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Risk Based Pricing for Unsecured Lending

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Masters of Management in Finance and Investments

Wits Business School

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2015

Thesis submitted in fulfilment of the requirements for the degree of

Master of Management in Finance & Investment

In the

Faculty of Commerce and Law Management

Wits Business School

at the

University of the Witwatersrand

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Declaration

I, Boitumelo Thoka, declare that the research work reported in this dissertation is my own, except where otherwise indicated and acknowledged. It is submitted for the degree of Master of Management in Finance and Investment at the University of the Witwatersrand, Johannesburg. This thesis has not, either in whole or in part, been submitted for a degree or diploma to any other universities.

Date: 08 OCTOBER 2015 Signature

Abstract

Risk based pricing has been a topic of discussion since the 2008 financial crisis as a result of the on-selling of packaged sub-prime assets. This paper will highlight the importance of correctly assessing risk within the framework of consumer credit provision. We will begin with a brief overview of the South African unsecured lending market, look into the definition of risk based pricing and the impact it has had in the market and conclude the paper by using a model by Robert Phillips to calculate the interest rate to be offered to a customer.

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1. Introduction

Risk-based pricing has been a topic of debate since the financial crisis of 2008. Incorrect pricing of risk in mortgage loans in the United States of America put a spotlight on the lending activities of lenders, the type of risk that lenders adopt in their operations and the risk management activities thereof.

South Africa experienced a surge in unsecured loans in 2010 according to Stuart Theobald of Leriba Consulting. As the country went through an overhaul process of their unsecured loans provisions act from the Usury Act of 1968 to the National Credit Act that was instituted in 2007, opportunities were created for growth in the unsecured lending market in the form of an increase in the size of loans that the new act provided for as well as an extension in the term.

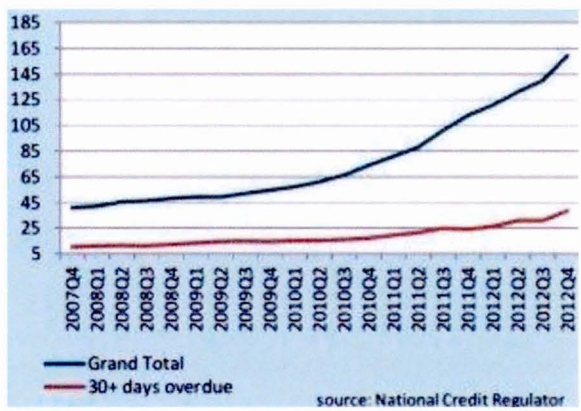


Figure 1: Unsecured Credit Gross Debtors Book[1]

Concerns have been raised around the fairness of the interest rate that lenders are allowed to charge borrowers. The National Credit Act prescribes the maximum rates that can be charged for unsecured lending which is further broken down into credit facilities, short term credit and unsecured credit. The maximum rate for unsecured credit is prescribed at 2.2 x repo rate + 20% per annum whilst that of short term credit (defined as the nominal not exceeding R8000 and

[1] Source: The Risk of Unsecured Lending in South Africa (Theobald 2013)

tenor of 6 months and less) is capped at 5% per month. Credit facilities are capped at 2.2 x repo rate +10% per annum.

1.1 Problem Statement of Study

The purpose of this study is to highlight the importance of a simple loan pricing framework that is reflective of the credit risk of the potential borrower as well as other risks that the lender or bank adopts as a result of the transaction.

The study aims to address the following questions:

- What is risk based pricing?
- What risks are considered when pricing loans?
- What are the key attributes of risk based pricing?

This study hopes to add to the conversation regarding the prudent identification, understanding and evaluation of risks associated with lending as well as the pricing of those risks to ensure consistency with respect to the concept of risk adjusted pricing. The scope of this study falls outside of determining whether or not to lend to the customer and the affordability of the interest rate offered to the customer.

1.2 Overview

Traditional banking involves the taking in of household deposits in exchange for interest and the on-lending of these deposits at a higher interest rate (DeYoung and Rice 2004). Other forms of banking involve very little deposit taking and participation in credit instruments such as credit cards and mortgage loans and the on-selling of these assets through securitization (DeYoung Rice 2004). Institutions involved in traditional banking activities, also regarded as financial intermediaries, are privy to certain risk that are associated with their operations and it is important that these risks are identified, understood and priced correctly (Saunders and Cornett 2011). The Hong Kong Institute of Bankers (2012) stress the importance of aligning the lender's risk appetite to that of risk adopted on their balance sheets through lending activities. In the activities that caused the 2008 the financial crisis, Ackermann (2008) points out that risk assumed by the financial institutions was not in agreement with the risk absorption capacity of

some of them. Banks bought financial products whose risk characteristics were not well understood. Below are some of the key risk factors faced by financial intermediaries.

Risk Factor	Description
Interest rate risk	The risk incurred by an FI (Financial Institution) when the maturities of its assets and liabilities are mismatched.
Market Risk	The risk incurred from assets and liabilities in an FI's trading book due to changes in interest rates, exchange rates, and other prices.
Credit Risk	The risk that promised cash flows from loans and securities held by FI's may not be paid in full.
Off-Balance-Sheet Risk	The risk incurred by an FI as a result of activities related to its contingent assets and liabilities held off balance sheet.
Foreign Exchange Risk	The risk that exchange rate changes can affect the value of an FI's assets and liabilities denominated in nondomestic currencies.
Country or Sovereign Risk	The risk that repayments to foreign lenders or investors may be interrupted because of restrictions, intervention, or interference from foreign governments.
Technology Risk	The risk incurred by an FI when its technological investments do not produce anticipated cost savings.
Operational Risk	The risk that existing technology, auditing, monitoring, and other support systems may malfunction or break down.
Liquidity Risk	The risk that a sudden surge in liability withdrawals may require an FI to liquidate assets in a very short period of time and at less than fair market prices.
Insolvency Risk	The risk that an FI may not have enough capital to offset a sudden decline in the value of its assets

Table 1 : Risks Faced by Financial Intermediaries[2]

[2] Source: Financial Institutions Management (Saunders and Cornett 2011)

Financial intermediaries are defined as financial institutions that intermediate between cash surplus entities and those short of cash. Lending activities, which make up a considerable share of operations in financial intermediaries, include secured and unsecured loans. Unsecured loans are described as loans that have a general claim to the assets of the borrower if default occurs (Saunders and Cornett 2011), which include mortgage loans. They are those loans that have a claim against specified assets (may be in the form of collateral) in the case of a borrower default. In pricing loans, financial institutions need to consider the credit risk or default risk of the individuals applying for loans, regulatory reserve requirements, loan origination fees, collateral and the costs of funding or capital sourced to fund the loans (Saunders and Cornett 2011). Default risk is described as the risk that the borrower is unable or unwilling to fulfill the terms promised under the loan contract (Saunders and Cornett 2011). Unsecured loans are high risk business due to their lack of collateral offering and thus should command pricing that is different to secured lending. This is to highlight the higher risk of default on the part of the lender and the lack of recovery given the lack of collateral that could have secured the loan.

The rate of participation in unsecured loans has been a topic of discussion in South Africa where credit provision is regulated by law thorough the National Credit Regulator (NCR). The NCR's operations are guided by the National Credit Act No.34 of 2005 (NCA) that came into law on 1 June 2007. The NCR's mandate is to regulate the credit industry of South Africa through enforcement, education, research, investigation of complaints, registration of industry participants and policy developments.

The NCA was instituted as replacement to the Usury Act No.73 of 1968, the Credit Agreement Act 75 of 1980 and the Usury Act's exemptions governed by the Integration of Usury Laws Act 57 of 1996. The Usury Act No.73 of 1968 (Appendix 1) was an act used to regulate credit, leasing and money lending transactions. The act aimed to limit the interest rate risk and other related finance charges to borrowers through credit agreements.

The exemptions to the Usury Act, which were first instituted in 1992, paved way for growth in the micro loans industry. The exemptions waived interest caps on loans up to R10 000 with a duration up to 3 years, for lenders registered with the Micro Finance Regulatory Council (MFRC).The MFRC was a instituted to regulate lenders participating in the exemptions based area. According to a 2013 paper by Stuart Theobald of Leriba Consulting, micro loans reached R15billion by 1999 as a result of the exemption.

All loans entered into before 1 June 2007 are still governed by the Usury Act. Current interest rate caps as prescribed by the act are as follows per the National Credit Regulator:

- For transactions with values not exceeding R10 000, the interest limit is determined as follows:

  Repo Rate + 1/3 thereof + 11 percentage points

- For transactions exceeding R10 000 the formula is as follows:

  Repo Rate + 1/3 thereof + 8 percentage points

The maximum rate charged for amounts <= R 10 000.00 is 23% and 20 % for those greater than R 10 000.00[3].

Following the micro lending crisis that resulted in the collapse of the likes of Saambou Bank in 2002, the National Credit Act's sole purpose was to protect consumers against high and unreasonable levels of interest rate, reckless lending and unfair practices by credit providers.

Following in the footsteps of its predecessor, the NCA also prescribes the maximum rate that lenders can charge and is detailed as per the table on the next page.

[3] Source: Finance Rates Altered (National Credit Regulator 2007)

Type of credit agreement	Maximum interest rate	Maximum initiation fee
Mortgages/Bonds agreements	(**REPO rate** x 2.2) + 5%	R1 000 + 10% of any amount greater than R10 000 (Maximum fee R5 000)
Credit Facilities (e.g. Credit cards, Store cards etc)	(**REPO rate** x 2.2) + 10%	R150 + 10% of any amount greater than R1 000 (Maximum fee R1 000)
Unsecured Credit Facilities (e.g. Personal loans)	(**REPO rate** x 2.2) + 20%	R150 + 10% of any amount greater than R1 000 (Maximum fee R1 000)
Incidental Credit agreements (e.g. overdue bills from doctors, Eskom, Municipalities etc)	2% per month	N/A
Developmental Credit Agreements:		
• Small & Medium Business Loans	(**REPO rate** x 2.2) + 20%	R250 + 10% of any amount greater than R1 000 (Maximum fee R2 500)
• Low income housing loans	(**REPO rate** x 2.2) + 20%	R500 + 10% of any amount greater than R1 000 (Maximum fee R2 500)
Short Term Loans (i.e. Loans of up to 6 months of no more than R8 000)	5% per month	R150 + 10% of any amount greater than R1 000 (Maximum fee R1 000)
Any other types of loans not covered above	(**REPO rate** x 2.2) + 10%	R150 + 10% of any amount greater than R1 000 (Maximum fee R1 000)

Table 2 : Prescriptions of the National Credit Act No.34 of 2005[4]

The Repo rate is the rate that the South African Reserve Bank lends money to banks. The NCA only applies to lenders whose books sizes are greater than R500 000 or have more than 100 credit agreements. The lenders are also required to register with the National Credit Regulator which has replaced the MFRC.

[4] Source: All you need to know about the Credit Act as a consumer (National Credit Regulator 2007)

According to a paper on unsecured lending by Bank Seta, unsecured lending in South Africa increased from 4% of total loans in 2005 to 8% by the end of 2011.As at June 2014, according to the NCR, unsecured lending which includes credit facilities, short term credit and unsecured credit makes up 23.46% of gross debtors book in South Africa. Bank Seta attributes the growing trend largely to attractive margins offered by unsecured lending as compared to those offered by secured lending, increase in urban dwellers as well as increased scope in terms of size and tenor of loans lenders are able to grant. In August of 2014, African Bank Limited, a leading player in the unsecured lending space was placed under curatorship by the South African Reserve Bank (SARB), the regulator of the South African banking industry, due to losses incurred as a result of non-performing loans. This resulted in Moody's (an international ratings agency), announcing its downgrade of the bank on the 29th May 2014. The rest of the South African banking system was downgraded in response to the decision by the South African Reserve Bank not to fully guarantee the holdings of institutional bond holders.

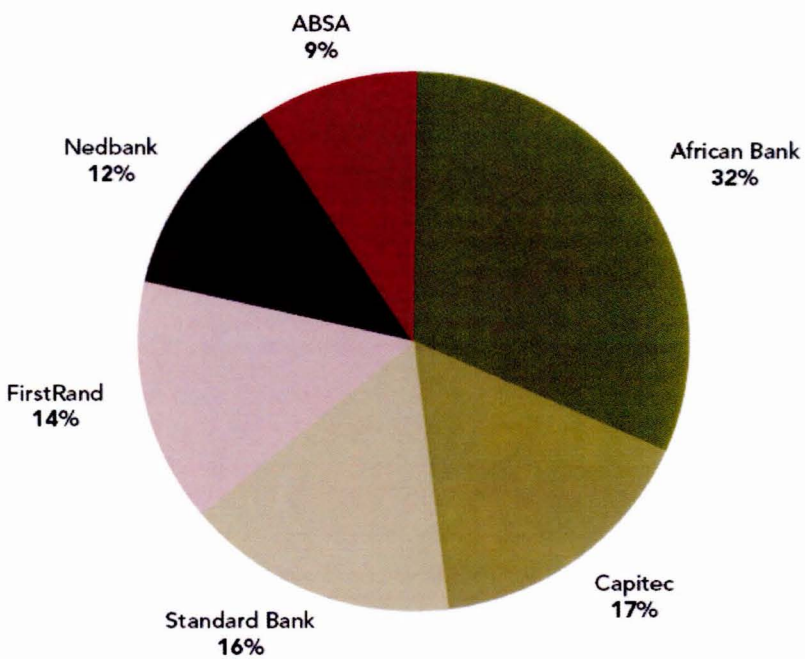


Figure 2 : Unsecured Lending Market Share[5]

[5] Source: Afena Insights (Sinenhlanhla Dlamini June 2013)

Over the past couple of years, unsecured lending has become a great part of South Africa's lending culture. The demise of African Bank posed questions around the business model of the bank and the risk management of the business. According to the Consumer Credit Report (June 2014), 20% of the unsecured debtor's book was in default as per the definition of Non-Performing Loans. Unsecured loans are known for their high risk qualities and high risk margins. The question around unsecured lending in South Africa given its size (in light of the scale of activities with various causes that led to the 2008 financial crisis and the impact it has had on the global economy) would be around whether or not the unsecured loans are being priced in a manner that is reflective of the risk that the lender would carry as a result of the lending transaction so as to avoid a similar 2008 financial crisis in South Africa.

1.3 Methodology

This paper will look to a formula that will take into account the credit score of the potential borrower and the risk premium that the credit score commands, the cost of funds, profit margin and cost of reserves in determining the interest rate to be charged to a potential borrower. The study will only be carried out for an unsecured loan of a period of one year. The results will be compared with the current maximum allowable interest rates as per the National Credit Act.

1.4 Outline of Study

The research work will be structured in the following:

- Chapter 2 will detail the literature review on risk based pricing, expand on Basel Frameworks and look at the impact that risk based pricing has had on the American market.
- Chapter 3 will look at the pricing of the interest rate to be charged at credit score level using a model used by Robert Phillips in one of his works
- Chapter 4 will provide the conclusion

2. Risk Based Pricing

"*Any security should be regarded as a last line of defense to fall back upon in exceptional circumstances. To lend money against a security knowing full well that one is likely to have to realize that security is bad banking practice.*"-John Holden.

Thus it is crucial that banks are able to identify and quantify risks being assumed so as to correctly price products offered in a compensating manner (The Hong Kong Institute of Bankers 2012).

A paper by Edelberg (2003) suggests that risk based pricing existed as early as the 1980s. By early 90s, the credit industry had reverted to charging borrowers a "single house rate" where most high risk borrowers were rejected. This changed again in the mid 90s when data storage costs dropped and the underwriting technology improved as a result of emphasis placed by bank regulators, in the United States of America, on lending to lower income neighbourhoods, households and borrowers. Estimates of default risk were used to determine different interest rate allocations to borrowers. In 1995, The Federal National Mortgage Association (commonly known as Fannie Mae) introduced new underwriting technology and began financing high risk loans. Fannie Mae made it clear to customers looking to sell mortgage loans to them to "include a credit bureau score as part of the loan package". This practice encouraged other lenders to participate in the high risk loans market in other sectors such as credit card and car loans. Risk based pricing practices led to increased credit access to very high risk households (Edelberg 2003). 25-75% of increases in consumer debt levels in the late 90s were as a result of risk based pricing practices. More households that were previously denied credit access as a result of the "single house rate" were afforded credit.

Hand and Crowder (2005) highlight the rising levels of consumer debt across the world and the importance of customer management programs to decrease the levels of loan delinquencies in the adverse economic conditions. They mention the use of statistical models called scorecards to draw information about the credit quality of the customer including the prediction on the probability of default on the loan. Variables looked at in evaluating the financial responsibility of the client include age, income, home ownership, employment status, debt levels and any previous credit judgments. Logistic discrimination model, linear discriminant model, linear

regression, classification trees, neural networks and rule-based approaches are some of the models used in calculating the scorecards of clients.

Phillips (2013), highlights the mispricing and packaging of loans and the role these played in the financial crisis of 2008. According to statistics in the United States, 85% of mortgages and auto loans were securitized in 2010. He categorizes loans into secured and unsecured and further breaks them into collateralized, revolving or non-revolving and fixed or variable rate pricing. All these factors contribute to the pricing offered on the loan together with the nominal size, term and character of the customer. Phillips made an observation regarding the differences in rates offered to the same customer by different credit providers in the United States of America. This is believed to be a function of market competition in the form of availability of a lot of credit providers. The same observation was made in the British unsecured lending market in 2004 by Phillips. According to Phillips(2013), the decision of the credit provider on whether to loan to the customer or not is based on the probability of default of the customers based on the lender's estimates as well as the potential loss absorption in the event of a loss. The information used in determining the probability of default is based on the customer's credit history and current financial abilities. Some lenders make use of credit scores supplied by credit bureaus such as FICO (Fair Isaacs Company). These are then used to determine the creditworthiness of the customer and whether that customer will be received funds as per loan application, together with other factors. Phillips references Edelberg (2006)'s risk based pricing in consumer credit pricing where customers are classified into different risk categories in line with their risk profiles. These are then further used to determine the interest rate to be charged. Phillips used a risk based pricing model that takes into account the cost of funds, profit margin and risk premium based on the risk category of the client to determine the interest rate to be offered. Lenders generally group customers into specific risk groups and use that classification to price customers due to operational and administrative complexities as opposed to pricing each and every customer differently. Phillips (2013) stresses that objective of risk based pricing is to price a high risk customer different to a low risk customer. The interest rate offered to customers should reflect the risk profiles of the customers.

According Koh et al (2006), the growth in large databases in the financial industry, increased competition and innovation in technology have called for more use of credit scoring models. Credit scoring models assist the lender in deciding whether or not to grant credit to a customer, in an objective manner. In deciding the interest rate to be charged to the client, the score obtained in the model plays a role in the risk adjusted premium. According Koh et al (2006),

Mester defines credit scoring as a quantitative method that is used to predict the probability that a loan applicant or existing borrower will default or become delinquent. Credit scoring assists lenders in quantifying and managing the risk that is assumed in the business of credit provisioning and serves as an important tool in predicting losses. Credit scoring models allow lenders to distinguish between high risk and low risk customers (Einav et al 2013), and subsequently provide customers with risk appropriate pricing. Einav et al (2003) show in their study on the impact of credit scoring on consumer lending that profitability can increase with the correct application of credit scoring. According to Siddiqi (2005), score cards can be used in credit evaluation in conjunction with Basel II measures of potential losses from credit risk of exposure at default, loss given default and maturity.

Athavale and Edmister (2004) investigate the role that quality of information and monitoring of the information play in the pricing of sequential bank loans to existing customers. Their study found that the more information that a bank has with respect to the credit quality of the client and patterns of behavior in their existing loans, the better or worse the interest rate of sequential loans offered to the client by the bank. Ogler (1970) uses information obtained from behavior of a borrower's existing loan(s) to construct a credit scoring model for commercial loans (to circumvent the information asymmetry that exists between lender and borrower) in pricing loans.

King (2007) defines risk based pricing as "an alignment of loan pricing with the expected loan risk" where the credit risk of the borrower plays an important role in the loan application decision. The high risk client profile would command a high interest rate charge and a low risk client would attract a low interest rate to compensate the lender for the risk assumed in the lending operations. In the paper "Risk-Based Pricing-Back to the Basics", King refers to credit and bankruptcy scoring as some of the risk based pricing models utilized in the lending industry as well as credit character telling variables such as debt to income, loan to value, collateral and origination channels. According to King, risk based pricing is especially important in unsecured and sub-prime lending as it allows the bank to correctly price compensation it requires for carrying such risk. He emphasizes profitability of risk as one of the key elements in the pricing strategy of any lender and not just portfolio or business growth, at the expense of risk adjusted returns. He further highlights that correct risk assessment and the pricing thereof are ways for lenders to avoid unknowingly carrying delinquent loans on their balance sheets.

Bexley et al. (2001) highlight liquidity risk, interest rate risk, credit risk and capital risk as the most important risk factors to consider in pricing financial products in light of recent bank

troubles. They encourage the use of risk based pricing as opposed to historical methods that shied away from the onerous credit risk models and focused more making money out of the customer without consideration for risk. Deans and Stewart (2012) agree with Bexley et al. in that cost of funds, credit risk and liquidity risk play an important role in the cost assigned to lending rates of banks. Saunders and Cornett (2011) refer to the credit risk and default risk, regulatory reserve requirements, loan origination fees, collateral and the costs of funding in pricing of consumer loans. Saunders and Cornett (2011) highlight risk adjusted return on capital as a widely used form of risk adjusted pricing in lending.

Edelberg (2005) focuses her study on credit provision on cars, credit cards, second mortgage and consumer loans. The default risk of each customer was used to determine the risk premium spread. A comparison is made between risk premium spreads paid by clients before and after 1995 when it is believed lenders made more use of risk based pricing models. In this, it was found that increasing levels of interest rates were charged for certain products in response to the default probabilities of the clients. This forced some clients to reduce their patterns of borrowing in an effort to curb the increasing costs.

Ruthenberg and Landskroner (2006) look into the impact of Basel II on loan pricing. Using the prescriptions as per the Basel II Accord of capital reserve as guidance, they look at the impact of the different credit risk rating approaches on the loan pricing model of an Israeli bank operating in an imperfectly competitive market. They use an internally derived loan rate equation and the probability of default of bank customers (retail and corporate) as guidance in their pricing. The decision on the interest rate to be charged is dependent upon cost of funds to the bank, risk premium that compensates the bank for the borrower's default risk, premium that shows the market power of the bank and a factor to reflect the sensitive nature of the cost of capital to bank loans advanced. They compared the impact of the internals ratings approach to that of the standardized approach and in both approaches the cost of the loan increases with the probability of default, with the internals ratings approach being slightly cheaper for low risk corporate customers. For retail customers, both high and low risk customers experienced lower interest rate charges using the internal ratings approach.

Curcio and Gianfrancesco (2010) highlight the importance of measuring and pricing credit risk. They too refer to Basel II Accords for capital requirements against credit risk, operational and market risk. The capital requirement depends on the probability of default, loss given default, exposure at default and maturity of the loan. The probability of default is depended on the

characteristics of the customer. They break credit risk into two components namely expected loss and unexpected loss. The price charged to the loan should achieve the required return on equity by shareholders. They look at changes in risk adjusted spreads using the internal ratings and standardized approaches in a multi-period pricing model looking at different payment profiles on loans. Results show that risk adjusted spreads in an internal ratings approach can be lowered by the relationship between a lower loss given default and a high spread stemming from a longer dated loan.

Subrahmanyam (2008) classifies borrowers as prime, perceived value and relationship borrowers. These borrowers are generally regarded as credit worthy borrowers. A rate encompassing default risk premium is required for creditors regarded as less credit worthy. In his paper Subrahmanyam (2008) calculates the loan rate using the present value method, prime rate method and as cost of holding the loan on the balance sheet.

The Experian's Business Information Solutions Group (2004) describes Risk based Pricing as a " tiered method of pricing that assigns interest rates and other terms of credit based on the customer's credit history ". Customers are charged according to the probability of their default risk. According to their business credit paper, balancing between a bank's risk appetite and the needs of the customer is key to the sustainability of the lending business and maintaining relations with customers. Basel II's risk pricing model takes the probability of default (PD), loss given default (LDG) and exposure at default (EAD) into account.

According to a paper by Layegue of KPMG (2011), a full understanding of risks faced by financial institutions is imperative in ensuring that adequate levels of profits are achieved in order to meet business and capital management objectives. This is done by correctly pricing credit products such as loans to ensure correct risk/return rewards. Layegue (2011) refers to risk adjusted pricing as the alignment of loan pricing to its expected credit risk. A high credit risk would justify a high interest rate charged to the potential borrower.

2.1 Key Attributes of Risk Based Pricing

The benefits of risk based pricing include efficient allocation of resources to borrowers with "better prospects and associated lower risk" and "less disruptive rationing of credit during economic downturns". Layegue (2011) lists benefits of risk adjusted pricing as per below:

- Enables an institution to know early enough what kind of price will satisfy its risk/return relationship
- Improves loan and profitability
- Enhances shareholders value by ensuring that credit risk associated with the credit product is appropriately measured and priced
- Enhances achievement of credit portfolio goals and objectives
- Satisfies regulatory requirements that the risks inherent in the loan products and serves have been adequately accounted for in the pricing.

The disadvantages of risk based pricing include:

- Highly dependent on credit modelling
- Credit modeling is highly dependent on data. The data needs to be relevant and accurate to provide users with usable and relevant information about the credit profile of the customer
- Credit modeling generally based on historical data which can miss relevant information that is current or can be predicted using forecasting methods
- Highly sensitive to market conditions. Updates to the credit models used in risk pricing should be frequent to capture and anticipate the impact of current and future market conditions.
- Certain variables such as race, gender and marital status used in credit scoring models can be used to discriminate against consumers
- Credit scoring models not developed correctly can produce incorrect information that is to the detriment of the customer.

2.2 Risk Based Pricing Models

Lenders consider various types of data in pricing loans. The most important of which is qualitative data. Qualitative data generally includes character, ability, margin, purpose, amount, repayment and insurance (The Hong Kong Institute of Bankers 2012).

- Character-reliability and level of honesty in applications
- Ability-Is the borrower able to make repayments based on current financial affairs and current and futures cash flows
- Margin-expected margin by bank should take into account all risks associated with the transaction
- Purpose-reason for loan application should be known to the bank
- Amount-bank should ensure that amount requested is reasonable and affordable to the borrower
- Repayment-the bank should ensure that the borrower has the means to make repayments or has access to means to make repayments. The methodology of repayments
- Insurance-the bank should consider necessity for some form of insurance. The security needs to be stable in value, measurable, easy to liquidate and must be legally enforceable.

Four types of risk based pricing models are described in the paper by The Experian's Business Information Solutions Group:

- Cost-plus -Identifies and measures costs so as to determine price to be charged to cover costs
- Competition -Uses competitors rates as benchmark or guidance in the pricing of loans
- Relationship -includes other costs used by the borrower related to the provision of loans
- Score-based system pricing is based on an internal or external credit scoring system

Model	Description
Credit Bureau Scored	Risk scores offered by credit bureaus that measure the risk of a particular business becoming delinquent based on analysis of the entire business population
Custom scores	Risk scores that are tailor-made to a specific lending institution or business based on customer data, credit policy, operations and marketing goals
Pooled data or industry specific scores	Risk scores based on data specific to an industry
Combination of above	Combination of models based on type of credit decision being made

Table 3 : Score-Based Pricing Systems[6]

2.3 Credit Scoring Models

According to Koh et al (2006), credit scoring models assisted the development and growth of the sub-prime lending market. Sub-prime borrowers are defined as those consumers with "poor credit records that fall short of credit acceptance and risk " .Sub-prime borrowers generally have a history of credit impairment and incomplete credit data or history and lenders have difficulty in verifying the source and pattern of income.

According to Saunders and Cornett (2011), quantitative models used in the pricing of loans include credit scoring models such as linear probability models, logit models and linear discriminant analysis. These models can be used in custom, credit bureau and pooled or industry specific scores.

[6] Source: Risk-Based-Pricing-Commercial Lending and Trade Credit (Business Credit June 2004)

Model	Description
Linear Probability	Uses past qualitative data as inputs into a model to explain repayment experience on old loans. The relative importance of the factors used in explaining the past repayment performance then forecasts the repayment probabilities on new loans and the probability of default. Its major weakness is that probability of default can lie outside the 0 to 1 interval.
Logit	Uses past data qualitative data as inputs into a model to explain repayment experience on old loans. The relative importance of the factors used in explaining the past repayment performance then forecasts the repayment probabilities on new loans and the probability of default. Restricts the default probabilities to between 0 and 1.
Linear Discriminant	Divides borrowers into high or low default risk classes. Uses past qualitative data inputs to explain repayment experiences on old loans. The relative importance of the factors used in explaining the past repayment performance then forecasts whether the loan falls into the high or low default class.

Table 4 : Credit Scoring Models[7]

Koh et al (2006) list the benefits of credit scoring that accrue to both lenders and borrowers as:

- Reduces discrimination against borrowers
- Allows credit providers the ability to focus on information that relates to credit risk related matters only
- Increases speed and consistency of loan application process
- Allows automation of the loan application process
- Enables the quantification of risks associated individual applications in a shorter time
- Improves the allocation of resources
- Assists in determining the interest rate to be charged to the client
- Better management of accounts and profitability
- Better and efficient determination of credit limits

[7] Source: Financial Institutions Management (Saunders and Cornett 2011)

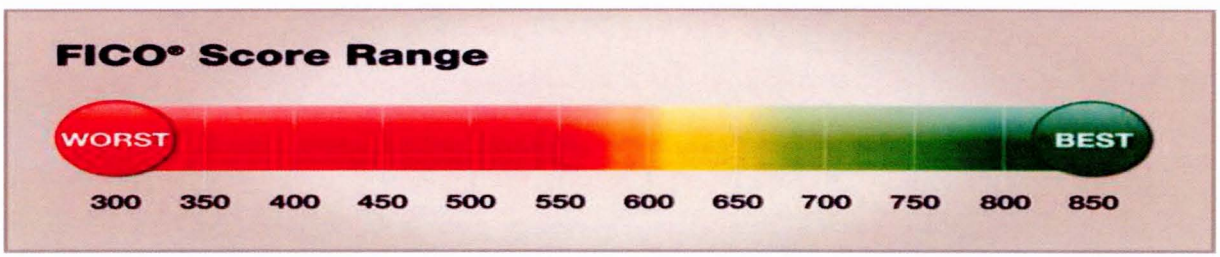
According to the Hong Kong Institute of Bankers (2012), credit scoring involves use of research, that is operational and statistical, as well as data mining models in determining the credit risk of potential borrowers. This number is generally calculated by a credit bureau. They further state that these models reduce the cost of evaluating credit and increase the speed, consistency and accuracy of credit decisions if used correctly (Hong Kong Institute of Bankers 2012). They make decisions more impartial. They stress that wrong, inaccurate and incomplete information can distort the scoring results. Credit scoring models are based on past information of potential borrowers. Variables used in the models include past due payments, debt load relative to income and employment status which all relate to the default risk. In South Africa, companies such as TransUnion, are able to provide such credit scores. In 2010, TransUnion teamed with Fair Isaacs Corporation (FICO) in the United States of America (US) to provide South Africans with an enhanced way of measuring their credit scores using the same methodologies as used on US consumers. The FICO score is calculated as a range between 300 and 850.

Other credit risk models include term structure of derivation of credit risk, mortality rate approach, RAROC(Risk adjusted return on capital) and option models (Saunders and Cornett 2011).The RAROC model is a widely used approach that looks to approve loans that have a sufficiently high RAROC relative to the shareholders required return on capital or equity. The credit models can either be credit bureau calculated or custom made to suit a specific business.

Bank Lending, a book by the Hong Institute of Bankers, states that banks need to ensure that the risks adopted as part of their business are reasonable and can be controlled within defined limits. The banking business is that of trust between lender and borrower. Trust that the borrower will return funds as stipulated in the contract-periodically or after an agreed period and the amount. Repayment of the loan is highly dependent on unknown future cash flows of a borrower. Overpricing of loans can result in loss of clients and under pricing in banks not being compensated enough for the level of risk adopted. Consistent under pricing will erode the earning of the bank as well as the market value.

2.4 FICO Scores

The FICO score is used by lenders to determine the risk premium to be charged as compensation for the credit risk imposed by the customer in line with the theory that the higher the credit risk the higher the interest offered. In South Africa, companies such as TransUnion provide such credit score for lenders to use in their lending decision making process. FICO scores range from 300 – 850 and are calculated using various credit impacting variables of consumers.



Your FICO® Score	Evaluation	What it means
760 or higher	Great	Your score is well above the average score of U.S. consumers and clearly demonstrates to lenders that you are an exceptional borrower.
725 to 759	Very Good	Your score is above the average score of U.S. consumers and demonstrates to lenders that you are a very dependable borrower.
660 to 724	Good	Your score is near the average score of U.S. consumers, and most lenders consider this a good score.
560 to 659	Not Good	Your score is below the average score of U.S. consumers, though some lenders will approve loans with this score.
Lower than 560	Bad	Your score is well below the average score of U.S. consumers and demonstrates to lenders that you are a very risky borrower.

Figure 3 : FICO Score[8]

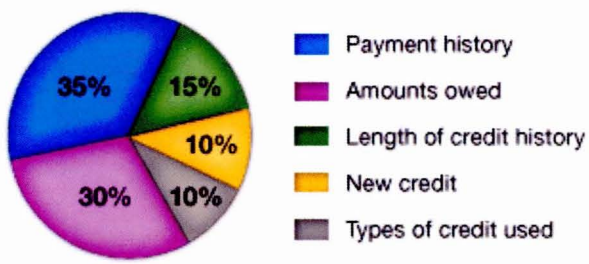
[88] Source: What Your FICO® Score Means (Fair Isaacs Corporation)

2.4.1 How my FICO Scores are calculated[9]

FICO® Scores are calculated from several different pieces of credit data in your credit report. This data is grouped into five categories as outlined below. The percentages in the chart reflect how important each of the categories is in determining how your FICO Scores are calculated.

Your FICO Scores consider both positive and negative information in your credit report. Late payments will lower your FICO Scores, but establishing or re-establishing a good track record of making payments on time will raise your score.

How a FICO Score breaks down



These percentages are based on the importance of the five categories for the general population. For particular groups—for example, people who have not been using credit long—the relative importance of these categories may be different.

The FICO score is there to provide lenders with enough information regarding the credit profile of the customer.65% of the score is made of the customer's payment history and amount of debt that the customer currently has. This information is important as it provides window into the indebtedness level of the customer as well as the customer's willingness to pay the debt, both of which are important in determining the default probability of the customer.

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[9] Source: What Your FICO® Score Means (Fair Isaacs Corporation)

2.4.2 What's not in my FICO Scores[10]

FICO Scores consider a wide range of information on your credit report. However, they do not consider:

- **Your race, color, religion, national origin, sex and marital status.**
  US law prohibits credit scoring from considering these facts, as well as any receipt of public assistance, or the exercise of any consumer right under the Consumer Credit Protection Act.
- **Your age.**
  Other types of scores may consider your age, but FICO Scores don't.
- **Your salary, occupation, title, employer, date employed or employment history.**
  Lenders may consider this information, however, as may other types of scores.
- **Where you live.**
- **Any interest rate being charged on a particular credit card or other account.**
- **Any items reported as child/family support obligations or rental agreements.**
- **Certain types of inquiries (requests for your credit report).**
  Your scores do not count "consumer-initiated" inquiries – requests you have made for your credit report, in order to check it. They also do not count "promotional inquiries" – requests made by lenders in order to make you a "pre-approved" credit offer – or "administrative inquiries" – requests made by lenders to review your account with them. Requests that are marked as coming from employers are not counted either.
- **Any information not found in your credit report.**
- **Any information that is not proven to be predictive of future credit performance.**
- **Whether or not you are participating in a credit counseling of any kind.**

The variables used in the FICO score are those that are credit related and will provide the lender with the information required to assist in the lending decision making process. Information related to religion, race and age which can be discriminatory are excluded in the score. Other forms of qualitative data can be used by lenders in building the risk profile of a client.

[10] Source: What Your FICO® Score Means (Fair Isaacs Corporation)

2.5 Impact of Risk-Based Pricing in America

Risk based pricing has had a considerable impact on the American market since its use. As noted by Edelberg (2003), risk based pricing illuminated the concept of a single blanket interest rate for consumers and adopted a risk driven interest rate that not only decreased interest rate charged for low risk borrowers, but opened lending to high risk customers that would have otherwise been turned away for credit. Figure 4 shows the impact of risk-based pricing in the United States of America post the introduction and regular use of framework. Between 1991 and 1992, the percentage of customers charged interest rates above 18% decreased from 70% to 44% as risk adjusted pricing allowed for individual assessment of credit profile and direct consideration of the impact of the credit risk on the entire risk undertaking of the banks.

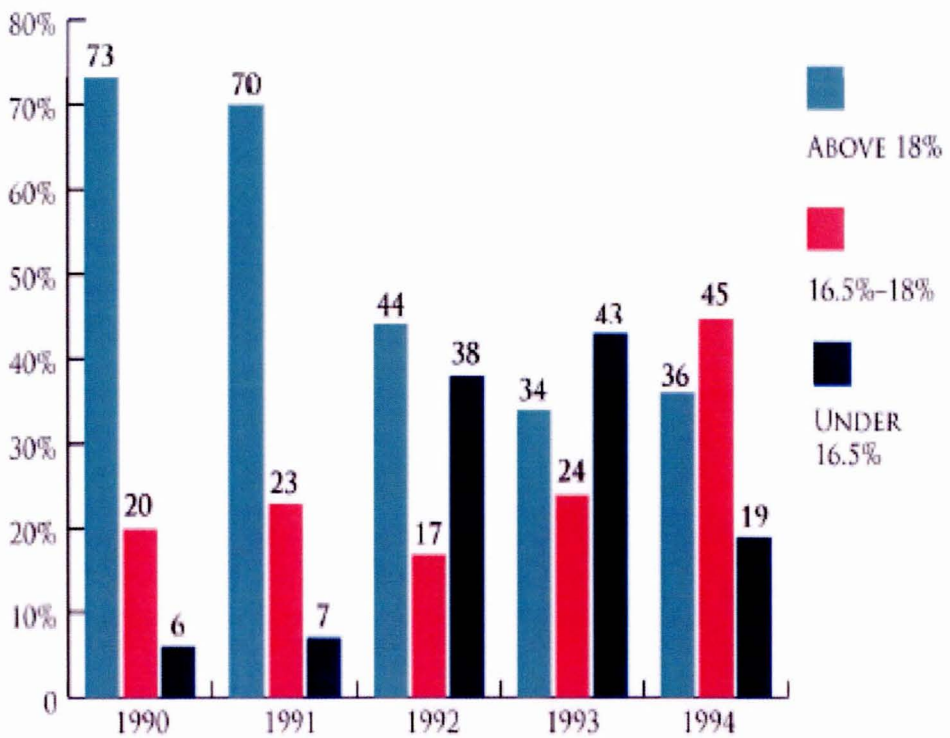


Figure 4 : Decrease in Credit Card Balances that Charged More than 18%[11]

[11] Source: Risk-Based Pricing in Consumer Lending (Staten 2014)

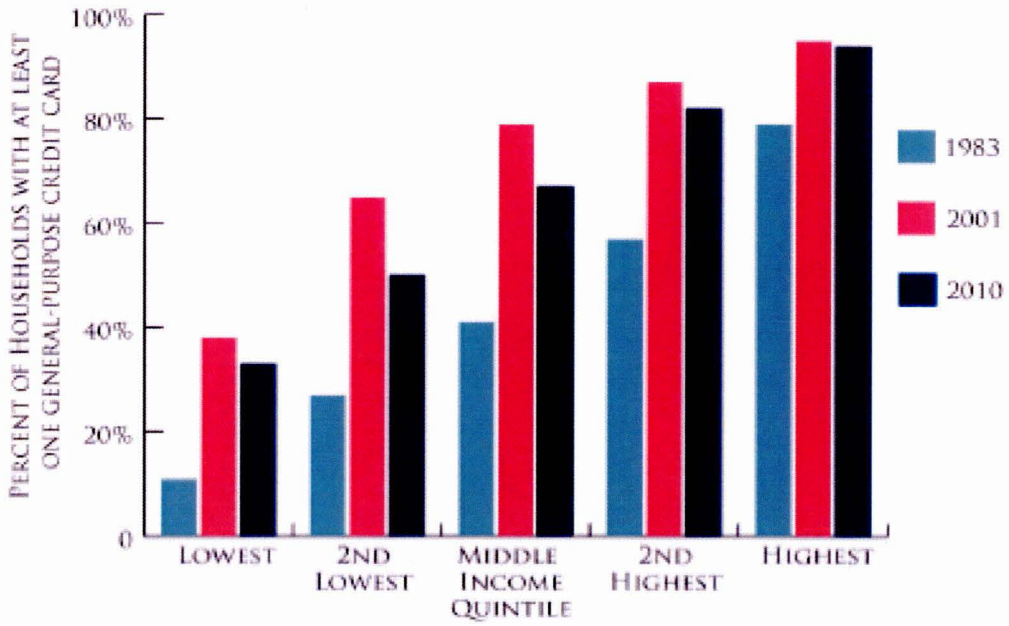


Figure 5 : Increase in Credit Card Ownership for Lower Income Households[12]

Before the adoption of risk based pricing by loan providers in the United States of America, most lower income households were denied access to credit due to blanket interest rates offered that did not take into account the individual credit profile of the consumer. Since the adoption of the methodology, more and more household have access to much needed credit access as depicted in the above figure. Access to credit for low household incomes has increased from under 20% to just under 40% from 1983 to 2010. This again proves the methodology's ability to expand the economy through increased credit provision participation by lenders. The increased participation is notable in middle and high income households as well.

[12] Source: Risk-Based Pricing in Consumer Lending (Staten 2014)

2.6 Basel Accords

In 1974, the central bankers of the Group of 10 countries (Italy, Japan, United Kingdom, United States of America, Switzerland, Germany, Spain, Sweden, France, Canada, Belgium and Netherlands) established The Basel Committee on Banking Supervision. This working group was put in a place to exchange ideas and improve on banking supervision across the globe. The recommendations out of this committee were designed to be voluntary and not compulsory or legally binding.

The first Basel Accord was established in the 1980's against the backdrop of increased global participation by banks. According to Balthazar (2006), the Basel I Accord of 1988 focuses on credit risk through prescription of minimum capital requirements based on risk weightings of the items on the balance sheet of the bank. The objectives of the accord were to improve and ensure the stability of the global banking system and to balance the playing field for international banks in the global economy. Basel II and Basel III have since been established as ways to improve on banking supervision.

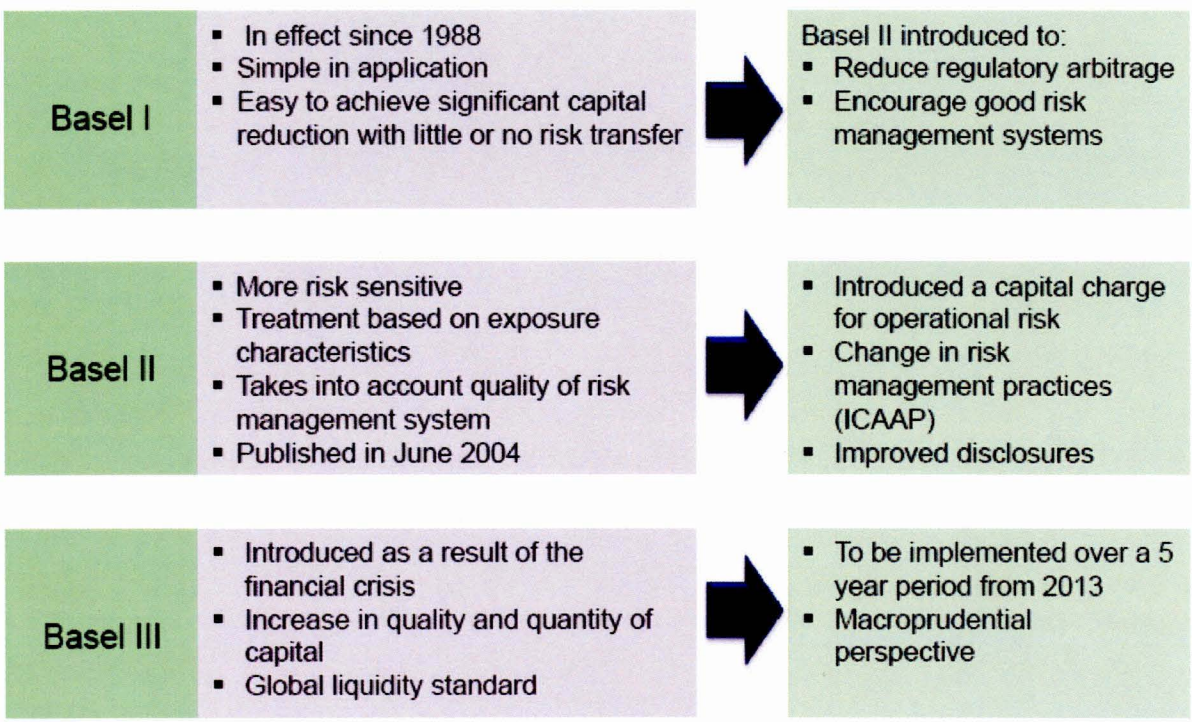


Figure 6 : The Basel Accords[13]

[13] Source: The Basel Capital Framework: From Basel I to Basel III (Chumo 2011)

Basel I required that banks hold a minimum 8% of risk weighted assets in the form of capital.

%	Item
0	– Cash – Claims on OECD central governments – Claims on other central governments if they are denominated and funded in the national currency (to avoid country transfer risk)
20	– Claims on OECD banks and multilateral development banks – Claims on banks outside OECD with residual maturity <1 year – Claims on public sector entities (PSE) of OECD countries
50	– Mortgage loans
100	– All other claims: claims on corporate, claims on banks outside OECD with a maturity >1 year, fixed assets, all other assets ...

Figure 7 : Risk-Weights of Assets[14]

Critics of Basel I faulted it on its inability to differentiate between good and bad credit as well as its lack of depth on risk management principles. Instead it was accused of focusing more on ratios.

Basel II was published in 2004 in an effort o correct the short-comings of the Basel I Statement. The objectives of Basel II, according to Balthazar (2006), were:

- Strengthen the stability and increase the quality of the international banking platform
- Create and maintain an equal playing field for banks participating in international market
- To encourage adoption of rigorous risk management practices

Basel II was broken into three areas of work named pillars:

- Pillar 1 –Minimum Capital Requirements
- Pillar 2- Supervisory Review
- Pillar 3- Market Discipline

[14] Source: From Basel 1 to 3 –The Integration of State-of-the-Art Risk Modeling in Banking Regulation (Balthazar 2006)

Pillar 1 allows the bank to set minimum capital requirement of 8% using the Standerdised Approach or the Internal Ratings Based Approach in calculating risk weightings of assets. The standerdised approach uses credit ratings as supplied by external credit ratings agencies against risk weightings as prescribed by the statement. The risk weightings as per the statement range from 20% for AAA-credit rating to 150% for BB- and below-credit rating and 100% for unrated consumers.

The Internal Ratings Based Approach was broken into Foundation and Advanced methodologies. In the Foundation methodology, the bank uses the internally derived credit rating (which describes the probability of default), based on internal credit models, against prescribed risk parameters such as loss given default (the losses that would be incurred by the bank in the event of a default by the consumer), exposure at default (total exposure to the consumer at time of default) and maturity whereas the advanced approach relies on internal models for derivation of all risk parameters. Pillar 1 also looks at the capital provision for operational and market risk.

Pillar 2 allows for intervention by the regulatory body that supervises the activities of the market that each bank plays in and looks at the capital structure of the minimum capital requirement. This is carried out through compulsory supervision reports that allow the supervisory board to independently determine capital requirements, assess adequacy of credit risk models utilized in calculation of minimum capital requirement and determine total exposure of the bank's balance sheet. Pillar 2 also addresses levels of interest rate risk, liquidity risk and concentration risk. Pillar 3 sets out minimum risk disclosure and risk management practices, capital categorization and concentration disclosure requirements to allow insight to other market participants with exposure to the banks.

Thus, Basel II credit rating system allows banks to pass on the costs of compliance with the accords to the individual consumer in accordance with the level of risk that each consumer adds to the balance sheet of the bank. This is done through the banks' ability to identify the cost of risk of each consumer.

Again, there were critics of the Basel II Statement in that during the 2008 financial crisis it failed to provide a buffer for liquidity risk and identify and provide for the complexities of new products in the market and monitor activities and riskiness of highly leveraged financial institutions. The use of external ratings agencies was criticized at it is believed that banks failed to carry out due diligence on the quality of data they were being supplied with.

Basel III is a framework looking to correct the faults of Basel II, especially that of over reliance on external credit ratings agencies, liquidity, external shocks resilience and impact highly leverage firms. It's focus is on capital reserves of a minimum of 8% of risk weighted assets and an additional 2.5%, capital to be held against the cyclical nature of the economy as well as on and off balance sheet leverage activities of the banks, the quality of the capital held and ensuring adequate liquidity in the market in adverse events such as the 2008 financial crisis.

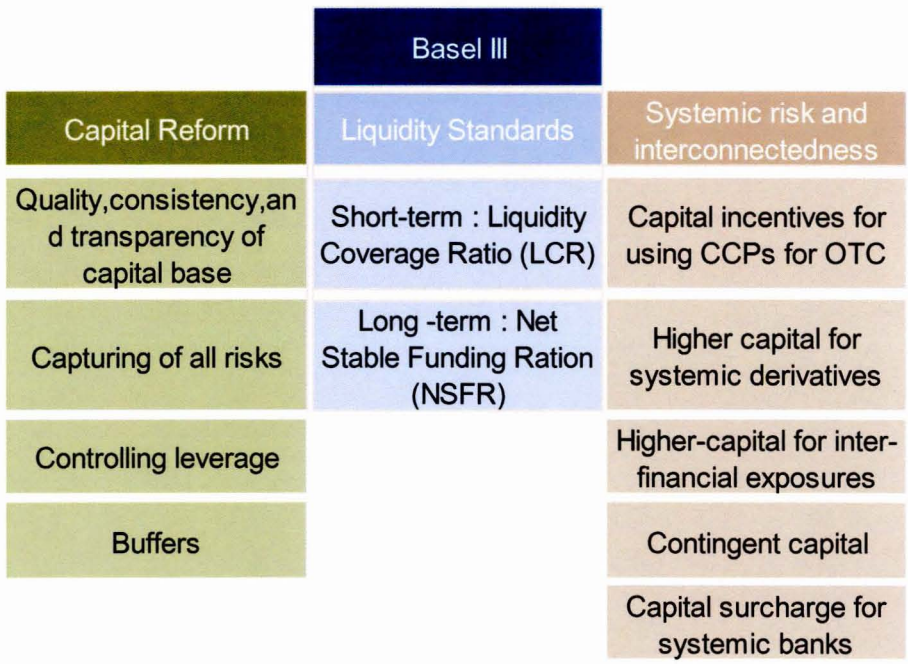


Figure 8 : Basel III[15]

Basel III looks to enhance the liquidity of the bank using the Liquidity Coverage Ratio (LCR) and the Net Stable Fund Ratio (NSFR).LCR looks to hold high liquid assets, as prescribed by Basel, on net cash flows expected to occur in the next 30 days. The NSFR looks to maintain a minimum level of stable source of funding in response to the liquidity profile of assets on the balance sheet of the bank. The quality of the funding is equally as important as the quantity. Basel III also highlights and requires regular simulated stress testing events, diversification of funding sources, reduction of contractual maturity mismatches and uniformity in banking supervision across the globe.

[15] Source: Basel III: Issues and implications (KPMG 2011)

The impact of Basel III's liquidity reform on retail banking products is that the cost of credit facilities up to 30 days will increase dramatically as banks try to recoup the cost of holding 100% liquidity against expected net cash flows up to 30 days and discourage borrowers from participating in the one month space. The counter to this would be the decrease in rates paid to overnight and up to one month deposits in an effort to deter short dated deposits. The impact of NSFR is that as the longer dated the assets on the books of the banks, the longer dated the funding required thus increasing the cost of funds of the bank that will be passed on to the consumer as the current banking models uses short dated liabilities to fund long dated assets.

Regulation has become an important feature in lending. Capital holding based on the Basel Accords creates opportunity costs to the lender, especially banks in South Africa, who are required by law through the SARB to comply with the capital reserve prescriptions. Unsecured lending in South Africa is largely dominated by banks thus unsecured lending imposes opportunity costs related to capital reserves that banks need to be compensated for.

3. Methodology

Risk based pricing involves pricing of interest rate to be charged to consumers taking into account the credit profile of the consumer and likelihood of defaulting.

Phillips (2013) describes a simplistic model of risk based pricing that is widely used. This paper will use this model to calculate the maximum interest rate to be charged to the client based on the risk categorisation of the client. Risk categorisation will be based on FICO credit scores where interest rate risk premiums will be assumed for each category. The results of this model will be compared to the maximum allowable interest rate for unsecured loans as per the NCR.

The interest rate offered will be calculated for a period of 1year only for clients wishing to borrow and have been accepted for the same nominal amount of R20, 000.

3.1 Pricing

Risk based model as per Phillips (2013)

$$r_c = r_i + m + l_i$$

Where:

r_i is the interest rate offered to the client in a specific risk category

r_c is the cost of capital

m is the profit margin

l_i is the risk premium as categorised by risk groupings.

Layegue (2011) states four categories of risk based pricing namely cost of funds, operation costs, risk costs and capital costs. This study will use a modified model that includes cost of capital reserves.

Expanded Model:

$$r_c = r_i + m + l_i + cc$$

Where:

r_i is the interest rate offered to the client in a specific risk category

r_c is the cost of capital

m is the profit margin

l_i is the risk premium as categorised by risk groupings

cc is the capital reserve cost

The NCR model to be used for comparison purposes is Repo x 2.2 +20%.

Cost of capital involves the cost of cash sourced from retail, corporate and institutional parties to fund the lending activities of a lender. Traditional banking involves taking in deposits from cash surplus entities and the on-lending of the funds to cash demanding entities. In exchange for placing funds with banks, cash surplus entities expect payment in the form of interest to be paid to them for use of the funds to create assets. Different instruments are made available to attract such funds. These instruments can range from one day to 30years. To attract funds, banks issue tradable instruments such as negotiable certificate of deposits, commercial paper, bonds and floating rate notes at rates reflective of their demand, market conditions and credit risk profile as perceived by the rest of the financial fraternity. These instruments are generally traded with institutional and corporate clients and can be tradable with a tenor of up to 30 years in South Africa. Non-tradable instruments are also made available to corporate and institutional clients in the formal of fixed deposits and floating rate deposits. Banks use transactional accounts such as cheque accounts and current accounts, fixed deposits and other forms of instruments to attract funds from retail customers. The difference in these instruments is the interest rate offered by the lender to the cash surplus entity as compensation for the use of funds. The rate that the cash surplus entity is willing to accept is related to the risk profile of the lender as well as the liquidity aspect of the instrument.

Retail deposits are regarded as cheap form of funding due to the high liquidity characteristic that they offer retail clients. Funds raised from institutional and corporate customers is regarded as

expensive as liquidity of the instruments is highly dependent on market conditions as a point in time and generally more long term than retail deposits. As in risk based pricing that we are exploring, lenders sourcing funds to operate their lending business are also subject to credit risk profiling in order to compensate. Thus, cost of funds will differ for each entity. The cost of funds is representative of the price that the bank is being charged for use of surplus cash.

Profit Margin in this model looks at the margin that the lender is looking to make to stay profitable and operational. The role of any business entity is to stay profitable and continue operating. The profit margin simplistically looks at the margin that the bank is willing to earn as part of the service that it is offering as a financial intermediary. This profit margin is post the operational costs such as office space, salaries, postage and includes margin earned from its lending activities.

Risk premium looks at the risk premium that the bank would charge a customer for carrying their risk of default on their balance sheets. This is the compensation that the bank would require in exchange for the default risk imposed on the bank by the customer. Risk premium play an important role in loan pricing due to the risk that the fact that the customer may not honor their payment commitments. In this instance, the bank cannot be expected to carry that risk alone. As part of risk management, it is in the bank's best interest to insure adequate cover for such risks. In this paper, we will use assumed risk premiums based on FICO scores for the risk premium.

We look to an example in the next section to illustrate the use of the model.

Example:

We take into account the variables in the expanded model at a point in time for a bank whose only business is unsecured lending:

$$r_c = r_i + m + l_i + cc$$

r_c is 7.725% for the 1 year period

m is static at 3.5%

cc is static at 10% which is representative of the weighted average cost of capital .The lender allocates average costs of capital reserves to unsecured customers as Basel II prescribes that 100% capital be held against unsecured loans. The figure used is just for illustrative purposes and is not reflection of the current market opportunity cost of holding capital.

FICO Score	Maximum Risk Premium(basis points)	Score Description
760 or higher	25	Great
725 to 759	100	Very Good
660 to 724	400	Good
560 to 659	900	Not Good
Lower than 560	1,500	Bad

Table 5 : Risk Premium per FICO Score Category

The risk premiums as per Table 5 are representative of compensation that a lender requires for the different risk categories. Customers with a FICO Score of 760 and higher are classified as great whereas those with a score below 560 are regarded as bad. This categorisation relates to the credit history of the customer in terms of debt payment history and level of indebtedness. 65% of the FICO score is based on historical payment patterns and how much debt the customer has accumulated. It would make sense that the better the relationship or interaction between the payment history and level of indebtedness, the higher the FICO score achieved. The FICO scores also look at the length of time that a customer has had any type of credit which assists in data collection and the ability to create a credit risk profile. Clients that fall in the 760 and higher score will command a lower risk compensation rate as compared to those in the 560 and lower category classified as bad. The difference between the risk premiums in the different risk categories is assumed at a non-linear incremental rate in accordance with the higher the risk the higher the risk premium theory. Clients categorised as great will be charged a maximum risk premium of 0.25% and those classified at bad can only be charged a maximum of

15% in risk premium. It is the discretion of the lender to charge different risk premiums for different clients however the risk groupings provide guidance as to what to charge clients at the top end of a specific category and those at the bottom end which should be charged up to the maximum risk premium allowable.

FICO Score	Maximum Risk Premium(basis points)	Score Description	Maximum Interest Rate Offered to Client (%)	% of Cost of Funds and Opportunity Cost of Capital
760 or higher	25	Great	21.475	82.538
725 to 759	100	Very Good	22.225	79.753
660 to 724	400	Good	25.225	70.268
560 to 659	900	Not Good	30.225	58.644
Lower than 560	1,500	Bad	36.225	48.930

Table 6 : Maximum Interest Rate Offered to Clients per Risk Category

Table 6 illustrates the maximum interest rate that can be offered to a client in each risk category. In the lower risk categories, the costs of funds and opportunity cost of regulatory capital make up a great share of the total interest offered to the client. This shows how clients with low probability of default should not be penalised on risk. The high risk client are charged on both risk and cost to the bank as their risk of default is higher and requires adequate compensation. By maintaining the profit margin at 3.5%, cost of funds at 7.725% and cost of capital reserves at 10% across the board, this model allows the default risk to be the main driver of the interest rate as specified in the literature review. Credit risk is the most important component of pricing unsecured loans.

Table 7 interpolates the risk premiums a little more between the FICO Scores. This is just to reflect the differential interest rates between the different risk premiums. The lower the FICO score the higher the interest rate offered to the client. The customer with the highest score of 850 is charged a risk premium of 10basis points due to the high credit quality of the customer. At the bottom end the customer with a score of 500 is charged the maximum risk premium of 1500basis points at a rate of 36.23%. The difference between the customer with a score of 500 and that with a score of 850 is 14.9% which is illustrative of the 15% and 0.1% risk premiums charged to the customer.

FICO Score	Maximum Risk Premium(basis points)	Interest Rate Offered to Client (%)
850	10	21.33
800	18	21.41
780	22	21.44
775	23	21.45
760	25	21.48
759	35	21.58
750	52	21.75
735	81	22.03
730	90	22.13
725	100	22.23
724	150	22.73
720	166	22.88
700	244	23.66
680	322	24.44
660	400	25.23
659	600	27.23
640	658	27.80
620	718	28.41
600	779	29.01
580	839	29.62
560	900	30.23
559	1,200	33.23
540	1,297	34.19
525	1,373	34.95
515	1,424	35.46
500	1,500	36.23

Table 7 : Risk Premiums vs. Interest Rate Offered to Client



Figure 9 : FICO Score vs. Interest Rate Offered to Client

Figure 9 is representative of the figures seen in Table 7. A negative relationship is observed between the FICO Score and the interest rate charged. The higher the FICO Score the lower the interest rate charged to the customer. The lower the FICO score the higher the interest rate. As discussed in earlier chapters, the higher the FICO score the better the credit profile of the customer and thus the lower the probability of default which translates into a lower interest rate charged as seen in figure 9. If the FICO scores where low for good credit customers and high for bad credit customers, we would observe a positive relationship between the scores and the interest rate charged.

Using the NCR's model of Repo x 2.2 +20%, the maximum rate that lenders can charge clients at current repo rate of 5.75% is 32.65% which is lower than the maximum rate computed in table 6. In this example, it is clear that the NCR's maximum rate is capable of protecting clients against high interest rates. In practice, the maximum allowable risk premium across all categories could be lower. The example above applies to all clients that apply for lending and how they would be categorized from a risk perspective and does not discount rejected applications. The aim of risk based pricing is also to allow clients that the bank would ordinarily reject, the opportunity to be extended lending based on their credit profiles and to be priced accordingly.

The Phillips model is a very simplistic model that considers a simple banking environment of cash in and cash out at fixed rates. The current banking environment is a little more complex than that in that there are derivatives traded to hedge instruments whose costs would need to be taken into account. Funding instruments are also open to reset risk as some instruments are linked to reference rates such a three month JIBAR and PRIME where the rates are reset daily or periodically. The costs of these would have to be passed on to the consumer. One

component of risk that was raised in the 2008 financial crisis is of liquidity risk. Without liquidity no lender can operate .This model doesn't take into account the cost of liquidity which is crucial in the banking sector. It assumes that liquidity is always available which was proven not to be the case in the 2008 financial crisis. The Phillips model takes into account the basics of financial intermediary in pricing a client's loan.

4. Conclusion

The purpose of this study was to understand the different risks that banks are faced with in the commercial lending space and to illustrate the differentiated credit cost that should be taken into account when pricing interest rates on loans using risk based pricing in the credit provision decision making process. This was carried out through a simplistic illustration of the interest rate differentiation that should be taken into account by lenders using FICO credit scores of each individual customer, without consideration for affordability and price sensitivity of each customer. We used a simplistic risk based pricing model that takes into account the risk premium that a lender would demand as compensation for carrying the risk that the customer may default on the balance sheet. We further differentiated the risk premiums based on the different risk categories using the FICO credit scores. The differentiated risk premiums were to illustrate the compensation that a lender would require for different credit profiles which agrees with the theory that the riskier the client, the higher the interest charged.

We started by highlighting the definition of risk based pricing, the different models utilized as a way to capture the risk that is imposed on banks through lending activities. As a way to include South African news reflective of the importance of risk based pricing, we took a look at the recent boom in South Africa's unsecured lending market and African Bank as a leader in the space prior to its well documented journey towards destruction as a result of increased levels of unsecured lending (a market characterized by high levels of interest rates not necessarily reflective of the risky nature of the consumer but by the ability to capture high margins in a short space of time) , that resulted in bad debts due to the ailing economic conditions of South Africa. We briefly looked into the National Credit Regulator, its role in the credit market and its prescriptions on the maximum interest rates to be charged for lending activities. We also took a look at the preceding act that is still applicable to loans entered into before 01 June 2007. The differences in these acts are notable in the reduction in maximum interest rates to be charged as per the law. We also took a look at the Basel Accords that have also added to the risk based pricing in that banks need to recoup some of the opportunity and operational costs of their activities in the interest rate charged to the client. The Basel Accords require banks to hold capital as a way to signify their ability to continue their operations in the event of defaults by consumers and other adverse events.

To illustrate the different interest charges offered to clients based on differentiated credit risk imposed by clients on lenders, we assumed an interest period of one year with the cost of funding, profit margin and capital reserve costs kept constant. The risk premiums were tiered to reflect increasing costs of credit risk. The study was done on a fixed interest basis to easier illustrate the impact of credit risk costs on the interest rates offered to clients. The differences in the interest rates offered are explained by the risk premiums with the maximum interest rate for a credit score of above 760 at 21.475% using maximum risk premium of 25 basis points and maximum of 36.225 % for a credit score below 560.A negative relationship was observed between the risk scores and the interest rate to be charged to customers. This was illustrative of the low default probability characteristics of customers with high FICO scores, that would command a lower risk premium from a lender, as compared to those with low FICO scores that would command a higher risk premium to compensate the lender for carrying the high probably of default risk on their balance sheets. This was then compared to the maximum allowable rate as per the NCR (figure 10) that was calculated at 32.65%.The difference between the maximum allowable rate per NCR and the maximum rate per the risk based pricing model is 357.5 basis points.

The 2008 financial crisis opened the world's eyes to the importance of risk understanding and correct risk pricing. The reckless lending of financial institutions to what was referred to as sub-prime borrowers, at rates not reflective of their risk, emphasised the caution and scrutiny with which the credit profile of potential borrowers should be looked at. The credit quality of each customer is a window into the potential risk that may be assumed as a financier.

Risk based pricing in credit products, driven by the credit profile of a potential borrower, is a tool that compensates financiers for the credit risk assumed as part of their lending business. This compensation is reflected in the incremental interest rate charged at each rating level. Risk based pricing has been proven to increase lending participation of financiers by including borrowers that would have otherwise been rejected due to race, gender and other criteria not related to affordability and previous credit products participation. Thus risk based pricing is an important tool that can be used by financiers not only to ensure correct compensation of credit risk assumed but also grow their business by expanding the customer base through pricing based on credit quality.

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Appendix 1: History of Prescriptions of the Usury Act NO.73 of 1968

Usury Act 73 of 1968

Effective date	Government Notice	Details
2004-09-17	GN 110/GG 26809/17-09-2004	20% in respect of transactions not exceeding R10 000 17% over R10 000 in terms of S.21(1), (2) and (3)
2004-02-06	GN 110/GG 25968/06-02-2004	21% in respect of transactions not exceeding R10 000 18% over R10 000 in terms of S.21(1), (2) and (3)
2004-01-16		Proposed notice in terms of s.15A Published for comment within 3 weeks of publication, exempting the category of money lending transaction where the loan is a housing loan secured by a mortgage bond over immovable property and where this loan is guaranteed by a loan guarantee policy GenN 3368/GG 25790/16-01-2004 The intention is to provide cover against a borrower defaulting as a direct result of an incurable disease see also Department of Trade and Industry 16 January 2004 Erwin exempt certain lending transactions from Usury Act
2003-11-21	GG 25752/21-11-2003	22% in respect of transactions not exceeding R10 000 19% in respect of transactions over R10 000
	GN 1389/GG 25529/01-10-2003	24% in respect of transactions not exceeding R10 000 21% in respect of transactions over R10 000
2002-06-12	GN 819/GG 23512/2002-06-12	26% in respect of transactions not exceeding R10 000 23% in respect of transactions over R10 000
2001-11-09	GN 1099/GG 22801/09-11-2001	23% in respect of transactions not exceeding R10 000 20% over R10 000
2001-09-07	GN 842/GG 22631/07-09-2001	24% in respect of transactions not exceeding R10 000 21% over R10 000
2001/02/16	GN 133/GG 22047/16-02-2001	R10 000 has been substituted for R6000, amending GNR 259/GG 20997/24-03-00
2000-03-24	GNR 259/GG 20997/24-03-2000	25% in respect of transactions not exceeding R6 000 22% over R6 000 GNR 259 has been amended : the amount of R6 000 has been

Effective date	Government Notice	Details
		substituted by R10 000 - GN 133/GG 22047/16-02-01
1999-10-22	GNR 1218/GG 20547/22-10-1999	27% in respect of transactions not exceeding R6 000 24% in respect of transactions exceeding R6 000
1999-07-16	GN 873/GG 20282/16-07-1999	31% in respect of transactions not exceeding R6 000 28% in respect of transactions exceeding R6 000
1998-08-21	GNR 1070/GG 19177/21-08-1998	36% in respect of transactions not exceeding R6 000 33% in respect of transactions exceeding R6 000
1997-03-14	GN 394/GG 17843/14-03-1997	32% in respect of transactions not exceeding R6 000 29% in respect of transactions exceeding R6 000
1995-09-22	GN 1423/GG 16670/22-09-1995	31% in respect of transactions not exceeding R6 000 28% in respect of transactions exceeding R6 000
1995-04-07	GN 506/GG 16343/07-04-1995	29% in respect of transactions not exceeding R6 000 26% in respect of transactions not exceeding R6 000
1994-11-11	GN 1908/GG 16065/11-11-1994	28% in respect of transactions not exceeding R6 000 25% in respect of transactions exceeding R6 000
1993-12-24	GN 2457/GG 15359/24-12-1993	26% in respect of transactions not exceeding R6 000 23% in respect of transactions exceeding R6 000
1993-03-12	GNR 385/GG 14644/12-03-1993	28% in respect of transactions not exceeding R6 000 25% in respect of transactions exceeding R6 000
1993-01-22	GN 75/GG 14536/22-01-1993	29% in respect of transactions not exceeding R6 000 26% in respect of transactions exceeding R6 000
1992-12-04	GN 3273/GG 14438/04-12-1992	30% in respect of transactions not exceeding R6 000 27% in respect of transactions exceeding R6 000
1992-05-29	GN 1489/GG 13998/29-05-1992	31% in respect of transactions not exceeding R6 000 28% in respect of transactions exceeding R6 000
1990-07-27	GNR 1778/GG 12665/27-07-1990	32% in respect of transactions not exceeding R6 000 29% in respect of transactions exceeding R6 000
1989-10-17	GNR 2285/GG 12148/17-10-1989	33% in respect of transactions not exceeding R6 000 30% in respect of transactions exceeding R6 000
1988-11-11	GNR 2308/GG 11577/11-11-1988	31% in respect of transactions not exceeding R6 000 28% in respect of transactions exceeding R6 000

Effective date	Government Notice	Details
1988-07-01	GNR 1304/GG 11382/01-07-1988	27% in respect of transactions not exceeding R6 000 24% in respect of transactions exceeding R6 000
1988-05-05	GNR 943/GG 11303/05-05-1988	26% in respect of transactions not exceeding R6 000 22% in respect of transactions exceeding R6 000
1988-04-01	GNR 630/GG 11221/31-03-1988	26% in respect of transactions not exceeding R4 000 22% in respect of transactions exceeding R4 000
1987-11-27	GNR 2634/GG 11045/27-11-1987	23% in respect of transactions not exceeding R4 000 20% in respect of transactions not exceeding R4 000
1987-01-23	GNR 141/GG 10587/23-01-1987	23% in respect of transactions not exceeding R4 000 19% in respect of transactions exceeding R4 000
1986-02-11	GNR 286/GG 10099/11-02-1986	29% in respect of transactions not exceeding R4 000 24% in respect of transactions exceeding R4 000
1984-08-03	GNR 1745/GG 9372/07-08-1984	32% in respect of transactions not exceeding R2 000 30% in respect of money lending transactions exceeding R2 000 but not R5 000 28% in respect of money lending transactions exceeding R5 000 32% in respect of credit transactions not exceeding R10 000 30% in respect of credit transactions exceeding R10 000 32% in respect of leasing transactions not exceeding R10 000 30% in respect of leasing transactions exceeding R10 000
1984-07-17	GNR 1571/GG 9334/20-07-1984	27% in respect of transactions not exceeding R2 000 25% in respect of money lending transactions exceeding R2 000 but not R5 000 23% in respect of money lending transactions exceeding R5 000 27% in respect of credit transactions not exceeding R10 000 25% in respect of credit transactions exceeding R10 000 27% in respect of leasing transactions not exceeding R10 000 25% in respect of leasing transactions exceeding R10 000
1983-12-01	GNR 2669/GG 8986/02-12-1983	26% in respect of transactions not exceeding R2 000 24% in respect of money lending transactions exceeding R2 000 but not R5 000 22% in respect of money lending transactions exceeding R5 000 26% in respect of credit transactions not exceeding R10 000 24% in respect of credit transactions exceeding R10 000 26% in respect of leasing transactions not exceeding R10 000 24% in respect of leasing transactions exceeding R10 000

Effective date	Government Notice	Details
1983-05-02	GNR 892/GG 8683/29-04-1983	24% in respect of transactions not exceeding R2 000 22% in respect of money lending transactions exceeding R2 000 but not R5 000 20% in respect of money lending transactions exceeding R5 000 24% in respect of credit transactions not exceeding R10 000 22% in respect credit transactions exceeding R10 000 24% in respect of leasing transactions not exceeding R10 000 22% in respect of leasing transactions exceeding R10 000
1982-06-25	GNR 1261/GG 8271/25-06-1982	26% in respect of transactions not exceeding R2 000 22% in respect of money lending transactions exceeding R2 000 but not R5 000 22% in respect of money lending transactions exceeding R5 000 26% in respect of credit transactions not exceeding R10 000 24% in respect of credit transactions exceeding R10 000 26% in respect of leasing transactions not exceeding R10 000 24% in respect of leasing transactions exceeding R10 000
1982-02-05	GNR 198/GG 8012/05-02-1982	24% in respect of transactions not exceeding R2 000 22% in respect of money lending transactions exceeding R2 000 but not R5 000 20% in respect of money lending transactions exceeding R5 000 24% in respect of credit transactions not exceeding R10 000 22% in respect of credit transactions exceeding R10 000 24% in respect of leasing transactions not exceeding R10 000 22% in respect of leasing transactions exceeding R10 000
1981-09-11	GNR 1968/GG 7790/11-09-81	24% in respect of transactions not exceeding R2 000 21% in respect of money lending transactions exceeding R2 000 but not R5 000 18% in respect of money lending transactions exceeding R5 000 24% in respect of credit transactions not exceeding R10 000 21% in respect of credit transactions exceeding R10 000 24% in respect of leasing transactions not exceeding R10 000 21% in respect of leasing transactions exceeding R10 000
1981-03-02	GNR 339/GG 7423/20-02-81	24% with reference to section 2(1)(a) 21% with reference to section 2(1)(b) 18% with reference to section 2(1)(c) 24% for credit transactions not exceeding R5 000 21% for credit transactions exceeding R5 000 24% for leasing transactions not exceeding R5 000 21% for leasing transactions exceeding R5 000 (For the purposes of section 2(11)(b) of the Act, the percentage referred to in that section shall be one-half of one percent per year of the amount of the principal debt of the money lending

Effective date	Government Notice	Details
		transaction or credit transaction or leasing transaction in respect of which the services referred to in that section are rendered, but not exceeding in the aggregate a percentage of two and one-half of the said principal debt)
1974-10-28	GNR 2006/GG 4472/28-10-74	21% with reference to section 2(1)(a) 17,5% with reference to section 2(1)(b) 14% with reference to section 2(1)(c) 21% with reference to section 2(2)

Source: Usury Act No.73 of 1968 (Kwazulu-Natal Law Society last retrieved 08 February 2015)