgmental evaluation, the subjectivity of decisioning became apparent, *“first time buyers buying a one bedroom flat in the back end of a Barrett development are going to be pretty bad news”*. Those lenders using judgmental evaluation had much more difficulty in presenting the groupings, or indeed individual variables that comprised the credit decision. In the main they confirmed that they are *“much more interested in the person”*, than for example the property or product. When asked specifically what sort of process the underwriters are asked to follow, e.g. stability then affordability, lenders responded that no formal process really existed, not even in terms of structure *“it’s a ‘loose arrangement’*. Nonetheless the judgmental lenders suggested that *“we probably go in to greater detail (than scorers)”*.

However, much of the anecdotal evidence provided by non-scorers, which might be interpreted as being without foundation might in fact reflect actual propensity to default. Statements like *“we don’t like flats”*, might, if analysis were to be done, be found to be an accurate reflection of loan outcomes, with this particular property type being found to be associated with propensity to default. What is more difficult to ascertain is how these lenders can make such judgements when they are not collating data formally. As they are not necessarily involved in arrears and collection activity, they cannot be using the loan outcomes to inform their judgements. Additional aspects of judgmental evaluation make it difficult to evaluate the process objectively. One lender confirming that *“a single person moving in to a four bedroom flat.....we would be highly suspicious”*, raises questions as to how such analysis fits in with the risk profiling of applicants. However, the flexibility of approach was confirmed with a lender confirming that *“sometimes we do want to lend to seventy five year old people”*. This type of loan to an older person, would not necessarily be acceptable only to a non-scoring organisation. Loans with a profile such as this would normally require a policy override in any sort of lending environment.

The implications of the responses relative to the credit decision, seem to confirm the benefits of scoring in presenting a decision based on past performance and comprising those variables known to be most strongly related to default. Whilst suggesting that judgmental evaluation was conducting a more thorough analysis, lenders failed to present any convincing evidence that this was the case.

5.6.6. Measuring Profit on the Individual Mortgage

The means by which individual mortgage profitability is measured produced a range of responses. This reflects the diverse nature of organisations represented. The responses also reflected the placement of the product within the overall product range. Three respondents confirmed an organisational ethos that was not wholly profit driven. This highlights divergent strategies within the financial services sector. However, lenders themselves were aware of the pressure on such an ethos surviving. The challenge to organisations which wish to retain their mutual status, is proving to be a forceful one. The divergence within the industry is reflected within individual organisations, with lenders confirming that the sales-focussed branch network is much more aware of profitability than the underwriting department. This may result from a variety of methods of incentivising staff co-existing within organisations. The sales staff in some of the organisations interviewed, were remunerated relative to volumes, despite other lenders being vociferously opposed to such a practice. The opposition to incentivising lending staff to “sell” loans, is understandable, as evidence was presented of staff manipulating the data input; *“they tweak the profile”*, in order to ensure loan acceptance. Whilst staff are unaware of the scorecard contents, they do become familiar with the “typical” characteristics of accepted and rejected loans. Whilst not a universal problem it is one which is acknowledged to exist, and is managed by increasing the remit of either the inspection or credit risk department to include management of scorecard manipulation within their brief.

All lenders were aware of the desirability of being able to evaluate profitability at a “customer” rather than a “product” level, however in reality they confirmed that the ability to compute such a figure was *“some way off”*. Commonly, the profitability of the mortgage is viewed in one of two ways. Either as a stand-alone loan, with costs

and interest rates determining profitability, or as part of a “bundle” of associated products. This results in the profitability of the mortgage loan being augmented by the profitability of associated insurance products. Such insurance products are sometimes optional, but often compulsory. In such a circumstance the mortgage loan might be offered at a low “teaser rate” to attract business. The profitability of the actual loan is negatively affected by the teaser rate, but is then bolstered by the profit on the insurance. Critical in calculating profit is accurate prediction of the length of time that loans “stay on the books”. This appears to be shortening from an anecdotal seven years to a new norm of five years. No data was presented which confirmed means by which lenders currently assess “loan life” for mortgages. Again the credit literature reflects developments in profitability with the move to using survival analysis techniques to evaluate profitability. The shortening life of the loan may have a knock on effect on product pricing, with loans requiring to generate profit within shorter periods. One lender confirmed that they were moving towards a more sophisticated measure of profitability. Whilst currently calculating individual loan profitability on the product alone, they were moving fairly swiftly towards calculating profit by the overall loan package. It should be noted that this particular lender offered a limited product range. However, what was unique about his approach was that there was an intention to make credit decisioning staff aware of the profitability profile of the loan being decisioned. A move such as this would require a meteoric increase in risk control, as it suggests that staff would be weighing up risk and return. A relatively dangerous practice if conducted in an uncontrolled manner.

The implications which can be drawn from this evidence on profitability calculations, is that lenders acknowledge that the calculation of profitability at a credit decision level is currently negligible. This suggests that when lenders override policy rules or credit scored decisions based on the “value of a relationship” they are unlikely to be conducting an objective evaluation of financial value.

5.6.7. Key Performance Indicators on the Mortgage Portfolio

Within the survey evidence, lenders had provided evidence of the benefits of adopting credit scoring. The interview sought to identify whether lenders could quantify such benefits achieved. They were therefore asked what common measures of mortgage loan success were routinely gathered and quantified. Those lenders who did not score were also asked to quantify how they measured success. Depending on the focus of the organisation, e.g. growth, risk management etc. the performance indicators understandably vary. An unexpected outcome of the interviews, was confirmation from lenders that performance indicators differ across the different organisational functions. Whilst the marketing department might focus on volumes of new business, and the sales department on volumes of cross sales of associated products, the risk department is quantifying it's success relative to levels of arrears and losses. These disparate measures of performance can lead to some inter-organisational conflict, and this was evidenced. Lenders interviewed confirmed that the need to "*align corporate goals*" across departments is an issue which organisations are aware of.

The measurement of growth has also been subject to a change in focus. Lenders no longer measure only the increase in sales volume. The current emphasis is on net growth of the portfolio. This shift in focus is a result of both the increased mobility of the borrower, and the resulting increased attention paid to retaining existing customers. Customers who are retained over the longer term are confirmed to be more profitable than "revolvers", those who move between providers within time periods of typically less than five years. The costs of attracting new customers impacts on the profitability of the mortgage loan. This results from the increased processing cost associated with each new applicant, and also the extremely attractive conditions that must be offered in the extremely competitive market place. Lenders complain of "*shaved margins*" and "*unrealistic teaser rates*" within the industry, suggesting that the pricing war is causing concern. Customer service levels and perceptions also feature prominently as a measurement of success. These are measured by a variety of means, including questionnaires, turnaround times and again retention rates.

The quality of mortgages is also measured, and this is not strictly a performance measure but a risk measure, which is linked to performance. Lenders analyse the portfolio in a variety of ways, segmenting by loan to value, by the credit score values, by the level of arrears, and by level of default. Discussion as to whether maintaining low levels of arrears had a positive or negative effect on profitability provided some lively debate, but no consensus.

The outcomes of the performance measurement section, provided the basis for the development of the benchmarking survey document which is discussed in greater detail in chapter seven.

5.6.8. Appeals Against Credit Decisions

Two areas of interest were discussed during the appeals section of the interview. Firstly, are customers provided with a decline reason, when they are refused credit? One of the main criticisms of scoring has been that customers are turned down “out of hand” without being offered any reason. This has led to press comment referring to scoring as the “*Dark Science of the Credit Industry*” Anderson (1996). Secondly, are applicants offered the means to appeal against a decision, which declines their application for credit. This matter also discussed by Anderson who found that even following an appeal, applicants are “*unlikely to be given much information about why your application has been turned down*”. This conflicts with US experience, where under the Equal Credit Opportunity Act “*when a creditor declines to grant a request for credit, it must give the applicant a statement of the reasons for the adverse action*” (Hsai, 1978).

When the questions are presented to those who do not credit score, the decline process seemed fragmented for several lenders with a respondent confirming “*do you know, I don’t even know if they get a letter*”, and another confirming “*I wouldn’t say there is*” (an appeals process). When asking about the specific reasons provided to applicants who were declined credit, every possible response was received. From giving a reason for every decline to giving a broad indication of the reason, and finally giving no reason at all. The request for an appeal was more commonly from

the branch network or via intermediaries than driven directly from individual customers. However, this may reflect centralised decisioning whereby the first level appeal is made to the interviewer who then decides whether or not to escalate the appeal. No major differences were evidenced between those who score and those who do not. Those using credit scoring also presented little appetite for an appeals process. This was again partly due to the centralised nature of decisioning which resulted again in most appeals being branch or intermediary generated. Respondents cite the games of “*ping pong*” that result from the combination of centralised decision making and branch accountability to the customer. The impression given was that of lenders who would prefer that they did not require to have a formalised process. The tension between a centralised decisioning team, and those at the customer interface was a feature of several interviews. Part of the tension certainly resulted from credit scoring being in place. One lender went as far as to describe “*a war of attrition going on*”. The perception gained, is of a group within the organisation who have faith in the ability of the credit scorecard. This group who “have faith” are normally risk based staff, and they are trying to manage relationships with branch staff, whose focus is on loan volumes and achieving sales targets. This poor relationship and dissonant view of credit scoring, is reflected in the lack of structure and form around the appeals processes in place. It seemed that there was little encouragement for applicants to appeal. Appeals were driven by lending staff or intermediaries whose desire for the loan to be granted might result more from personal motivation, than a customer focus.

When asked specifically about the provision of reasons for credit declines, those who did score confirmed the provision of decline reasons to be “*a thorny issue for credit managers*”. This results from a fear that providing decline decisions compromises the confidentiality of the scoring system. This conflicts with the credit industry’s own Guide to Scoring (1993), which confirms that lenders should provide “*as clear an explanation for the refusal as possible by providing the principal reason for the decline*”. However, another scoring lender, did confirm that where the decline reason was adverse credit they were legally bound to provide the customer with details of how to obtain further data, and this was done. Non scorers variously did

and did not provide reasons, in concert with the scorers. The ability of non scoring lenders to provide a decision presents an interesting problem. If, as they say, they consider more information than a scoring system, they would require some structure around the decision that offsets the value of one variable against the other. As no such structure was commonly found, it might be surmised that if a clear decline reason does exist it might well have been reached in a subjective manner. This of course precludes policy overrides, which are declined on that basis.

5.6.9. Other Issues Related to Credit Decisioning

The final section of the interview, comprised a general discussion of some current issues relating to the use of scoring. The potential for credit scoring to be used as a mechanism for risk-pricing, arrears management and for securitisation pricing exists. However, as credit scoring usage for mortgages has been found to be in its infancy, the practical applications are found to lag behind the potential applications. Despite this lender's views are included to give an overview as to the pace of development in these areas.

One topic discussed was risk-pricing. Lenders regardless of scoring status confirmed that risk-pricing does exist. This is currently based variously on loan values, loan to value ratio, new borrowers, existence of MIG, and one non scorer confirmed pricing based on credit history. The credit score's role in risk pricing had been confirmed within the survey. The difficulty in adopting risk-pricing for some mutual societies, stemmed from an ethical dilemma. This was confirmed by one lender stating *"if one gets charged 8% all customers get charged 8%", we feel it isn't fair to offer new borrowers a discount*". The reality of the situation was presented by another mutual society who suggested that *"purely on lending terms the interest rate charged should be based on risk, but the market doesn't work like that"*.

The issuance of Mortgage Guarantee Certificates was also discussed. Mortgage Guarantee Certificates are issued in advance of the borrower finding a suitable property, and confirm the maximum loan value which will be advanced, (subject to confirmation of some key information). Typically the additional information is the

survey confirming that the property affords suitable security to the lender. The relationship between such certificates and credit decisioning is that they confirm that property variables are forming little part of the decision to lend as the property has not been chosen. However, borrowers might be being asked to indicate the likely property variables, e.g. type, number of bedrooms, LTV ratio etc. in order that the decision can be made “in principle”. The lenders view of the certificate, “*of course it isn't really worth the paper it's written on, there are so many caveats*”, is reflected by scorers and non-scorers alike.

Securitisation formed the basis of the next part of the interview. As securitisation of mortgage loan portfolios is a recent and developing activity in the UK market, it was unclear how aware lenders would be of this form of mortgage activity. Without exception all lenders were found to be aware of the securitisation activity (or lack of) within their own organisation. Actual securitisation activity was stronger amongst the credit scoring organisations. The non scoring organisations had several problems with securitisation. For several the problem resulted from their acknowledgement of weak management information systems, which meant that “*we couldn't securitise our book easily as we wouldn't be able to produce the background information on each case*”. However, others simply cited that they did not require to raise capital by this means. For some of the mutual organisations particular problems existed regardless of scoring status. This results from the relationship with their customers who are also their members. A lender confirming that “*we would probably have ethical problems, people are our members, and if you securitise you are passing on your members to somebody else*”; a perspective reflected by another lender who suggests “*it wouldn't sit very well with the ethos of the society*”.

Those who did securitise confirmed recent volumes of activity. One lender had a plaque on his desk. This was an example of a plaque given to all staff as a result of a recent European “*record breaking*” securitisation which their organisation had undertaken. He confirmed that being involved in this had been a “*big thing, and we should show it off*”. Another lender giving details of recent securitisation also confirmed that “*size matters*”, “*at that time it was the biggest transaction of the*

year". Regardless of current levels of activity, lenders had either recently changed documentation to ensure that they could securitise or were currently involved in initiatives which reflected a need to do so "*it's something we're dealing with at the moment*". When asked whether the credit score values had been used in setting the price of the securitisation, or as a means by which to "bundle" the mortgage loans for securitisation, lenders were less clear. No lender confirmed the link, the majority did not know whether or not the score value was being used. The actual securitisation of the loans was being conducted by other functions within the organisation. Generally the view was that the credit score was not being used, but responses were vague "*I don't think it has, no*".

5.7. Addressing the Research Questions

The richness of the interview data, provided a new dimension to the research. The complexity of the issues, highlighted by the fact that even within the organisation a different perspective would be provided from individual departments.

What became evident was a relatively unstructured approach to risk management for a proportion of cases. These were the credit score and credit policy overrides. Evidence provided later via the benchmarking survey, suggests that this group might comprise as much as thirty percent of applicants. For lenders approaching this level, a substantial proportion of the portfolio might be being compromised from a risk management perspective.

In relating this evidence to the research questions presented at the commencement of this chapter, the following answers are presented:

- *Do the credit decisioning systems used, contain sufficient data to be able to predict mortgage default risk?*

When this question is addressed to organisations which do credit score the answer would appear to be yes. Scoring lenders are aware that information relating to the

borrower, product, property and affordability require to be considered, in assessing mortgage risk. This data is included in the scoring systems. The lack of economic data is not an oversight. Lenders suggested that the size and nature of their markets made the inclusion of such data, un-necessary and un-realistic. Indeed a single lender had dropped economic data from the scorecard. It would seem therefore that overriding the credit scoring system is not done on the basis of additional risk related information.

When related to those organisations that do not credit score, but instead use judgmental evaluation, the answer to this question would appear to be no. The lack of formal processes and procedures suggests that information on the borrower, product, property economic conditions and affordability are not consistently applied in reaching a judgmental decision. Not only does a considerable volume of such data need to be considered, but each variable also requires to be weighted for risk. The lack of structure, when combined with the lack of analysis of previous lending outcomes, and the volume of data required would make it almost impossible for all underwriters to include all relevant data consistently.

- *Does organisational culture determine the rate and means by which lending policy alters from judgmental to empirical”*

The answer to this question would appear to be yes. Respondents alluded to difficult relationships between “scoring teams”, both technical and operational, and the staff who operate the scoring systems. Additionally, the existence of a lending hierarchy, confirmed that issues of status and seniority might be affected by a move to empirical decision making. The confrontation between the supporters of scoring and the traditionalists, is highlighted by the overt manner of the confirmation to underwriters that the scorecard could outperform them. The confirmation of the “macho culture” which prevails, highlights that respondents are aware of these cultural issues. The response from non scorers also confirmed that in many respects they considered themselves to have a unique organisational focus and culture which

considered relationships and customer service to be a priority, which scoring might compromise. Again evidence that they believe the “culture” of the organisation is unsuited to empirical decisioning systems.

- *Are lending decisions made based on profitability profiles of customers, rather than risk profiles?*

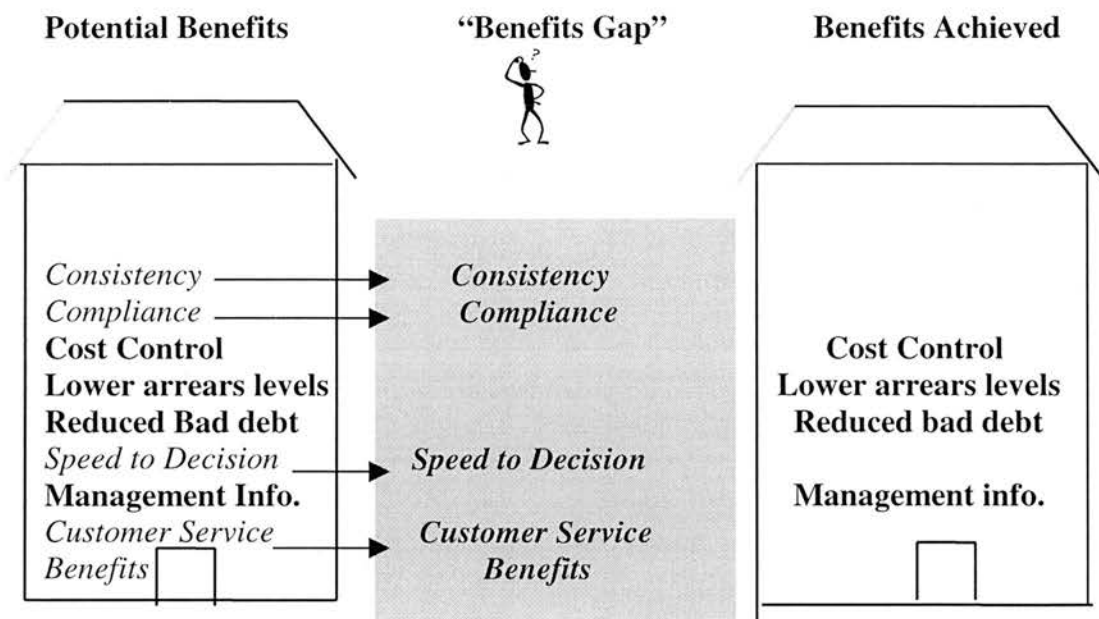
For scorers and non scorers alike the answer to this question is no. No lender interviewed appeared to be in a position to calculate profitability at the time when the credit decision was being made. Indeed lenders considered an evaluation of product profitability at the time of credit decisioning to conflict with the concept of good credit risk management. This suggests that, for the moment, at least risk-based scorecards will be of more value to mortgage lenders than a profitability scoring system. Chapter six of this thesis presents the development and performance of such a risk based scorecard for an UK mortgage lender.

5.8. Conclusions

In considering the research output generated following both the survey and the subsequent interviews it has become clear that credit scoring can offer potential advantages to mortgage lenders. However, what has also become clear is that the combination of policy rules, overriding, and the location of scoring in the lending process reduce the effectiveness of scoring and limit the benefits actually derived by the lender.

In order to clarify the current situation the problem is depicted graphically and presented in figure 5.4.

figure 5.4: The “Benefits Gap”



The shaded section in the centre of figure 5.4, highlights those benefits which are not currently being achieved by all lenders. This failure to derive benefits is a result of the following reasons.

5.8.1. Credit Policy and Credit Scoring

One of the most significant failings is that in general credit policies have not been rewritten to reflect the goal, or role of scoring in the organisation. The objective of the scorecard is not clearly defined. Whether the scorecard is intended to provide decisions for all applicants, or only a certain group of cases is never overtly stated. This results in overriding of the scorecard taking place in an ad-hoc fashion, which impinges on the ability of the scorecard to deliver it's key objectives.

5.8.2. Overriding and Credit Scoring

The ad-hoc nature of scorecard overriding, results in a potentially detrimental impact on risk management. The scorecard cut off has been set to deliver a pre-determined

ratio of potential good applicants being accepted relative to potential bad applicants being declined. By compromising the cut off value, the agreed ratios of good and bad accounts will be altered, by either accepting more risk and thus potentially decreasing profitability, or by accepting less risk with the same potential impact.

The failure of organisations to make over-riding a more cohesive and scientific practice is evident. Despite some lenders acknowledging that the overrides performed badly, almost no tracking of override reasons relative to loan performance was in place. Within some organisations little evidence of override tracking relative to the performance of the rest of the portfolio takes place at all.

5.8.3. Policy Overrides and Credit Scoring

Reflecting the situation of overriding credit score decisions, is the overriding of mortgage policy rules, or lending criteria. The rules are based on a variety of mainly historic features, and do not seem to have been in any way “married” with the predictive ability of the credit scorecard. Indeed some seem to have no direct relationship with either risk or profitability. Again, the situation becomes more confused as these rules are often subjectively overridden. A lack of tracking and management information is evident, and suggests that organisations are not using their experience in an manner that permits the organisation to learn from their lending experience in a formalised manner.

Overriding of both credit score generated lending decisions, and of policy rules prevents credit scoring from delivering consistency, objectivity and the assurance of compliance with legislation which seeks to prevent discrimination.

The practice of overriding credit scoring, need not be discontinued. Where overriding does take place, organisations must seek to gain control of the practice, and marry the override procedures and policies with the abilities and objectives of the scorecard. Improved tracking of lending outcomes is required, particularly related to the override reasons. This will provide the management information which allows organisations to begin to use their discretion in overriding. Discretionary overriding which is more tightly managed will allow organisations to

move towards the achievement of consistency and compliance. Discretionary overriding will also provide data that will improve scorecard performance. This in turn will result in the derivation of improved levels of customer service.

5.8.4. The Lending Process and Credit Scoring

The lending processes also require to be reviewed if credit scoring is to add maximum value, and achieve its potential. The location of scoring at the centre of the organisation compromises the ability for maximum speed to decision to be offered. However, additional practices like delays in loading data, double checking of all applications prior to data input, paper based applications, and retrospective scoring of applications after a judgmental evaluation has been made were evident. This places in question the efficiency of scorecard management by some lenders. Significant streamlining of the lending process could be achieved without compromising risk management.

Market research requires to be undertaken by lenders to establish at what point the customer perceives that he has received a commitment to lend that he is satisfied with. If this is indeed at the “agreement in principle” stage, lenders might focus on reducing time to this initial decision. This could for example be achieved by separating the categories of data required for risk assessment, and gathering this information first with all other data being gathered sequentially as it is required. Thus the application data, which is needed to determine the loan outcome, would be gathered initially producing a very fast decision. This would significantly reduce the volume of data being requested at the first customer interview or contact. The security, marketing and other data could then be gathered when the loan had been agreed.

It is acknowledged that the level of technology available to lenders is varied. Lenders reported systems often derived from a legacy of bolt-on systems, and also derived as a result of mergers. The resulting systems are often delivering performance and functionality which lenders acknowledge to be sub optimal. Until higher levels of technology are in place, real-time, on-line, point-of-sale decision

making may be some way away for many lenders. However, lenders should consider how best they can simulate this optimum solution, in order that applicants get a quick, consistent decision whilst the organisation maintains risk which is controlled at acceptable levels.

This thesis thus far, has summarised the incidence and manner of usage of mortgage scoring in the UK. Additionally, evidence has been presented within this chapter which suggests that the derivation of business benefits has been compromised by the manner by which credit scoring has been adopted and managed within the operating environment. The diversity of lenders both in terms of their operational capacity and their business objectives means that no single “blueprint” as to how scoring should be operationalised would be appropriate. However, some suggestions have been made as to the means by which lenders could practically improve their scorecard management. It is believed that by adopting some of these suggestions lenders would derive a real improvement in achieving consistency, compliance, speed and customer service benefits.

Chapter six of this thesis will now report the findings of a case study undertaken with the co-operation of a non-scoring mortgage lender. The development and performance of a bespoke mortgage scorecard will be reported.

Chapter Six

6. Case Study Data and Analysis

6.1. Introduction

Thus far within this thesis a sequential approach to the research problem has yielded valuable data. The literature review introduced credit scoring, and the development of credit scoring. The range of techniques used to build scorecards was also considered. Additionally, the literature introduced the mortgage loan, confirming that a wider group of variables need to be included in the credit decisioning of this particular product. Finally, within the literature we confirm that the complexity of the operating environment requires to be considered, when we examine how lenders implement new technologies. Chapter four presented an overview of how credit scoring is currently used in the mortgage environment, and showed extensive use of mortgage credit scoring, but ad-hoc adherence to the system generated decision. Chapter five addressed the contradictions evident between lenders goals for credit scoring, and their subsequent behaviour when scoring had been introduced. Despite the work undertaken during the interview programme, which sought to uncover a logical reason for overriding based on risk or profit, none was found to exist.

In combination, the foregoing research generated a further research question. Given that within scoring organisations a strong judgmental element still exists in the lending process, evidence requires to be presented which compares the outcomes of judgmental and empirical decisioning when applied to a mortgage portfolio. Chapter six of this thesis addresses the following research question:

- Can a mortgage credit scorecard outperform judgmental evaluation of mortgage loan performance?

The research design is presented in chapter three, and the decision to select the case study method as a means to address this research question is explained. Chapter six will now describe the case study, which was undertaken in order to obtain data to

enable the research question presented to be resolved. In conclusion chapter six answers the research question.

6.2. Shaping the Case Study

6.2.1. Organisations Targeted for Case Study Analysis

It was necessary to identify those firms within the research population who were potentially suitable for case study analysis. The respondent population was examined to find suitable organisations to approach. The criteria indicating suitability combined lending characteristics, with geographic considerations. The lending characteristics identified as desirable were as follows;

- Mortgage loan decisions made judgementally
- High volume of mortgage loans granted (relative to survey respondents)
- Application data available
- Performance data available
- Access to staff who undertook decisioning permitted

It was desirable that the participant organisation was located within a particular geographic zone as it was likely that data gathering would take some time, and resources required to be managed efficiently. Two organisations emerged as being most suitable for case study analysis. A meeting was arranged with each of the two organisations during which they were introduced to the research in more detail.

6.2.2. Presenting the Research to Participants

It was considered vital that the case study objectives meet the needs of both the researcher and potential participant organisation, if a mutually rewarding relationship was to be achieved. Equally importantly, the case study required to offer some incentive to the potential participant, if they were to be persuaded to provide access to valuable data. It was therefore deemed necessary in the first instance, to provide both potential participants with a document, which provided an overview of the

intended outcomes of the case study. This initial outline was provided in a document entitled "*Mortgage Credit Scoring - An Evaluation*". This document is included as Appendix J, and describes the key areas which were intended to form the basis of this phase of the research. The document was initially presented to both target participants.

Both lenders were generally receptive to the initiative, but both were concerned regarding issues of data access and confidentiality requirements. However, following further informal discussions both at interview and via telephone and email contact, the larger of the two¹ (by volume of new lending), was formally approached with a personally tailored research outline which reduced the number of areas to be covered. The actual areas of investigation will be outlined in more detail later within this chapter. The negotiations for access to data were protracted. From the initial interview, which took place in February 1999, meetings took place both at the offices of the participant organisation and at the University. It was not until May 1999 that final agreement was reached and work could commence. The delays resulted from a combination of restructuring within the case study organisation, busy schedules of participants, and confidentiality requirements. Some very specific confidentiality requirements were appended to the standard University confidentiality agreement, and these required negotiation. Thus some four months after negotiations had commenced, the case study research was finally underway.

6.2.3. Case Study Objectives

The research thus far has identified three key areas where credit scoring can add value to the organisation; those are risk, process and cost benefits. During the initial discussions with the lender, it became clear that detailed financial cost information would not become available. The research objectives were therefore amended to reflect a focus on two key benefit areas, process and risk. At a process level it was agreed that the mortgage process be examined and documented, in order that

¹ The organisation which became the focus of the case study research will here-after be referred to as the Lender

potential inefficiencies could be highlighted. At a risk level, it was determined that the performance of the judgmental decisioning method would be compared with the performance of a bespoke mortgage scorecard. This objective reflects the key research question being addressed. Such a direct comparison of judgmental and empirical lending outcomes has not previously been undertaken using data from an UK based mortgage loan portfolio.

6.3. Organisational Profile

Without compromising confidentiality, it is useful to consider some characteristics of the organisation, which was the focus of the case study research. The lender is an established participant in the financial services market place, in which they have operated successfully for many years. They maintain a strong branch network, and individual branches have considerable autonomy of mortgage decision making. This reflects a traditional de-centralised culture, within which the individual branch manager has considerable influence and decision making authority. This profile reflects the traditional hierarchical approach to lending previously identified. Within such an environment, value is attached to traditional lending skills and the resulting level of authority, which is associated with such skills. Again reflecting earlier research findings, we might expect an environment such as this to be one in which some conflict might arise were empirical decisioning to be introduced. During the earlier interviews, evidence of conflict and disparate views were presented. These had sometimes resulted from new strategies supporting change from a de-centralised branch based approach to lending, to an empirically based centralised lending function. Such an organisational change might also result in the de-skilling and subsequent re-skilling of personnel. The alternative to re-skilling as evidenced in other similar organisations is the redundancy of some senior roles within the branch network, and a move towards a less hierarchical environment with a stronger focus on the role of the sales person.

The senior members of management who participated in the discussions as to whether to proceed with the research were exclusively male. However, it would be

wrong to present this as confirmation of a “macho culture” existing, a feature which was also confirmed within the interview findings.

Whilst maintaining a strong branch network, with considerable autonomy, a centralised credit underwriting function also exists. The role of the underwriting team is to make lending decisions for those applications, which, are outwith the credit policy guidelines. On occasions where the branch receive such an application they should forward it to the underwriters where a lending decision is made by one of an experienced team of underwriters. The underwriters are graded on a policy rules basis, and are managed within a hierarchical team. The underwriting team leaders are highly experienced in making lending decisions on mortgage loans. However, no performance data on the lending outcomes of the loans they grant, which are outwith credit policy was held by the lender prior to this research. The underwriting team does also have a second function. When branch officers have made a decision to approve a mortgage application, the application is then sent to the processing centre. At the processing centre the clerks key the application data on to a mortgage management system. During this process the process clerks are checking that the application meets lending criteria. If this is not the case the application is passed to the underwriters who contact the branch, in an effort to clarify the reason why a non-criteria application has been decisioned by the branch. This is usually due to the ambiguity of the credit rules resulting in a variety of interpretations existing. The underwriting team then makes an attempt to convince the branch to withdraw the application. This negotiation involves the underwriters convincing the branch of “the error of their ways”. This is not always successful, as the branch has often committed the bank to lend, and will not withdraw the application. This underwriting role results in some areas of conflict and will be examined further as the mortgage process is outlined.

The overview presented is one of a “typical” established lender, who values the “specialised” knowledge of the underwriters, and has only recently come to terms with the potential value of new technologies. Thus a follower, rather than a leader in the mortgage market. However, as a fairly large volume lender this organisation

was ideal for case study analysis, as it did not suffer from a lack of data which was cited by smaller lenders as a reason for not scoring.

6.4. Establishing Relationships

Having set up the research project, the senior personnel stepped back from the research and appointed various personnel to act as liaison officers with the researcher. The personnel appointed seemed to be genuinely interested in the research being undertaken, and provided assistance where required. This was an unexpected response, as an investigation of the role of mortgage scoring in a judgmental lending environment might have been expected to set “alarm bells” ringing amongst an underwriting team. This appeared not to happen as the underwriters seemed absolutely confident of their status within the organisation as that of a “specialised” team”. All individuals had heavy workloads, and beyond providing information as requested they were not actively involved in undertaking any element of the research. They remained very “hands off”, and seemed happy to allow the researcher to “get on with it”, without supervision or their active involvement. These key personnel were from a variety of functions and are now introduced.

6.4.1. Mortgage Underwriting Personnel

The first point of contact, and the most senior contact, was with the most senior member of the underwriting team. The underwriting team operates from a centralised decisioning unit. The centralised unit is housed within a processing environment as opposed to a branch environment. A variety of meetings were held during which the lending process was outlined to the researcher. Documentary evidence regarding credit policy was also provided to the researcher as background material in order that the mortgage process be fully understood. Following these meetings, it was determined that the application data to be gathered would be from February 1998. This time period was selected as it provided the oldest data available on which reports could be produced, which would result in lists of application numbers becoming available. Application numbers were required in order that the application details could be tracked. The lender has only relatively

recently utilised technologies which allowed such tracking to be conducted. The key outcome of the initial discussions was the production of an Excel spreadsheet providing the application details for February 1998. This spreadsheet was the “starting point” from which applications could be tracked, to establish their fate. The credit personnel were revisited at later stages in the research to clarify file notes, and actions taken during the application process.

6.4.2. Application Processing Personnel

Despite the mortgage lending decisions being taken at individual branches, mortgage application processing is conducted centrally. The senior officers in charge of the processing centre also became liaison staff. They allocated working space to the researcher, and provided a security pass, which allowed unrestricted access to the operating environment. When it became necessary for the researcher to become familiar with the automated systems, staff were allocated to “walk through” the various processes in order that the researcher could then access data as required. The data being gathered within the application processing centre, related to the status of applications, and the current status of accounts which had been opened. Using the spreadsheet provided by the underwriting team, the fate of the applications made in February 1998 was tracked using the computer based systems at the processing centre. The processing staff also provided details as to the likely locations of various files, when files were required. They also provided a useful liaison function which ensured that the researcher could get access to the data storage warehouse.

6.4.3. Data Warehousing Personnel

Armed with the account details gathered from the processing centre, the researcher spent several months at the data warehouse. Two members of personnel at this location acted as liaison, having been contacted by the processing staff. Again working space was allocated to the researcher, and involvement of staff was limited. The liaison staff assisted in providing a “walk through” of their systems. The warehouse had a different technology based file tracking system. It was therefore necessary to input the account numbers obtained earlier, in order to obtain a bar code

for each file. Using this bar code, the location of the file could then be tracked to a single box, on a specified shelf at a particular point in the warehouse. This allowed the researcher to identify and gather files. The files when tracked were taken to the allocated desk where they were examined and data gathered. The warehousing personnel assisted where codes indicated that files were missing for a particular reason, and provided insights as to where they might be held.

6.4.4. Arrears Management Personnel

As the research progressed, it became necessary to track down files relating to those accounts which had gone into arrears. These files were variously held at branches or at the centralised arrears management centre. This centre was being established during the earlier stages of the research, and was in its infancy when the files were required. Thus files were being “called in” from branches to the centralised arrears unit during the research period. The centralised arrears function is housed in a new building, again remote from the other processing centres. The processing liaison staff contacted members of arrears staff, and access was arranged for the researcher. Despite the researcher conducting analysis, beyond that which the arrears staff conducts, again staff were not at all defensive about their role. Despite expressing an interest in the results when they became available, they accepted that the results would be forwarded only to a very senior member of management. This seemed to confirm that the hierarchical nature within the organisation, was accepted. On request the arrears files were passed to the researcher, who gathered data as required.

6.4.5. Credit Risk Personnel

Towards the very final stages of data gathering a new group showed interest in the research, and invited the researcher to a meeting. The Credit Risk staff, who are in charge of writing credit policy within the organisation, were interested in the arrears analysis being conducted. This was a somewhat surprising development, as the existence of a risk team had never previously been acknowledged by any of the personnel, whom the researcher had encountered. The credit risk team is housed in a processing environment, which is unrelated to the main mortgage processing centre

and the arrears management centre. Very limited interaction with this team took place, as their requirements could not easily be met within the research brief. The credit risk personnel would have liked more detailed analysis to be conducted on a subset of the population chosen for analysis. However, the limited number of cases in the subset, would have rendered any analysis statistically invalid. Additionally, the outcome would not have contributed to the research study, and as such was not undertaken, as it would have put an unhelpful strain on resources.

However, the risk team did request, and were provided with, a list of all accounts from the sample examined which had gone in to arrears, along with data on the extent of the indebtedness. This was a surprising request indicating that the internal reporting mechanisms were not providing a level of management information, which could usefully support in depth portfolio analysis. This was confirmed within the meeting, as staff expressed surprise that they had any accounts which were ten payments in arrears at a time period twelve months after opening. Information which they might reasonably have been expected to be aware of. Reporting which did exist, appeared to be at a macro level, e.g. the proportion of accounts in arrears across the portfolio rather than segmented in variety of ways.

6.4.6. Summary - Personnel Involved

The picture presented is that of a somewhat fragmented staff structure supporting the mortgage process. This is an accurate reflection of the organisation during the research period. However, it should be noted that this picture was taken during a period of change. The organisation, like many others, had maintained de-centralised control of mortgages for many years. Applications and arrears had traditionally been dealt with at branch level. Central support had previously been available for those applications which were clearly outwith policy, and for those arrears cases which had reached a particular “status” i.e. at a pre-determined level of arrears. What was witnessed was a move to centralisation in order to improve efficiencies. Thus the processing, file storage and arrears functions were being centralised. As with any centralised functions, the intended outcomes were confirmed by the lender to be a combination of improved control, consistency of approach and cost savings.

However, the decision making function was not at this point being centralised. The participant lender was quite frank in confirming that the research being undertaken, might usefully assist them in deciding whether to centralise the decision making function also.

A lack of cohesion between functions was also evident. The fact that functions such as mortgage processing, arrears management and credit risk were geographically remote could have contributed to the fragmentation evident. However, in discussions with the various staff, it became apparent that they had a very “functional mindset”. Staff within each function, appeared to have little interest in the role of the other functions. This held true even when the functions appeared to the researcher to require to have close relationships in order to meet business goals. No evidence of the processing, arrears and credit risk teams having regular meetings was found. This suggests that the potential for valuable organisational learning is being missed. No feedback loops or iteration processes seemed to have been formalised. In order to maximise learning opportunities, the mortgage process might usefully be viewed more holistically.

6.5. The Mortgage Process

6.5.1. Mortgage Documentation

Initial assessment of the documentation provided, confirmed that staff had written guidelines on all aspects of mortgage lending. These included elements of an introduction to mortgage related topics, as well as detailed instructions regarding the mortgage process. The instructions which guided staff focussed on process related issues, and included the following broad topic areas:

- ❑ General mortgage guidelines
- ❑ Types of mortgage
- ❑ Application assessment
- ❑ Procedures following a successful offer
- ❑ Mortgage arrears management

The information available to staff which provided a broad overview of issues related to mortgages generally included the following:

- MIRAS an introduction
- Mortgage analysis reports
- Sources of mortgage business
- Securitisation

The content of these documents is not reproduced in detail, due to issues related to confidentiality. However, it is possible to confirm that the focus of the documentation was process and task driven. The uniqueness of the mortgage product, the drivers of mortgage default, or risk management generally did not feature within the various documents. The purpose of the documentation was to provide basic procedural instructions.

The documents provided confirmation that written information was available to staff which informed them about their ability to take lending decisions on behalf of the lender in a variety of circumstances. Analysis of the quality of the written guidelines was made subjectively by the researcher, again in order that confidentiality would not be compromised. In examining the written guidance given to staff the research focus was in trying to “tie in” the guidance given to staff with aspects of risk, profitability and customer relationships. These aspects having been identified as being important in reaching a mortgage loan decision.

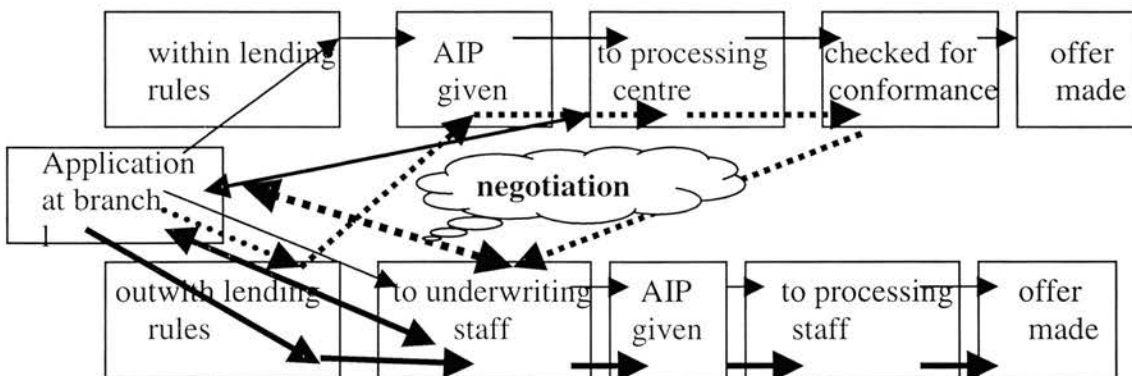
The outcome of the examination of documentation, was a view that the guidance was presented to staff in a manner not wholly supportive of risk management. Guidance was worded loosely, and in a way which allowed many interpretations to be made by individuals. This compromises the need for control and consistency. The only aspect of risk, which received attention, was the potential for mortgage fraud. Again this information was worded in a fairly ambiguous fashion. An example was the need for staff who are trying to ensure no fraudulent applications are accepted to “*scrutinise the proof of identity to ensure that it is not a forgery*”. Due to the nature

of the mortgage loan, and the fact that legal security is taken over the underlying property, one might assume that mortgage fraudsters are capable of producing some high quality forged documents. By giving such general guidance it is unclear what the lender expects of individual staff members. How much checking is attached to the instruction to “scrutinise”? Does this involve cross checking or simply giving the document a visual examination only? Such criticism is not intended to be trite, rather to exemplify that it was often hard to find a relationship between the instructions given to staff, and the need to manage the process in a way which manages risk and meets customer service needs. Additionally, some aspects of the guidance on avoiding fraud were linked to loan to value ratios. This resulted in the different levels of activity which were focussed on fraud avoidance, being determined by the LTV ratio. This in turn suggests that a risk:return trade-off is being made centrally. Whilst the trade off between risk and return is a given in the lending environment, it was something of a surprise to find it related to fraud avoidance. The desire to avoid fraud, might be expected to produce guidelines which are adhered to in all cases. Profitability (return) might be expected to become a consideration, only where a level of certainty about the applicant was assured.

6.5.2. The Mortgage Process

As has been alluded to in the earlier discussion of the role of the underwriter, the process was extremely fragmented. And the extent of the fragmentation is evident in figure 6.1.

figure 6.1: The Mortgage Process



What figure 6.1 shows is that several different scenarios can exist depending on the nature of the application. The first determinant of action is whether the mortgage is within or outwith credit policy criteria. If the loan is within criteria, the branch can give agreement in principle to lend. They then take up references, and when they have all the required documentation the application and supporting paperwork is sent to the processing centre. The processing clerks then check that the loan is within criteria, and that the documentation is in order. If everything is correct the offer papers are produced. If however the loan is found to be outwith criteria, the loan is passed to the underwriting team. This part of the process is indicated by the dotted lines in figure 6.1. The underwriters then contact the branch by telephone or fax, and try by means of pointing out the branches "error" to prompt the branch to withdraw the application. This may or may not happen. If the branch officer has interpreted the credit policy rules differently to the underwriter he will maintain that he was "within his rights" to make the loan. Also if the branch has committed the bank to lend, the application will proceed. The number of negotiations and the rate of underwriter success in making the branch withdraw the application was not known. However, of the applications approved, 30% had been passed to the underwriting team, either directly from the branch or via the processing staff.

Another scenario evidenced when the loan has been approved at the branch office, is that the processing clerks find that some supporting evidence is missing. In this instance they will liaise with the branch to obtain the missing documentation.

Where an application is acknowledged by the branch to be outwith the lending criteria, it should be sent directly to the underwriting team. The underwriters then either give a decision in principle without obtaining further information, or may ask the branch to provide some additional information. Again this liaison is either by telephone or fax.

The key process problems mainly arise due to different interpretation of the policy rules which result in branch lending staff, considering loans to be within criteria, whilst the underwriting staff consider them to be outwith lending criteria. This

results in considerable friction and “ping-pong” of applications between the branch offices and the underwriting team. The credit policy rules, which cause many of these problems, are now considered in more detail.

6.5.3. Credit Policy Rules

As evidenced in figure 6.1 the credit policy rules, determine whether the branch rather than the centralised unit should grant a mortgage. The credit policy rules, like the general procedures are open to interpretation. Having examined the credit policy documentation, the researcher believes that the rules contain some apparent contradictions. Applicants who had displayed previous poor credit behaviour in a relationship with this lender were to be declined. However, applicants who had displayed poor credit behaviour with another lender (identified by bureau information) were only to be declined if the poor behaviour had taken place within a given timescale. This would seem to penalise existing customers, who in analysis conducted later in this chapter, are found to be less risky than new borrowers.

Many extremely subjective assessments were encouraged within the credit policy rules. Staff were expected to be able to evaluate “*marketability of applicant skills*” where applicants were employed on short-term employment contracts. Likewise the ability of the potential borrower to meet the loan repayments (service the loan) was taken subjectively by lending staff who were given very few guidelines as to what should be included. Staff were advised to consider “*all regular monthly outgoings*”, and to ensure that “*this figure appears accurate*”. Within the examination of files which followed, it became apparent that interpretation of this “rule” varied immensely. A common occurrence was that an individual previously living at home with parents often provided outgoing figures of nil. This somewhat unlikely figure was accepted by staff as being accurate. The existence of no outgoings was often presented by applicants who earned substantial sums and had no capital assets or savings. Neither the loan officer nor the centralised lending team challenged this apparently contradictory evidence.

6.5.4. Process Inefficiencies

As identified the branch officer examines the loan application to ensure compliance with the various rules which exist, prior to making a lending decision. To help ensure compliance he completes an assessment form, which is a rule-based form in which confirmation of the loan's adherence to the various policy rules is requested. However, within the form are various options for the loan officer to confirm that the application is in fact outwith the criteria, and to provide supporting reasons as to why he has made his decision despite conflict with the rules. According to the procedures, applications outwith the criteria should have been sent to the central underwriting team in order that a decision be made by them. The existence of this anomalous rule based form, is not supportive of the policy which states the branch should not be making these decisions.

An additional process problem is identified. When the branch assess the application, they are then responsible for obtaining supporting information. A combination of credit search details, bank statements, property survey and suitable identification required to be collated. The branch therefore make the initial loan assessment, and give a decision to lend in principle subject to this back up data being provided. This then led to a period during which the branch requested and "chased up" the supporting information. Following this period, the completed application and supporting data was sent to the centralised team for preparation of a final offer to take place. The final offer is the legal document, which finally confirms that the loan will be made on a given day. Problems resulted when gathering the supporting data required a protracted time period, or indeed where the customer wished to move quickly to purchase a property. In these cases the borrower had often received agreement in principle and had heard no further, assuming that the offer papers were being produced. When all documentation was finally sent for processing it might be found not to conform to criteria and be passed to the underwriting team. The underwriters then often found themselves trying to decline a loan, which the customer believed, had already been approved. Thus the underwriters found themselves to be in a situation where the branch had "committed the bank to lend", and they could not then decline the transaction.

Thus a process or procedural problem metamorphoses into a risk problem. The underwriters find themselves “accepting” (albeit grudgingly) loans which they believe pose an unacceptable level of risk.

A further risk problem evident, is that the duty of identifying “non-criteria” loans which are being presented for processing via the “within criteria” channel falls to the processing clerks. The processing clerks have had no formal risk or lending based training, and must identify the loans via a checklist of criteria. This suggests that a proportion of loans, which are being accepted might be non-criteria loans which are eluding the scrutiny of the processing clerks. This would result in a mistaken view of the risk inherent in the portfolio.

The combination of risk and process inefficiencies identified, often resulted in customer service problems. These were evident in file notes and letters or faxes of complaint within the files or noted on the screen based mortgage system. The “ping-pong” of applications between two decisioning bodies (branch and underwriter), resulted in delays in producing offer papers, and on occasion customer disappointment when the decision to lend was changed.

6.5.5. Summary - the mortgage process

Figure 6.1 shows that the mortgage process is complex. Liberal interpretations of credit policy rules and ill-defined procedures have a negative impact on both risk management and customer service. Additionally the many actions taken, and interactions between various groups are inefficient and potentially costly. That the responsibility for “spotting” non-criteria loans at the processing stage rested with the processing clerks, was a further compromise of risk management.

The written mortgage procedures contain many amendments and are in the process of being updated. What became apparent, was that within the organisation a move was afoot to “force” more structure around the mortgage process. The staff was being provided with new mortgage documentation, to encourage them to follow the rules. An example was the mortgage “checklist”, which required to accompany each

application. This sought to ensure that staff acknowledged when the application was truly within credit policies or not. Where accounts were clearly outwith policy rules, the branch officer should not have made a commitment to lend money. However, the checklist did not appear to be having the desired effect.

In the environment which prevailed, the lender appeared to be attempting to impose structure without removing all autonomy from individuals. This resulted in the large number of exceptions to the stated process being permitted. What is unclear is the level of improvement that the lender was achieving in both the process and risk aspects of the lending process. No formal analysis was conducted which measured the extent of risk and process improvements, as data was unavailable.

It was apparent that the processes in place would not achieve consistency, control or improved customer service to the same degree that a more directive approach would. What is not clear is the kind of organisational backlash that might have resulted from a directive approach. What was confirmed during discussions is that the lender had aims to improve both risk management procedures and the mortgage process. The reasons why they were moving towards this in stages was never established with absolute certainty. However, by combining anecdotal evidence with the procedural evidence, it seemed that they were making incremental shifts towards such improvements in a manner that was designed to be non-confrontational with those who wished to retain autonomy of decisioning. Thus the lender appeared to be moving towards the potential to introduce centralised decisioning in stages. The current situation is almost that of “parallel running” which is a recognised implementation strategy when new systems are being introduced to the organisation. As an implementation method, parallel running is confirmed to be useful when “*the proposed changes will have a dramatic affect on the system and associated systems*”, (McCalman & Paton, 1992).² Personnel involved are considered to be part of the system. Parallel running allows familiarisation with the new system, which in this

² A full review of all change management strategies is felt to be outwith the scope of this thesis.

case is centralised decisioning, until the new system becomes reliable and is understood. This is believed to be likely to reduce resistance to the new system.

When compared with researcher experience gained in similar environments this is a common approach, and is intended to deflect criticism of centralisation. Such criticism is often partially based on many of the cultural issues that have already been alluded to. What cannot be determined is the cost to the organisation of making the desired changes incrementally. The trade off between risk and process improvements, which lower costs and improve control and service, and retaining staff autonomy in decision making, cannot be quantified within this research. However, that such a trade off exists, is confirmed within the literature, the interview evidence and the case study phases of this research. The rationality or otherwise of such a trade off, is a question which is likely to have a variety of responses when considered relative to a variety of lending organisations and their circumstances.

6.6. Application Data Gathering

Having conducted the initial examination of the mortgage process, it was then possible to commence gathering the application data that would facilitate the creation of the bespoke credit scorecard. The Lender processes approximately twenty thousand mortgage applications per annum via a network of branches. In view of this large number forming the loan population it was impossible for all the available data to be used. This is due to the resource limitation of a single researcher gathering data, and limited time available. Additionally, not only was application data to be gathered, but subsequent performance data was required, which also had to be gathered manually. It was agreed during an early meeting that as a proportion of the overall population, all applications made during a single calendar month would form the research sample. This common time period offers the benefit of ensuring that all applicants were subject to the same economic conditions, both at the time of application and during the life of the loan. Additionally, the applications were subject to the same application and management procedures during their lives. This

was particularly important due to the large amount of change taking place within the lending environment under examination.

6.6.1. Tracking the Applications

The month selected for analysis was March 1998. The lender had provided an Excel spreadsheet containing application numbers and applicant surnames for 1484 applications, which had been received during March. The applicants listed were those who had formalised their application by completing a paper based application document. Thus, omitted from analysis are those who had made a verbal enquiry about a mortgage loan product, and had either been dissuaded from applying or had chosen not to apply. No data was retained on such potential applications, and it was noted that gathering data on the enquirers who fail to convert to applicants could prove useful to the lender. In particular gathering the reasons for non-conversion could provide valuable data on the suitability of either the products on offer, the information being requested, or the process which requires to be followed prior to a lending decision being reached.

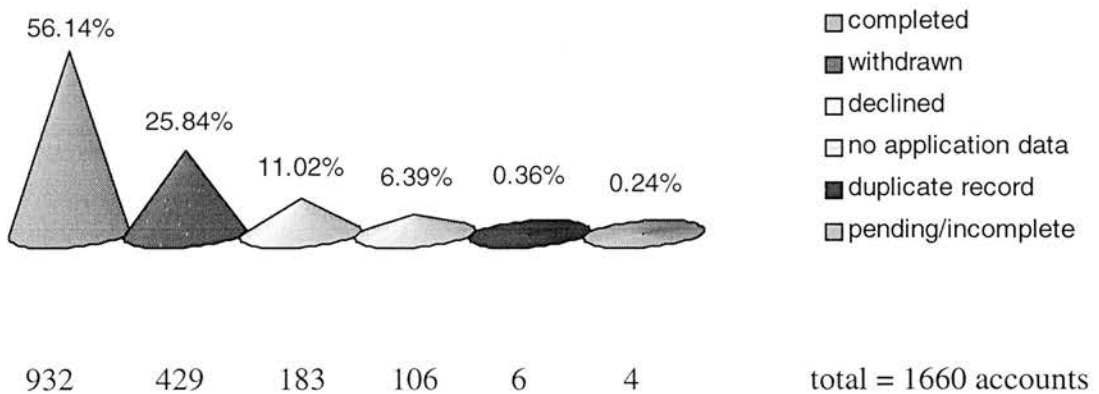
In order to track the 1484 applicants, it was necessary to use the mortgage processing system to gain access to the actual account number issued. Armed with the list of application numbers, the researcher spent time at the mortgage processing centre signed on to the computer based processing system, using the application numbers to obtain the account numbers. The system supporting such tracking was very recent, yet despite this the search process was not straightforward. On occasion when application details could not be traced, the search required to be done by branch sort code and surname of applicant rather than application number. This means of searching uncovered additional applicants who appeared to have “slipped through” the system, and whose existence was not recorded on the system which produced the Excel based list of applicants. Thus more searching revealed that during March 1998, 1660 applicants had formalised a paper-based application for a mortgage facility, almost twelve percent more applications than the lender originally believed had been received. When this information was presented to the processing staff, they seemed quite unconcerned by the lack of data accuracy. They seemed very

accepting of the problems, which can be encountered when establishing new procedures and using new technologies. This evidence suggests that depending on the supporting procedures, when new systems go live it may take some time before acceptable levels of efficiency are achieved.

6.6.2. Fate of Applications

Having tracked the applications received, the fate of each application was then established. This required that a systems enquiry be executed on each individual application. This was done and it was established that of the 1660 applications received, only 932 were completed. The term completed or completion refers to those applications which were both approved by the lender and accepted or “taken up” by the applicant. The 932 completions give an overall completion rate of 56.14%. Further enquiries were processed to examine the fate of the 728 applications, which did not result in mortgage accounts being opened. The final status of the 1660 applications from March 1998 is presented graphically in figure 6.2.

figure 6.2: Fate of Applications



The categories in figure 6.2 are now explained. 932 applications completed, a completions level of 56%. No publicly available data existed which allowed this

figure to be compared to industry norms. However, the subsequent benchmarking study conducted within this thesis, confirms that 56% is below the mean respondent level of 72%. Further analysis was attempted in order to gain further useful insight into the 44% of applicants who did not complete, and these are now considered individually.

429 applications are categorised as “withdrawn”. The categorisation is insufficiently specific to allow analysis. Withdrawal of an application might occur where applicant circumstances change, and either the applicant or the property vendor decides not to proceed with the transaction. This withdrawal can take place at any time between the formal offer being placed and the missives being concluded.

Due to the nature of the application process at the lending organisation, withdrawn might also refer to those applications that were technically declined, following negotiation between the branch and the underwriting function. Thus some of the 429 applications withdrawn are likely to belong in the category “declined” which contained 183 applications or 11% of the applicant population. Declines at a level of 11% are low when compared to 1997 evidence, which suggests that *“as many as 30 percent of applicants are turned down by traditional mortgage lenders”* (Brown-Humes, 1997). Evidence on a single lender collated in 1999, confirms the 1997 data, *“Northern (Rock) turns down one-third of mortgage applications because of poor credit risk”* (Merchant, 1999).

The remaining categories of no application data, duplicate records and incomplete applications can not usefully be analysed. These represent seven percent of the sample, and mainly refer to applications which could not be traced. This suggests that some tightening up of procedures might be required to ensure that no applications fall into a “black hole”, which precludes their inclusion in portfolio analysis.

6.6.3. Status of Completed Accounts

The completed accounts were subject to further analysis. This level of analysis was descriptive. It was undertaken to provide an overview of the data, and in response to the needs of the participant organisation which required feedback reports as the research progressed. Several variables were examined both at sample and individual branch level;

- Current status (arrears or up to date)
- Level of arrears across portfolio (2 payments missed)
- Level of arrears relative to number of branch applications
- Closed accounts and where possible reasons
- Product type

Feedback was provided to the lender on the analysis undertaken. Due to the sensitivity of these figures much of this output data is not included within the thesis. However, industry wide data relevant to several of these issues is presented within the benchmarking survey in chapter 7. Some general observations are now made without compromising confidentiality.

The level of arrears amongst the sample examined at a time period 12-15 months after account opening, was significantly higher than expected. It can be confirmed as being between five and eight percent without compromising confidentiality. This figure reflects the view within the literature, that there may be a high number of individuals who experience difficulty in meeting their mortgage repayments. Lenders typically cite the final possession figures of less than half of one percent, when discussing the extent of repayment difficulties. However, the portfolio default figure, which highlights all accounts with serious repayment problems is often quoted at around two percent. This study reports an early arrears figure of between five and eight percent. The maturation pattern of arrears clearly requires further study. However, what is particularly necessary is to establish how many of the two percent in default (serious arrears), give up their home, rather than face forced

possession by the lender. Thus the possession figure might significantly understate the numbers who lose their home as a result of repayment difficulties.

When the arrears evident within the case study organisation were examined stratified by branches, it was possible to examine whether those branches processing higher number of applications granted loans, which performed significantly better than those branches with less experience. This analysis was undertaken, as branches obtained humans resources partly relative to the volume of lending, therefore an experienced mortgage lending team would be available at the busier branches.

The branches with lower than average numbers of applications, do in fact display arrears levels almost half of that of the portfolio as a whole. This suggests that their lending policy was more stringent than the high volume branches, which might be related to their lack of mortgage experience. However, such “pre-screening” of applications whilst turning down potentially bad applications, is likely to result in a significant number of good applications also being declined. Thus the impact of an overly strict lending policy, might in fact be a reduction in overall profitability. Unfortunately this could not be examined further due to lack of data. Branches with high volumes of loan applications variously displayed arrears levels above and below the mean value. What was striking was that two branches whose lending volumes were very significantly higher than the others displayed arrears performance almost double that of the average across the sample. This resulted in part from the higher proportion of applications at those branches, which were from intermediary sources. This high volume of intermediary business was due in part to the location of these particular branches in city business districts, and in close proximity to the offices of lawyers and estate agents.

The mean level of arrears relative to the mean rate of completions were examined with a view to finding those branches with low completions and high arrears, or high completions and low arrears. These branches and their experience could provide useful information, which might be useful in shaping credit policy. A chi-squared test was performed to test the hypothesis that branches displayed relative arrears

performance that was statistically significantly different. This analysis was undertaken despite the fact that the data did not lend itself to rigorous statistical testing as many of the expected arrears values exhibited by branches were less than the five desired for chi-squared to be considered robust.

Figure 6.3 presents the findings of the subset of the data, with the greatest contribution to the chi square statistic. The chi square value of 69.023 with 81 degrees of freedom rejects the hypothesis that branch performance differs with statistical significance. Despite lacking statistical significance, chi squared highlighted the branches that are most noticeably different in performance from the others. These, as you would expect are those with few approvals and high arrears, and those with high approvals and relatively low arrears. The fifteen branches presented, is a sub-set of all branches. The number of branches in the population cannot be divulged, but it is important to note that only thirty percent of all branches had any arrears to report.

figure 6.3: Branch Arrears Performance

Branch Code	Number of Completions	Number of Arrears	% Arrears at Branch	Contribution to Chi-squared stat.
confidential data	2	1	50.00%	7.615354
2	15	3	20.00%	6.200872
3	8	2	25.00%	5.930805
4	3	1	33.00%	4.497861
5	99	10	10.10%	4.417469
6	12	2	16.66%	2.971037
7	12	2	16.66%	2.971037
8	12	2	16.66%	2.971037
9	99	9	9.09%	2.767088
10	5	1	20.00%	2.066957
11	7	1	14.28%	1.085227
12	27	0	0.00%	1.419528
13	19	0	0.00%	0.998927
14	18	0	0.00%	0.946352
15	49	1	2.04%	0.964352

When examined by product status, it became clear that the majority of mortgages were endowment based rather than capital and interest. The poor performance of endowments, which grabbed the headlines during 1999, had not generated much publicity at the time the applications were made. It is likely that a reduction in the level of endowment based mortgages might now be evident. Analysis of the performance of accounts by product interest status (product type) was conducted. This confirmed the findings within the literature, that flexible rate mortgages “*are riskier than fixed rate mortgages*” (Webb, 1982)

The final descriptive phase of the initial data analysis examines the closure of accounts within the period 12 months after drawdown. Almost three percent of accounts had been closed, with just over two percent of these being transferred externally from the lender i.e. migrating to another lender. No information or analysis was possible to determine why borrowers moved so quickly. What is important is that this sort of data enters into a “feedback loop” that allows the lender to learn from his actual lending experience. Migration rates impact on pricing and profitability issues, and lenders ought to collate data that allows them to track and manage migration actively.

6.6.4. Summary - Mortgage Application Data

The confidentiality of the data has not compromised the overall findings of the initial phase of the case study research. The difficulties experienced by lenders using new technology based systems effectively was evident in that some data was incomplete. Where data was complete there was also evidence that recording mechanisms had not been fully “thought through”, e.g. inadequate codes available to describe applications that did not complete. However, this reflects what you might expect to find where many systems changes are taking place at once. What is clear, is that a major change in the level of analysis of the mortgage portfolio is underway. Much of the reporting, such as that on non-completion reasons, is entirely new to the organisation. This desire for more knowledge across many aspects of portfolio performance reflects the views of interview participants. Lenders, who found

themselves surprised by their exposure to negative economic conditions during the 80's recession, vowed to improve data recording and analysis.

The relatively high levels of early arrears, also reflects the view that lenders present only the "tip of the iceberg" by relying on possession figures to suggest a high quality loan book view (Doling, Karn & Stafford, 1985). More detailed analysis of the maturation of arrears, from arrears to default and possession is required. The data relative to account closures seems intuitively to be high. However, as no comparative figures are available in the public domain, no inferences as to the normality or otherwise of this data can be drawn at this stage.

One of the most interesting findings of the application data analysis was that the descriptive data when presented to the lender was in fact new to him. That more applications had been processed than they knew about, the number of those accounts which had completed, and subsequent status of accounts opened was all new information to the lender. Whilst they believed that they knew the number of applications, the figure they held significantly understated the true volume. Likewise some arrears and closure data is available, but it cannot be generated relative to "tranches" of applications. That the credit risk team requested account and arrears information which, appeared new to them, confirmed this. The analysis is currently available to the lender only at a portfolio level.

This suggests that some lenders might require to improve their data gathering, and reporting mechanisms. Only by knowing accurately the current risk levels, and the impacts of various process changes, can lenders begin to make real improvements on both the risk profile and process efficiencies of their lending operations.

6.7. Building the Scorecard

6.7.1. Introduction

It is outwith the scope of this thesis to offer a detailed comparison of statistical techniques commonly used in scorecard development. This work has been done, and

results are available within the literature. Having evaluated the various comparisons which have been undertaken it was ascertained that the selection of a suitable technique was largely a matter of preference, as no single technique is without its critics. This view is supported by McCahill (1998), who confirms that "*differences in predictive power between credit risk models are more a function of the differences in the skill, experience and care of the model developers than of the technologies used*". Thus with the choice being that of the researcher it was decided that a linear regression technique would be used in order that a scoring model could be constructed which would afford a comparison with the judgmental evaluation system in place. It is not asserted that the scorecard that resulted offers the optimum predictive performance possible. However, as confirmed in the literature review the regression technique used, has been found to afford comparable performance when judged alongside other techniques.

The data sample used to build the scorecard has many features, which are desirable when creating a scoring model. The application data is from a single time period, and is drawn from a population applying for a specific product. Additionally the data is drawn from all applicants during the given period. The data quality is good, as the researcher had the opportunity to gather primary data from the actual applications and other file based data such as survey and bureau reports. All required files were tracked down with the exception of five individual cases. Some limitations are found in respect of several variables which are incomplete, but this only applies to those applicants who were declined a facility. This results from the nature of the business process, which allows "speculative" applications for mortgage loans prior to a property being found. Such speculative applications are seeking an "agreement in principle" subject to satisfactory survey and references subsequently becoming available. A further limitation is acknowledged in relation to the volume of data available on which a scorecard may be developed. This limitation is the result of compromises being reached in order to balance the access to data allowed by the lender, and the limited time and resources available.

6.7.2. Mortgage Application Data

The data comprises application data on mortgage loans applied for during March 1998. The performance data for these loan accounts at a time period 12-15 months after opening was also available. The application time period self selected as constraints existed in identifying a block of applications prior to 1998. Thus it was necessary to gather 1998 application data and 1999 performance data in order to complete the research within a pre arranged timescale. Whilst twelve months performance data for a loan which is expected to survive at least five-seven years, might appear to be something of a compromise, this is not entirely the case. Anecdotal evidence from lenders presented in chapter five, suggested that lenders are most interested in predicting those loans which default in the first twelve to twenty-four months. Loans which default at a later stage, may do so due to "life cycle events", and data enabling prediction of such events is not currently gathered at the application stage. Additionally by reviewing the data twelve months after drawdown, subsequent research, tracking default maturation patterns became a possibility for the participating lender.

6.7.3. The Development Sample

As the data was being gathered manually from paper based files which are stored in a variety of locations this physically limited the volume of data that could be gathered. Thus, data was gathered on just over twenty percent of the approved applications. These applications comprised 152 good accounts and 44 bad accounts. The good accounts were selected using a random number generation programme using Excel. This selected accounts by their reference number from the good population. The bad sample comprised all bad accounts. These were needed to provide sufficient bad experience to allow scorecard development. Additionally data was gathered on one hundred applications which were declined during the period. In order to be wholly objective regarding which data to gather, analysis of all data which could potentially be gathered, was undertaken. In order to do this, each organisation which had been a participant in the survey phase of the research was asked to provide a mortgage application form. The contents of each form were collated and analysed on an Excel

spreadsheet to examine the type of data lenders considered to be useful, and the purpose of each piece of data gathered. The research output from this subset of the main research is presented as appendix L. This appendix discusses the role of the various pieces of data gathered. The role of each piece of data varies, between risk assessment, marketing, security and in meeting the requirements of the mortgage code.

As a result of this analysis of possible characteristics, sixty-two variables were identified as being potentially useful. All sixty two were therefore gathered from each application. A full list of these variables is provided in Appendix M. Of the sixty-two only the reference number formed no part of the subsequent analysis.

As confirmed earlier, data was also gathered on one hundred rejected applications. However, the rejected applications form no part of the subsequent analysis at this stage, as they were found to contain many missing variables. This was particularly true of product and property variables, suggesting that the nature of the rejected applicants was mainly "speculative". Some limitations of the data finally used in the scorecard development are acknowledged to exist and these are now discussed.

6.7.4. Sample size

Sample size is less than may be considered desirable. However, this does not compromise the quality of the data. The limited data set which contains one hundred and ninety six cases, is enhanced by comprising sixty-two application variables for each case. The data quality is further enhanced by the availability of subsequent performance data. Previous research in the field has also been conducted using relatively small samples. (Myers and Forgy, 1963) conducted a study using a total of six hundred cases, of which three hundred were used in development and three hundred in testing. (Orgler, 1970) used three hundred loans in development and one hundred and twenty in testing during his analysis of commercial loans. (Orgler, 1971) went on to expand his sample size by bringing in data from another bank. However, by combining the data of more than one lender in creating a scorecard, he confirms that variations in application forms, and control techniques exist. Thus the

models are compromised by only comprising those elements, which are commonly available from both lenders. This potentially limits the predictive ability of the scorecard, by not using the most predictive elements from each bank. (Rakes,1973) examined mortgage loans based on data from 152 good and 48 slow paying loans, almost identical to the sample used within this study. These figures seek to confirm that previous researchers in the field, have worked with relatively small volumes of data, and produced some interesting results.

6.7.5. Reject Inference

The construction of a scorecard based solely on those applications which have been approved, is acknowledged to result in bias. Inferring the behaviour of rejected applicants is a popular pastime amongst statisticians. However, regardless of the technique used, the true class (bad or good) of rejected applicants is never known. The development of the scoring model within this thesis supports the view of Kelly in 1998. Kelly confirmed the importance of reject inference, but concluded that it is acceptable in certain contexts not to “*concern ourselves with this extra complication*”. As the reject data did not lend itself to inclusion due to a number of missing variables, it was decided to build the scorecard without making inferences about the rejects. This does not preclude work being undertaken at a later stage to utilise the reject data more usefully.

6.7.6. Initial Data Analysis - Coarse Classification

Following common practice in scorecard development, each individual value that is found within each variable, is initially coarse classified. This procedure allows the “relative goodness” of each individual value within a variable to be identified. The procedure is explained in detail within the literature (Lewis, 1982) in the seminal book “Introduction to Credit Scoring”. For the purposes of this research the definitions good and bad followed classifications used within the case study organisation and remain confidential. However, those classified as bad were not formally in default (three or more payments missed). The definition bad is closer to two payments missed. This is a perhaps not an unreasonable definition of bad in a

mortgage of between 12-15 months old. The number, and then proportion of goods, is compared to the bads. By dividing percent goods by percent bad, the “good odds” or relative goodness is computed. It must be borne in mind that this is the relative goodness of the value only *if no other information is available*. Coarse classification of the data in this way is time consuming but can yield interesting results, and ensures that no useful information is “lost”. Figure 6.4 illustrates the coarse classification procedure being carried out on part of the variable “age”. Here we see that borrower behaviour does not improve directly with age. We can also see some unexplained very good odds for those aged 29 - 31 and particularly poor behaviour for those aged 32-33.

figure 6.4: Coarse Classification

Attribute	Category	No. Good	No. Bad	of goods % good	of bads %bad	relative goodness
Age	18 to 21	X	Y	9.21	13.64	0.68
	22 to 23	X	Y	11.84	6.82	1.74
	24 to 28	X	Y	26.97	40.91	0.66
	29 to 31	X	Y	15.79	2.27	6.95
	32 to 33	X	Y	3.95	9.09	0.43
	34 to 39	X	Y	15.79	13.64	1.16
	40 plus	X	Y	16.45	13.64	1.21
				100.00	100.00	

The process of coarse classification continued, refining each variable in order that “relative goodness” could be grouped where appropriate without losing interesting features within the data. The relative goodness figure provides the basis of the scoring weights for each variable.

The coarse classification undertaken at this stage was entirely rigorous and made no assumptions about the underlying data. Conducting this process rigorously ensures that the resulting scorecard is as predictive as possible. Where assumptions are made about what data should be included, then developers might “skip” some of the coarse classification stage and start analysis with a reduced number of variables,

based on prior knowledge of what is likely to be predictive. Again this information could be rendered less effective where the prior knowledge relates to alternative products, alternative geographic regions, or alternative time periods.

6.7.7. Exclusions following coarse classification

Each of the original sixty-one variables was analysed using coarse classification techniques. Following coarse classification several were excluded on the basis of the strong relationships which existed between variables, such as between annual net income and monthly take home pay. Additional exclusions resulted from some categories having very small numbers of bad accounts. This was only undertaken where differences in the “good/bad odds” were very small. Figure 6.5 provides an outline of data used at the final stages of analysis when only 18 of the original 61 variables remained. Those retained are those, which exhibit the lowest “good odds” 12 months after drawdown, and could legally be included in a scorecard. The only other variable strongly associated to being in arrears and excluded is “referred to credit assessor”. This is because being referred to the central credit assessor was part of a process, rather than a reflection of applicant characteristics.

Figure 6.5: Variables Retained in Scorecard Development

Source of application (branch or intermediary)
Existing customer (yes or no)
Application type (sole, joint, guarantor)
Age
Occupancy (owner, tenant, with parent/friends, tied)
Time at address
Occupation code
Time in present employment
Monthly income
Free funds
Product interest (fixed or flexible)
Product type (endowment, capital & interest, PEP,discounted)
LTV based on purchase price
Property type
Property age
Number of bedrooms
Number of previous delinquencies recorded
Number of previous searches noted

6.8. Building the Model

Having coarse classified the data, the development of the scorecard could commence. In accordance with Guide to Credit Scoring (1993), the following industry principles are acknowledged, and are amended to reflect the research being conducted.

Purpose

The scorecard was developed to allow the performance of an empirical evaluation tool for mortgage loan applications to be examined.

Scope

The scorecard being developed, is for the purposes of comparison and analysis only, and would require further testing and refinement prior to implementation

Sampling Method

All data used to build the scorecard is typical of the credit grantor's own total experience, and obtained using appropriate sampling methods.

Development

Points given to each applicant are derived from a comparison of the repayment experience of good and bad accounts. The sample groups do not include rejected applicants, as insufficient data was retained on rejected applicants to allow their inclusion.

Validation

The scorecard has been validated using appropriate statistical principals relevant to "hold out".

6.8.1. The Hold Out Sample

In order to facilitate the building of the scorecard, and in common with industry guidelines the model was built using a hold out technique. A random sub-sample of accounts was selected within SPSS, selecting 60% of good accounts and 60% of bad accounts. The model was then built on the 60% and the performance tested on 40%.

6.8.2. The Technique

The technique adopted was least squares linear regression, which is a popular method amongst scorecard developers, and is acknowledged to be "*one of the most widely*

used techniques in scoring”(Kelly, 1998). Despite the popularity of linear regression for scorecard development, the method is critiqued based on the underlying assumption of normal data distribution. However, the failure of the data to meet the normality assumptions is not found to impair the predictive power of the models and this is confirmed within the literature, (Kelly, 1998) (Reichart, Cho & Wagner, 1983).

The regression model is used to compare a group of bad accounts with a group of good accounts. The coarse classification discussed earlier produced a value for the “relative goodness” of each variable. The linear regression is then computed, with loan status (good or bad) presented as the dependent variable, and the application variables regressed to determine the strength of their relationship with the dependent variable. The relationship is presented as the regression co-efficient. The regression methods tested are presented in figure 6.6. All were tested at a 95% level of significance.

figure 6.6: Regression Techniques Used

Approach	
(i)	Linear regression using all predictive variables used, thus “forcing” all the variables in to the model
(ii)	Stepwise forward regression, this programme uses multiple linear regressions, which start with the most predictive variable, adding one step, at a time the new variable which makes the greatest improvement in goodness of fit. This continues until the specified level of significance of improvement fails to be reached.
(iii)	Backward regression, this programme enters all of the variables as a block as in (i) above, but then removes them one at a time in line with the procedures identified in (ii).

6.8.3. The Models

Taking cognisance of existing literature on the groupings of variables required to predict mortgage default, it was decided to examine the data in several ways. The variables were split into three groups. Group 1 comprised all 18 remaining variables as presented in figure 6.5. Group 2 comprised variables identified as being personal and financial. Group 3 comprised variables related to product or property. Each group was subject to linear regression, firstly forcing in all variables, and then using stepwise and backward approaches.

6.8.4. Building the Scorecard

Having developed a regression model, the regression co-efficient values are then used to build the scorecard. The regression is developed based on the sixty percent of data held in the development sample. When the most predictive models have been identified, the models are then tested on the hold out sample. The co-efficient values are multiplied by the weighted value of each variable that remains in the model. Therefore if age was weighted at 6.95 “relative goodness”, this would be multiplied by the relevant co-efficient value. This same procedure would be undertaken for each variable in the model. The resulting values are then summed, and this summed value is the “credit score” given to each application.

Again using the test sample the cases are ranked by credit score. At each credit score value the number of good accounts correctly predicted, and the number of bad accounts correctly predicted is established. Thus it is possible to determine that at “cut off” value X, y percent of goods and z percent of bads will be accepted. Dependant upon the organisations risk profile, they will then select a cut off score which reflects the level of risk which they wish to undertake. As economic or other conditions change, so the lender can raise or lower the cut off value to quickly and surely manage the risk he accepts. Again reflecting earlier comments, over-riding of score values diminishes the risk management capacity of credit scoring.

6.8.5. Results

The results are considered in several ways, all of which are commonly used in comparing the performance of credit scoring models. The regression coefficients and the attached levels of significance are presented in figures 6.7 and 6.8. Figure 6.7 provides coefficients and significance for all variables “forced in” to the model. Figure 6.8 provides the results of the backward stepwise regression. The results of the forward stepwise regressions have been excluded as this model generally performed less well than the backward stepwise analysis. The results are then presented graphically in figure 6.9 and 6.10 using ROC curves to show the performance of the models. Finally, in figure 6.11 the results are presented in a manner which describes their performance relative to lending performance. This enables us to determine how the models actually perform. Thus we can identify how many good accounts a lender would decline, relative to the number of bad accounts which he would also rid himself off. It is this final presentation of results that is most likely to be of use to the practitioner, and would allow him to conduct a cost:benefit analysis of introducing credit scoring.

6.8.6. Regression Results

The regression output in figure 6.7 present the results, which are achieved when all variables are “forced in” to the model. Group 1 comprises all 18 variables, and here we can see that the majority of the contribution to the model is derived from the personal and financial variables. Of the product and property variables only the product type, loan-to-value ratio and to a much lesser extent property type make a contribution. This is reflected in figure 6.8, where using the backward regression technique on all variables at a 95% level of significance, only LTV remains in the model from the product and property group.

When we examine group 2, the personal and financial variables alone, we see that in figure 6.7 when all variables are forced in to the model, several are not significant. When we then look at group 2 when a backward regression is applied, figure 6.8

shows that source, application type, occupancy status and delinquencies have all been excluded from the model.

Group 3 follows this trend. When all property and product variables are forced in, several are not significant. In figure 6.8 we then apply the backward regression to only the product and property variables,. The result is that product type³ and LTV are the only two variables remaining in the model.

figure 6.7: Regression Results

Coefficients Variable	Group 1 Linear Regression	Sig.	Group 2	Sig.	Group 3	Sig.
source	3.325	.609	6.282	.312		
existing customer	8.514	.120	7.949	.140		
application type	2.658	.580	4.214	.358		
age	4.715	.003	3.206	.002		
occupancy	-3.164	.666	-1.387	.845		
time at address	17.080	.004	15.687	.008		
occupation code	1.333	.121	1.686	.040		
time employed	7.579	.023	6.935	.037		
basic income	6.105	.025	5.622	.019		
delinquencies	12.777	.258	16.705	.128		
searches	35.609	.000	37.535	.000		
product	1.336	.852			2.049	.815
product type	35.701	.080			54.671	.032
LTV (purchase)	2.071	.057			3.885	.002
property type	-10.524	.225			0.057	.996
property age	-3.868	.831			.533	.981
bedrooms	15.694	.293			1.273	.206
intercept	-97.914	.015	-65.361	.000	-17.159	.692
	R ² .474		R ² .468		R ² .084	

result when all variables are “forced” in to the model

³ The variable product type distinguishes between products, which exhibit either fixed or variable interest rate structures.

figure 6.8: Regression Results

Coefficients Variable	Group 1 Backward regression	Sig.	Group 2	Sig.	Group 3	Sig.
source						
existing customer	8.659	.054	12.259	.005		
application type						
age	4.627	.002	4.494	.003		
occupancy						
time at address	17.536	.002	16.418	.005		
occupation code	1.500	.065	1.808	.027		
time employed	7.124	.028	7.084	.031		
basic income	6.884	.003	6.042	.010		
delinquencies						
searches	37.004	.000	38.931	.000		
product						
product type					47.424	.039
LTV (purchase)	2.147	.026			4.107	.000
property type						
property age						
bedrooms						
intercept	-45.399	.000	-45.438	.001	17.259	.474
	R ² .519		R ² .468			R ² .098

result when backward regression selects most significant variables

The inclusion of variables with limited statistical significance, reduces the predictive ability of the models. This is now exhibited graphically in the ROC curve results.

6.8.7. ROC Curve Results

This next presentation of results, shows the performance of the models graphically. These results are presented in figures 6.9 and 6.10 as receiver operating curve (ROC) analysis. ROC curves are a useful way to evaluate the relative performance of classification schemes, where there is one variable being classified in either one of two categories (good and bad). In this application the ROC curve is used to present

the proportion of good applications accepted against the proportion of bad applications. The figures on which the ROC curves are based, are the proportions of good and bad lending accepted subject to various cut off values being adopted. The closer the ROC curve appears to the top left hand corner of the diagram, the better the discrimination, as this suggests a high level of good accounts being accepted, whilst a low level of bads is being accepted. One measurement used to quantify what the graphic is depicting is the area under the curve. The higher the area under the curve, the better is the performance of the classifier in distinguishing between good and bad accounts.

Figure 6.9 shows ROC results, which reflect performance when all variables are forced in to the model regardless of significance levels. Figure 6.10 shows the results of the backward regressions. It is useful to compare the three groups of variables considered, and the performance between the two regression methods. The first ROC in figure 6.9, shows very good performance when all variables are forced in to the model. However, if this is compared to the first ROC in 6.10, we see that the area under the curve (and thus performance) is better using backward regression. This is due to the inclusion of variables with low levels of significance being retained in 6.9, which actually negates the predictive power of some of the other variables.

If we consider the second ROC in each model we can compare the performance of only the personal and financial variables. On this occasion the bigger grouping of variables perform better, as less of these variables are as insignificant as those in the other group. The grouping of all personal and financial variables in figure 6.9 provides the best performance of all the combinations tested.

Finally the contribution of product and property variables alone is considered. The final ROC in each model, as expected performs much less well than the personal and financial variables. However, what is interesting is that they do present an element of predictive ability. This suggests that these variables should be included in analysis and scorecard development, as they are slightly relevant. Thus on a

different data set, they may have an increased significance and be worthy of inclusion in the final model.

In summary the ROC curves on the groupings of all variables, and on personal and financial variables, exhibit very good performance. However the product and property curves, whilst being much less good are also exhibiting a subtle predictive ability.

figure 6.9: ROC Curve Results

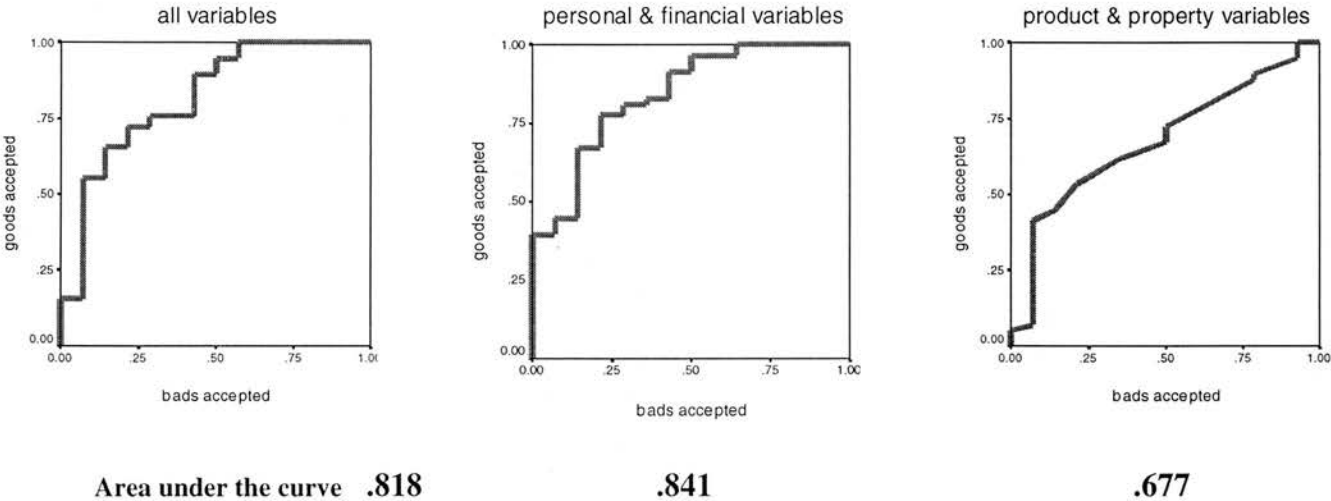
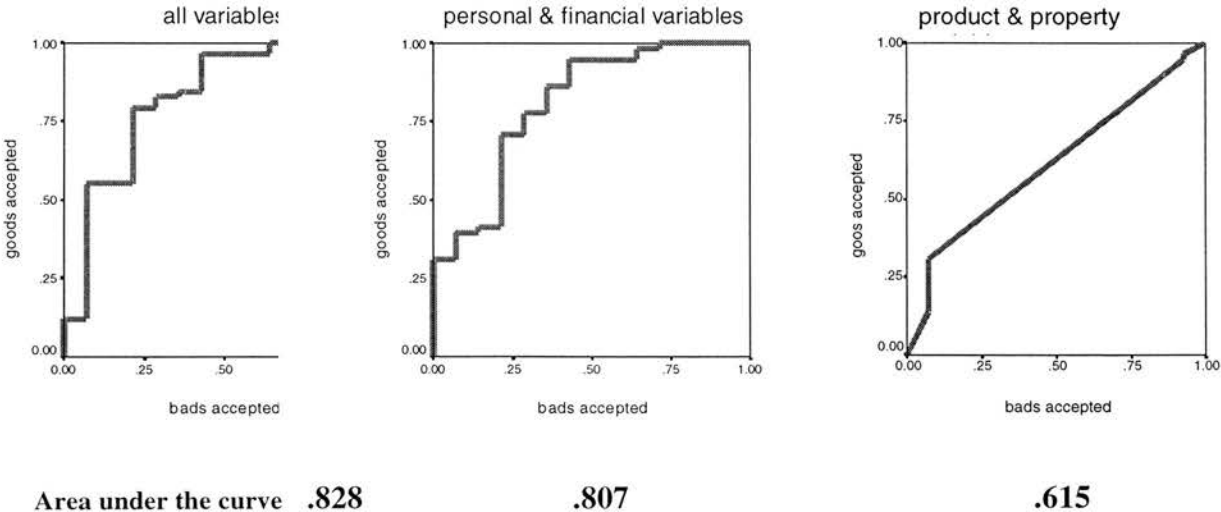


figure 6.10: ROC Curve Results



6.8.8. Loan Performance Results

A final analysis of the results is presented in figure 6.11. This provides examples of the number of bad accounts, which would be eliminated relative to the resultant loss of good accounts, at a variety of cut off scores. Dependant on the risk profile of the organisation, the priorities might be focussed either on accepting risk, or minimising risk. Likewise, some lenders might want to ensure that they reject very few good accounts, whilst accepting that this might reduce the number of bad accounts which they will decline. The selection of a cut off value is an organisational issue. The information presented in figure 6.11 allows the lender to make a judgement as to whether the mortgage scorecard could offer significant benefits to the organisation. Additionally, this information allows the lender to determine pricing and debt provisioning requirements.

figure 6.11: Performance of Various Models

Performance of Various Models				
cut off score	correctly predicted good	incorrectly predicted good	correctly predicted bad	incorrectly predicted bad
value 5	84.48%	15.52%	50.00%	50.00%
value 4	91.38%	8.62%	42.86%	57.14%
value 3	94.83%	7.17%	57.84%	42.14%
value 2	94.83%	5.17%	42.86%	57.14%
value 1	100.00%	0.00%	42.86%	57.14%

The results shown in figure 6.11 are those most interesting to lenders. Interpreting and analysing the results from a lender’s perspective requires a knowledge of average profit on a mortgage with a “good status”, and average loss on a mortgage with a “bad” status. Several models are predicting more than ninety percent of the good accounts whilst eliminating between forty and fifty percent of bad accounts. The highest prediction of bad accounts is 57%. At this level of bad prediction a very high proportion of good accounts are still being accepted.

6.9. Conclusions

The case study research confirms that the results obtained using a mortgage scorecard can outperform judgmental lending evaluation. Exhibiting consistently good performance, several models predict over ninety percent of the good accounts correctly, whilst declining around half of the bad accounts. A single model correctly predicts 100% of the good accounts whilst eliminating forty two percent of the bad accounts. However, it is acknowledged that these results are achieved on a small dataset, and that the models also contain an element of bias as they do not consider reject inference. With regard to the suitability of credit scoring techniques for application in mortgage lending, the results confirm that bespoke scoring models can perform well. In particular, the results presented in figure 6.11 show that exclusion a significant proportion of bad accounts is possible for relatively low losses of good accounts. This makes scoring a potentially useful tool, either as a stand alone decisioning option, or to augment the existing process by offering a “fast tracking” mechanism. Fast tracking allows those identified as lower risk, via the credit score value to be processed differently to those higher on the risk scale. Earlier work within this thesis confirms that in practice lenders presently authorise loans, mainly based on risk criteria. In such a circumstance a risk based scorecard such as those developed within this thesis can usefully augment the lending process, providing control, consistency, risk assessment and speed of decisioning.

However, when customer profitability, and the strength of relationships influence lending decisions, a scorecard predicting risk of default requires to be augmented by other data. This other data might result from augmenting the risk based score with underwriters who consider other factors which do not form part of the applicant profile. Alternatively this might be achieved by using more sophisticated techniques which facilitate profitability scoring. At present it appears that the scorecards in use are not being augmented by additional data in a considered fashion.

With regard to how a mortgage scorecard might comprise different data from a consumer loan or credit card scorecard, the influence of product and property

variables is considered. This research confirms that product and property variables do contribute slightly to the predictive performance of the model. However, the majority of the predictive ability is derived from personal and financial attributes of the applicant.

The work undertaken in collating the data, which could usefully be combined to build a scorecard, confirmed that despite presenting a technologically advanced facade, lenders are still working on improving their basic management information systems. The pace of development is immense, and lenders are beginning to realise the benefits of taking a more analytical approach to data. As a result they are now preparing themselves technologically in order that they will be able to derive value from data, which is increasingly being viewed as a valuable asset of the organisation.

In presenting the predictive ability of the scorecard, it appears that credit scoring is a superior method of decisioning to judgmental evaluation. However, the potential for scoring to improve organisational performance is limited by the way in which lenders operationalise scoring. Chapter six has shown a fragmented lending process, focussed on process and task to the detriment of risk management. It is therefore impossible to assert that lenders who adopt credit scoring will achieve the potential benefits. Credit scoring can offer risk, process, and customer service benefits. These benefits in combination can offer cost savings. However, the benefits of scoring will only be achieved if credit policy rules and lending processes are aligned with the empirical decisioning method adopted.

The evidence from this thesis suggests that credit scoring may be incongruous with a situation whereby individual lending officers having designated authority to lend. Unless a control structure is in place to ensure that the scorecard decisions are adhered to, the process will not be significantly improved.

The case study organisation favours evolutionary rather than revolutionary change management strategies. The incremental changes evidenced, suggest that they are aware that centralisation of arrears and processing can deliver benefits. The

evidence from the research undertaken suggests that credit scoring, if implemented wisely could also offer significant benefits to this lender.

Chapter Seven

7. Benchmarking Mortgage Lending – Survey Evidence

7.1. Introduction

This final stage in this current research seeks to determine whether those organisations, which use credit scoring display performance levels which are superior to those who do not. Whilst not providing conclusive evidence that credit scoring is the single source of improved performance, this phase intends to identify any differences in performance between scoring and non scoring organisations. Another driver for conducting this phase of the research is found within the literature. Leonard (1996) in presenting his views on scoring generally, presents a view which reflects the current UK situation relative to mortgage scoring. He confirms that within the credit scoring industry, both developers and users have, until now, been concerned with the efficiency of scoring models. *“Very little concentration has been on the effectiveness of scoring - are we using the models correctly?, Can we use these models to satisfy our customers?, Who is using the models better?”* One means by which Leonard suggests that we might begin to address the issue of measuring the effectiveness of scoring was by developing a *“benchmarking programme”*.

As well as quantifying the benefits derived by scoring organisations, it is hoped that the provision of benchmarked data to lenders will offer them the chance to compare their performance relative to others. This in turn might contribute to a more open dialogue about the actual benefits which organisations derive from scoring, and help to develop and extend the discussion about how scoring must be operationalised if it is to add value to the organisation. This study also helps to identify the quantity of data that lenders are willing to provide, and the appetite amongst lenders for the existence of a dialogue about how best to achieve value from credit scoring.

7.2. The Survey

7.2.1. The Survey Instrument

The presentation of the survey instrument was based on the design of the previous survey document. This continuity was intended to provide an element of familiarity within the research, which is revisiting the same population several times. A copy of the survey document, is provided in appendix K.

The content of the survey was driven by the measures identified during the earlier survey and interview phases of the research. Collating the views of lenders the researcher had confirmed that several groups of benefits can be derived from adopting credit scoring. These are risk benefits, process benefits, customer service benefits and cost benefits. These measures reflect some of the recommendations by Leonard as to what criteria can usefully be evaluated. Within this benchmarking survey, the cost data, which Leonard recommends for inclusion, was not requested. This is due to the fact that the case study had established that this data is commercially sensitive. Customer service data, which Leonard does not suggest gathering is requested from lenders. Customer service levels are identified as being important performance measures by lenders themselves.

Taking into account the lack of cost data, the benefits examined are presented in two groups. These are risk benefits and process benefits. The process category includes some aspects of customer service. The ways in which the benefits are measured, and the links to business and portfolio performance are now discussed.

7.2.2. Risk and Process Measures

Risk is measured by considering the levels of arrears and default across the portfolio. An outline as to when such status is afforded to accounts is included. Additionally data on the proportion of lending conducted, which is outwith published credit policy rules is presented. The arrears data is intended to identify whether those organisations which use credit scoring, have levels of arrears which differ from those who use judgmental evaluation. The credit policy data allows further insight into the anomaly of having published lending criteria and then lending outwith these. No

figure has previously been empirically established which quantifies the volume of lending conducted, which is outwith the published criteria. Establishing the true role of lending criteria might have implications for the non-vociferous potential applicant for credit, who is deterred from applying by the existence of published terms. If these terms are intended to be indicative rather than prescriptive, lenders might actually be deterring a proportion of the potential borrower population by having such terms. The proportion of new business which is received from intermediary sources, along with the maximum loan to value ratios at which lenders offer mortgage loans are also identified within the survey. These final criteria are included due to their relationship with portfolio risk.

The process measures seek to ascertain “usual” levels of approval of applications, and also to confirm whether organisations do in fact track this data. The length of time to both approval in principle, and to the production of a formal offer is also examined. This data is required in order to identify whether those organisations which are scoring, typically derive the benefit of speed to decision which scoring offers. Due to the various ways in which customer service can be measured, no data was requested on perceived levels of service. Instead frequency of measurement of customer service was gathered. This is intended to identify the level of importance which lenders attach to the measurement of customer service.

The unique dimension of this benchmarking survey, which underpins the work carried out within this thesis, is that each of the various benchmarks are analysed relative to the method of credit decisioning used.

7.2.3. The Survey Process

The survey document was initially produced in draft format. The document was then proof read by two industry practitioners, both of whom had been involved in proofing the initial survey document. The proofing took place at the practitioner workplace, during a meeting, which had been pre-arranged. The proofing process was intended to ensure clarity in questioning, and also to ascertain whether the data requested appeared “reasonable” in the context of a benchmarking survey.

These initial meetings resulted in no changes being made to the survey document, and the document went to print in October 1999. Participants were invited to take part in the survey via a letter. Each letter was sent to the named respondent who had been targeted at the time of the initial survey. Where lenders had participated in subsequent stages of the research process, the benchmarking survey was sent to the most recent contact. A copy of the letter inviting participation is included as Appendix N. The incentive to lenders to participate was the promise of a personalised and confidential feedback report, which would rank their performance relative to other respondents. As part of the research output it was therefore necessary to prepare individual research reports for each participating lender. An example of an individualised report is presented in Appendix O.

7.3. The Survey Population and Respondents

In concert with the previous research, the survey population comprised the members of the Council of Mortgage Lenders. The profile is identical to those surveyed in chapter four of this thesis, and comprised one hundred and eighteen lenders. However, unlike the previous survey which achieved a 56% response rate, this benchmarking survey achieved only a 20% response rate. Only twenty four lenders provided the data requested. Of those who did not respond fifteen contacted the researcher providing confirmation that they would be unable to respond. Thirteen of these responses were via letter and two via telephone call. Ten organisations simply stated they would not provide the data, or that they considered that providing the data to be inappropriate. Two other lenders confirmed that the sensitivity of the data was the reason for not participating, and one other cited pressure on staff time and workloads. The others confirmed that they were involved with commercial benchmarking schemes and would not be taking part. The final combination of reasons for this somewhat disappointing response rate are now put forward.

- The nature of the data requested might have been considered too confidential to share with a researcher from an external body. This was confirmed as being

correct by some lenders. Levels of arrears, completion rates, approval times and background information relating to portfolio size and source of new applications were all requested. It may be that as a pilot study, the range of data requested was too broad, and thus acted as a deterrent to lenders.

- Several initiatives were underway to establish commercial benchmarking forums. KPMG had been benchmarking mortgage performance for about 12 months. Despite contact with the researcher, they provided little detailed data on their initiative and their research output was not in the public domain. Another group, Performance Benchmarking was also in the process of establishing a benchmarking group. Again despite contact with the researcher, little information on participants or results was forthcoming. Finally the Mortgage Credit Managers Forum were considering such a scheme. Some liaison suggested that they might be interested in University involvement in the scheme, and negotiations on this are ongoing. Thus it might have been that the industry was swamped by such initiatives, thus dulling the appetite of participants to take part in the survey.

Given that commercial benchmarking has “taken off” it would seem that lenders are keen to benchmark their performance relative to others. However, it is clear that the data is considered to be sensitive, and that a non professional survey was perhaps not the ideal forum in which lenders might chose to share data.

7.3.1. Respondent Profile

The respondent population is examined relative to the whole population and is segmented by organisational type. When we examine the respondents by organisational status, we find that as a proportion of the overall population the banking sector is over-represented to the detriment of the building society sector. However when we look solely at the number of responses received, we see that most of the organisations responding are in fact building societies. This is evidenced in figure 7.1.

figure 7.1: Respondent Population

	Number Surveyed	Org. type as % of Population	Number Responded	Org. type as % of Respondent Population
Bank	22	18.64%	7	29.16%
Building Soc.	74	72.17%	13	54.16%
Other	22	18.64%	4	16.66%
	118	100.00%	24	100.00%

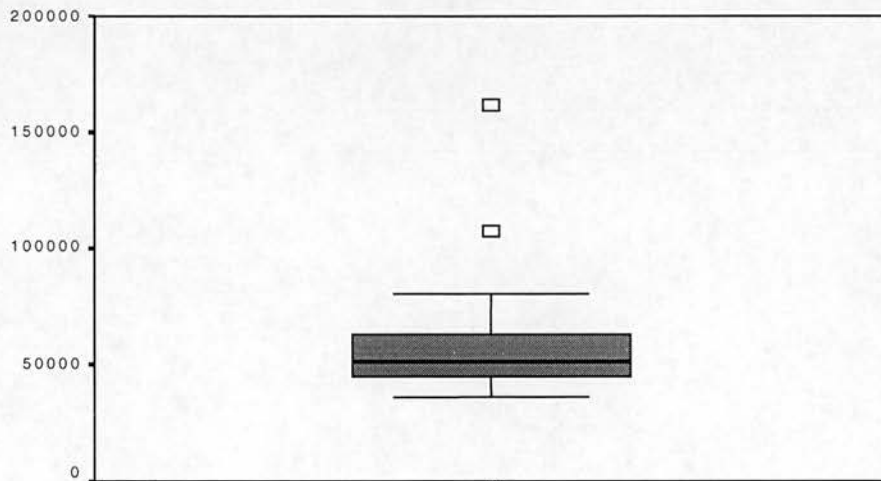
However, if the analysis is conducted using number of loans processed, the picture is quite different. The respondent population was responsible for granting 461,862 loans in the twelve month period preceding the survey. Of these loans the seven bank respondents were responsible for 331,857 loans or 72% of all those granted. Building societies had granted 114,596 or 25%, with the others issuing the remaining 3%, or 15,409 loans. It becomes apparent, that when dealing in small numbers such as this, the data may be interpreted in various ways. Therefore it should be borne in mind that despite the small number of organisations involved, the banking respondents are the more influential in the market place if considered by lending volumes.

In order to describe the data in more detail some additional measures, which might be indicative of response bias are considered. The volume of lending conducted by the respondents was examined relative to the whole population. As identified in chapter four, the CML had confirmed that 1.3 million loans had been approved in the period 1997/98. Respondents in the initial survey had been responsible for 83% of these loans. All respondents, with the exception of one, provided new data to the benchmarking survey. Respondents to the benchmarking survey had granted 461,862 loans in the previous financial year. This equates to 35% of all loans granted, and might appear to be high for organisations which equate to 20% of the population. However, this reflects anomalies of reporting whereby the CML figures exclude re-mortgage business from their building society figure. Given the high proportion of building societies that are survey respondents, this may account for the

seemingly high proportion of loans granted. The benchmarking respondents therefore conduct a respectable proportion of all mortgage lending within the UK. Whilst as a proportion of all lenders their numbers are small, they undoubtedly have some influence in the market place.

The mean loan value of the survey population from the first survey was calculated at £46,595. Those who used credit scoring displayed a higher mean value than those who do not score. Amongst the benchmarking population the mean loan value is £57,467. However, as evidenced in figure 7.2 this mean value is inflated by the presence of two outlying values. When these outlying values are removed, the benchmarking mean is £48,432, which is very slightly higher than the whole population mean evidenced in the first survey.

figure 7.2: Mean Loan Value



Reflecting the work conducted in the earlier survey, the mean benchmarking survey values are considered relative to the method of credit decisioning. Again it is found that contrary to commonly held perceptions, those who do credit score, process mortgages with a higher mean value than those who do not. Analysis was conducted both including and excluding the outlying values. Those who do credit score display a mean mortgage value of £63,673, or £56,408 excluding the outliers.

Those who do not use credit scoring display a lower mean value of £52,841 or £45,600 excluding the outliers. These figures reflect the previous findings in respect of the whole population.

Having examined the mean value of loans, the volume of loans granted is also examined. This analysis supports earlier findings, that generally scoring is utilised by high volume lenders. However confirmation is also presented that this is not an entirely volume driven relationship, as several high volume lenders do not use credit scoring. The data is presented relative to scoring status in figure 7.3.

figure 7.3: Scoring Status

Number of mortgages approved in prev. 12 mths	Do not score number of organisations	Do score number of organisations	Do not score number of loans	Do score number of loans
0 - 4,999	65% (11)	0	8% (20,496)	0
5,000 - 9,999	12% (2)	0	5% (11,600)	0
10,000 -104,000	23% (4)	100% (7)	87% (224,184)	100% (205,582)
	100.00% (17)	100.00% (7)	100% (256,280)	100% (205,582)

7.3.2. Summary - Respondent Population

The perception of a low response rate is accurate when compared to the response rate achieved in the earlier survey undertaken in support of this thesis. However, the 20% response rate achieved by the benchmarking survey is not unusually low for a survey response rate from industry. Some of the possible reasons for the low response rate were presented. What is encouraging is that fifteen lenders took the trouble to explain their non-response, which suggests that they at least considered the survey. Due to the limited number of organisations which responded, a mainly descriptive analysis of the data gathered is presented thus far. However, the analysis confirms that when examined by organisational type the profile of respondents reflects the lender population. This confirms the earlier finding that those who do use credit scoring, process mortgages with a higher mean value than those who do

not. Confirmation is also presented that credit scoring is the favoured method of decisioning by high volume lenders, although this is not exclusively the case.

7.4. Benchmarking Risk

7.4.1. Definition of Arrears

Lenders were asked to define the point at which an account is classified as being in arrears. Twenty three organisations provide this data, with thirty percent of these confirming that arrears exist when any monetary value is overdue. The majority, forty eight percent define an account as being in arrears when 1 – 1.99 monthly instalments are overdue. Only one lender defines arrears as existing when 2 – 2.99 instalments are overdue. The remainder of respondent organisations uses alternative definitions. One defines the arrears position as existing at a point in time where a subjective assessment determines that the relationship between lender and borrower has “broken down”. Two other lenders use financial values rather than actual number of instalments in arrears. One other used a proportion of the monthly repayment, and the other a small financial sum. The variety of definitions of arrears, mean that industry wide figures relating to arrears levels may not be a good overall indicator of credit quality. This might also suggest that industry wide statistics on arrears do not present a cohesive account of the actual situation, as one lender’s accounts in arrears might be another lenders good accounts.

7.4.2. Arrears – 12 months after account opening

Lenders were asked to provide data on the level of arrears that exist twelve months after accounts have been opened. This data was requested, as earlier findings had suggested that arrears which occur later in the loan life, might arise from events which lenders believe cannot be predicted at the time the application is assessed. Therefore by asking about early arrears, we might minimise the chance of “life style” events being the primary cause. We might also presume that this 12 month old loan behaviour might have been predicted at the time of application. As the variety of different ways in which lenders quantify arrears had been anticipated, respondents were asked to provide data on those accounts that were not “up to date”. Specifically

they were asked for data on accounts not up to date at a time period twelve months after account opening. This very specific request was to ensure consistency of reporting. Only seventeen lenders provided this data. Of the seven lenders who failed to provide this information six did not credit score mortgage loans. This may present confirmation of the improved management information obtained via credit scoring. The range of arrears levels was from a minimum of 0.002% to a maximum of 22.6%. The overall mean value was 5.98%.

This analysis is presented in two ways in figure 7.3. It is presented by scoring status only, and then more specifically by scoring status and number of loans granted.

Figure 7.3

% of accounts not up to date after 12 mths.	Do Not score number of organisations	Do score number of organisations	Do Not score number of loans	Do score number of loans
0 - 0.99%	55% (6)	16.66% (1)	47% (114,192)	13% (21,225)
1.00% - 9.99%	27% (3)	33.33% (2)	51% (125,200)	15% (24,500)
10% and above	18% (2)	50.00% (3)	2% (4,870)	72% (121,707)
	100% (11)	99.99% (6)	100% 244,262)	100% 167,432)

When organisational and scoring status are considered, those organisations that do not use credit scoring are found to have lower mean arrears levels than those who do credit score. Non scoring organisations have mean arrears levels of 4.99% at the time period twelve months after opening. Those who credit score display a mean arrears level of 7.66% at the period 12 months after opening. When the data is examined further to look at ranges of arrears values the differences are more pronounced. Whilst fifty five percent of non scoring organisations have less than one percent arrears, only sixteen percent of scoring organisations maintain such a low level of arrears. At the highest levels of arrears 12 months after opening, we find that fifty percent of scorers have more than ten percent of accounts in arrears.

When compared to non scorers, we see that only eighteen percent of those organisations maintain arrears levels of above ten percent.

Due to the relatively small number of respondents it is useful to consider the impact of such figures by examining the actual loan population. The second part of the analysis shown in figure 7.3 does this and presents arrears experience relative to the number of loans. The seventeen respondents being considered granted 411,694 loans. The analysis using number of loans highlights more clearly the differences between those who credit score and those who do not. Seventy two percent of all loans granted by organisations which do credit score, reside in portfolios where more than ten percent of loans are in arrears twelve months after opening. A striking comparison is made with the non scorers, who have only two percent of loans in this category. At the opposite end of the spectrum, thirteen percent of all loans, which were granted by scoring organisations, reside in a portfolio where the 12 months arrears level is less than one percent. A considerable contrast with the forty seven percent of loans granted by non scorers which are in a portfolio where less than one percent are in arrears 12 months after opening.

7.4.3. Arrears – Level of Indebtedness

The extent of borrower indebtedness is examined in greater detail. Lenders were asked to break down the arrears levels into the extent of the indebtedness, which exists twelve months after account opening. This breakdown, into the actual number of loan instalments which are unpaid, provides an insight into the seriousness of the arrears position. The results are in line with expectations, in that the number of accounts in arrears decreases in line with the seriousness of arrears increasing. The exception is the figure for those accounts between five and nine months in arrears which shows an increase. A single lender is responsible for this anomaly. The lender in question confirmed that eighteen percent of his accounts were between five and nine months in arrears twelve months after opening. Interestingly this figure was presented by an organisation not using credit scoring. When this outlying figure is removed from the data, the adjusted maximum level for accounts which are five to

nine months in arrears is nine percent, and the adjusted mean value is 1.24%. This supports the general trend. Figure 7.4 presents this data.

figure 7.4: Extent of Arrears

Instalments	Minimum	Maximum	Mean
0-0.99	0	98.40%	31.51%
1-1.99	0	51.00%	10.36%
2-2.99	0	33.00%	4.23%
3-3.99	0	9.00%	1.36%
4-4.99	0	5.00%	0.96%
5-9.99	0	18.00%	2.30%
10 +	0	3.00%	0.48%

7.4.4. Arrears – Portfolio Level

Having ascertained the level of arrears for relatively youthful accounts, a broader view of arrears was requested. Lenders were asked to provide figures confirming the level of arrears across the whole mortgage loan portfolio. In total twenty three lenders provided this data, which is now presented in figure 7.5. This data is not presented compared to number of loans, as the number of loans which comprise the whole portfolio, is unknown. The numbers of loans which have thus far been considered, reflect the volume granted over the previous 12 months, representing lenders recent mortgage activity.

figure 7.5: Portfolio Arrears

Portfolio Arrears	Do Not score number of organisations	Do score number of organisations
0 - 0.99%	56.25% (9)	14.28% (1)
1 - 1.99%	18.75% (3)	28.57% (2)
2% and above	25.00% (4)	57.14% (4)
	100.00% (16)	99.99% (7)

Reflecting the earlier presentation of data, the organisations are stratified by scoring status. The data shows that those who credit score experience higher levels of

arrears across the whole portfolio, than those that do not credit score. Again the figures are quite striking with fifty six percent of non scoring organisations displaying portfolio level arrears of less than one percent, compared to only fourteen percent of credit scoring organisations.

7.4.5. Definition of Default

Mirroring the data gathered on arrears, lenders were asked to define how they categorise mortgage default. Twenty three respondents provided this data. Fifty two percent of respondents considered an account to be in default when it was 1-1.99 instalments in arrears. This is similar to the previous responses which asked about the definition of arrears. It would therefore seem that the terms arrears and default might be used interchangeably. The traditional view is that accounts migrate through various states, from being in order, to being in arrears and then to a more serious arrears situation referred to as “default”. Just over 17% of respondents considered that default occurred when 2 – 2.99 instalments were unpaid, with a further 13% defining default as being at 3-3.99 instalments unpaid. Again relationship breakdown and financial values were used by the remainder to identify when default has occurred.

7.4.6. Portfolio Level of Default

Default is also examined across the whole mortgage portfolio. The default levels are, as expected, lower than arrears levels. The default levels are categorised only by organisational type, as again the number of loans, which comprise the total portfolio of each lender is unknown. The minimum default level is reported as zero percent. Whilst this might seem unlikely, more than one lender had default levels of less than a tenth of one percent, so it has been assumed that a single lender had no default. The maximum level of portfolio default was seven percent, and the mean value 2.03%. This data is categorised by organisational status and is now presented in figure 7.6.

figure 7.6: Portfolio Default

Portfolio Default	Do Not score number of organisations	Do score number of organisations
0 - 0.99%	46.67% (7)	28.57% (2)
1 - 1.99%	20.00% (3)	28.57% (2)
2% and above	33.33% (5)	42.86% (3)
	100.00% (15)	100.00% (7)

Again mirroring the findings on arrears, the level of default exhibited by organisations that credit score is higher than those who do not credit score. Forty six percent of lenders who do not score have less than one percent of the portfolio in default. This is compared to twenty eight percent of those who do credit score. On this occasion, unlike the figures presented for overall portfolio arrears, the figures for most serious indebtedness are closer for scorers and non scorers. Thirty three percent of non scoring organisations exhibit portfolio default rates of two percent and above. This is compared to forty two percent of scoring organisations. As indicated earlier, the percentages are not extrapolated to suggest the number of loans currently in default as the overall size of the loan portfolio is unknown,

7.4.7. Possessions

Whilst the benchmarking survey has examined levels of arrears and default, no information has been gathered on levels of possession. As indicated earlier within this thesis the published figures on “mortgage failures” often refer to the level of possession which occur. This is the point at which the extent of mortgage failure, evidenced by default, is such that the lender takes possession of the property. The property is then sold in order to repay or partially repay the mortgage debt. According to published figures (CML, 1998), possessions in 1997 amounted to 0.31% of all mortgages held in the portfolio. This figure represents 0.31% of 10,738,000 mortgages, which the CML quotes as being the number of mortgages held by their members. 1998 figures recorded are similar, with 0.16% of all mortgages held being re-possessed in the first half year.

Figure 7.6 presented confirmation that the scoring organisations have 2% of their portfolio in default. In order to understand the impact of default on the organisation, we can relate the possession rate, not to the overall portfolio size overall, but to the number of loans granted in a year.

Using the CML figures and assuming an annualised possession rate of 0.31%, we can now relate the figures to mortgages granted. The average number of mortgages granted in a twelve month period, by respondents to the benchmarking survey was 19,244. A possession rate of 0.31% means that of those mortgages granted, on average sixty properties would be possessed by each lender. This confirms that for all lenders the cost of each bad loan is offset by the profit on 320 good loans. Unfortunately the possession data is not available at an organisational level which would allow the possession rates of scoring and non-scoring organisations to be directly compared.

However, given the lower cost bases of the scoring organisations, and the higher loan volumes and values involved we might presume that the scoring organisations can generate a higher profit per loan. This might contribute to an explanation as to why they feel comfortable carrying higher levels of early arrears, and slightly higher levels of portfolio default.

However, the evidence which suggests that scoring lenders experience higher early arrears, and slightly higher portfolio default presents an anomaly when considered alongside the reasons for introducing scoring. In chapter four of this thesis lenders confirmed that they introduced scoring, to improve risk management. This leaves us with two possible reasons for the evidence from the benchmarking survey. Firstly, improved risk management is not necessarily derived from lower arrears. Improved risk management might be achieved via improved control of lending, and an improved knowledge of the likely “bad experience” that will occur. As alluded to by lenders, riskier lending can be profitable. The move from minimising arrears to maximising profits has already been suggested within this thesis, and the findings on increased arrears may reflect this. Secondly, the arrears figures being quoted, may in

fact be a real achievement for lenders. Certainly the arrears figures quoted by the CML (1998) of 0.31% in 1997, are lower than the 1991 levels of 0.77%. However, whether this results from improved risk management or an improved economic environment cannot be determined within this thesis. There is considerable scope for more research in the field to specifically consider issues related to mortgage arrears.

7.4.8. Lending Outwith Published Credit Policy

The final measure that might be related to the risk inherent in the loan portfolio is the volume of lending that does not comply with the published credit policy rules. Previous work within this thesis questioned the role of credit policy rules, and their relationship with either risk or profitability. Lending outwith credit policy rules in a non scoring organisation can be compared to overriding credit score values in a credit scoring organisation. However, an anomaly has already been highlighted in that credit scoring organisations also have credit policy rules, so the comparison is not absolute. No previous data about the extent of this non-criteria lending is available. Nineteen organisations provide data on the extent of lending outwith published loan criteria. Without exception those who did not provide this data did not credit score. Again this might be a symptom of the less well developed management information systems in the non-scoring lending environment. This data is now presented in figure 7.7.

figure 7.7: Non-Criteria Lending

Level of non criteria lending	Do Not score number of organisations	Do score number of organisations	Do Not score number of loans	Do score number of loans
0 - 4.99%	33.33% (4)	42.86% (3)	68% (87115)	64% (131332)
5 - 9.99%	16.67% (2)	42.86% (3)	6% (8281)	30% (62250)
10 - 14.99%	25.00% (3)	14.28% (1)	11% (14372)	5% 12000)
15% and above	25.00% (3)	-	15% (18812)	0%
	100.00% (12)	100.00% (7)	100% 128580)	100% 205582)

The minimum level of lending outwith credit policy was zero; some lenders did not make exceptions to their policies. The maximum level was thirty five percent. This was a surprising result as it would seem to be contradictory to have credit policy rules and then ignore them for such a large proportion of applicants. The mean level was eight percent. When lending outwith credit policy is examined relative to decisioning status, it is clear that the scoring organisations exhibit lower levels of non-criteria lending. Eighty five percent of those who credit score have less than ten percent of their lending outwith credit policy rules, this compares to fifty percent for judgmental lenders.

The analysis is again augmented by consideration of the number of loans involved. Again a slightly different picture emerges. Considered by number of loans, the non criteria lending of both groups is mainly maintained at less the five percent. The raw loan numbers do however confirm the high level of non criteria lending by non scoring organisations. Lending outwith criteria is acknowledged by lenders to be “more risky”. During the case study analysis within this thesis, non criteria cases were found to perform substantially worse than others. Twenty six percent of loans granted by non scorers reside in portfolios with over ten percent of lending outwith credit policy. This compares to only five percent of loans in scoring organisations. This again casts doubts on the role of lending criteria. Credit scoring organisations conduct less lending which is outwith their published criteria, yet maintain slightly higher levels of default. Non scoring organisations conduct high levels of non criteria lending, but in the main have lower levels of default. We might expect to find higher levels of lending outwith criteria to be related to high levels of default, and this does not appear to be the case. Thus the role of credit policy appears to be inconsistent, when considered relative to expected risk reduction outcomes.

7.4.9. Source of Business

Data is also now presented on the sources from which lenders derive their new mortgage accounts. This is considered relevant for two reasons. Within the interview phase, it had been asserted that mortgage intermediaries generally had a poor opinion of credit scoring applied to mortgages. Also within the case study

phase of the research it is confirmed that existing customers display loan performance superior to non-customers. Therefore source of business might impact on the method of credit decisioning chosen. Lenders were therefore asked to disclose the proportion of new business received from mortgage intermediaries. The data collected confirms that organisations that credit score applications, derive a greater proportion of their loans from intermediaries as figure 7.8 shows. Not all non-scoring lenders provided this data, thus the total loan figure for them is, in this instance, lower than previously reported.

figure 7.8: Source of Business

Proportion of new business received via intermediaries	Do not score number of organisations	Do score number of organisations	Do not score number of loans	Do score number of loans
0 % - 29.99%	36% (5)	0%	68% (89,389)	0%
30% - 59.99%	21% (3)	14% (1)	8% (10,972)	19% (38,150)
60% plus	43% (6)	86% (6)	24% (31,919)	81% (167,432)
	100% (14)	100% (7)	100% (132,280)	100% (205,582)

The figures presented in figure 7.8 are consistent with the higher levels of arrears and default exhibited by scoring lenders. As non customers are riskier, and as levels of non customer business increases, so we might expect the scoring lender who accept intermediary introduced new business to display higher levels of arrears.

7.4.10. Loan to Value Ratio

The final risk measure considered is the loan to value (LTV) ratio which lenders agree to advance monies against. Again, the findings of the case study confirm that higher LTV ratio loans display worse performance. This ratio is therefore examined relative to credit decisioning method. However, caution must be exercised when reviewing these results. Lenders were asked to confirm the maximum loan to value ratio on which they offer mortgage loans. This may bear no relation to the proportion of loans which are actually granted at high loan to value ratios. During the interview phase one scoring lender confirmed that no more than fifty percent of

the overall loan portfolio could be at a LTV greater than 90%. Findings presented in figure 7.9 confirm that those who do credit score do **offer**, but may not accept more high LTV ratio loans.

figure 7.9: Loan-to-Value Ratio Offered

Maximum LTV offered	Organisations that do not score	Organisations that do score
80 - 89.99%	6% (1)	-
90 - 99.99%	76% (13)	57% (4)
100%	12% (2)	43% (3)
101% and above	6% (1)	-
	100.00% (17)	100.00% (7)

These figures for 100% lending and above are generally in accordance with the risk management benefits, which can be achieved following the adoption of credit scoring. Lending organisations that credit score, seem to be comfortable in offering products that attract potentially higher levels of risk. An interesting anomaly in the data is that the single lender offering loans above the value of the property, does not credit score. These loans might be specialised cases such as negative equity etc. where credit policy rules are considered dominant over the credit risk rules.

7.4.11. Summary – Risk Measures

This data presents useful confirmation that credit scoring organisations generally accept and manage higher risk levels. The data suggests that scoring organisations chose to maintain higher rather than lower arrears levels. This is potentially due to improved risk management resulting from scoring which might permit or encourage higher levels of risk taking. Several reasons for this might exist. The use of credit scoring facilitates high quality management information indicating portfolio risk. By adjusting credit score cut-off values, lenders can quickly and conclusively alter the risk profile of applicants being accepted (not withstanding over-riding). Lenders therefore know that the risk is managed at a given and pre-determined level. They also know how many bad accounts they will accept relative to good accounts. Using profitability calculations they might therefore decide that it is worthwhile to

accept a higher level of “bad” business, and reap the additional profitability from the increased number of good applications being accepted. This potential shift in focus from maintaining levels of arrears that may be considered unrealistically low, towards a profit maximising culture, might have some ethical implications for lenders. Should the credit score cut off value be set at a level which “anticipates” a level of borrower difficulty in meeting repayment requirements, in order to maximise profitability? This might force the lender to decide whether his first responsibility is to his customer or his shareholders or members.

The alternative premise is that credit scoring might perform less well than judgmental lending, and its use is therefore driving up levels of arrears and default. This scenario is discounted for two reasons. Firstly chapter six presented confirmation that credit scoring can outperform judgmental evaluation.

Secondly, the scoring organisations appear to maintain tighter control on the sort of lending, which they conduct. They maintain more of the portfolio within agreed credit policy rules. As the scoring lenders exhibit lower levels of non policy lending, so we can confirm that they are achieving higher levels of consistency and control. This is as a result of a higher proportion of loans authorised by scoring lenders, being granted on terms that have been pre-determined at an organisational rather than individual level.

However, the foregoing assumes credit scoring is being used effectively. There is a possibility is that a high level of overriding, combined with bad performance from overridden accounts is negating the risk reduction benefits of scoring. This makes it imperative for lenders to examine their override strategies very closely.

The extent of lending conducted outwith credit policy rules, supports the earlier assertion of this author that credit policy rules might usefully be reviewed. Additionally, the potential deterrent effect of credit policy rules on borrowers might usefully be considered. If thirty five percent of applicants can be granted loans which are outwith the rules, then potentially a group of applicants who would be

granted loans might be failing to apply because of credit policy rules which are in place.

7.5. Benchmarking Process

7.5.1. Acceptance Rate

The acceptance rate refers to the level of applications received, which convert to become mortgage loans “on the books”. As indicated previously a wide range of reasons may cause “non conversion”, from borrower withdrawal to lender decline. Within the literature figures of around sixty to seventy percent are cited as being a normal acceptance rate, whilst the case study in chapter six found a conversion rate of fifty six percent. It is not the raw acceptance rate per se that might have importance for credit policy rules. Rather, understanding the reasons for non-conversion might have a useful function. However, prior to considering reasons it is first necessary to benchmark the overall acceptance rate, to establish the range of rates that do exist. An astonishing range of data was found. And this is now presented in figure 7.10.

figure 7.10: Acceptance Rate

	Population	Minimum	Maximum	Mean
Do Not score	17	22%	98%	73%
Do score	7	40%	98%	67%

The maximum acceptance rate is 98%. This is reported both by a very small non scoring “other” lender and a bank which is credit scoring. The non scoring organisation in question is responsible for less than one thousand mortgages per year, whilst the bank accept twelve thousand mortgages per year. The minimum acceptance rate is 22%, again this seemed surprisingly low. The organisation reporting this level, also process less than one thousand mortgages per year and is a non scorer. The lowest conversion rate amongst the scoring lenders is forty percent of all applicants.

In order to look at the figures in a more relevant fashion it is useful to consider the level of acceptance related to volume of applications processed. Therefore a weighted average is now presented in figure 7.11, which examines acceptance against number of loan applications.

figure 7.11: Weighted Acceptance Rate

	number of loan applications weighted by approval rates	number of loan approvals	Weighted overall acceptance rate
Do Not score	304,386	256,280	75%
Do score	343,010	205,582	60%

By weighting the approval rates by number of loans processed we see that the gap between scorers and non-scorers broadens. This confirms that credit scoring organisations convert a lower proportion of applications than non-scorers do.

The lower rate of conversion for credit scoring organisations must be viewed in conjunction with the high levels of business which they receive via mortgage intermediaries. Figure 7.8 confirmed that 86% of scoring organisations receive over sixty percent of new business from intermediaries compared to only forty percent of non scoring organisations.

Additional useful data could be generated if lenders were to maintain accurate records on those applications which fail to convert. In particular applicants that withdraw because they have found a better product elsewhere, or because the process was perceived to be “too slow” or otherwise unsatisfactory, could usefully inform organisations on their product and process. Equally importantly organisations need to maintain data on the declined applicants. Whether scoring or not, it might be useful for organisations to compare the profile of declined applicants with those of approved applicants when behavioural data relevant to the loan becomes available. This will help to ascertain the effectiveness of the credit screening process. Whilst

reject inference is variously supported and discredited within the literature, the value of using relevant data to inform the credit process should not be underestimated. Conducting analysis of the declines, even where scoring is not involved, helps to ensure that lenders can vouch for consistency and objectivity in their lending processes.

7.5.2. Enquiry Conversion

Whilst the figures for acceptance allow the lender to examine the population who have formally applied for credit, survey evidence confirmed that a population exists whose application for credit never becomes part of the data bank which the lender uses.

This part of the credit problem receives no attention in the credit scoring literature, but is confirmed to exist by lenders themselves. The interview evidence supports the premise that very little is known about those applicants who make a verbal enquiry, and who then fail to proceed to a formal application. The benchmarking survey evidence conflicts with the interview findings. The interviewees maintained that they did not collate data on enquiry conversion rates. However, nineteen of the twenty four survey respondents provide a figure which they believe represents the proportion verbal enquiries which convert to formal application. Again the range is extensive. One lender who credit scores confirms that 80% of verbal enquiries proceed to application. This figure is produced by a bank which process twelve thousand applications per year. The minimum conversion rate is 16% which is presented by another credit scoring bank. This bank processes over seventy thousand successful applications per year. This surprisingly low conversion figure must be placed in context. The 16% are derived from number of completed applications received at a mortgage call centre when compared with number of telephone enquiries related to new mortgages. None the less it is quite astonishing to think that a potential loan population of some 437,500 is converted to an actual population of 70,000. The cost of dealing with the "lost" 84%, is being borne by the organisation and ultimately by the live 16% of account holders. This clearly exemplifies the

importance of lenders managing this particular interface more actively, rather than only actively managing those who formalise an application.

When rates of verbal enquiries which convert are related to all respondents, the mean value of non scoring organisations is 57%, which exceeds the rate for those who do credit score. Organisations who do credit score have a mean enquiry conversion rate of 45%.

Only seven of the lenders collate additional data on enquiries, which fail to convert to applications. Those who do gather additional data, do so to identify the reasons for non conversion. A variety of reasons were presented as follows;

- products not meeting needs
- lending criteria
- withdrawn
- declined at initial interview
- shopping around
- property does not meet criteria
- customer does not fit target market
- lost to competitor
- indemnity requirements

Of the foregoing categories those relating to “lending criteria”, “declined at initial interview”, “property failing to meet criteria”, and “customer does not fit target market”, are all failures related to credit policy rules. Further evidence perhaps of a need for review in this area. The categories, “product not meeting needs”, “lost to competitor”, and “indemnity requirements” can usefully be used to inform marketing and product development departments of the mis-match between customer needs and product profiles.

7.5.3. Approval Time

During both the initial survey and the interview phases of the research, lenders had confirmed the importance of reaching “agreement in principal” (AIP) as quickly as possible. This is one of the key areas of process efficiency for lenders. Respondents were invited to select from a range of times, and to present a “usual time” which it

takes to reach agreement in principle. Twenty three organisations provide responses, and as evidenced the majority does in fact reach a decision within one day. However only a quarter are currently reaching a decision to lend within one hour. These results are now presented in figure 7.12.

figure 7.12: Approval Time

	less than 1 hour	1 hour - 1 day	2 - 5 days	6 days- 1 month
% of respondents	26.1%	47.8%	21.7%	4.3%
No. of Respondents	6	11	5	1

When the time to decision is considered relative to the method of credit decisioning, we see some evidence of the benefits being derived from scoring. Those who credit score process a higher proportion of mortgages to AIP within one hour. Almost forty three percent of scorers reach a decision within an hour, compared to nineteen percent of those using judgmental evaluation. Strangely the only organisation outwith the six day AIP criteria, also has access to credit scoring. This response was offered by a building society which approves over 20,000 mortgages per annum. No additional information is currently available which explains such an anomaly, but this highlights the exploratory nature of the research and the need for further research to be conducted. The results relative to decisioning status are presented in figure 7.13.

figure 7.13: Time to Offer

	Do not score number of organisations	Do score number of organisations
Less than one hour	18.75% (3)	42.86% (3)
One hour - one day	50.00% (8)	42.86% (3)
Two - five days	31.25% (5)	
6 days-one month		14.28% (1)
	100.00% (16)	100.00.% (7)

7.5.4. Time from application to offer

All twenty-four organisations responded with information on time to offer. Only two produced a formal offer within 2-5 days. A further twenty one organisations (87%) produced offer papers in a time period of six days to one month. A single organisation confirmed that time to offer was usually in excess of one month. No additional analysis was conducted on this data. The time between application and offer is spent gathering evidence, which is used to corroborate the application details. Due to the nature of the survey, which already contained many sections, data on what information was being requested by lenders at this stage could not be gathered. However, the determination of the amount of supporting evidence required is a topic, which also requires further investigation. This topic is already under review by lenders.

7.5.5. Customer Satisfaction

The final process measurement considered provides an insight into the level of activity which lenders undertake in measuring customer satisfaction levels. Whilst measurement of satisfaction does not confirm pursuit of customer satisfaction, it may be considered indicative of general organisational awareness. Of the twenty four respondents, nineteen (79%) confirm that they do measure satisfaction. Of the nineteen who measure satisfaction only five of these measured the satisfaction of each mortgage customer. The majority (14), used some form of random sampling, variously monthly, quarterly or driven by some other time period.

When the satisfaction measurement is related to decisioning status, the results confirm that all organisations that credit score do measure satisfaction. All five respondents who fail to measure customer satisfaction do not use credit scoring. This may be linked to the high levels of analysis conducted within the credit scoring environment, where the levels of technology are supportive of extensive analysis of many aspects of performance. Within the initial survey, credit scoring organisations had reported improved data management and management information being derived following the adopting scoring. Data is acknowledged to be an important asset by all lenders, regardless of decisioning mechanisms in place.

7.6. Conclusions

The benchmarking pilot study confirmed that issues of data sensitivity require to be managed if lenders are to offer information into the public domain. This is particularly important when the data is explicitly intended for sharing with their competitors. Twenty percent of the population did however offer information for this benchmarking study, and the results provide data, which might usefully inform further research.

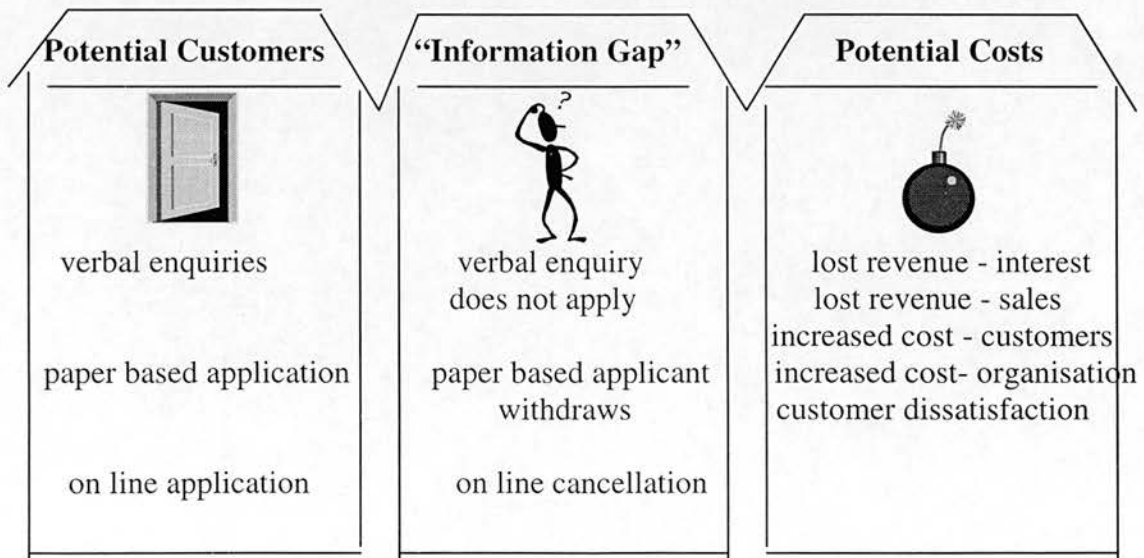
When examining risk measures, it appeared that those who used credit scoring to reach lending decisions accept and manage higher levels of risk than those using judgmental evaluation. The higher levels of risk result from a combination of higher loan to value ratios offered, and the higher proportion of business received via non-customers. Despite these loans presenting potentially riskier profiles, they are also of higher value than the non-scored loans, and scoring lenders manage substantially higher volumes of lending. Lenders might willingly accept higher levels of risk due to the potentially increased profitability of doing so. As an illustration only, and using averages, the possession data suggests that on average lenders possess sixty properties per annum. Again using data on averages this suggests that for every bad loan accepted lenders accept over three hundred good loans. Depending on the loss on each bad loan, lenders might willingly accept higher levels of bad loans, as the profit on the goods is more than enough to offset the losses anticipated. This of course presents only a financial view of the cost of default, to the exclusion of a consideration of the social cost. However, many lenders are highly risk averse, and this was evident during the interview phase of the research. Therefore the use of averages will not truly reflect the risk profile of all lenders in the market place.

When process measures are examined, we find that the speed to the initial lending decision is faster for lenders who do use credit scoring. In addition to this customer service benefit being quantified as having been delivered, those who do score do in all cases measure customer satisfaction levels. This compares with the non scorers who do not all currently measure customer satisfaction levels.

One of the most interesting features of the analysis was the identification of the need for more information to be gathered on both those who make verbal enquiries, and then fail or make a formal application, and those who formally apply but subsequently fail to convert to a “completed” account. Many individuals appear to interact with lending organisations over house purchase, potentially the most major financial transaction they will undertake, and then vanish into a “void”. This author suggests an “information gap” might exist which lenders might usefully seek to resolve. The potential for increased levels of business and improved business processes and thus profitability might be considerable.

This is presented in figure 7.14 in a way which mirrors the benefits gap described in chapter four. This graphic depiction is intended to highlight the large numbers of potential customers who “vanish” following an initial interaction with the lending organisation. Whilst these customers might disappear for a variety of very good reasons, the key issue is that lenders are unclear as to the reasons for the failure of these potential customers to establish a relationship. Thus, by resolving the information gap, so lenders will position themselves in a manner, which allows and encourages them to be more responsive to market and customer needs.

figure 7.14: The “Information Gap”



At present many lenders are failing to address the “information gap”, which is acknowledged by many lenders to exist. However, resolving the “information gap” might go some way towards allowing lenders to improve organisational efficiencies. As a result they might better meet the needs of their existing and potential customers.

7.6.1. Limitations of the Study

What is apparent is that the survey mechanism alone, will produce useful statistical evidence. However, this requires to be augmented by more insight into the market in which the lender operates and his risk and return profiles. A future survey might usefully be augmented by the undertaking additional research that more closely profiles respondent groups. Whether organisational type is the most appropriate means by which to group respondents is now in question. A more holistic grouping might be achieved if a wider variety of organisational characteristics were used to create categories. The complexity of the market place makes “simple” groupings less meaningful. Volume of loans, delivery channels, source of business, source of profit (i.e. product or bundle), will all impact on shaping the performance desired by organisations, and the performance achievable. Thus, additional research might usefully be conducted to establish who lenders believe their competitors are. A competitor grouping as a basis for benchmarking might more usefully inform both the practitioner and research communities.

Chapter eight, which follows, will present the overall conclusions of the research conducted in support of this thesis.

Chapter Eight

8. Conclusions

8.1. Aims of the research

Due to the exploratory nature of the early research which underpins this thesis, the aims of the research have evolved as the subject area has been explored. Little was known about the extent to which credit scoring is used as a decisioning method by mortgage lenders. An initial survey was undertaken in order to meet the first aim of the research, which was to establish how widespread the application of credit scoring to mortgage loans is in the UK. During the initial survey the other important aim was to establish the reasons why lenders use credit scoring (empirical) based decisioning, rather than judgmental decisioning methods. These aims were achieved, confirming that credit scoring is the method of evaluation used on over sixty percent of loan applications. The benefits of credit scoring were identified and these were presented in a new way. Rather than a single focus on risk, lenders also confirmed the achievement of process, customer service and cost benefits.

Following the analysis of the survey results an interesting anomaly became evident. All lenders were aware of the benefits which credit scoring can deliver. Despite this, those lenders who adopt scoring confirm that they use scoring in tandem with, rather than to the exclusion of, judgmental methods. The judgmental element of the decision arises where lenders override the credit decision, which the scorecard delivers.

This presented a further research aim, which was addressed via a programme of interviews. The research now sought to ascertain whether the scorecard over-riding, was compensating for a known deficiency in the scorecards being used. The interviews sought to discover whether the judgmental input, which augmented the scorecard decision, was based on identifiable risk or profitability criteria. Additionally, the variety of ways in which scoring was operationalised was

investigated via the interview programme. This sought to establish how credit scoring must be implemented in the lending organisation, if the organisation is to derive maximum value from its application.

The interviews established that overriding was not based on either risk or profitability information that was not included in the scorecard. Overriding was not a rational response to some known scorecard limitation. This presented a further research question and this was now pursued. Lenders had been found to value the judgmental input into the loan evaluation, despite the lack of identifiable risk or profit criteria in evidence. It was therefore necessary to establish empirically which method of credit decisioning performed better. This new aim led to the direct comparison of credit decisioning methods on an UK mortgage portfolio. This comparison was undertaken via a case study. Results of the case study, confirmed that the credit scoring models developed could outperform judgmental evaluation. The best scoring model accepted all of the existing good loans whilst declining over forty percent of the bad loans.

Finally, in drawing together all of the evidence gathered which suggested that several groups of benefits could be derived from the adoption of credit scoring, a final research aim was pursued. The benchmarking survey was conducted in order to identify whether organisations which use credit scoring, achieve levels of performance superior to those achieved by lenders who do not use credit scoring. Findings of the benchmarking study were not conclusive. Whilst confirming the speed to decision, and the potential cost savings from speed to decision and high volumes of loans, the risk results can be interpreted in several ways. The risk benchmarks confirmed that credit scoring lenders, experience higher levels of early arrears and slightly higher levels of portfolio arrears and default. When placed in context with the earlier findings, this is perhaps unsurprising. Scoring lenders were found to accept higher risk loans and higher volumes and values of loans. They also exercise greater control of the profile of their lending, and using cut-off scores can quickly and easily manage the portfolio. They can if they chose, outlaw the practice of overriding to improve consistency and control. Taking these features into

account, it is therefore not unexpected that they are willing to allow slightly higher levels of arrears. As arrears increase, so do the volumes of profitable “good” loans. Therefore, it is likely that the scoring lenders focus more on portfolio profitability as a whole, rather than minimising risk by keeping arrears at the lowest possible level.

8.2. Contribution of the research

The key contribution of the research is the confirmation that the application of credit scoring to a mortgage lending portfolio can achieve levels of loan performance, which are superior to those achieved by judgmental lending.

A further contribution is made, in that the evaluation of credit scoring within this thesis goes beyond the typical risk focus usually encountered within the credit scoring literature. The benefits of credit scoring have been expanded following the initial empirical work, and are now categorised in a new way. The benefits of credit scoring are now presented in four categories:

- Risk benefits
- Process benefits,
- Customer service benefits
- Cost benefits.

The success of lenders in achieving those benefits is now considered.

8.3. Conclusions

8.3.1. The Benefits Achieved via Credit Scoring

This research has shown that mortgage credit scoring can be used effectively in order to manage and mitigate mortgage credit risk. These results are achieved as the performance of credit scoring is at a level above that achieved by judgmental evaluation. This improved performance is achieved via the capacity of the scoring system to objectively analyse and apply appropriate weightings to those application characteristics, which are empirically established as being most strongly correlated with poor loan performance. This result ensures that lenders, who credit score,

accept a pre-determined level of credit risk across the whole mortgage portfolio. A further benefit of mortgage scoring is the improved management information, which is derived via using the credit score value to improve analysis and portfolio management. This allows organisations to manage the loan portfolio more actively. These efficiencies result not only from the improved loan outcomes, but also from the ability to target customers, manage arrears and potentially to offer products and securitised mortgage bonds, which have been priced to reflect risk.

The improved risk management is augmented by process benefits which allow scoring lenders to achieve faster decisioning, retain less specialised staff, and centralise processing in a manner which reduces costs. The evidence presented by the initial survey respondents confirmed that cost benefits are being achieved. In addition, evidence of lower cost:income ratios amongst credit scoring organisations was found during the benchmarking survey, and this produces empirical confirmation, which complements the views presented by lenders.

In confirmation of risk and process benefits being achieved, we find that credit scoring lenders process larger volumes of loans, which on average have a higher value. One fact which initially appeared as anomalous with other data gathered, is the higher level of arrears which are experienced by those who do credit score mortgage applications. However, closer analysis of the data confirmed that the applicants which credit scorers do accept comprise of many more new applications from customers who are new to them. This contrasts with the profile of applicants to non-scorers who are more often drawn from the organisation's existing customer base. Additionally, the credit scoring organisations do offer higher loan-to-value products. Both non-customer business and high loan-to-value lending are proven to be higher risk. Therefore, this applicant profile is in concert with the slightly higher arrears levels evidenced.

Mitigating the perception of a higher level of risk being accepted, we find that the scoring lenders accept loans, which much more closely adhere to a pre-determined level of risk i.e. they are within lending criteria. Non-scoring organisations conduct

much more lending which is outwith published guidelines. This non-criteria lending usually comprises features or characteristics, which the organisation has determined at a policy level should be avoided, as such lending often poses a higher level of risk.

8.3.2. The Benefits Gaps Identified

Despite the presentation of evidence in support of benefits being achieved via the adoption of credit scoring, significant “gaps” in the benefits that are achieved are identified. These result from the way in which scoring is integrated into the operating environment.

Achieving risk benefits is limited by the ad-hoc approach to over-riding which is evident. Despite attempting to identify a rational reason for overriding, none is apparent. Lenders require to examine this area closely. The lending process must be reconsidered, based on the lending organisation's knowledge of the ability of their scorecard. This performance is determined to some extent by the data used in developing the scorecard, and is evident in the results of testing the scorecard performance. Where lenders determine that a judgmental evaluation is warranted alongside the scorecard decision, they must identify on what basis this additional evaluation is being made. If the scorecard has provided a risk ranking, which is intended to manage risk at a pre-determined level, this decision should only be overridden on the basis of profitability. Often lenders cite the “relationship value”, either as a reason for overriding the scorecard, or as a reason for not credit scoring. However beyond a financial relationship, what sort of relationship is relevant in a lending context? The decision to grant loans is surely a function of risk and return. It is not as subjective as lenders would lead us to believe. Therefore by using the scorecard to rank the risk, the lender should only override based on some function of the financial return that is not captured in the credit scorecard.

By over-riding on an ad-hoc basis, several inefficiencies beyond increased risk enter the lending process. Unless maximum over-ride levels are established, the portfolio risk is compromised across the whole lending organisation. However, by setting volume targets for numbers of overrides, the quality of overrides is ignored.

Therefore the lending organisation must set strict criteria about the actual circumstances which, in combination, would warrant an override of a system-generated decision.

All over-riding compromises the consistency and control afforded by credit scoring. Therefore the organisation must accept that they are intentionally compromising consistency and control. With this awareness they might find themselves being rather more selective about the circumstances which prompt a compromise of the empirical imperative.

In combining the evidence gathered within this research programme, two main reasons as to why overriding is commonplace are suggested. Firstly, the loan officers and indeed more senior bank officers, appear to be relatively remote from the more technical aspects of credit scoring. This view is supported by the survey evidence, which confirms that 86% of the population of scoring lenders used the expertise of outside agencies in order to develop their scorecards. During the interviews, varying levels of knowledge were exhibited as to what variables are being used in reaching the mortgage decision. This view reflects the earlier findings on credit scoring generally that "*this judgmental intrusion (overriding) occurs because creditor managements do not fully understand scoring systems*", Hsai, (1978). Lenders also confirmed that they "devolve" responsibility for analysing the performance of the decisioning technologies to their technical partners, again suggesting they may be somewhat remote from the "nuts and bolts" of the decisioning. Confirming the view of credit scoring's perceived complexity, many non-scorers cited lack of knowledge of credit scoring as a reason for its non-introduction into the loan environment.

Whilst not conclusive evidence, these findings and views suggest that lenders may not be wholly aware of the imperative to adhere to the scorecard decisions if risk is to be managed and consistency and control achieved. The high levels of lending, which are outwith published criteria, suggest that lenders achieve significantly reduced levels of scorecard performance due to overriding. Non-scoring lenders who

display even higher levels of non-criteria lending are likely to achieve even lower levels of control and consistency in this respect. Scoring lenders consistently recount reasons for overriding their scoring systems, despite the scoring systems being acknowledged to deliver superior performance than the judgmental decision makers. Despite this conflict of evidence being presented lenders continue to seek to validate their actions. These actions are found to be invalid when measured against the risk and return criteria normally associated with lending.

The second reason as to why organisations permit over-riding of the scorecard is the influence of the culture within the lending environment. As was evidenced during the interview and case study phases of the research, the skills traditionally associated with judgmental evaluation of loans have a level of kudos attached. This kudos confers seniority and status on the loan officers. The move from judgmental lending to wholly empirical lending makes redundant a number of roles within the organisation. Any redundancy of roles can lead to confrontation. Due to an unwillingness within financial organisations to undertake this confrontation “head on”, there may be a willingness to delay the consistent adoption of scoring until the incumbent senior staff are no longer in place in the senior roles. The roles can themselves be gradually be made redundant without impacting on the senior staff. This is achieved by the gradual integration of scoring into the lending process, where loans are at first decided by the scoring system with the decisions being adhered to within a flexible framework. As staff becomes more familiar with the decisioning system, so adherence to the system’s decisions becomes a rigid rather than optional requirement.

Consistency is further compromised by the existence of credit policy rules, which have no empirical foundation. The role of credit policy rules, was at best established as a “screening mechanism” by which to dissuade applicants from applying for mortgage loans. This might be perceived as an unusual objective for a lending organisation. When this information is combined with the fact that as many as one in three loans granted by some lenders are outwith the policy rules set, the lack of

consistency is apparent. Further, the lack of a relationship between the various rules and risk makes their existence even harder to justify.

For non-scoring lenders the credit policy rules might have been viewed as a “guide” as to what characteristics an applicant for a mortgage loan should have. The evidence presented found that the non-scoring lenders grant an even higher proportion of non-criteria lending than the credit scoring organisations. When the credit policy rules are considered in order to determine their relevance to the scoring organisation, their role is even less clear. The scorecard provides the required risk ranking. The scorecard will have considered all the issues normally included in policy rules such as salary levels, age of applicant, and applicants prior credit performance. As indicated earlier, only property characteristics, which confirm the types of property which would form a suitable security, might usefully be contained in policy rules at this time. The policy rules in contrast seem to have no identifiable relationship with risk or return. No real reason has been established for their existence, beyond their role as a deterrent to potential applicants.

The benefit of speed to decision is also compromised by the way in which credit scoring is integrated into the credit process. Where scoring is located at the customer interface, either in a branch office or at a telephone call centre, the time to decision is greatly reduced. Where scoring is centralised the delay in getting the data to the central unit can significantly reduce any speed benefits. However where scoring is centralised and the process is such that the loan is first underwritten and then scored, the speed benefit is almost removed altogether. The ideal location for credit scoring is at the customer interface. This might require that scorecard management be strengthened to ensure that data manipulation by lending personnel is avoided.

This leads to a further potential compromise, in that where scoring is in place at the customer interface more staff might be required to manage and monitor the scorecard. This may be to the detriment of the cost benefits, which can result from having reduced numbers of specialised personnel involved in making lending decisions.

Finally, the cost benefits of scoring are themselves compromised by a combination of the above. When scorecards are developed and tested, the performance exhibited by the scorecard assumes adherence to the system-generated decisions. Adherence to the scorecard is what ensures consistency, control, risk management and cost benefits. Any deviation from the scorecard decisions results in a lessening of the potential benefits. This might simply be as the result of an additional “action” being taken by a member of staff, to judgementally evaluate the application. The time and cost involved limit the scorecard benefit, regardless of the ultimate loan outcome, which determines the impact on the risk benefit.

8.3.3. The Benefits Gap Resolved

Due to the complex nature of the lending environment, and the variety of organisational profiles which exist, it is impossible to provide a “blueprint solution” which would ensure that all lenders achieve maximum value from their credit scoring system. However some suggestions are put forward as an indication of the type of actions which might offer benefits:

- ❑ Revisit credit policy rules. Those who credit score should consider the rules and the relationship of the rules with the scorecard content. Those who do not currently score should use coarse classification techniques identify the variables most closely associated with default. This information can then be reviewed in conjunction with the credit policy rules. All lenders, regardless of decisioning methods must ensure that the true purpose of credit policy rules is established.
- ❑ Identify the time period and location in the application process at which an applicant, or enquirer, can first be given a “decision in principle” without compromising risk management. Lenders must then focus their efforts on ensuring that the decision takes place at this location and at this point in time.
- ❑ Improve data gathering. Gather data on those applicants who are rejected, and those applicants and enquirers who fail to convert to become account holders.

By bridging this information gap, lenders will be able to improve credit processes and ultimately improve customer service.

8.4. Suggestions for further research

Several areas of research would usefully build upon the work within this thesis. It would be beneficial to replicate the work on mortgage scorecard development using a larger data set. The limitations of small numbers of bad accounts may raise doubts about how truly robust the model is. By recreating the scorecard using a greater volume of data, more assurances about the consistency of the model's performance would be provided.

It would also be useful to compare the results of this bespoke mortgage scorecard with results derived using a generic “consumer loan” card in order to measure the improved performance afforded by a bespoke mortgage scorecard.

In order to compare the performance of the scoring and non scoring organisations more holistically, more data which allowed organisations to be categorised in “competitor groups” could usefully be used to revisit the results which are currently based on scoring status and organisational type. Information regarding the mortgage delivery channel could also be usefully included in categorising lenders. This might reflect the different cost structures of “new lenders” and traditional providers of mortgage finance.

More research needs to be conducted which establishes the true cost of mortgage default. The average profit and loss which lenders make on mortgage loans is unlikely to become publicly available at an industry wide level. However, a case study which examined one lender's experience would provide a more holistic view. This could establish the financial cost, to both the lender and borrower, and the social cost to the borrower and society as a whole. Such an investigation would also allow a closer examination of the many arrears accounts which exist, in order that arrears maturation patterns can be identified. Establishing the proportion of borrowers who

voluntarily “give up” their homes, rather than face default would confirm whether possession figures really are only the tip of the iceberg when mortgage repayment difficulties are discussed. This might also help to provide an insight into the true quality of mortgage loan portfolios.

Trends in the financial services markets suggest that future research might usefully take a more European view. As the potential for the expansion of lending organisations across traditional European boundaries receives more focus in the financial press, it is appropriate to consider the European mortgage market, and to determine the similitude of the mortgage lending environment across Europe.

The US and UK both have well developed mortgage markets. The development of a secondary mortgage bond market in the UK mirrors US experience. However, the home ownership profile of the UK population is considerably higher than that found in many European countries. Gaining an understanding of the determinants of home ownership across Europe, the availability of mortgage finance, and the credit policies and processes which exist would provide an interesting and potentially valuable pan-European study.

Additionally, the development of securitisation in the UK, suggests that the role of the credit score in pricing mortgage-backed bonds require study. This would perhaps link with the need to review the role of scoring in relation to other aspects of pricing, such as that of the mortgage indemnity guarantee premiums, and the pricing of the mortgage loan itself.

Finally, the focus of this study has been on the impact of credit scoring on mortgage lending organisations. Further research might usefully examine whether small lenders who lack data can achieve some of the potential risk, process and cost benefits associated with scoring. This would require that scorecards be built using their pooled data. Such scorecards would be a compromise between traditional bespoke and generic cards, but might well outperform judgmental evaluation. Such analysis would allow inclusion of cost data, for the development and implementation

of scoring in a variety of environments. Data on cost benefits would complement the findings on risk benefits, process benefits, and customer service benefits already identified within this thesis.

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Appendix A
Industry Survey Document

Mortgage Credit Scoring

An Industry Survey

Research Supported by:
Glasgow Caledonian University



and The University of Edinburgh

Mortgage Credit Scoring

This survey is part of a research project into Mortgage Credit Scoring within the UK. The project will investigate the levels and areas of usage of Credit Scoring. **The objective of the research is to evaluate the opportunities which exist in utilising credit scoring to obtain competitive advantage. In particular it is intended to examine the opportunity for utilising credit score values to facilitate risk pricing.**

The findings of this survey will enable further work in the area of Mortgage Credit Scoring to be undertaken.

This research will ensure respondent anonymity, at no time will any respondent be identified in the research output.

Completion of this questionnaire should take approximately 20 minutes of your time.

Should you wish to obtain a copy of the findings of this survey please tick the appropriate box below.

Yes	<input type="checkbox"/>	No	<input type="checkbox"/>
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Should you have any queries about any element of this research please do not hesitate to contact the survey co-ordinator as detailed below:

Miss Ann MacNeill

Department of Risk and Financial Services

Glasgow Caledonian University

Glasgow G 4 OBA

Telephone 0141 331 3158

Email A.MacNeill@gcal.ac.uk

Respondent Information

Name of respondent _____

Designation /Job Title _____

Contact address

Telephone number _____

Company Information

Company Name _____

Address of Registered Office

Value of mortgages granted during
previous financial year _____

Number of mortgages granted during
previous financial year _____

Current value of mortgage portfolio _____

Current number of mortgage accounts _____

Section 1: Current Status of Credit Scoring

Please indicate the current status of credit scoring within your organisation in relation to granting the following personal account products/facilities:

	Not applicable	Not used	Being Considered	Under Development	In Use (in any capacity)	Previously used No longer in use
Current Account						
Overdraft						
Personal Loan						
Secured Loan (not secured on property)						
Credit Card Facilities						
Mortgage Facilities						

Where credit scoring of personal products is currently in use (in any capacity), please indicate the length of time which credit scoring has been in operation:

	1 year or less	2 - 5 years	6 - 10 years	11 years +
Current Account				
Overdraft				
Personal Loan				
Secured Loan (not secured on property)				
Credit Card Facilities				
Mortgage Facilities				

Respondents who **currently use mortgage credit scoring** should turn to **Section 2** of the questionnaire, **other respondents** should turn to **Section 3**.

Section 2: Mortgage Credit Scoring

Prior to utilising credit scoring what procedure(s) were in place for granting mortgage facilities? *(Please indicate if procedures differed at different values, LTV figures etc.)*

What were the reasons for the change from your previous procedure(s) to utilising mortgage credit scoring?_____

Who within your organisation, were the drivers for change in implementing credit scoring?

- Director of Credit
- Director of IT
- Audit Committee
- Other(s) Please specify_____

Was the system which is currently in use, developed by in-house or external expertise?

- In - house
- External
- Jointly with external help*

(* continued overleaf)

* Where jointly developed please indicate source of external help

- Fair Isaac
- Scorex
- CCN Systems
- Other (Please specify) _____

System Usage:

Please indicate the mortgage business areas in which the credit score is used:

- Initial "weeding out" of applications
- Accept/reject lending proposal
- Interest rate offered to customer
- Marketing (segmenting existing customer base)
- Marketing (other)
- In establishing level of mortgage indemnity guarantee
- Securitisation pricing
- Other (please specify) _____

Where credit score is used in the mortgage lending decision, which of the following applies?

- Lending officer makes decision with credit score value considered
- Credit scoring system provides decision which is always accepted
- Credit scoring system provides a recommendation which may be overridden

Please detail the circumstances in which it is acceptable to over-ride a credit score recommendation _____

Where the credit score recommendation is not adhered to please detail the procedure that is then followed in reaching a lending decision:

Please indicate the frequency with which you update your credit scoring system in any way (e.g. cut off score, variables, values etc.) _____

What external data sources are used in conjunction with the credit score result in reaching lending decisions:

- | | | | |
|-------------------------------------|--------------------------|--------------------------------|--------------------------|
| Credit reference bureaux | <input type="checkbox"/> | Evidence of source(s) of funds | <input type="checkbox"/> |
| Survey Report | <input type="checkbox"/> | Bank reference | <input type="checkbox"/> |
| Employers reference (wage evidence) | <input type="checkbox"/> | Bank statements | <input type="checkbox"/> |
| Other (please specify | <input type="checkbox"/> | | |

Please outline the business benefits that you believe are derived from the use of credit scoring: _____

End of Section 2 – thank you for taking the time to complete this questionnaire, please return it to us in the envelope provided.

Section 3: Non Usage of Mortgage Credit Scoring

Who holds the authority for granting mortgage facilities? *(Please indicate if authority differs at different values, LTV figures etc.)* _____

Please outline the main business reasons for utilising your current system in preference to utilising mortgage credit scoring? _____

How likely do you think your organisation are to adopt mortgage credit scoring in future?

Very likely Quite likely Quite unlikely Very unlikely

Please outline the business benefits (if any) that you believe could be derived from the use of credit scoring _____

Please indicate any reasons which you feel make credit scoring unsuitable for introduction to your organisation: _____

If your organisation has a negative experience or image of mortgage credit scoring, please provide a brief summary of how this has arisen:

End of Section 3: Thank you for taking the time to complete this questionnaire please return it to us in the envelope provided.

Appendix B

16th July 1997

Dear

Mortgage Credit Scoring - The Business Benefits

Further to my telephone call to your organisation you have been identified as being responsible many aspects of mortgage lending. I therefore enclose for your attention an important research questionnaire. All members of the Council of Mortgage Lenders are being asked to provide their views. I have provided a stamped addressed envelope for ease of response.

Whether you do or do not use credit scoring your views are important to us. It is equally as important for us to hear the arguments both for and against adoption of scoring within organisations.

Feedback from the survey will be provided to you should you wish to receive it. A tickbox within the questionnaire affords you the opportunity to request feedback.

In addition to the questionnaire I am pleased to enclose information regarding a forthcoming credit conference which may be of interest to you.

May I thank you in anticipation of your assistance.

Yours sincerely,

Ann MacNeill
Research Co-ordinator

Appendix C

28th August 1997

Tel. 0141 331 3158

Fax. 0141 331 3229

Email

A.MacNeill@gcal.ac.uk

Dear

Mortgage Credit Scoring - The Business Benefits

May I thank you for taking the time to complete the questionnaire which I recently forwarded to you. The response rate has exceeded expectations, and will allow us to progress the research.

Research findings will be forwarded to those who requested them when the results of the survey have been fully analysed.

May I reassure all respondents that confidentiality and anonymity will be strictly observed.

Thank you again for your assistance. Please contact me at any time if you require further information.

Yours sincerely,

Ann MacNeill
Research Co-ordinator

Appendix D

28th August 1997

Tel. 0141 331 3158
Fax. 0141 331 3229
Email A.MacNeill@gcal.ac.uk

Dear

Mortgage Credit Scoring - The Business Benefits

I refer to the above, and to the questionnaire which I forwarded to you recently. To date I have not received your response, and I understand that this may be due the normal pressures of business and to the holiday period.

However I would be grateful if you could forward a response within the next two weeks in order that I may progress the research analysis.

If you would like a second copy of the questionnaire please do not hesitate to contact me.

Yours sincerely,

Ann MacNeill
Research Co-ordinator

Appedix E

1st September 1997

Dear

Mortgage Credit Scoring - The Business Benefits

Thank you for your telephone call with regard to the above. I am pleased to enclose a copy of the questionnaire . I would be grateful if you would complete this and return it to me in the envelope provided. I would emphasise that all responses will be treated in a confidential manner, and the research output will at no time identify individual respondents.

Within the questionnaire you will find a section offering you the chance to receive feed back on the results of our research. We will be pleased to provide this to all interested parties. Please do not hesitate to contact me if you would like any further information

Yours sincerely,

Ann MacNeill
Research Co-ordinator

Tel. 0141 331 3158
Fax. 0141 331 3229
Email A.MacNeill@gcal.ac.uk

Appendix F

Date

Title

Designation

Address

Address

City

Postcode

Dear Salutation

Mortgage Credit Scoring

Further to our previous correspondence I hope that you found the initial research report of interest (further copy enclosed). The research is now moving into a second phase during which I hope to conduct more detailed interviews.

The interviews which are informal in nature will comprise a discussion on some of the areas of interest which have arisen both from the first survey and from other recent research. These include; factors which make mortgage credit scoring different from other forms of scoring, how to measure the value added by the scoring system, methods of usage, and override mechanisms and management.

I would be grateful if you would take part in the interview programme. It is intended that the interview last approximately forty-five minutes. The identity of companies taking part in the interview will not be divulged at any time. Additionally, a transcript of the interview will be provided to each participant to ensure accuracy of reporting.

Whilst I am aware that demands on your time are considerable I would be most appreciative if you would agree to see me. I will contact you by telephone within the next few days to obtain your response and hopefully to agree an interview date.

Yours sincerely,

Ann MacNeill

Tel. 0131 650 4644

Email Ann.MacNeill@ed.ac.uk

Appendix G

Interview Guide - Scoring

The Mortgage Process

What are the sources of applications (branch, intermediary, telephone banking,).

How many mortgages will you have the capacity to process per annum.

Outline of mortgage process from receipt of application to credit decision

Introduction of Credit Scoring to Mortgage Lending

Method of introduction (*pilot, bullet, etc.*)

Initial usage and development over time

Discuss variety of uses as disclosed on survey document

Existence or otherwise of mortgage criteria? Role of criteria?

What sort of output does scoring comprise off?

Role of credit scoring in the credit granting decision

What source of data used to create scorecard?

What types of factors built into credit score (stability, affordability, economic indicators, property characteristics, product characteristics, LTV ratio, etc.)

Have you done any work on determining whether taking out mortgage protection insurance is a predictive variable? (*explain link to other types of scoring*)

Intuitive belief /experience of factors most predictive of mortgage default
(*compare with what is built in to system*)

Role of underwriting staff (*overrides or all cases*) Tracking of individual performance

Number of underwriters employed and trends in terms of numbers of underwriting staff

Method of training underwriting staff

Who triggers override? (*customer request, branch, intermediary, underwriter*)

Outline of override process

Existence of written procedures dictating situations in which override is appropriate

Levels of overrides (*decline to accept/ accept to decline*)

Overrides, coded and tracked (Override performance, tracking and comparison *with the rest of the portfolio*)

Override data being analysed and built back in to the system?

How (if at all) are staff incentivised to adhere to the system decision?

Measurement of Success of Mortgage Scoring

What data do you keep that lets you measure the success of the mortgage system. (*processing times, time to decision, customer satisfaction levels, retention levels, default levels, arrears levels, costs of processing, number of staff involved*)

Profit measurement method - by product (*i.e. is this mortgage going to be profitable*), by package (*i.e. depending on cross sales*) or by customer

Profit measurement formalised and communicated, staff awareness of profit profile of various mortgage scenarios. Influence of profitability on credit decision

Appeals

Who generates appeals customer or branch (*or intermediaries*)

Outline of appeals procedure

Method of notification of the appeals procedure (*letter, leaflet etc.*)

Appeal unsuccessful and application declined - information given to customer regarding the decline reason

Existence of designated officer to whom appeals are sent, Are customers who have been turned down notified accordingly of this persons contact details?

Other Issues

Factors currently affect mortgage price e.g. LTV, type of product, cross sales

Views on risk pricing.

Mortgage indemnity guarantee still in existence

Mortgage certificates in existence

Influence of credit score on arrears management

Securitisation activity, is documentation designed allow securitisation at present

Confirm interview complete

Tape off

Thanks

Confirm transcript will be provided

Timescales of other interviews

Selection of case study organisations

Thanks again

Appendix H

Mortgage Credit Scoring Interview Summary

This summary document provides an outline of the key areas of interest that arose during the semi-structured interviews which were conducted during a three month period earlier this year. The contributing companies included banks, building societies, friendly societies and specialised mortgage lenders.

The Mortgage Process

This area is examined from a variety of perspectives. The impact of the mortgage process on the overall processing costs leads to a focus on the number of 'actions' required with each new application. This varies enormously, and determinants of the number of actions required include, the existence of otherwise of lending mandates, the delivery channels utilised and the level of technology in place. The relationship between the mortgage process and the level of customer service is highlighted by the variations found in both time to decision, and time to offer.

The source of applications also impacts on the mortgage process. Within organisations with multiple sources, a variety of mortgage processing systems and even varied credit policies often co-exist. The impact of such divergent strategies and how they impact on overall credit policy is an area that is likely to receive the attention of credit managers in the future.

The Credit Decision

All participants are keenly aware that the "time to decision" requires to be driven down. There is consensus that "time to decision" refers to a decision in principle subject to confirmation of information provided by the borrower (commonly salary confirmation) and subject to survey confirmation that the property is an acceptable security to the lender. In the majority of cases time to decision shows a marked variation between scorers and non scorers. However this only applies where the scoring is being conducted using an on line system at the first point of customer contact. Where scoring is centralised and not in place at the customer interface, the applications which are commonly paper based require to be sent to the centralised unit. In such a circumstance the scoring system may offer no time advantage to the lender. Whilst it is commonly perceived that the use of credit scoring reduces the number of factors/variables being considered, the subjective nature of underwriting does not allow for confirmation of this fact. Whether underwriters do in fact consider more or less data than a typical scoring system, will be clarified as the research continues. However what is clear is that a scoring system utilised at the customer interface can offer a decision in principle in approximately ten minutes.

The time advantage which can be gained depends to a large extent on the means by which the credit scoring system presents a credit decision. Whilst the system decision derives from a numerical score, the system output generated is commonly a graded decision along the premise of clear accept, clear reject or refer to underwriting department. Thus whilst a decisioning system can provide a clear accept/reject decision very quickly, there remains a percentage of cases that require to be reviewed by underwriting staff. Any time advantage gained must therefore be viewed relative to the proportion of applications on which the scoring system can present a lending decision, without referral to underwriters. Again the consensus is that the objective must be to continually drive down the numbers referred by improving the decisioning data utilised by the system.

The Manual Underwriting of Mortgages

The requirement to have underwriters is confirmed by all lenders, even those with considerable scoring experience. The underwriting process varies considerably. Methods of grading underwriters vary between value amounts and criteria driven grading such as loan to value. Commonly the more 'junior' underwriters are given low value mandates which combine with loan profiles that are strictly within criteria. Those with more experience underwrite the higher value, higher loan to value, and outwith criteria cases. Training is largely in-house. When asked whether underwriter performance is tracked, few organisations responded affirmatively. Most organisations have the ability to track individual underwriter performance, but do not do so formally. This suggests a potential 'gap' in the iterative loop which could improve lending performance by examination of previous experience both good and bad. Sustained analysis of underwriting cases, particularly in respect of the cases which are in the "grey area" (neither clear accepts or rejects), may well yield valuable data which could be built into the scoring and underwriting processes.

Whilst the majority of organisations subscribe to the view of the underwriting process as a subjective activity, there is evidence of a more structured approach to manual underwriting. A structured approach would typically seek to drive the underwriter to consider some combination of stability, affordability, economic, product and property characteristics in a more formal manner. This may be evidenced by either supporting documentation or reporting mechanisms which confirm that each area has been considered in turn.

The Mortgage Criteria and Policy Overrides

All those who are currently lending confirmed that they operate a policy of producing mortgage criteria. The criteria are issued to those at the front end of the delivery channel, both within the lending organisation and to intermediaries. The criteria are designed to indicate the profile of applicant which the lender organisation is willing to consider. Worthy of detailed investigation is the commonality of policy overrides which contravene the criteria published. Whilst the criteria provide guidance to assist and direct those who initially discuss the mortgage proposal with the prospective applicant, they are also incredibly flexible, a point which the more experienced interviewer is no doubt aware of. The existence of criteria ensures that

pre-screening of applications takes place. However what is not clear is the value of such pre-screening. Whilst the cost of reviewing cases which are clearly outwith policy criteria is obviously to be avoided, concern must be voiced at the potential pre-screening of cases which, whilst strictly outwith policy may in fact be acceptable lending propositions. For organisations which use credit scoring for the purpose of credit decisioning, the existence of criteria seems somewhat anomalous. Given that the system contains the variables believed to predict default, and that applicant profiles provide valuable data, it seems unusual that such a potentially rich data source be discarded. However several organisations remained convinced that should they dispense with criteria, the volume of applications being presented would be excessive when compared to the potential gains from increased volumes of accepts. The role and impact of criteria will receive further consideration as the research progresses.

Policy overrides are common, whether the credit decision process is manual or automated. The level of data available on the performance of policy overrides varies greatly. No lender appears to have a system that does not require some refinement. The ability to code policy overrides in a manner which identifies the override reason is something which most lenders recognise the value of. However much data captured on systems is currently in a text only format. Likewise some of the processes by which underwriters justify their policy overrides are such that specific reasons are not given. Some lenders are able to produce evidence that policy overrides perform equally well when compared with the rest of the mortgage portfolio. However others confirmed that those applications which are approved despite being outwith criteria, inevitably perform worse than the rest of the "book". These contrasting experiences may result from variances in the quality of the overriding process, or indeed in volume of overriding of criteria which is permitted. When examining volumes of overriding the majority of organisations had no clearly perceived upper limit on how many "outwith criteria" cases could be approved. All discussion on overriding criteria focused on altering reject decisions to accept. When questioned as to when an accept decision would be altered to reject, less clarity exists. It would appear that a credit score decision accept would rarely be converted to reject, whilst a manual underwriter with considerable experience may be slightly more inclined to review accepts with a view to rejecting a case on "gut feeling".

The matter of affordability is dealt with by a broad spectrum of approaches. For some the affordability calculation is a manual process, which sits beside the actual mortgage application and is considered almost separately. Others build affordability models into credit decisioning systems, and such affordability criteria are combined with other data driving the loan amount being offered. Not all organisations run affordability tests on all applicants, which would appear to be in contravention of the Mortgage Code. However as the interviews were informal in nature such findings require to be revisited, in order that participants be given the opportunity to fully clarify their position.

The matter of incentivising staff elicits very disparate opinions. There are those who believe it wholly unethical to have those making credit decisions incentivised to lend

money. The separation of the desire to lend which is acknowledged to be a driver in an incentivised sales force, and the authority to lend is clearly deemed to be important by several lenders. Others do not perceive the same dangers from financially incentivising staff to lend. Clearly the removal of lending mandates from branches and a move to centralised authority has lessened the threat of individuals having a conflict of interests. However a move to point of sale decisioning could bring this matter to the fore again. The “massaging” of applicant data is a matter which organisations require to be aware of. Indications of developments for the future, allude to staff being more aware of the profit profile of products at the customer interface. Again a potential ethical dilemma that requires to be carefully managed in order not to conflict with requirements of “best advice”.

Credit Scoring

A key issue is the definition of those who are “using credit scoring”. The research focus is on the use of credit scoring for credit decisioning. However the practical applications range from those who obtain a credit score which forms no part of the credit decision, to those who rely almost wholly on the credit scoring system to provide a lending decision. Commonly scoring is introduced as a fast-tracking method. Interestingly it is viewed by several as an accept rather than a reject tool, confirming its role solely in speeding the process. The implication being that any system decline will be reviewed by an underwriter prior to final decline. This approach, whilst logical to lenders, forms an uneasy alliance with the statistical processes which underpin credit scoring. However when an organisational viewpoint is taken, and the change process reviewed, such a means of adopting scoring may well be expedient in that acceptance and trust of the system may grow over time. Whilst the variables which drive the various scorecards are company confidential, it is worthy to note the move from solely stability characteristics to a more sophisticated approach. Data mining is being undertaken extensively in order to determine the true default predictors for individual portfolios. The improvement in the volume and quality of bureau information is being exploited, resulting in more payment behaviour models being considered. Likewise affordability and product characteristics now appear to be common currency in scorecards. Less common is the use of property characteristics, such as property type and number of bedrooms within the scorecard. As one would expect existing customers often merit their own scorecard, and any behavioural score from the key money transmission account would commonly be included. Several lenders allude to Payment Protection Insurance and the strength of the correlation between PPI and default. Many issues surround the inclusion of PPI as a scorecard variable. However a discussion of this issue does not form part of this summary document.

Of the non scorers, several are convinced that no improvement in credit quality would result from adopting scoring. However they do concede that they believe overhead cost savings could be achieved, were credit scoring to be adopted.

Key Performance Indicators

The key performance indicators are predictable, but each organisation focuses on different indicators. Additionally it is clear that the key performance indicators vary

between functions within organisations with credit risk focusing on default and marketing on market share etc. The measurement of growth has seen a shift in emphasis. Several lenders have moved from a volume of sales measurement to an emphasis on net growth. This confirms the increased importance of customer retention to today's lenders. Customer service features prominently as a measurement of success, measured variously by customer service questionnaires, turnaround times and again by retention rates. The quality of mortgages is also measured in a variety of ways, by segmenting loan to value, by score value, and by the level of arrears and defaults. Discussion as to whether the desire to maintain arrears at a very low level is actually the most profitable way to proceed, provided lively debate.

Measuring Profit

The variety of organisations interviewed provided a range of responses, each in keeping with the placement of the mortgage within their own product range. For a minority the mortgage product is viewed strategically as a means of customer service provision. The mortgage being offered as a peripheral product in order to complement the organisation's other product ranges. This highlights the divergence amongst financial service strategies in the current market. This divergence is echoed within individual organisations. Branch networks are portrayed as being more keenly aware of the profit potential of individual mortgages than the underwriting department. As alluded to previously this may be a result of the varied ways in which staff within organisations are incentivised. For the majority, the mortgage requires to be a substantial contributor to overall profitability. Everyone is aware of the move towards measuring profit on a "by customer" basis, but it would seem that the reality of being able to compute such a figure is still some way off. Commonly the profitability of the mortgage is viewed in relation to a "package" of products. Such packaging results in the mortgage profitability combining with the profitability of insurances which are variously optional or compulsory. Detailed investigation of profitability measurement is not appropriate within the context of the interviews, but will form a key part of the next phase of the research. Critically the length of time which mortgages "stay on the books", would appear to be shortening. This may well have a knock on impact on product pricing, with future products requiring to reach profit "maturity" sooner.

Risk Pricing

Risk pricing is commonly delivered via the product profile. The commonest means of doing this is obviously loan to value. Targeting of customers to whom organisations are keen to lend involves the promotion of special deals based on the risk profile of the target applicant. However, when seeking to obtain views on the growth or otherwise of risk pricing mortgages, all respondents are cautious about such a development. Whilst many believe it to be fair, a substantial number believe it would be unpalatable in the market place, and very difficult to justify offering customers different rates particularly based on the credit score value. Where a potential to risk price is perceived to exist is at the retentions end of the market.

Rather than overtly penalising high risk customers, by reducing pricing in order to retain customers, so risk pricing may arrive as an incentive to remain. Some variations on this theme are already acknowledged to exist, however such covert product offerings may soon become more visible. Linked to this, the question of mortgage indemnity guarantees was discussed, with the majority retaining MIG at starting rates which varied from 75% to 90%. Concerns are voiced about both no MIG being required, and about customers who take steps to force themselves into a lower MIG band. The former, no MIG, is somewhat cynically perceived by those who charged MIG. The consensus being that as no lender can take risks without such contingency insurance, the MIG is simply being hidden and funded in an alternative manner. Conversely it is the concern about those customers who drive themselves into a lower MIG band, which is one of the drivers that has prompted lenders to incorporate MIG into their product offering.

Anecdotes

The foregoing is supported by anecdotes. Inclusion of them all was impossible. However the following may well strike a cord with many of the interviewees;

“ I think before too long there will be figures about customer worth and profitability in front of the sales people, possibly even driving the sales people ”

“the vast majority are declined before they've even filled in an application form”

“I don't think a broker pre-screens anything, started up by the broker and pre-screened by the branch maybe”

“the residual mandates remain in branches because of the macho culture”

“we see a lot of ping pong between the branches and the lending authority holder”

“ we would be looking to use scoring to get the price of risk, but that's some way away”

“any idiot can say no, there's no skill in that at all”

“because of the government's paperwork on home ownership we're going to be forced into ripping our customers off by flogging them insurance's they don't need”

(on arrears) “ we ask the underwriters to do the home visits, they can't just walk away they have responsibility throughout the mortgage's life

“we used an information terrorist approach to scare people into accepting scoring by showing them the previous arrears figures”

“the challenge lies in customer worth, ultimately the credit assessment will be one variable in that”

“we’re not getting full value (from scoring), because we’re not using the information as well as we should”

“we have a basic philosophy, if it’s good business why turn them away because of criteria”

Appendix I

18th November 1998

Dear

Mortgage Credit Scoring Research

Further to previous discussions about my research, I am pleased to enclose a summary document which outlines some of the issues raised during the most recent phase, which comprised interviews. The interview themes were developed from the findings of the initial survey document.

I am now planning the next phase of the research, whereby I intend to quantify the benefits which organisations derive from scoring. This will take into account the variety of ways in which credit scoring is operationalised, and will seek to identify an optimum means of integrating credit scoring into the mortgage process.

Please do not hesitate to contact me to discuss the research, or any of the points raised in the summary document. The participant companies will of course remain confidential.

Yours sincerely,

Ann MacNeill

Tel. 0131 650 4644
Email Ann.MacNeill@ed.ac.uk

Appendix J

Mortgage Credit Scoring - An Evaluation

Project Proposal

Mortgage Credit Scoring

An Evaluation

prepared for:

Organisation Title

prepared by:



Ann MacNeill
University of Edinburgh

Introduction

This document provides a framework for discussion with a view to a partnership being developed between the researcher and the participant organisation. The project proposal outlines the key areas of interest, and is intended to provide a stimulus for more detailed discussions. Such further discussion would set the project within a more tightly defined set of boundaries with specific deliverables.

On agreement of the scope of the work, a full research project contract will be drafted for each participant organisation which will include timescales, milestones and deliverables as agreed during discussions.

Such terms of reference, once agreed, will ensure that the research project provides the maximum value to both the participant organisation and the field of credit research.

Project Background:

This proposal forms part of an ongoing research project funded by the Economic and Social Research Council. The project examines the impact of the adoption of credit scoring on both the lending organisation and potential and existing consumers. Thus far the following have been completed;

- An empirical evaluation of the extent of usage of mortgage credit scoring
- An empirical evaluation of the methods of adoption of mortgage credit scoring
- An analysis of the reasons why some organisations deem credit scoring to be an unsuitable means of making mortgage credit decisions
- An analysis of the benefits which organisations sought to derive from mortgage credit scoring
- An analysis of the benefits which organisations believe they have obtained from utilising mortgage credit scoring

In addition to the foregoing, qualitative analysis was undertaken via interviews. This provided insight into the mortgage process, mortgage underwriting and mortgage credit scoring within the operating environment. The results of the qualitative analysis were combined with other published data, in order to augment the empirical study. By combining data from a variety of sources the research has been grounded in the operating environment of today.

Project Contract

Each participating company is assured of complete confidentiality. Documentation will be provided which confirms this. In return for access to personnel and data within the organisation, levels of which require to be agreed by negotiation, participant organisations will be provided with an analysis of the costs and benefits associated with the current mortgage process. This will include a complete overview of the mortgage process, and where appropriate an examination of the way in which credit scoring is being operationalised. Whilst participant organisations have expertise in abundance with which to conduct such an exercise, resources are often utilised in a manner which impose artificial boundaries on expertise. By providing an holistic study the project will cross organisational boundaries to look at administration, sales, arrears, strategy, marketing, customer service and costing procedures all of which form important parts of the mortgage process. Such an approach will allow additional insight to be obtained. Additionally, time may be available to conduct special project work to provide additional management information. Such work might examine areas such as;

- revisiting and coding previous non policy applications approved (policy overrides or system overrides) with a view to examining performance relative to the portfolio
- conducting examination of defaults with a view to eliciting default reasons

Project Objectives:

This research project will compare the mortgage process and credit decisioning in a variety of lending organisations. A comparative analysis will be undertaken which will evaluate the benefits which are derived from credit scoring, and the limitations of the scoring system. The ultimate goal will be to identify the optimum means of integrating the scoring system into a variety of lending organisations where it is deemed that this is the means by which maximum value can be achieved. In order to achieve the goal the following areas will be examined in detail:

- Profitability/Costs
- Speed
- Credit quality
- Credit strategy
- Customer Service

Profitability/Costs

This evaluation does not seek to replicate the standard accounting practices which exist within the organisation. Rather the focus will be on determining the profits and costs associated with mortgage lending, and the impact on profitability of alternative means of credit decisioning. The examination will review the cost:benefits of mortgage lending, the cost:benefits of credit scoring and the costs and benefits of alternative methods of credit decisioning. Areas of interest include:

- The cost of processing each application to the decision stage
- The cost of applications decisioned solely by credit score
- The cost of applications decisioned solely by underwriters
- The cost of applications decisioned by a combination of credit score and underwriting
- The quantification of the volume which do not progress to a formal application
- The cost of processing each enquiry which does not progress
- An analysis of the reasons why applicants do not progress to formal application
- The full cost of getting each application “on the books”
- The length of time it takes to recoup such set up costs
- The length of time mortgages stay on the books
- The reasons why mortgages migrate
- The profitability profile of the mortgage portfolio
- The cost of arrears and default management

Speed of response:

In today’s customer driven environment, speed to decision and offer is increasingly important. This area will be examined with a view to examining the timescales for a variety of types of lending proposal. This will include those within and outwith lending criteria, existing customers and potential new customers. An examination of differences in service standards which each category receives will be undertaken, with a view to streamlining the process where possible.

Customer Service

As with all other evaluations, the intention is for non intrusive research to be conducted. The research will be conducted within the lending organisation. The customer service evaluation will seek to utilise existing reporting mechanisms where they exist. If no measures exist to currently evaluate the following, the research project will support the development of reporting mechanisms should the participant organisation wish to do so.

- Customer service questionnaire responses
- Level of retention
- Percentage of enquiries which proceed to formal application
- Percentage of applications approved
- Reasons for declines
- Percentage of applicants offered an alternative product
- Level and nature of supporting documentation required from applicants

Credit Quality

Credit quality will be reviewed from the perspective of both trends within the lending organisation and a comparison of industry figures. An overall assessment of quality will consider the following:

- Credit score values (where appropriate)
- Loan to value ratio's
- Levels of applications accepted and declined
- Reasons for declined applications
- Levels of non criteria applications accepted
- Reasons for non criteria applications accepted
- Levels of arrears
- Movement and trends from minor arrears to serious arrears
- Proportion of those in arrears who are making and adhering to repayment agreements
- Level of voluntary surrender of property
- Level of repossession of property

Credit Strategy

In recognition of the various credit strategies which exist in the market place, the individual credit strategies of participant organisations will be documented. This will ensure that the research recognises disparate strategies, and the variety of objectives which will exist in support of differing strategies. In order to fully understand the credit strategy, the examination will include:

- Credit policy documentation
- Marketing focus
- Product placement and variety
- The existence or otherwise of lending criteria
- The adherence to published lending criteria
- The extent to which maximising profits is mitigated by ethical lending

Timescales

Timescales will be confirmed by negotiation with participant organisations. However it is intended that an intensive period of access of up to three months may be required in order that all data be gathered to facilitate the research. On completion of access to each participant organisation a summary document will be provided within six weeks which will provide feedback on key deliverables. The full case study research over several organisations will take up to a year. On completion of the full research programme, it may be desirable to revisit organisations for a short period in order to examine additional new areas of interest, or to update data. This, as with all other requests for access, would require to be agreed individually with participant organisations.

Conclusion

Credit scoring research has evolved over the past fifty years. Much of the current research focuses on the ability of the credit scorecard to accurately predict default. However the manner by which credit scoring is adopted into the operating environment has received little attention. The multiple methods via which credit scoring has been operationalised, result in a variety of differing benefits being obtained. This research seeks to quantify the value and benefits of a variety of methods of credit decisioning, and to identify the optimum credit decisioning strategy which maximises value.

Appendix K

Benchmarking Survey Document

Benchmarking Mortgage Performance

An Industry Survey

Research Supported by:

The University of Edinburgh



Benchmarking Mortgage Performance

Objectives of the Research:

This study complements previous research which examined the impact of credit scoring being adopted by mortgage lenders. Within the research already undertaken key performance indicators have been identified. This new study, asks organisations to provide “benchmarking” data relating to both risk and process measurements. The provision of such data will allow lenders access to industry wide data on risk and performance measurements within the mortgage lending environment. The objectives of the research are as follows;

- Gather industry wide data to allow the creation of a benchmarking dataset
- Create a benchmarking tool based on mortgage risk measurements
- Create a benchmarking tool based on mortgage process measurements
- Provide segmented benchmarking data based on primary means of credit decisioning

Confidentiality:

Respondents are assured of **complete confidentiality**. No organisation or individual will be identified within the research output.

Feedback:

A research report will be circulated to all participants. Recipients will be provided with information which enables them to “benchmark” their own performance in a number of key areas of both credit risk, and mortgage process efficiency. Of particular value will be the focus on how performance differs between those who credit score and those who do not. This will allow lenders to compare themselves against those using the same decisioning techniques, and to examine whether alternative techniques appear to be associated with particular performance trends. The research report will be circulated in January 2000.

Should you have any queries about any element of this research please do not hesitate to contact the survey co-ordinator as detailed below:

Ms. Ann MacNeill
Department of Business Studies
University of Edinburgh
William Robertson Building
Edinburgh EH8 9JY

Telephone 0131 650 4644
Email Ann.MacNeill@ed.ac.uk

Section 1: Risk Measures:

Arrears levels:

What percentage of mortgage accounts are not up to date 12 months after drawdown?	_____ %														
Please break down the percentage given above based on the number of instalments in arrears:	<table style="width: 100%; border-collapse: collapse;"> <tr><td style="width: 80%;">0 – 0.99 instalments</td><td style="text-align: right;">_____ %</td></tr> <tr><td>1 – 1.99 instalments</td><td style="text-align: right;">_____ %</td></tr> <tr><td>2 – 2.99 instalments</td><td style="text-align: right;">_____ %</td></tr> <tr><td>3 – 3.99 instalments</td><td style="text-align: right;">_____ %</td></tr> <tr><td>4 – 4.99 instalments</td><td style="text-align: right;">_____ %</td></tr> <tr><td>5 – 9.99 instalments</td><td style="text-align: right;">_____ %</td></tr> <tr><td>10 + instalments</td><td style="text-align: right;">_____ %</td></tr> </table>	0 – 0.99 instalments	_____ %	1 – 1.99 instalments	_____ %	2 – 2.99 instalments	_____ %	3 – 3.99 instalments	_____ %	4 – 4.99 instalments	_____ %	5 – 9.99 instalments	_____ %	10 + instalments	_____ %
0 – 0.99 instalments	_____ %														
1 – 1.99 instalments	_____ %														
2 – 2.99 instalments	_____ %														
3 – 3.99 instalments	_____ %														
4 – 4.99 instalments	_____ %														
5 – 9.99 instalments	_____ %														
10 + instalments	_____ %														
At what point does your organisation first define an account as being in arrears?	<table style="width: 100%; border-collapse: collapse;"> <tr><td style="width: 80%;">Any monetary value</td><td style="text-align: right;">_____</td></tr> <tr><td>1- 1.99 instalments</td><td style="text-align: right;">_____</td></tr> <tr><td>2- 2.99 instalments</td><td style="text-align: right;">_____</td></tr> <tr><td>Other</td><td style="text-align: right;">_____</td></tr> </table>	Any monetary value	_____	1- 1.99 instalments	_____	2- 2.99 instalments	_____	Other	_____						
Any monetary value	_____														
1- 1.99 instalments	_____														
2- 2.99 instalments	_____														
Other	_____														
What is the current level of arrears (as defined by your organisation) across your entire mortgage-lending portfolio as a percentage of portfolio value?	_____ %														
At what point does your organisation first define an account as being in default?	<table style="width: 100%; border-collapse: collapse;"> <tr><td style="width: 80%;">1- 1.99 instalments</td><td style="text-align: right;">_____</td></tr> <tr><td>2- 2.99 instalments</td><td style="text-align: right;">_____</td></tr> <tr><td>3- 3.99 instalments</td><td style="text-align: right;">_____</td></tr> <tr><td>Other</td><td style="text-align: right;">_____</td></tr> </table>	1- 1.99 instalments	_____	2- 2.99 instalments	_____	3- 3.99 instalments	_____	Other	_____						
1- 1.99 instalments	_____														
2- 2.99 instalments	_____														
3- 3.99 instalments	_____														
Other	_____														
What is the current level of default across your entire mortgage-lending portfolio as a percentage of portfolio value?	_____ %														
Commonly lending institutions lend outwith their published lending criteria. What proportion of mortgages which your organisation approves are typically outwith your published lending criteria? <i>If you do not measure this data, please indicate this fact as your reason for non-response.</i>	_____ %														

- Please continue overleaf

Section 2: Process Measures:

Acceptance Rate:

What is the level of mortgage applications which are converted to completed mortgage accounts?	_____ %
What proportion of verbal enquiries are converted to actual applications (either paper or electronic)? <i>Please provide an estimate if you do not formally record this data</i>	_____ %
Do you gather data on why enquiries which fail to convert to applications?	Yes/no
If yes to the above, what are the most common reasons cited for enquiries failing to convert to applications, e.g. wrong products:	

Approval Time:

What is the usual length of time between an application being completed and the customer being offered an "agreement in principle"? Agreement in principle being defined as " <i>subject to receipt of either suitable employers reference or property survey</i> "	Less than 1 hour	_____
	1 hour - 1 day	_____
	2 days - 5 days	_____
	6 days - 1 month	_____
	1 month +	_____
What is the usual length of time between application being completed and offer papers being issued?	1 hour - 1 day	_____
	2 days - 5 days	_____
	6 days - 1 month	_____
	1 month +	_____

Customer Satisfaction:

How frequently do you measure customer satisfaction?	Not measured	_____
	Every application	_____
	Every accepted account	_____
	Random sampling	_____
If random measurement of customer satisfaction, please indicate a typical cycle time between measurements	Monthly	_____
	Quarterly	_____
	Other (please specify)	_____
Do you accept intermediary introduced business, and if so do you measure introducer satisfaction?	Accept business	Yes/No
	Measure satisfaction	Yes/No
Please indicate the frequency of measurement of introducer satisfaction.		

Section 3: Background Information:

<p>What is the primary means of reaching a mortgage lending decision within your organisation?</p> <p><i>Please tick one box as appropriate</i></p>	<p>Lending decision reached with no input from credit score. <input type="checkbox"/></p> <p>Credit score value comprises part of the lending decision. <input type="checkbox"/></p> <p>Credit score value determines the lending outcome. <input type="checkbox"/></p>
<p>What is the number of mortgage applications approved by your organisation within the last 12 months?</p> <p>What is the monetary value of mortgages granted by your organisation within the last 12 months?</p>	<p style="text-align: right;">_____</p> <p style="text-align: right;">_____</p>
<p>What is the current asset value of your mortgage portfolio?</p>	<p style="text-align: right;">_____</p>
<p>What proportion of new mortgage business from existing customers comes from the following sources?</p> <p><i>Please specify measurement method</i></p> <p>Volume of new business by number of applications <input type="checkbox"/></p> <p>Volume of new business by value of applications <input type="checkbox"/></p>	<p>Direct _____%</p> <p>Via Intermediary _____%</p>
<p>What proportion of new mortgage business from new customers comes from the following sources?</p> <p><i>Please specify measurement method</i></p> <p>Volume of new business by number of applications <input type="checkbox"/></p> <p>Volume of new business by value of applications <input type="checkbox"/></p>	<p>Direct _____%</p> <p>Via Intermediary _____%</p>
<p>What is the maximum loan to value ratio on which you offer mortgage advances?</p>	<p style="text-align: right;">_____%</p>
<p>If purchase price is lower than valuation do you calculate the loan to value ratio on (i) advance:purchase price or (ii) advance:survey valuation figure?</p>	

Section 4: Respondent Information

Name of respondent _____

Designation/Job Title _____

Contact address

Telephone number _____

Email address (if applicable) _____

Company Information

Company name _____

Address of registered office

End of Section 4: Thank you for taking the time to complete this survey document. Please return it to us using the envelope provided. You will receive a research report during January 2000.

Appendix L

Mortgage Credit Scoring Research Application Data

Mortgage Credit Scoring Research Application Data

Introduction

The research is now in phase two, where mortgage application data is being collected and analysed. The objective is to compare the mortgage application process and lending outcomes based on the method of credit decisioning. This will enable a comparison of empirical, judgmental and combined decisioning systems.

The research will examine accounts which meet the criteria of being “resource intensive”. These will include default, arrears and early redemptions. Analysis will be undertaken in order to determine which variables are most strongly correlated with the various categories of resource intensive accounts. To gain a perspective on which variables should be considered in the analysis a wide variety of mortgage application forms were examined in order to identify the data which is available.

Overview of Application Data

What is immediately apparent is that the mortgage application form often has multiple roles which may include;

- Assessing credit risk
- Marketing tool for products/cross sales
- Providing additional security features
- Meeting mortgage code requirements

This review of application data categorised the information gathered within the following categories; (i) applicant, (ii) financial, (iii) employment, (iv) property and (v) product characteristics. The focus was on the information which could be analysed with a view to contributing to the credit decision. Supplementary information such as name of solicitor etc. was ignored. Assuming a sole applicant the average number of characteristics gathered by organisations was 51. The maximum was 64 and the lowest number recorded was 40. These figures of course exclude credit bureau information which would provide additional variables. The figures stimulate discussion as an average credit scorecard may contain 20 - 30 variables, and therefore questions arise surrounding the value and purpose of such comprehensive data gathering. This confirms the multiple role of the application document as going beyond risk assessment.

Observations

Applicant Characteristics

The combination of basic information and some additional security variables was common. Areas of differentiation include:

Gender variable: some lenders do not explicitly gather the gender variable, rather if they use it in analysis they must make an implicit deduction based on name and title. This can cause confusion where for example the title is Professor and the name common to both genders albeit with spelling variations. e.g. Lynn, Lyndsey etc.

Relationship variable: Reflecting trends this is tackled from a variety of perspectives, perhaps to address the limitations of raw data. Rather than simply asking for marital status, several lenders ask for relationship between applicants. This perhaps reflects the fact that “married” does not necessarily mean to each other.

Dependants variable: Variance exists between lenders. Some request only numbers of children explicitly. Other request age of children. The question arises as to how this data is actually used. Unless this data is combined in some way with a household expenditure index to calculate affordability, its inclusion in the application form may be for marketing purposes. Reflecting demographic changes several lenders now ensure that they identify not only children but other dependants (presumably elderly relatives).

Financial Characteristics

Very basic data is gathered via the application form. This suggests that credit bureau data is considered a valuable source of financial information, and supplements the data collected on the application form. Obviously where the applicant is an existing account holder additional valuable information on account behaviour is also available. The application forms do not all contain a supplementary section which allows the collation of financial information in a pre-determined format. Very little data is gathered on the assets of the applicant, the focus is on liabilities.

Credit card variable: Several lenders gather balances, limits and monthly payments. This allows credit card debt level to be considered relative to card limit, which has in the past been correlated to propensity to default. By explicitly requesting such information presumably an “honesty check” is being carried out. Others may gather such data via credit bureau reports.

Loans/other outgoings: Lender, type of loan, amount outstanding and typical monthly payments were commonly gathered. The prompts around type of loan included, mortgage, overdraft and hire purchase agreements. Many lenders (68%) ask explicitly about maintenance commitments, and seek to identify those which are voluntary and those which result from Court Order.

Affordability: It is clear that the application form is not the medium by which affordability is calculated. Whilst basic income details are gathered (see employment section), only the most basic of expenditure details are commonly gathered. This confirms that despite a large number of variables being collated on the application forms, they are augmented by many more from additional sources which increases the number of variables being considered beyond the mean of 51 identified.

Employment Characteristics

Employment Status: Again demographic changes reflect the new status of contract worker. Several lenders ask explicitly about the terms of the contract, the date the contract is due to be renewed, and whether/how often the contract has been renewed in the past.

Income: Acknowledgement of new remuneration structures is evident from the categorisation of income source. Basic income is isolated from guaranteed other income, regular income, commission income and any other income. Such data may provide valuable avenues for analysis. The proportion of income received from DSS is also considered useful to a few lenders. This data collection may be for analytical

purposes for a proportion of lenders, and risk assessment by others who have been gathering income data in this format for longer.

Other Benefits: Information is requested by some lenders on other employment benefits. This information would require to be augmented with details about certainty/terms of benefits in order to be of real value to the credit assessment. It is likely that the impact of other benefits would be in relation to calculation of affordability, should the other benefits mitigate some household expenses.

Pension Arrangements: Several lenders sought confirmation of pension arrangements. Useful for marketing purposes, and potential impact on type of product selected.

Property Details

Property Type: Increasingly, data is being collated on type of property (93% of respondents). Property type has been found to be correlated to default in some studies. This data is being augmented by number of bedrooms and in some cases number of storeys. Data such as construction which is collected by 56% of lenders at application stage, is most likely to be considered by others on receipt of the valuation.

Insurances: This section is used by many as an opportunity to cross sell insurance products such as building and contents insurance. Lenders have heeded the CML and government initiatives with 83% “flagging” the subject of Mortgage Payment Protection Insurance at this stage. Lenders are asking not only if applicants wish cover, but are emphasising the need for cover by asking explicitly what arrangements exist to meet the mortgage payments in the event of accident, illness, unemployment etc. The potential relationship between existence of MPPI and likelihood of default also means that many lenders are currently using this data in analysis. As a rich data source it may require to be augmented by information on how the MPPI product came to be in place (sought or sold). This would enable the consumer behaviour/risk profile aspects of those who have MPPI to be considered.

Product Details

Very standard across all lenders. General collation of data on type of product, term, source of deposit etc.

Conclusion

The extensive volume of data being gathered has a broad range of implications. With a focus on customer service and speed to decision, organisations must critically evaluate their usage of data. The multiplicity of roles which the data must meet should be objectively examined regularly. This requires a variety of organisational perspectives be addressed, with marketing, credit risk, and other departmental representatives reviewing their requirements. Whilst the credit decision can be made on a limited number of variables, organisations recognise that drivers of default may vary over time. The volume of data gathered allows the retrospective evaluation of variables in order to examine the existence and strength of relationships over time. The focus of such analysis may examine not only default but other arrears and early redemption indicators. It is this iterative loop that provides improved knowledge about the truly valuable data which must be gathered at the credit assessment stage.

Appendix M

Variables Gathered in Mortgage Lending Evaluation

Reference Number Granted or declined Application type Gender Marital status Time present address Number of children Other dependant	Source Existing customer Age Home phone Occupancy Time previous address Ages of children
Occupation code Time in present employment Pension source	Occupation status Time in previous employment
Basic income Other income guaranteed Other income regular Income benefits Total income Total expenditure Free funds Second income p.a.	Loans total monthly Mortgage/rent monthly Maintenance monthly Type of loans Credit card limits Credit card balances Credit card monthly Other outgoings identified
Type of accounts held Other assets (type and value)	Credit card Cheque card
Mortgage fixed or flexible rate Mortgage term Purchase price Source of contribution Property age Number of bedrooms Main residence	Mortgage purpose (purchase/refin./transfer) Mortgage amount Property value Property type Number of storeys Number of kitchens MPPI taken
Ever Bankrupt Number CCJ Previous delinquencies Number of credit searches Current status (up to date/arrears) Arrears causality code	Default on previous mortgage Date most recent CCJ CCJ satisfied Referred to credit assessor Reason referred to credit assessor

Appendix N

16th December 1999

«TITLE»
«COMPANY»
«ADDRESS»

Dear «SALUTATION».

Benchmarking Mortgage Performance

Further to previous communication, you are invited to take part in an industry wide survey of mortgage lenders. All members of the Council of Mortgage Lenders are asked to provide information relating to mortgage performance. This data will enable industry performance figures to be “benchmarked”, providing a useful database for participants to share.

The data gathered and all research output will be **wholly confidential**, and no organisation will be identifiable within the research output. Participants will obtain an analysis report, and individually tailored information of their position benchmarked against other lenders. The added dimension to this survey, is that the method of credit decisioning will be considered. This allows a unique comparison of performance related to the method of credit decisioning.

Your participation helps to ensure that the results are robust. The more organisations that participate, the more valuable the results will be. Whilst I appreciate that time constraints exist, I would be most grateful if you would spare time to complete and return the survey document by 7th January. If you are unable to meet that deadline, please let me know a preferred response date. Do not hesitate to contact me if you have any queries regarding any aspect of the research.

May I thank you for your co-operation, and also wish you “all the best” over the festive season. I look forward to sending you the findings in the New Year.

Yours sincerely,

Ann MacNeill

Tel. 0131 6650 4644
Email Ann.MacNeill@ed.ac.uk

Appendix O

Benchmarking Feedback Document

Research Supported by:
The University of Edinburgh



Private and Confidential

Prepared for:

Benchmarking Mortgage Performance

Summary

The contents of this report are drawn from a confidential survey of UK mortgage lenders. Your performance has been benchmarked against other participants. Due to the diverse nature of financial services organisations, and the variety of delivery channels utilised in mortgage lending it is impossible to draw absolute conclusions from the data. However as a pilot survey, the results provide some interesting observations, which will provide participants with an overview as to how they compare with other lenders.

What is most encouraging is that lenders obviously maintain good quality management information. Recent improvements in the quality and quantity of data available, allows detailed analysis of business performance. Early identification of trends ensures that the proactive analyst is equipped to advise management on movements within the portfolio. Additionally, maintaining good quality data allows new areas to be explored, which in turn may offer new insights into mortgage risk management.

The results provide an overview of some key performance measures in risk, process and customer service. You will see a surprising range of values in many fields, illustrating the diversity amongst lenders. The raw results are provided, and some comments are made to explain unusual occurrences within the data. However the report does not make any attempt to quantify an ideal “target range” for any area. It would be inappropriate to do so, as one lender's optimum figure could be an unrealistic target for other lenders.

The results are also presented in a way that relates the outcomes with regard to whether the lender uses credit scoring in reaching a lending decision. This data is included, as this benchmarking survey is part of a larger research project, which examines mortgage credit scoring. Again whilst the results are interesting, it is inappropriate to conclude that the differences exist exclusively as a result of credit scoring being used.

When considering the results it is useful to be aware that a limitation of the survey, is the low response rate. The final number of usable responses received from lenders was twenty-three. This response rate amounts to 19% of the whole population. Whilst this is lower than desired, it is not untypical of survey response rates generally. Several reasons have been provided for the low response. Many organisations confirmed that much of the data was “too sensitive” for release. Whilst others confirm that they are commercially involved with a variety of other Benchmarking Consortia at present.

It is hoped that these survey results will be useful to you. Many thanks for your participation in the research survey.

Section 1: Risk Measures:

1.1 Arrears levels:

Percentage of mortgage accounts not up to date 12 months after drawdown.

17 lenders provided information on arrears levels. The results reported below exclude one response which stated that the level of arrears 12 months after drawdown was 97.5%. This may or may not be a valid response, but as it was an “outlier” when related to the other data it was excluded from the analysis. The figures below indicate the range of data, a mean value and your ranking. Rankings are from 1 (lowest) to 16 (highest).

Minimum	Maximum	Mean	Your value	Ranking (16)
0.002%	22.60%	5.98%		/16

1.1.1. Arrears levels related to Credit Decisioning

When the level of arrears is related to the method of credit decisioning, we see that the lowest arrears are maintained by those that do not use credit scoring. Whilst this is an interesting observation, issues of prudence, profitability and credit policy require to be debated before any actual conclusions could be reached.

% of accounts not up to date 12 mths. after drawdown	Organisations that do not score	Organisations that do score
0 - 0.99%	60% (6)	16.66% (1)
1.00% - 9.99%	20% (2)	33.33% (2)
10% and above	20% (2)	50.00% (3)
	100% (10)	99.99% (6)

1.2 Breakdown of arrears

Breakdown of arrears based on number of instalments in arrears

The table, which follows on page four, provides results in line with expectations, in which the levels of arrears decrease in line with seriousness increasing. The exception however is the figure for five to nine months in arrears, which shows an unexpected increase. A single lender showing 18% arrears at the five to nine month stage is the cause of this anomaly. . When this lender is removed from analysis, the adjusted maximum is 9% and adjusted mean is 1.24%, which supports the general trend.

Breakdown of arrears based on number of instalments in arrears (contd.)

Instalments	Minimum	Maximum	Mean	Your value	Ranking
0-0.99	0	98.40%	31.51%		/14
1-1.99	0	51.00%	10.36%		/16
2-2.99	0	33.00%	4.23%		/16
3-3.99	0	9.00%	1.36%		/16
4-4.99	0	5.00%	0.96%		/16
5-9.99	0	18.00%	2.30%		/16
10 +	0	3.00%	0.48%		/16

1.3 Definition of arrears

Twenty-three organisations provided a response. Interestingly, a significant number of organisations (30.4%) considered that arrears exist at any monetary value. This perhaps reflects new trends in arrears management where organisations seek to track arrears maturation patterns across the portfolio. The majority of lenders, 47.8%, define arrears at 1 - 1.99 instalments outstanding. Only one lender considered that an arrears position commenced at the point 2 - 2.99 instalments outstanding. The remaining organisations used a variety of alternative methods including an assessment of the “relationship having broken down”. Two lenders used financial values, one a proportion of the monthly repayment, and the other a small financial amount.

1.4 Level of arrears across the portfolio

Level of arrears as a percentage of portfolio value

All lenders provided data on the overall level of arrears across their portfolio. The following confirms the range, mean value and ranking of arrears “as defined by individual lenders”. The ranking is from 1 (lowest arrears) to 23 (highest arrears).

Minimum	Maximum	Mean	Your value	Ranking (23)
0.01%	8.00%	2.02%		/23

Some interesting observations are provided which shows that banks generally have lower arrears figures at the portfolio level. The table below details Banks as a proportion of Bank respondents etc.

Portfolio Arrears	Organisation Type		
	Bank	Building Society	Other
0 - 0.99%	66.66%	30.77%	50.00%
1 - 1.99%	16.66%	30.77%	0
2% and above	16.66%	38.46%	50.00%
	99.98%	100.00%	100.00%

1.4.1 Level of portfolio arrears related to method of Credit Decisioning

Analysis of arrears across the portfolio, shows that those who input a score value, maintain higher levels of arrears on average than those who do not use scoring.

Portfolio Arrears	Organisations that do not score	Organisations that do score
0 - 0.99%	56.25% (9)	14.28% (1)
1 - 1.99%	18.75% (3)	28.57% (2)
2% and above	25.00% (4)	57.14% (4)
	100.00% (16)	99.99% (7)

1.5 Definition of default

Of the twenty-three respondents 52% considered an account to be in default at 1-1.99 instalments in arrears. This is similar to the earlier responses on definition of arrears. It would therefore seem that at a portfolio level, the terms arrears and default may be used interchangeably in some organisations. Just over 17% identified default at 2 -2.99 instalments with a further 13% defining default at 3 - 3.99 instalments. Of the remainder "relationship broken down" and a variety of financial values are used to determine the point at which an account is considered to be "in default".

1.6 Level of default across the portfolio

Level of default as a percentage of portfolio value

Only one lender failed to provide data on the level of portfolio default, hence the ranking values below range from 1 (lowest) to 22 (highest).

Minimum	Maximum	Mean	Your value	Ranking (22)
0	7.00%	2.03%		/22

Again some additional analysis was undertaken based on organisational type as illustrated below. Due to the fact that the terminology may be being used interchangeably the results almost mirror those of the arrears analysis, with banks more commonly holding lower levels of portfolio default.

Portfolio Default	Organisation Type		
	Bank	Building Society	Other
0 - 0.99%	50.00%	33.33%	50.00%
1 - 1.99%	16.67%	33.33%	0
2% and above	33.33%	33.33%	50.00%
	100.00%	99.99%	100.00%

1.6.1 Level of Portfolio **Default** related to method of Credit Decisioning

In accordance with the earlier observation regarding portfolio arrears, it seems that lenders maintain higher levels of portfolio default when they have access to credit scoring. This further analysis shows that the terms arrears and default are not wholly interchangeable. This is illustrated by the fact that the outcomes differ between the arrears and default analysis.

Portfolio Arrears	Organisations that do not score	Organisations that do score
0 - 0.99%	46.67% (7)	28.57% (2)
1 - 1.99%	20.00% (3)	28.57% (2)
2% and above	33.33% (5)	42.86% (3)
	100.00% (15)	100.00% (7)

1.7 Non criteria lending

What proportion of mortgages approved are outwith your published criteria

Twenty-two organisations provided a response on non-criteria lending. Of the twenty-two that responded three did not measure levels of non-criteria lending. In view of this the rankings below are based on nineteen lenders. Rankings are from 1 (lowest level) to 19 (highest level).

Minimum	Maximum	Mean	Your value	Ranking (19)
0	35.00%	8.42%		/19

1.7.1 Non criteria lending related to the method of credit decisioning

Interestingly some differences are observed when analysis is conducted relative to the decisioning methods. Those that credit score appear to restrict the level of outwith criteria lending to a maximum of ten percent. This may support the belief that the scoring system allows overall risk to be measured more accurately. Thus portfolio exposure may be managed in a way that limits non-criteria lending to strictly measured pre-determined limits.

Level of non criteria lending	Organisations that do not score	Organisations that do score
0 - 4.99%	33.33% (4)	42.86% (3)
5 - 9.99%	16.67% (2)	42.86% (3)
10 - 14.99%	25.00% (3)	14.28% (1)
15% and above	25.00% (3)	-
	100.00% (12)	100.00% (7)

Section 2: Process Measures:

2.1 Acceptance Rates

Level of applications converted to mortgage accounts

What is most interesting in the table, which follows, is the substantial range between minimum and maximum levels of conversion. No additional data about market focus, or customer profile is available to provide an explanation as to why such differences might occur. Organisations must of course consider the processing costs and reasons why such large numbers of applications fail to convert to “accounts on the books”. The ranking is from 1 (highest conversion level) to 23 (lowest).

Minimum	Maximum	Mean	Your value	Ranking (23)
22%	98%	72.27%		1/23

2.1.1 Level of applications converted related to method of credit decisioning

The method of credit decisioning appears to have no strong relationship with the level of applications which convert to completions. This may suggest that the method of decisioning is not having an overt influence on the applicant profile. The majority of organisations fall in the mid range between 50 - 80% completions. This contrasts with earlier published figures (1997) which suggested that the level of declines was much higher, with up to two out of three applicants for mortgage facilities being declined. Despite additional analysis being undertaken relating application levels to number of mortgages processed, no other useful data emerged.

Level of applications converted to mortgage accounts	Organisations that do not score	Organisations that do score
0 - 49.99%	12.50% (2)	14.28% (1)
50 - 69.99%	6.25% (1)	57.14% (4)
70 - 89.99%	56.25% (9)	14.28% (1)
90% and over	25.00% (4)	14.28% (1)
	100.00% (16)	99.98% (7)

2.2 Enquiry conversion rates

Several lenders do not gather data on the levels of enquiries which convert to formal application stage. The table which follows provides range, mean and ranked values on the nineteen lenders that responded. Rankings are from 1 (highest conversion levels) to 19 (lowest).

Enquiry conversion rates (contd.)

Minimum	Maximum	Mean	Your value	Ranking (19)
16%	80%	43.95%		/19

Only seven lenders confirmed that they collate data which examines the reason for non-conversion. Despite this low number a wide range of reasons exist. These could potentially inform the organisation as to its product offering and processes. Reasons for enquiries failing to proceed to application stage include the following;

- products not meeting needs
- lending criteria
- withdrawn
- declined at initial interview
- shopping around
- property does not meet criteria
- customer does not fit target market
- lost to competitor
- indemnity requirements

2.3 Approval Time

Length of time from application to “agreement in principal

The table, which follows, provides numbers and percentages of respondents, related to time to agreement in principal (AIP) being offered. As you can see the majority reach AIP between one hour and one day. A significant number do reach a decision in less than one hour.

	less than 1 hour	1 hour - 1 day	2 - 5 days	6 days- 1 month
% of respondents	26.1%	47.8%	21.7%	4.3%
No. of Respondents	6	11	5	1

2.3.1. Approval time related to method of credit decisioning

Perhaps confirming the process benefits believed to be delivered by scoring, those with access to credit scoring process a higher proportion of mortgages to AIP stage, within one hour. Just under 86% of those with scoring reach agreement in principal, within one day. Interestingly the only organisation outwith the six day AIP criteria, also has access to credit scoring. No additional information is currently available which explains such an anomaly.

	Organisations that do not score	Organisations that do score
Less than one hour	18.75% (3)	42.86% (3)
One hour - one day	50.00% (8)	42.86% (3)
Two - five days	31.25% (5)	
6 days - one month		14.28% (1)
	100.00% (16)	100.00.% (7)

2.4 Time from application to offer

All twenty-three organisations responded with information on time to offer. Only two produced a formal offer within 2-5 days. A further twenty organisations (87%) produced offer papers in a time period of six days to one month. A single organisation confirmed that time to offer was usually in excess of one month.

2.5 Customer Satisfaction

Frequency of measurement of satisfaction

The most common method for measuring customer satisfaction was by random sampling. Fourteen organisations (61%) confirmed they random sampled. Of those that did so, the most popular timing for conducting the sampling was quarterly, which was reported by 30% of respondents. Four organisations (17%) sampled monthly, with the others citing various alternative timings.

Of those that do not carry out random sampling, five organisations (22%) measure customer satisfaction on every application. The remaining four organisations carry out no measurement of customer satisfaction.

The satisfaction results were then viewed relative to whether credit scoring is in place or not. This illustrated that all organisations which conduct credit scoring, do measure customer satisfaction by some method. The four organisations which do not measure satisfaction, do not have credit scoring. Whilst no relationship is proven, it may be reasonable to suggest that the scoring organisations have levels of technology in place which make measurement of satisfaction a more manageable task.

2.5.1. Measurement of Introducer Satisfaction Levels

Twenty of the twenty-three respondents accept new business which is introduced by mortgage intermediaries. Of those that accept business 50% confirm that they measure intermediary satisfaction levels. No trend in frequency of measurement can be identified, which frequencies being reported as follows:

Frequency of Measurement	Number of organisations	Percent
Every application	1	10%
Quarterly	3	30%
Monthly	1	10%
Annually	3	30%
Random	2	20%
		100%

2.5.2 Measurement of introducer satisfaction related to method of credit decisioning

All organisations in which a credit score forms a part of the credit decision accept intermediary introduced business. When the measurement of intermediary satisfaction is related to whether the organisation uses a credit score, it becomes clear that the scorers conduct more analysis of satisfaction levels. As stated in section 2.5, it may be that levels of technology involved in scoring organisations facilitates the collation and analysis of a variety of data.

	Organisations that do not score	Organisations that do score
Intermediary satisfaction measured	31%	86%
Intermediary satisfaction not measured	69%	14%

Section 3: Background Information:

3.1 Decisioning Method

This benchmarking survey supports a broader research project, which examines the application of scoring technologies to mortgage lending. Information was sought on the role of credit scoring (if any) in the respondent organisations. Of those who responded almost seventy percent continue to make lending decisions with no input from a credit score. Of the twenty-three respondents, only seven (30.4%) use credit scoring to assist with mortgage decisioning.

3.2 Volume of business

Number of mortgages approved in previous 12 months

The following ranking provides the number of applications approved, and assumes position 1 is the highest number approved, running through to 22 the lowest number. One lender failed to provide the number of mortgages approved.

Minimum	Maximum	Mean	Your value	Ranking (22)
428	104,000	20,075		/22

The following ranking provides the value of applications approved, and assumes position 1 is the highest value approved, running through to 23 the lowest value. All lenders provided the value of mortgages approved.

Value of mortgages granted in previous 12 months

Minimum	Maximum	Mean	Your value	Ranking (23)
£7,600,000	£938.8 million	£40.8 million		/23

3.2.1. Decisioning Method related to volume of business

Further analysis examined the relationship between volume of business and utilisation of credit scoring. This analysis supports earlier findings, in which low volumes of business were cited as being a main reason for not using credit scoring. As can be seen from the table which follows, this is not exclusively the case, as several high volume lenders do not utilise credit scoring.

Number of mortgages approved in prev. 12 mths	Organisations that do not score	Organisations that do score
0 - 4,999	66.66%	0
5,000 - 9,999	13.33%	0
10,000 - 104,000	20.00%	100%
	99.99%	100.00%

3.3. Source of business

Organisations provided information on the proportion of mortgage business coming from both existing and new customers. This was further segmented to examine whether the business was coming via intermediaries or “direct” to the lender. The tables which follow look firstly at results relating to existing customers, and then at “new” customers. Not all lenders were able to provide information on sources of business.

3.3.1 Volume of business - direct from existing customers

Volume of business received direct from existing customers	number of organisations	% of organisations
0 - 29.99%	0	0
30 - 59.99%	3	15%
60 - 99.99%	9	45%
100%	4	20%
not measured	4	20%
		100%

3.3.2 Volume of business - direct from new customers

Volume of new business received direct	number of organisations	% of organisations
0 - 29.99%	6	27.27%
30 - 59.99%	8	36.36%
60 - 99.99%	5	22.73%
100%	3	13.63%
		99.99%

3.3.3. Volume of new business from intermediaries related to Credit Decisioning

Having examined the direct business, some additional work was done looking at the lending organisations and the levels of business received via intermediaries. As can be seen below many lenders receive a substantial proportion of mortgage business via intermediaries. For the purpose of this analysis new (non-customer) business received from intermediaries is related to the method of decisioning. What is most interesting is that those who use credit scoring receive a higher proportion of new business from intermediaries than those who do not. This fact is perhaps surprising, as there is a perception that intermediaries are not often supporters of credit scoring technologies. The breakdown is as follows;

Proportion of new business received via intermediaries	Organisations that do not score	Organisations that do score
0 % - 29.99%	40%	0%
30% - 59.99%	20%	14%
60% plus	40%	86%

3.4 Maximum LTV ratio

Responses on maximum LTV ratio, ranged from a lowest maximum LTV of 80% to the highest LTV on offer of 125%. The majority of respondents (70%) confirmed a maximum LTV of 95%.

3.4.1. Maximum LTV related to credit decisioning

Maximum LTV offered	Organisations that do not score	Organisations that do score
80 - 89.99%	6.25%	-
90 - 99.99%	81.25%	57.14%
100%	6.25%	42.86%
101% and above	6.25%	-
	100.00%	100.00%

Again, in accordance with the risk management benefits believed to be achievable with credit scoring, a higher proportion of scoring organisations offer higher LTV ratios. However another interesting anomaly in the data is that the only lender lending in excess of 100% is not using credit scoring. These could of course be specialised cases such as negative equity etc. where credit policy rules are dominant over credit risk rules.

3.5 Calculation of LTV

In order to clarify current industry practice, lenders were asked how they calculated LTV. Twenty-one respondents confirmed that they calculated LTV on the lower of the purchase price or the survey valuation. The remaining two lenders calculate LTV on the survey valuation regardless of purchase price. Both of the lenders using the survey valuation figure in all cases do not currently use credit scoring as part of the decisioning process.