

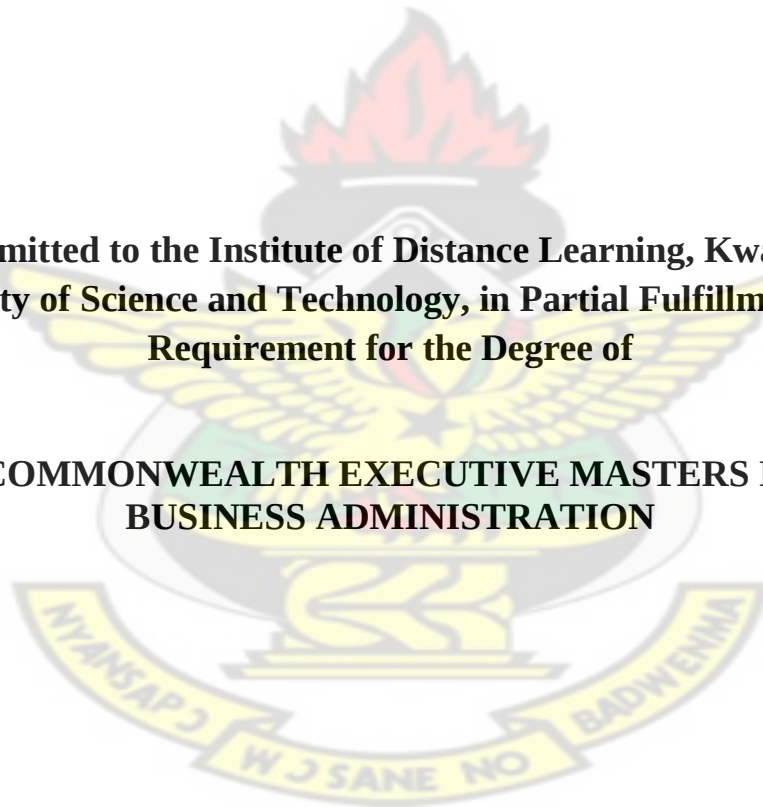
THE DETERMINANTS OF LENDING RATES IN GHANA

by

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**COMMONWEALTH EXECUTIVE MASTERS IN
BUSINESS ADMINISTRATION**



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DECLARATION

I hereby declare that this submission is my own work towards the Executive Masters of Business Administration and that, to the best to my knowledge, it contains no material previously published by another person nor material which has been accepted for the award of any other degree of the University, except where due acknowledgement has been made in the text.

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DEDICATION

This work is dedicated to my lovely and caring parents for their continuous support in my life.

Adam Alidu Seidu

And

Beilawu Yahaya



ACKNOWLEDGEMENT

My sincere thanks go to the Almighty God for His protection and guidance through the successful completion of the course.

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God bless you all.

ABSTRACT

The main objective of this study was to determine factors that impact lending rates in Ghana. Secondary data was obtained from Ghana Statistical Service and Price Water House Coopers regarding inflation, GDP and the various bank factors from 2005 to 2010.

The findings indicated that for bank specific factors, lending rates in Ghana increases with increasing interest expense. Whiles for industry specific factors, the findings indicated that lending rates decreasing with increasing T-bill rates.

Again, for macroeconomic factors, inflation and gross domestic product were found to impact lending rates in Ghana. Lending rate was found to increase with increasing with increasing inflation and gross domestic product.

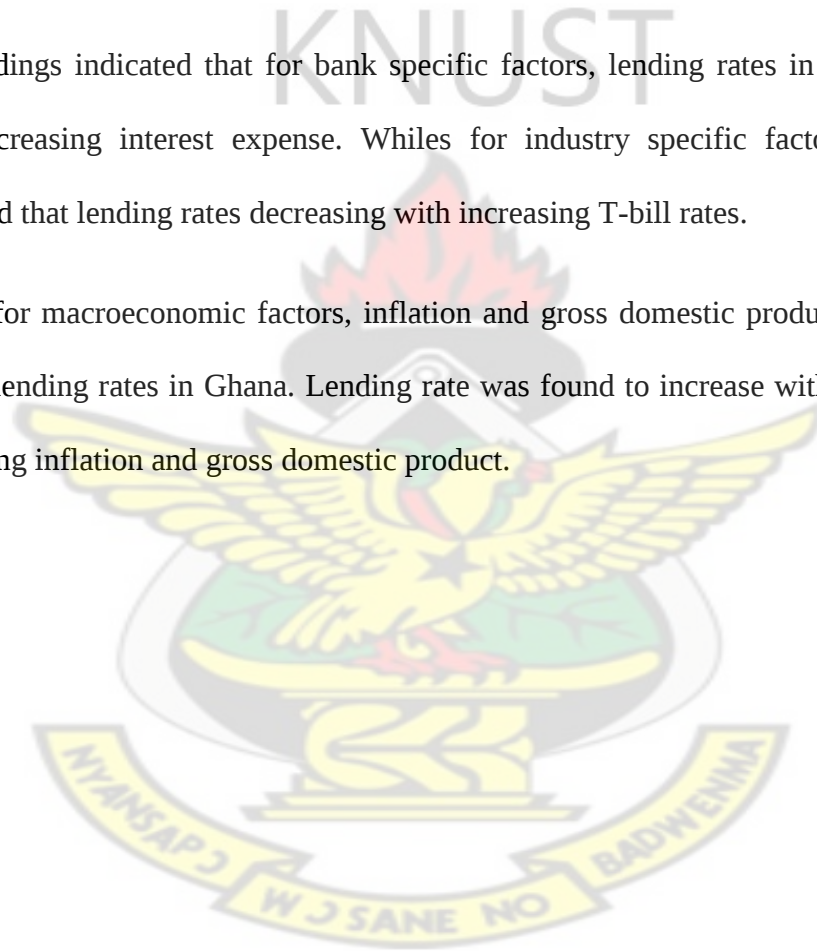
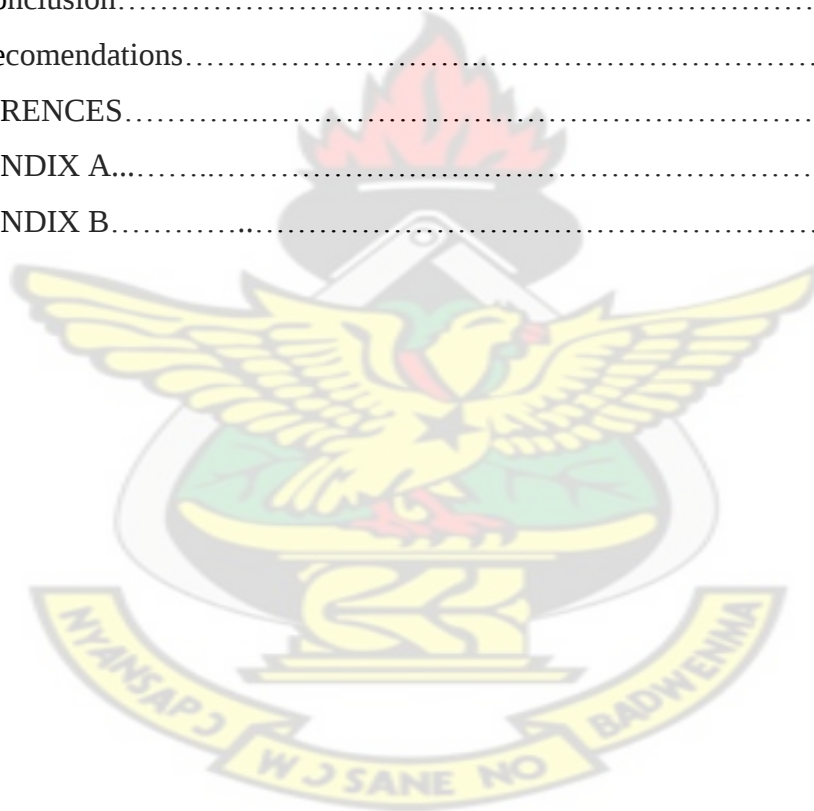


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CHAPTER ONE

INTRODUCTION

1.1 Background of study

Lending rate is the interest charged by banks when they advance loans to its customers. This interest is usually set in a way that the cost incurred by the banks will be covered and a profit made by the banks when customers service their facilities. In economics, this interest is the payment for the services of the capital provided, Williamson (1996). In other words, interest is the price of hiring capital.

Lending is considered one of the major functions of commercial banks. Banks play an important role in the mobilization and allocation of resources in an economy by accepting deposits and converting them into loans and investment. This role of financial intermediation of commercial Banks supports businesses to grow and also increase their profitability through the loans advanced to customers.

Although the number of Banks in Ghana has increased over the years, from about eight in 1990 to 28 in 2011, there is often the claim that lending rates of commercial banks are higher thereby scaring small scale business away from borrowing. Banks have been accused of charging high interest rates far higher than the central Bank's prime rates and therefore extorting customers. Banks on the other hand claim that the high cost of Banking coupled with the risk among others are the reasons for the seemingly high lending rates suggested by businesses. Lending rates in Ghana have been considered one of the highest in Africa. It is theoretically known that the interest rates are dependent on inflation but this is not the case in Ghana as inflation has dropped in recent times, the

interest rates have remain fairly high suggesting that the interest rates and for that matter the lending rates in Ghana may not necessary depend on inflation.

Also, arguments advanced for the failure of lending rates to decline in developing countries Include;

- a. High reserve requirement which acts as implicit financial tax
- b. Adverse selection effect which result in mounting of nonperforming loan and provision for Doubtful.
- c. High operating cost; inefficiencies of Banks may be translated to bank customer through wide margins.
- d. The cost of capital that banks hold to cushion themselves against risk is relatively more expensive than the debt because of taxation and may lead to high spreads.
- e. Macroeconomic instability and the policy environment may also affect pricing behavior of commercial banks.

A number of factors have been found to impact interest spread charged by banks. Bawumia (2005) in their research found that high operating cost as well as banks determination to high profit margins contributes to the wide interest spreads in Ghana. They also found that liquidity reserves and taxation as well as the rate of change of inflation also affects interest margins set by banks even though the influence of these is not as large as that of operating cost and the market share of the banks.

Also, Folawewo (2008) in his research found that the extent of government crowding out in banking sector, public sector deficits, discount rates, inflationary level, money supply, reserve requirement, level of economic development, and population sizes are important determinants of interest rate spreads in Sub-Saharan Africa.

1.2 Problem Statement

Lower lending rates in an economy help businesses to grow. This is because firms can easily access funds to expand their business at a cheaper rate. Individuals also access funds for mortgages and other personal development. However, there is the perception that lending rates in Ghana is high. Commercial banks are perceived to be charging higher rates despite attempts by government and the central bank to reduce lending rates by reducing the policy rates. This situation leaves the small scale businesses and general borrowers finding it difficult to access facilities to enable them grow. Also reduction of inflation in the country in recent times would have been seen to reduce lending rates drastically. This is however not the case as commercial banks still charge relatively high lending rates. The study therefore seeks to determine the factors that determine lending rates charged by commercial banks in Ghana

1.3 Objectives of the Study

The study seeks to:

- a. Identify the banks specific factors impacting lending rates in Ghana
- b. Identify the banking industry factors or characteristic impacting lending rates in Ghana
- c. Identify macroeconomic policy factors impacting lending rates in Ghana

1.4 Research Questions

- a. What are the firms specific factors impacting lending rates in Ghana?
- b. What are the Banking industries factors impacting lending rates in Ghana?
- c. What are the macroeconomic factors impacting lending rates in Ghana?

1.5 Rationale

The rationale of study is to determine the determinants of lending rates in Ghana so as to help in decision making in relation to lending rates. A lot of studies have been done to determine the spreads in the banking industry but little has been done in the relation to determinants of lending rates in Ghana. This seeks to determine the factors that impact lending in Ghana

1.6 Chapter Disposition

Chapter One is the introduction and composes of background description of the study, statement of the problem, research questions, objectives of the study, rationale and the chapter disposition. Chapter Two is literature review and will consist of introductory literature, theoretical literature and empirical literature. Chapter Three is methodology and will consist of an introduction, a research design, population and sample size of the research, sampling frame and sampling technique, instrumentation, data gathering and data analysis. Chapter Four is data presentation, preliminary analysis and summary Statistics. Chapter Five, which will be the final chapter will consist of further analysis, interpretation conclusion and recommendations.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

There have been a number of researches on the determinants of interest spread by commercial banks in Ghana and in Sub-Saharan African. The spread, usually found by using the basic definition that difference between the average lending rates of commercial banks and the policy rates set by the central bank, is found to have factors that impact it by various studies. Most literature looks at factors impacting interest spread in commercial banks. This approach leaves out the policy rates as set by the central bank and some other external factors and focuses on the factors of the banks both within and its environment that impact spreads of the banks. This research looks at the lending rates as a whole taking into consideration the policy rates set by central bank.

2.2 Empirical Literature

A number of researches has been done on this area. However few of these research concentrates on determining the determinants of lending rates. Most of the researches concentrate on finding the determinants bank spread.

Bawumia,(2005) in their research noted that intermediation spreads remain generally high in Ghana compared with other countries. According to them, the existence of major structural impediments, such as the market concentration, incompatibility of segregated technological systems and the degree of contestability among banking institutions, among others, prevent the financial system from reaching its full level of efficiency.

They also noted that, market share variable is very influential in explaining spreads in Ghana and reflects the lack of price competition in the banking industry. High operating

cost (mainly due to labour costs) as well as the banks' determination to maintain high profit margins contributes to the wide spread.

Their results also showed the effect of cross subsidization between interest and non-interest income. Liquidity reserves and taxation, as well as the rate of change in inflation, also affect interest margins, even though the influence of these is not as large as that of operating costs and market share.

Also, Folawewo (2008) in their research titled determinants of interest rates spread in sub-Saharan African countries: a dynamic panel analysis, found that, different macroeconomic policy variables play significant role in explaining variations in interest rate spread in the region. Among others, the study showed that the extent of government crowding out in the banking sector, public sector deficits, discount rate, inflationary level, level of money supply, reserve requirement, level of economic development, and population size are important determinants of interest rate spreads in Sub-Saharan African countries. This result, according to Tennant, has an important implication in terms of policy design in the region. Rockerbie (1993), for example examines the determinants of interest rate spreads on sovereign Eurodollar loans, D'Amato(2001) study the determinants of long-term yield between Italian and German bonds, Marshall (2006) focus on the determinants of swap spreads in the United Kingdom, and Ito(2007) investigates the determinants of swap spreads in Japan. This study, however, focuses specifically on commercial bank lending rate. The approach used in much of their research was to classify determinants of commercial banks' interest rate spreads according to whether they are bank-specific, industry (market) specific or macroeconomic in nature. Demirguc-Kunt (1998), Moore (2000), Rojas-Suarez (2000),

Gelos (2006), Sologoub (2006), and Crowley (2007) note that the specific characteristics of commercial banks that are usually theorized to have an impact on their spreads include:

1. The size of the bank, ownership pattern,
2. The quality of the loan portfolio,
3. Capital adequacy,
4. Overhead costs,
5. Operating expenses, and
6. Shares of liquid and fixed assets.

Robinson (2002) further notes that the incidence of fraud, the ease with which bad credit risks survive due diligence, and the state of corporate governance within banks all lead to higher operating costs, asset deterioration and ultimately wider interest rate spreads. These studies all show that such bank-specific factors impact significantly on commercial banks' net interest margins.

Notwithstanding this, Brock (2002) note that the results of many other studies suggest that individual bank characteristics are often not tightly correlated with interest rate spreads. They assert that this may be because spreads are largely determined at the industry level, thus making individual bank characteristics more relevant to other variables, such as bank profitability.

A similar argument, made to explain the failure of spreads in developing countries to converge to international levels even after financial liberalization, suggests that high interest rate spreads in developing countries will persist if financial sector reforms 'do not significantly alter the structure within which banks operate' Chirwa (2004). This structure

refers to the market/industry and macroeconomic environment in developing countries. The market-specific determinants of commercial bank interest rate spreads highlighted in the literature typically include lack of adequate competition in the banking sector and consequent market power of commercial banks, the degree of development of the banking sector, and explicit and implicit taxation - such as profit taxes and reserve requirements. Cross-country studies have also established that banking spreads tend to fall as institutional factors improve. Such factors include the efficiency of the legal system, contract enforcement, and decreased levels of corruption, which are all critical elements of the basic infrastructure needed to support efficient banking.

Several studies on small island developing states further note that interest rate spreads are widened by scale diseconomies due to the small size of markets (Demirguc-Kunt (1998) Craigwell (2000) Robinson (2002) Jayaraman (2003) and Mlachila (2004). Of these factors, evidence has been found that interest rate spreads are increased by:

1. Greater market power of commercial banks, Barajas (2000);
2. Poorly-developed banking sectors Demirguc-Kunt, (1998);
3. High reserve requirements, Barajas and
4. Inefficiency of the legal system and high corruption, Demirguc-Kunt.

Macroeconomic factors have also been shown to explain significant variation in commercial bank interest rate spreads. Brock (2003) quote from a Moody's report which argues that, 'macroeconomic factors are certainly among the most influential sources for variations in credit spreads.' Chirwa (2004) concur and assert that macroeconomic instability and the policy environment have important impacts on the pricing behaviour of commercial banks. They noted that the macroeconomic variables typically thought to be

determinants of interest rate spreads include inflation, growth of output, and money market real interest rates. Franken (2002) include interest rate uncertainty and exchange rate volatility, and Randall (1998) also includes the share of commercial bank public sector loans, in her list of determinants of spreads in the Caribbean.

Randall's inclusion is similar to the additional variables suggested by stakeholders in Jamaica, as Tennant (2006) showed that macro-policy variables, such as public sector domestic borrowing, discount rates and Treasury Bill rates, are commonly perceived to impact on commercial bank spreads. Additional macro-policy variables included by Crowley (2007) in his study of English-speaking African countries are broad money growth, and the fiscal balance. The macroeconomic variables which have been empirically shown to increase interest rate spreads include:

1. High and variable inflation and real interest rates (Demirguc-Kunt and Huizinga, 1998);
2. Interest rate uncertainty - proxied by inter-bank interest rate volatility (Brock and Franken, 2002);
3. Broad money growth (Crowley, 2007);
4. Increased fiscal deficits (Crowley, 2007); and
5. A high share of commercial bank public sector loans (Randall, 1998).

Bawumia, Balnye, and Ofori(2005), further states that there is a large degree of agreement among economists that that financial liberalization facilitates economic development and growth. This view according to them, embodied in the McKinnon-Shaw paradigm, states that the removal of financial repression, in the form of interest rate controls, imposition of credit ceilings and credit rationing, leads to significant

improvement of growth prospects. This will occur as deposits (loanable funds) increase through real interest rate increases that attract household savings to bank deposits, and by increasing the efficiency (lower level of intermediation spreads) of the banking system. They noted that after a long period of financial liberalisation in Ghana, the expected decline in interest rate spreads has not materialised.

Bawumia, Balnye and Ofori(2005) also states in the work that, arguments advanced for the failure of interest spreads in developing countries to decline in the context of financial liberalisation include:

- a. Lack of changes in the structure and institutional behaviour of the banking system shown by concentration, the conditions of free entry and competitive pricing.
- b. High reserve requirements, which act as implicit financial tax. While reserve requirements may be designed with the aim of protecting depositors, the availability of a pool of resources allows for financing high fiscal deficits through the implicit financial tax, creating an environment that can promote high inflation and persistent high intermediation margins.
- c. Adverse selection and adverse incentive (moral hazard) effects, which could result in mounting non-performing loans and provision for doubtful debts
- d. High operational costs have also been found to be a source of persistent and wide intermediation spreads in developing countries. Operational costs reflect variations in cost of capital, employment, and wage levels. Inefficiency in bank operations may also be shifted to bank customers through wide margins.

- e. The cost of capital that banks hold to cushion themselves against risks is relatively more expensive than debt because of taxation and may lead to high spreads.
- f. Macroeconomic instability and the policy environment may also affect the pricing behaviour of commercial banks.

Mario and Marc (2002) looked at the determinants of long term interest rates. They tried to see whether they were real forces or convention. They indicated that Wicksellian and Fisherian versions of the neoclassical theory of interest, the determinants of the money rate of interest are

- a. The rate of profit (or the natural rate),
- b. fluctuations in demand and of loanable funds
- c. the rate of inflation (either because of the effect it has on the behavior of banks in seeking to raise the money rate, or because of the importance attributes to the effect of inflationary expectations on nominal interest rates).

The question, according to them, still to be addressed, has to do with whether these market phenomena of productivity and thrift would be reflected equally well in the long end of the market for loanable funds or would they be restricted only to the short end. In short, are the various determinants, listed above, applicable to both short-term and long-term interest rates?

According to neoclassical theory, as first elaborated by Irving Fisher, long-term rates of interest are merely an average of the short rates that are expected to prevail during the period for which various long-term loans would apply. With the possibility of arbitrage

between the holding of short and long-term securities, the amount that a sum of money would fetch if held as a long-term bond ought to be approximately equal to the amount that it would be expected to obtain for the wealth holder if invested in succession at the anticipated short-term rates.

Therefore, as long as there would be no systematic errors between forecasted and actual future yields, long-term rates would gravitate around the mean of the expected short rates. Moreover, if the forward rate is indeed the arithmetic average of the short rates, it would follow that the former would normally be expected to fluctuate in the same direction as the latter, albeit with less amplitude than the short rates.

Critics of the traditional expectations theory of the term structure of interest

Rates according to Mario (2002) have historically pointed to a number of obvious problems with this approach. Because of the elements of risk and uncertainty, and because of the existence of information and transactions costs, the link between the short and long rates could be highly weak they added. Hence, there could exist a high degree of market segmentation between the short and long end of the yield curve that could make the two rates independent of one another. As long as there is some degree of segmentation, market forces cannot be presumed.

They also state that, while all agree that credit and money are endogenous, being provided on demand to credit-worthy persons and institutions, there are some differences of opinion regarding the ability of the central bank to impose a rate of interest of its choice on the overall financial structure. While horizontalists believe that eventually, through persistence and arbitrage, the short-term rate of interest set by the central bank will become the standard for the whole of the financial system, structuralists believe that various market forces can disjoint the base rate of interest set by the central bank from all

other market rates, Lavoie (1996). In addition, some structuralists believe that market rates have an impact on the base rate set by the central bank, i.e., they have a feedback effect. The arguments of the structuralists can be described at two levels.

Firstly, there is the issue of the determination of loan rates, in particular, the prime lending rate set by banks. They argue that the prime lending rate depends on the base rate set by the central bank, but that the spread between the two (i.e., the markup) depends on the liquidity preference of banks. For a given degree of liquidity preference, it is presumed that lower liquidity ratios or higher loans-to-deposits ratios would induce higher spreads. It is also sometimes claimed that these higher spreads ought to be procyclical: when demand for loans is high, the spreads would be pushed up. It has been pointed out, however, that such spreads appear rather to be counter-cyclical, (Moore (1988) and Dow (1996)), implying that the degree of liquidity preference of banks does not remain constant, but fluctuates counter-cyclically.

Secondly, there is the issue of the determination of long-term rates of interest. Here two arguments have been made. On the one hand, it is argued that the spread between the short and the long-term rates of interest, i.e., the term structure, depends on the liquidity preference of the public. This has been expressed in two different, yet comparable, manners. Authors such as Panico(1985) express this in terms of interest premia, by saying that the long-term rate of interest is such that

$$L = B + L ,$$

where B is the base rate of interest set by the central bank and where L is the liquidity premium.

Authors such as Wray (1991), according to Marc (2002), express this by saying that the price of short-term bonds relative to that of long-term bonds is an inverse function of the relative proportions in which they are desired by the public. Moreover, structuralists sometimes argue that it is the long-term rate of interest which ultimately determines the short-term rate of interest that can apparently be set by the central bank. The question then arises as to what are the ultimate determinants of this long-term rate of interest.

The answer usually provided, according to Marc(2002), is that the economy-wide rate of profit determines this long-term rate of interest. In a nutshell, it is believed that when the rate of growth of the economy is high, so is the rate of profit, in accordance with the well-known Cambridge equation, and hence so will be the long-term rate of interest, and eventually the short-term rate of interest. Since it has been shown that the rate of return on the stock market closely follows the vagaries of the profit rates of firms, ultimately the rate of return on the stock market should determine the base rate set by the central bank. In a moderate version of this story, one could argue that the growth rate of the economy or the rate of return in the stock market have an impact on the term structure. There have been some empirical studies which have attempted to disentangle the issues described above. On the matter of the spread between the base rate set by the central bank and the prime rate set by banks, results conflict between authors and models.

Deriet (1996) look at the spread between the bank rate and the prime rate in Canada. They show that the loans to-deposits ratio has the expected positive and significant effect on the markup; however the liquid assets ratio has an unexpected and significant positive effect on the same markup. In addition the size of the inventories of firms, included to reflect the strength of demand for short-term loans, is rarely significant. Similar ambiguous results are obtained by Nicol (1997), also with the use of Canadian data.

Using a frictional model of the determination of the prime rate, he shows that while changes in loans to firms have the expected positive and usually significant effect on changes in prime rates, changes in industrial production never achieve any degree of significance. On the other hand, changes in the discount rate or the overnight rate, as well as changes in the U.S. prime rate, always have a significant effect on changes in Canadian prime rates.

Finally, Tissaaratchy (1996) could not find any evidence of the Canadian prime rate markup (over the bank rate or the overnight rate) being determined by cyclical factors or proxies of financial fragility, such as the rate of GDP growth, the loans-to-deposits ratio and the liquid asset ratio of banks, and the debt-to-equity ratio of firms. There is thus little evidence, at least within the Canadian context, that the central bank is unable to assert its authority over prime lending rates.

The better-known empirical studies on the relationship between long-term rates and short-term rates, according to Mario (2002), are those of Pollin (1991; 1996). His Granger-Sims causality tests show that there was interaction between market-determined short-term rates of interest and the rates of interest controlled by the U.S. central bank. However, more surprisingly from the horizontalist point of view, his tests show that market-determined long-term rates of interest the rates of interest controlled by the Fed, such as the discount rate and the rate on Federal funds. These results would thus appear to give considerable credence to the belief that profit rates and long-term rates of interest are the ultimate determinants of the base rate of interest which central banks are compelled to set eventually.

As Pollin (1991) puts it, these findings suggest that the Fed adjusts the federal funds rates, and certainly the discount rate, in reaction to market interest rate changes. An

(1997) has also shown that long-term interest rates cause present Canadian overnight rates. This result seems to be quite robust: Moore (1988) himself had found that past long-term rates of interest appeared to cause present short-term rates of interest, both Federal funds rates and Treasury-Bills rates. The only way out for horizontalists (of what appears to be substantive empirical evidence that long-term rates do affect short-term rates) is to argue that long-term bond rates embody expectations about future short-term rates set by the central bank, and that these expectations are correct more often than they are not. This, indeed, is the explanation offered by Palley (1991) and Moore (1988).

The latter found that future federal funds rates explain current long-term interest rates, and that past long-term interest rates explain current federal funds rates and short-term rates in general. Taking expectations into account, it would imply that past long-term rates of interest are explained by past expectations of the current federal funds rates. Hence, it is not surprising that past long-term rates of interest can explain current actual federal funds rates, since these past long-term interest rates embody expectations about current federal funds rates. The Granger causality is to be expected as long as expectations are sometimes correct and not totally random.

This interpretation is corroborated by the analysis of Bernanke (1992), who argued that the base rate set by central banks (the Federal funds rate in the United States, the overnight rate in Canada) is the ultimate independent variable, or the monetary variable which is least contaminated by endogenous responses to current economic conditions. They show, in particular, that changes in the Federal funds rate reflect changes in monetary policy and credit conditions rather than a reaction to changes in the demand for reserves. Also the movements in the spread between the Federal funds rate and the long-term rates are dominated by changes in the Federal funds rate.

As a consequence, it could be assumed that the base rates set by central banks are indeed under the control of the central bank, given its overall economic objectives with regards to the desired rate of inflation and the exchange rate. The purpose of the following section is to shed some further light on this question of what determines long-term rates by using more traditional econometric techniques of regression analysis. In particular, an attempt is made to tackle the issues raised by both neoclassical theorists and heterodox economists regarding the importance of the underlying forces of supply and demand in affecting the spread between short and long-term rates. Some Preliminary Evidence from Canadian Postwar Data Using Conventional Techniques of Regression Analysis The empirical analysis described below has been influenced by a certain amount of research undertaken by neoclassical economists, such as Howe (1991) and Robson (1995), and heterodox writers, such as Stanford (1997), who have sought to evaluate using various econometric techniques the impact of certain key variables on long-term interest rates. For instance, Pigott (1991-92) adopt the traditional loanable funds approach discussed above to explain the behaviour of long-term real rates of several OECD countries for the turbulent period between 1975 and 1990. Though their results were not particularly robust, their conclusion was that the forces of productivity and thrift did affect the long-term equilibrium rates over time. On the opposing side, using standard causality tests Stanford (1997) found no evidence that traditional variables, such as government budget deficits, statistically explained the behaviour of interest rates in Canada. Indeed, Stanfords evidence supported the opposite causal link that high interest rates caused high deficits Though hopefully also shedding light on the relevance of the neoclassical loanable funds explanation of long-term interest rates, our intention is primarily to contribute to the debate, discussed above, between the horizontalists and the

structuralists. Not unlike an aspect of the loanable funds story, structuralists emphasize the significance of demand factors in affecting the relation between long and short-term rates of interest. Indeed, while accepting the general Post-Keynesian position that short-term rates, such as the overnight rate and the rate on Treasury Bills, to be largely exogenous and under the control of the monetary authorities, long-term rates are presumed to be subject to endogenous pressures within financial markets. For this reason, the statistical model tested is a variant of numerous time-series models of the type discussed by Howe (1991).

In addition to the crucial short-term rates as explanatory variable, it was assumed, therefore, that the evolution of nominal long-term rates of interest in Canada can be explained by indicators of return on physical capital and/or the growth rate of output, as well as factors such as budget deficits, inflation rates, and measures of corporate indebtedness.

Elsas(2003) looks at relationship lending. He considered relation lending as based on the idea that close ties between borrowers and banks may be economically beneficial. He defines relationship as a long-term implicit contract between a bank and its debtor. Due to information production and repeated interaction with the borrower over time, the relational bank accumulates private information, establishing close ties between the bank and the borrower. Such ties according to Elsas create well-known benefits from the lending institution suggested in the literature: intertemporal smoothing, increased credit availability, enhancement of borrower's project payoffs, and more efficient decisions if borrowers face financial distress.

However, relationship lending according to Elsas (2003), is not a dominant type of financing since it is, inevitably, associated with costs. One of such costs is exogenous

monitoring costs in the spirit of the costly state verification approach by Hellwig (1985). More specific are switching costs in the sense of Sharpe (1990) and Rajan (1992). In their models, the information privilege of banks endogenously induces bargaining power, thereby giving rise to a hold-up problem. He further asserts that hold-up problem does not imply that an informed relationship lender earns positive rents over the lifetime of the bank-borrower relationship. Rather, the bank extracts rents over some periods after the loan contract is initiated. This will be anticipated at the contract initiation and therefore competed away. Nevertheless, ex post rents can induce costs. For example, in the model by Rajan (1992), the bargaining power of the relationship lender reduces entrepreneurial incentives to spend effort in a project, which constitutes opportunity costs of having an informed lender. Elsas(2003) states that one remedy against these lock-in costs is to borrow from multiple banks where the presence of (possibly uninformed) banks restricts the bargaining power of the informed lender in an optimal way. A potentially superior solution is analyzed by Thadden (1995), who shows that using long-term debt contracts with specific features can also circumvent the hold-up problem. More specifically, the long-term contract should resemble a line of credit arrangement that the lending bank may terminate, but if it chooses to continue financing it should do so at ex ante specified terms. This arrangement can optimally limit the informed lender's bargaining power without the need for bank relationship.

The most commonly used proxy for relationship lending in applied empirical work, according to Elsas(2003) is the duration of a bank-borrower relationship. The basic idea is that duration reflects the degree of relationship intensity over time. If duration is equivalent to private information accumulation over time, the lock-in of a borrower

should increase with duration. Duration then reflects switching costs, the severity of the hold-up problem, and relationship intensity in general.

However, the relation between accumulated information, duration, and borrower lock-in does not have to be monotonic. First, it may take time to establish a valuable information advantage. Second, the value of previously accumulated private information may start to decrease after some time, for example if the borrower establishes an observable track record, as suggested by Diamond (1991). Third, the marginal value of additional information might be decreasing. Using the number of bank relationships as an indicator for the presence of relationship lending is based on the premise that maintaining an exclusive bank relationship promotes the development of close ties between bank and borrower. Finally, Exclusivity induces a lower degree of direct competition between banks, allows for unique access to valuable information, and eases the realization of the economic benefits associated with relationship lending, like for instance (efficient) renegotiation of loan contracts. However, exclusivity of a bank relationship is neither a necessary nor a sufficient condition for relationship lending.

Holmstrom (1997) have shown that only a fraction of funds needs to be financed by a monitoring lender to deter the borrower from moral hazard. The remaining funds can be raised from the market or uninformed arm's-length banks. Second, the building block of theory is access to valuable private information and its accumulation over time. But, since valuable information is likely to be distributed by the borrower in a strategic way, this can be accomplished even in the context of multiple bank relationships (though possibly harder), and, most importantly, it does not have to happen at all. Elsas(2003) then asserts that, the proxy value of the number of simultaneous bank relationships remains unclear, but a negative correlation between the number of banks and the

incidence of relationship lending seems plausible. Zuzana Fungacova and Tigran poghosyan in their research, Determinants of bank interest margins in Russia: Does bank ownership matter? Found out that there are certain similarities across banks with different ownership structure. According to them, significant and economically sizable impact of operational costs across all subgroups justifies the extension of the basic dealership model by and Fernandez (2004), which includes this important variable. They asserts that risk aversion has a significant and positive impact on all subgroups and that bank ownership plays an important role in emerging markets and should not be disregarded when analyzing interest margin determinants.

Zuzana, also indicates that, empirical evidence suggest that the level of interest margins in developing economies persistently higher than in developed economies. Claey's (2008) attributes those differences to low efficiency and low degree of market competition

Ho (1981) advocate a two-step procedure to explain the determinants of bank interest spreads in panel data samples. In the first-step, a regression for the bank interest margin is run against a set of bank-specific variables such as non-performing loans, operating costs, the capital asset ratio, etc. plus time dummies. The time dummy coefficients of such regressions are interpreted as being a measure of the "pure" component of a country's bank spread. In the second-step, the constant terms are regressed against variables reflecting macroeconomic factors. For this second step, the inclusion of a constant term aims at capturing the influence of factors such as market structure or risk-aversion coefficient, which reflect neither bank-specific observed characteristics nor macroeconomic elements.

Rojas-Suarez (2000) applies the two-step procedure for a sample of five Latin American countries (Argentina, Bolivia, Colombia, Chile, and Peru). For each country, the first-

stage regressions for the bank interest spread include variables controlling for non-performing loans, capital ratio, operating costs, a measure of liquidity (the ratio of short term assets to total deposits) and time dummies. The coefficients on the time dummies are estimates of the “pure” spread.

Their results show positive coefficients for capital ratio (statistically significant for Bolivia and Colombia), cost ratio (statistically significant for Argentina and Bolivia), and the liquidity ratio (statistically significant for Bolivia, Colombia, and Peru). As for the effects of non-performing loans, the evidence is mixed. Apart from Colombia, where the coefficient for non-performing loans is positive and statistically significant, for the other countries the coefficient is negative (statistically significant for Argentina and Peru). The authors explain these findings as a result of inadequate provisioning for loan losses: higher non-performing loans would reduce banks’ income, thereby lowering the spread in the absence of adequate loan loss reserves. The result for Argentina is striking given the opposite findings reported by Catão (1998).

Tarsila (2001) in their research, determinants of bank interest spread in Brazil, found out that bank interest spread in Brazil showed an impressive downward trend. They noted that a stable macroeconomic environment as well as the official priority given to the reduction of the interest margins was the main factors behind this behavior.

Another important feature of bank interest spreads in Brazil as mentioned by Tarsila(2001) is its high and persistent cross-sectional dispersion. These elements disclose a market where productive inefficiencies and regulatory burden allow that some banks keep operating even charging rates much higher than their rivals.

Their results showed the relevance of the macroeconomic conditions over bank’s observable characteristics as the main determinants of bank interest spreads in Brazil.

However, some yet unidentified factors as noted by Tarsila still account for a large portion of the spread behavior in the country.

Demirgüç-Kunt (1999) investigates the determinants of bank interest margins using bank-level data for 80 countries in the years 1988-1995. The set of regressors included several variables accounting for bank characteristics, macroeconomic conditions, explicit and implicit bank taxation, deposit insurance regulation, overall financial structure, and underlying legal and institutional indicators. The variables accounting for bank characteristics and macroeconomic factors were of special interest since they are close to the ones included in the regression estimated in our paper.

Demirgüç-Kunt report that the bank interest margin is positively influenced by the ratio of equity to lagged total assets, by the ratio of loans to total assets, by a foreign ownership dummy, by bank size as measured by total bank assets, by the ratio of overhead costs to total assets, by inflation rate, and by the short-term market interest rate in real terms. The ratio of non-interest earning assets to total assets, on the other hand, is negatively related to the bank interest margin. All the mentioned variables are highly statistically. Output growth, by contrast, does not seem to have any impact on bank spread.

Another branch of the literature is concerned with the adjustments of bank interest rates to the market interest rate. These studies showed that, in the long run, one cannot reject the hypothesis that bank interest rates follow the market interest rate in a one-to-one basis, i.e. that there is full adjustment to changes in the market interest rate. In the short-run, though, the departures of bank interest rates from the market interest rate are relevant and there is some evidence that adjustments towards the long run equilibrium are

asymmetric, i.e. the adjustment varies according to whether one observes positive or negative unbalances.

There is some evidence of price rigidity in local deposit markets with decreases in deposit interest rates being more likely than increases in these rates in the face of changes in the market interest rate Berger (1991). One reason for such behavior is market concentration: banks in concentrated markets were found to exacerbate the asymmetric adjustments Neumark (1992).

The same sluggishness has been observed for the loan interest rate. Cottarelli (1994) applied a two-step approach to investigate the reasons for the stickiness of bank lending rates for a sample of countries. In the first step, the impact multipliers of changes in the market interest rate were calculated for each country in the sample. In the second step, such impact multipliers were regressed against a large set of explanatory variables controlling for cross-country differences in the competition within the banking system, in the extent of money market development and openness of the economy, in the banking system ownership, and in the degree of development of the financial system. Of interest are the results that the impact multiplier is higher for countries where inflation is higher and where the banking systems are not dominated by public banks.

Angbazo (1997) studies the determinants of bank net interest margins for a sample of US banks using annual data for 1989-1993. The empirical model for the net interest margin is postulated to be a function of the following variables: default risk, interest rate risk, an interaction between default and interest risk, liquidity risk, leverage, implicit interest payments, opportunity cost of non-interest bearing reserves, management efficiency, and

a dummy for states with branch restrictions. The results for the pooled sample suggest that the proxies for default risk (ratio of net loan charge-offs to total loans), the opportunity cost of non-interest bearing reserves, leverage (ratio of core capital to total assets), and management efficiency (ratio of earning assets to total assets) are all statistically significant and positively related to bank interest margins. The ratio of liquid assets to total liabilities, a proxy for low liquidity risk, is inversely related to the bank interest margin. The other variables were not significant in statistical terms.

Some recent contributions have made use of more structural models based on profit maximization assumptions for banks operating in imperfect markets to develop empirical equations to understand the behavior of bank interest rate.

Barajas *et al.* (1999) documents significant effects of financial liberalization on bank interest spreads for the Colombian case. Although the overall spread has not reduced with the financial liberalization measures undertaken in the early 1990s, the relevance of the different factors behind bank spreads was affected by such measures.

In a single equation specification, the bank lending rate is regressed against the ratio of the deposit rate to (one minus) the reserve ratio, a scale variable represented by the volume of total loans, wages, and a measure of loan quality given by the percentage of nonperforming loans.

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According to P Gupta, from Stiglitz and Weiss (1981) to Banerjee and Duflo (2002), both theory and evidence have shown that credit markets are not perfect—problems of moral hazard, adverse selection, and contract enforcement lead to credit rationing. Countries, people, or regions that can make credit markets more efficient have benefited and will continue to benefit from a higher GDP.

Beck, Demirguc-Kunt, and Levine (2000) compare financial markets in developed countries to those in developing countries, revealing that economies grow faster, industries depending on external finance expand at higher rates, new firms are created more easily, and firms grow more rapidly in economies with higher levels of overall financial sector development and in countries where legal systems more effectively protect the rights of outside investors.

Beck, Demirguc-Kunt, and Levine (1999) (BDL) present a new database on financial development and structure which shows that the market capitalization of public equity markets and public and private bond markets in less developed countries (LDCs) is zero to five percent of the GDP on average. Thus, most firms which need external finance must rely on private credit.

BDL also asserts that in rich countries private credit is also offered by banks and “other financial institutions” including other bank-like institutions, insurance companies, private pension funds, and development banks. In developing countries, however, BDL show that deposit money banks are the chief issuers of credit.

To summarize, LDCs suffer from very shallow public equity and private and public corporate bond markets. The external credit that is provided in LDCs is provided primarily by deposit money banks. Yet, the amount of private credit extended in these countries as a percentage of GDP is only 10-20% compared to 60% in richer countries.

Recent industry and firm level research shows that the level of banking sector development has a large, causal impact on real per capita GDP growth (Rajan and Zingales 1998; Demirguc-Kunt and Maksimovic 1999). Beck, Levine and Loayza (2000) extend this work by examining the channels by which banking sector development

influences GDP growth. Using both cross country data and panel data, they find that banking sector development improves resource allocation and accelerates total factor productivity growth—as opposed to physical capital growth or savings per capita growth—which in turn increases long run economic growth.

While the studies above determine the effects of bank loan volume on GDP growth, there are few studies that examine the determinants of bank loan volume across countries.

A study, “Credit Stagnation in Latin America”, by Barajas and Steiner (2001) decomposes bank loan volume into supply side and demand side shifts for three Latin American countries. The authors find that supply side expansions are driven primarily by lending capacity, or loanable funds, and regulatory variables become more important during slowdowns. On the demand side, credit expansions were characterized by improved macroeconomic conditions.

P Gupta also indicates that Banks worldwide suffer from adverse selection and moral hazard. Because banks cannot be certain about a borrower’s (ability ex-ante) and because a bank cannot perfectly monitor a borrower’s effort (ex-post), the bank must design contracts to try to achieve the first-best—full information—outcome. But, in the situation where collateral is scarce and contract enforcement is weak, the bank is never quite able to achieve the optimal allocation of loans where low-risk entrepreneurs pay a low interest rate and high-risk entrepreneurs pay a high interest rate. Thus, according to P Gupta credit is rationed.

Two stylized facts about credit markets worldwide are:

(1) Lack of Arbitrage: Within a single country, borrowers can observe hundreds or thousands of different interest rates. Each interest rate corresponds to a different level of collateral and differences in a number of other borrower characteristics.

(2) Rationing: Entrepreneurs willing to pay a higher interest rate in return for a larger loan are often denied, because the higher the interest rate the less the incentive for the borrower to pay back the loan.

Besanko and Thakor (1987) and Besten (1985) show that all of our credit market woes can be rectified if borrowers have enough collateralizable wealth. Indeed, banks can offer two different contracts to prospective customers. One contract could require a high collateral and a corresponding low interest rate, thus attracting low-risk entrepreneurs. The other contract could require less collateral but a higher interest rate, thus attracting high-risk individuals.

If the collateralizable wealth (w) of the entrepreneur is equal to opportunity cost of the bank's capital (p), the first best level of effort will be exerted by the entrepreneur. If w is less than p , the bank will charge an interest rate (r) decreasing in w . Because the agent's effort is increasing in w , the total surplus of the borrower and the bank is increasing in w . Thus, the lower the collateralizable wealth of the borrower, the lower the social surplus from lending-borrowing.

The agency costs according to P Gupta are exasperated in developing countries for the following reasons:

(1) There is **less collateralizable wealth** in developing countries (De Soto 2000). A borrower is likely to be charged an exorbitant interest rate or rationed out of the market altogether when his wealth is not enough to satisfy the zero profit constraint (ZPC) of the bank.

In many LDCs, banks require collateral that is many times higher than the value of the loan or the opportunity cost of capital, because the costs of foreclosing a property can exceed the value of the property itself. In parts of Mexico and Thailand, for example,

collateral valued at three to nine times the loan size is required by banks (La Porta, Lopez-de-Silanes, and Zamarripa 2001).

(2) **Information is scarce and contracts are much harder to enforce.** Thus, in a single period world, entrepreneurs can wilfully refuse to pay back a loan without any legally enforceable recourse. Even in a multiple period world, the bank that was frauded may not be able to blacklist the fraudulent borrower effectively enough to prevent that borrower from getting another loan.

Bulgarian and Hungarian bankers interviewed by Koford and Tschoegl (1999) reported significant difficulties in both stages of the credit process: finding information to evaluate prospective borrowers and their projects, and encouraging borrowers to wilfully repay loans. They also found it difficult to seize collateral, resell it, and/or to use legal action to collect bad debt.

In LDCs, He also observed:

(3) **Very high or very low real interest rates on deposits.** Many developing countries suffer from unusually high or unusually low real interest rates.

(4) **High spreads and therefore high interest rates on loans.** The interest rate spread is the difference between the rate charged on loans and the rate paid by commercial or similar banks for demand, time, or savings deposits. Spreads are higher in LDCs to compensate for a lack of enforceable and marketable collateral, high loan default probabilities, and high bank operation costs. Through the spread, the bank attempts to pass its operating costs and the probability of default onto the borrower.

High lending interest rates further reduce the quality and effort of borrowers, increasing the default rate and pushing the interest rate higher in the next period. Income and savings continue to remain low, and capital continues to be scarce. This vicious circle is

hard to break.

(5) **Bank dependence.** In most developing countries banks dominate the financial system. Bank deposits are the most important form of household savings, and bank loans are the most important form of external finance for firms. The share of domestic credit provided by banks is high. Equity markets and corporate bond markets remain very shallow, concentrated, and illiquid. It is important to note, however, that some low-middle income countries like Chile and Thailand have recently improved the depth of their equity markets. This has presumably decreased their bank dependence.

Firms in countries like Columbia depend much more on bank loans and internal-finance than equity finance. A case study for Columbia shows that in the early 1990's firms financed themselves with profit withholdings (33%), new equity (12%) and loans (55%) (Steiner and Salazar, 1998). This study does not distinguish between loans from suppliers and loans from financial institutions. A more recent study by Arbelaez and Echavarria (2002) shows that in 1999 about 19% of Colombian manufacturing firms' liabilities were with financial institutions.

Small-medium enterprises in developing countries are even more dependent on bank financing. In Argentina, for example, 79% of small industrial firms have bank debt (Llorens, van der Host, and Isusi, 1999).

This is not to say that bank dependence is restricted to developing countries. Gertler and Gilchrist (1994) show that small-medium manufacturing firms in the United States are more bank dependant than larger firms. Also, in Germany more than 60% of firm finance comes from banks. Nonetheless, it is clear that firms in developing countries are more likely to be bank dependent than their rich-country counterparts due to greater credit market imperfections.

(6) **Low private sector loans to GDP ratio.** Developing countries make far fewer loans to the private sector as a percentage of GDP than rich countries. P Gupta also indicates that banks and other financial institutions in less developed countries extend loans up to 10% of the GDP on average, while banks and other financial institutions in rich countries extend more than 60% of their GDP in loans to the private sector. This, along with evidence that equity and debt markets are shallow in developing countries, suggests that firms in developing countries are more likely to depend on internal finance or trade credit than firms in developed countries.



2.3 Theoretical literature

Borrowing and lending in the financial market depend to a significant extent on the rate of interest. In economics, interest is a payment for the services of capital. It represents a return on capital. In other words, interest is the price of hiring capital. While the necessity of charging interest on credit has been widely accepted, there seems to be plenty of disagreement over the level of interest rate charged by financial providers because the factors that go into these calculations are not well known. This poses a problem of ascertaining what determines interest rates set by financial. It is widely suggested that cost of funds of financial institutions, operating expense contingency reserves (provision for bad loans) are among some of the determinants of interest rates set by the financial institutions. Others suggest that tax expense, profits earned by banks, inflation rates and competition are some of the determine interest rates set by financial institutions.

H. S. Houthakker & P. J. Williamson (1996) suggest that different rates of interest are charged for the same sum of loan for the same period because of the fact that some loans involve more risk, more inconvenience and more incidental work. Thus interest is of two types: *pure interest* and *gross interest*. The **pure interest** is the payment for the use of money as capital when there is neither inconvenience, risk nor any other management problem. The **gross interest** is the gross payment which the lender gets from the borrower. It includes not only net interest but also payment for other elements, which have been outlined below.

i. Elements of Gross interest

i. Payment for risk

Every loan, if not secured fully, involves risk of non- payment due to the inability or unwillingness of the borrower to pay back the debt. The lender charges something extra for taking such risk.

ii. Payment for inconvenience

The money lender may add extra charges for the inconvenience caused to him. The greater the inconvenience involved, the higher will be such charge and consequently the gross interest. For instance, the borrower may repay at a very inconvenient time to the lender or the borrower may invest the capital for a period longer than the one for which loan has been given.

iii. Payment for management

The lender expects to be compensated for the additional work he has to do in connection with lending e.g., the form of keeping accounts, sending notices and reminders and other incidental work.

iv. Payment for exclusive use of money, i.e. pure interest

It is the payment for the use of money which is in addition to payments for the above-mentioned risks, inconvenience and management. In short, gross interest is the total payment which the lender gets from the borrower, whereas, net interest is just one part of gross

interest which is paid exclusively for the use of capital. According to Keynes, interest is purely a monetary phenomenon and its rate is determined by the monetary forces of demand and supply. Interest is the reward for capital and is the payment made to the supplier of capital for the use of this factor in the process of production.

They also indicate that the most basic determinant of interest rate is what economists call the real rate of interest, or the rate at which capital grows in the physical sense. In addition to the real rate of interest, market interest rate is also affected by various risk premiums which investors may demand. In order to undertake risky investments, lenders may require one or more risk premiums to be paid over and above the real rate of interest to induce them to lend their funds when the risk of loss exists. Since the interest rates and loans are typically in nominal money quantities, rather than real physical quantities, the nominal interest rate must contain an allowance for the rate of price changes so that lender's wealth is not be corroded away by inflation.

Level of interest rate is determined by

Nominal or market = real rate of interest + various interest rate possible risk premium + expected

Rate of return

They added that, although the rising rates of inflation push up the interest rate, sometimes, changes in interest rates are not related to inflationary factors but, are result of various risk premiums, changes in supply of and demand for loanable funds. During a period of economic

expansion, the unemployment rate falls, business activity quickens and business needs more money finance for purchase of machinery and to build bigger plants. This results into higher interest rate. In contrast, during slowdowns and recession, unemployment increases, manufacturing activity slows and demands for credit decreases. This results into fall in interest rate, if all other factors are constant.

Deutsche, Bundes bank Monthly Report July 2001, indicated that in a monetary economy in which money is the unit of measurement for all prices, it is not only important how many monetary units are obtained in return for forgoing immediate access to goods (“saving”), but also how many goods those units will be able to buy in the future; much the same applies to investment. Hence the money interest or nominal interest is adjusted to take account of the price changes which occur during the observation period and saving and investment decisions are based on the real interest rate. Analyses of real and nominal interest rates yield similar results only when the rate of inflation is stable and low. The use of nominal rather than real interest rates can lead to wrong decisions, particularly over longer periods.

The Fisher parity links the real interest rate and the nominal interest rate:

$$r = i - \pi^e$$

where r stands for the real interest rate

i for the nominal interest rate with the same maturity

π^e represents the expected inflation

H. Berument and K. Malatyali indicate that the real interest rates should move with expected inflation. Not knowing the inflation rate for the current period contributes to the risk undertaken while holding the asset. Risk adverse agents demand compensation for holding a risky asset in the form of additional returns. Therefore, there should be a positive correlation between inflation risk and nominal interest rates.

The monetary and financial systems workbooks(1991) notes that the impact of changes in short –term interest rates charged by commercial banks depends on the base on which the loan was agreed. It notes that there are three alternative bases relevant here.

1. A fixed margin above and inter-bank rate;

The relationship between the interbank rate and the rate charged on commercial bank Loan is straight forward, since if a loan has been made at say three percent above three months interbank rates, a rise in interbank rates will give rise to immediate rise in the rate charged by the bank.

2. A fixed margin above the banks base rate

The relationship is somewhat more complicated here, since it depends on the link between the bank base rate and the interbank rates. Base rates tend to follow the general trend in short term interbank rates over the longer term, due to fact that short term interbank rates represent the marginal cost of funds to a bank. It notes that for some banks where significant proportion of their lending is funded from wholesale sources, these short-term interbank rates

come close to representing the average cost of funds in addition to marginal cost. However, over the short term interbank rates will turn to diverge from bank base rates due to the cost and perhaps the loss of customer goodwill associated with frequent changes in base rates. Accordingly, banks will turn to adjust their base rates when change in interbank rates is expected to be long lasting, when it is relatively large change and when the proportion of a bank funding at these interbank rates is high. The result is that adjustment turns to take place with a lag and in relatively large step when it does occur, but in certain cases a very narrow profits margin on lending activities may cause a bank to change its base rates quickly. It notes that banks will not let the divergence (in either direction) between the base rates and interbank rates become too large as this will encourage arbitrage(borrowing from banks when base rates are low in order to on-lend in the whose market).

3. At fixed rates

Some lending, particularly to personal sector, is undertaken by banks on fixed rate basis.

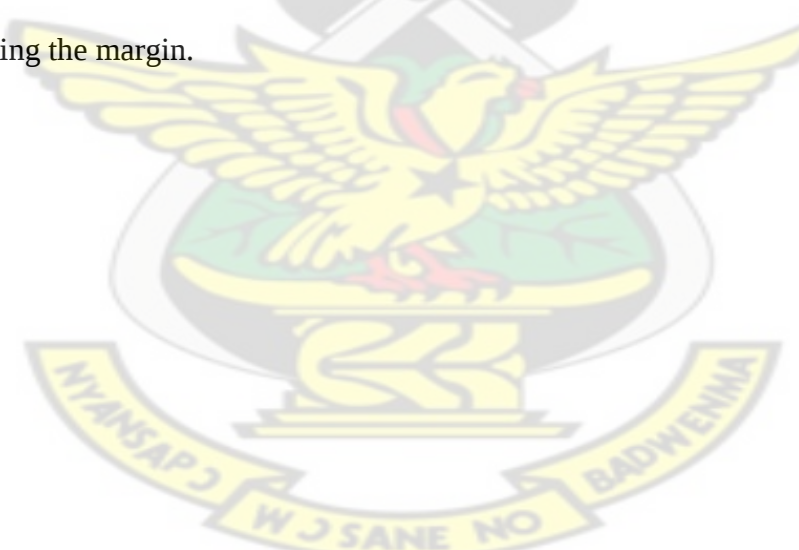
Clearly, changes in interbank rates will have no impact on such loans. But as they mature and new loans are negotiated, the new fixed rates are likely to reflect the altered cost of funds to the banks.

Zuzana Fungacova and Tigran poghosyan in their research, Determinants of bank interest margins in Russia: Does bank ownership matter? based their research on the dealership model proposed by Ho and Sauders (1991). Under this model banks are assumed to be risk-averse intermediators in financial markets, collecting deposits and granting loans. An important factor influencing the size of bank margin in this model is transaction uncertainty due to asymmetric arrival time of supply of deposits and demand for loans. Another factor

deriving the margin is the market structure; due to the relative inelastic demand for loans and supply of deposits, banks chose to exercise their market power and set higher margins.

According to Zuzana Fungacova and Tigran poghosyan, the main criticism of Ho and Sauders (1991) model is its failure to recognize the banks as a firm having a certain production function associated of an intermediation service. They assert that the presence of cost inefficiencies associated with the production process across banks can have a distortionary effect on the margin.

The extension of the basic dealership model by Maudos and Fernandez de Guevara (2004) responds to this criticism by explicitly incorporating the role of operation costs and providing a detailed description of the link between riskiness and margins. This model specifically differentiates between market risk and credit risk, as well as their interaction as separate factors affecting the margin.



CHAPTER THREE

METHODOLOGY

3.1 Introduction

The study intends to determine the factors that impact the lending rates in commercial banks in Ghana. To this, a number of factors will be assessed. The contribution of market characteristics and policy driven factors that impact lending rates among commercial banks in Ghana and how this impact differs from that of micro financial institutions in the country. This study looks at the lending rates of commercial banks as opposed to Bawumia, Balnye and Ofori (2005) who looked at the determinants of interest spreads in the Ghanaian commercial banks.

Folawewo and Tennant (2008) who looks at the determinants of interest spreads in Sub-Saharan African countries and many studies that looks at the determinants of interest spreads. The interest spreads is gotten from the difference between the lending rates of commercial banks and the policy rates as set by the central banks.

This chapter seeks to address among other things, the methods and procedures to be employed in finding the determinants of the banking lending rates in Ghana. The research design will be discussed, the population of the study will be looked at and how to select the samples for the research. The sampling frame and the sampling technique to be employed will be discussed.

Instrumentation, data gathering and how the data gathered will be analyzed will also be discussed.

3.2 Research Design

Correlative causal design will be used in carrying out study since the study intends to find out the factors that cause the lending rates in Ghana to either increase or decrease. This is also used to determine the trend of lending rates in Ghana as against the factors that impact it.

Another method for developing multiple regression models is called the *best subsets* method will be employed in the study. As the name implies, this method works by trying possible subsets from the list of possible independent variables. The user can then select the “best” model based on two widely used criteria, the adjusted R-square and the C_p statistic.

The first criterion that is often used in the model is the adjusted r^2 , which adjusts the r^2 of each model to account for the number of variables in the model as well as the sample size. Because the models with different number of independent variables are to be compared, the adjusted r^2 is more appropriate than r^2 .

A second criterion often used in the evaluation of competing models is based on the statistic developed by Mallows. This statistic, called C_p , measures the differences of fitted regression model from a *true* model, along with random error. When the regression model with p independent variables contains only random differences from true model, the average value C_p is $(p+1)$, the number of parameters. Thus, in evaluating many alternatives regression models, our goal is to find models whose C_p is close to or below $(p+1)$.

Also, quantitative design will be used in the study since quantitative data will be sourced regarding the banking characteristics that impact lending rates, the industry characteristics that impact lending rates and the macroeconomic characteristics that impact lending rates.

With the commissioning of Energy the total number of commercial banks in Ghana has risen to twenty eight (28) with the Bank of Ghana serving as the regulatory body in the Banking industry.

The banking industry has seen an increase in number with influx of foreign banks especially Nigerian owned banks. The study intends to use a probability sampling technique, simple random sampling technique, to select the number banks to be used for the study. This is because the total number of banks, the population, is known to be twenty eight (28). The study will also use the simple random sampling technique to select samples for the micro financial institution for the study.

3.3 Population and Sample Size

With the inauguration of the Energy bank, the total number of banks in Ghana stands at 28. One of these is operating with universal and offshore license and 26 operating with universal banking license. There is also one Apex bank that serves as a representative of the rural banks. It therefore liaises with other banks in an effort to carry out the various banking of the rural folks through the rural banks. The bank of Ghana serves as the regulatory body of the banking industry in Ghana and is responsible for enacting rules that best keep the industry sound and conducive for doing business. It is also responsible for setting the policy rates that guides the other banks in doing business.

The study will use a sample size of 10 banks in carrying out the investigation. To this, simply random sampling technique will be used to select the six banks for the study. Data regarding the rates of these banks will be sourced for the period of five year beginning the year 2005 to 2010 for the study. For the rural banks, the average lending rates for the period 2005 to 2010

will be sourced from the mother bank, Apex bank, for the study. This is because of the large number of rural banks in the country.

3.4 Sampling Frame and Sampling Technique

The sampling frame in the research comprises of the 28 banks in Ghana namely, Ghana commercial bank, Barclays bank, Access bank, Agricultural development bank, Bank of Baroda, Banque Sahelo-Sahareinne, Cal Bank, Ecobank Ghana, Fidelity bank, First Atlantic merchant bank, Guarantee trust bank, HFC bank, Intercontinental bank, international commercial bank, Merchant Bank, National investment bank, Prudential bank, SG-SSB Ltd, Stanbic bank, Standard Chartered bank Ghana, The Trust bank, Unibank, United bank for Africa, UT bank, Zenith bank, Amalgamated bank and Energy bank. The Energy bank will not be considered in this study since it was not operational during the year 2005 to 2010. The frame is then reduced to the 27 banks in the country. Simple random sampling technique (balloting) will be used to select samples for the study. The first ten banks selected will be used for the study. This is because the population of banks in the country is known and satisfies the assumptions in simple random sampling technique. Secondary data regarding their lending rates, the banks characteristics (operating cost, staff cost, cost of funds, taxation, profit margins etc) will be sourced for the period 2005 to 2010 to carry out the study and analysis. The market characteristics for the various years will also be assessed including the inflation rates and the policy rates as set by Bank of Ghana.

3.5 Data gathering

The research will use only secondary data hence the data sourced from the yearly financial statements of the banks and the performance of the banking industry. Data regarding the various banks characteristic will be extracted from these reports. These data will be analyzed and inference made about the study. Various characteristics of the banks (market characteristics, operational cost, etc), regulatory environment and macroeconomic factors will be used for the study.



CHAPTER FOUR

DATA ANALYSIS AND INTERPRETATION

4.1 Introduction

This chapter consists of data collected regarding the various banks characteristics and the macroeconomic factors under which these characteristics were determined. The banking characteristic that were included in the research are;

- a. The lending rates of the various banks; this was denoted by the base rates of each bank at the end of the year.
- b. The operating expense of the various banks as recorded in the income statement of the banks at the end of the year. This included expenses incurred in salaries and employee benefits , administrative expenses, depreciation and amortization, and IT expenses
- c. The interest expense of the various banks. This consists of the interest paid on customer deposits and that paid on deposits from other banks.
- d. The stated capital of the various banks as indicated on the balance sheet at the end of the year. This serves as an indication of the size of the bank.
- e. The profits recorded by the various banks at the end of the year after tax

The macroeconomic factors that were considered are;

- a. The gross domestic product (GDP) in a particular year. This serves as an indication of the growth of the economy.

- b. The rate of inflation in a particular year serving as the rate of changes in prices of commodities in a particular year.
- c. The average policy rates as set by the central bank in a given year. This serves as the rate at which central banks lend to the various commercial banks
- d. The average treasury bill rates

The base rates of the banks were regressed on the various banking characteristics to determine which of them impacted on the base rates. Also, it was regressed on the macroeconomic factors to determine which of them impacted on it.

4.2 Data Analysis and Results

Secondary sources of data were collected for the study. Data regarding the income statement and the balance sheets of the various banks were collected from the annual banking survey conducted by Price Water House Coopers. Also data regarding inflation, gross domestic product, T bills and the policy rates as set by the central bank were sourced from the Statistical service and the Bank of Ghana for the stated.

To determine the various banks characteristic that impact lending rates, the average base rate (representing the lending rates) was regressed on the various banking characteristics collected (operating expense, profit of the banks, stated capital and interest expense).

Table 4.1 Pearson correlations

	BASE	OPERATING	PROFIT	INTEREST	CAPITAL
BASE	1.00				
OPERATING	0.372	1.00			
PROFIT	0.049	0.302	1.00		
INTEREST	0.586	0.744	0.172	1.00	
CAPITAL	0.437	0.795	0.259	0.634	1.00

Table 4.1 shows Pearson correlation statistics used to measure association between the base rate, operating expense, interest expense and the capital. It can be observed that, 0.586 Pearson correlation coefficient shows fairly strong positive relationship between base rate and interest rate. This shows that interest expense has fairly strong positive impact on the base rates of the banks.

Meanwhile, capital of the banks has about 0.437 correlations with bank's base rates. This indicates fairly strong positive relationship between capital and base rate. Thus capital correlates positively on the base rate of banks.

There was about 0.372 weak positive correlations between operating expense and base rate. This shows that there is weak positive relationship between operating expense and base rate, which means that operating expense, correlates with the base rate in a positive fashion.

Table 4.2 Best Subsets Regression

Variables	R-sq.	R-sq. adj.	Mallows C_p	Std. error	Operat.	Prof.	Int.	Cap.
1	33.0	2.3	2.8210	-				
1	19.1	17.4	13.5	3.1312				x
2	35.2	32.5	3.6	2.8314	x		x	
2	35.0	32.3	3.7	2.8353			x	x
3	38.6	34.6	3.1	2.7856	x		x	x
3	35.5	31.3	5.4	2.8549		x	x	x
4	38.8	33.3	5.0	2.8134	x	x	x	x

From the Table above, it can be observed that first three variable combination with operating expense, interest expense and capital have the highest R-square adjusted value of 34.6% with the lowest standard error of about 2.7856 and Mallows C_p of 3.1 which is below $p+1=3+1=4$. Therefore, the best possible subset to be considered for the multiple regression model consist of the independent variables operating expense, interest expense and capital.

Table 4.3 Multiple Regression Analysis: weighted analysis using weights in banks

Predictor	Coeff	SE Coeff	T	P-value
Constant	21.7880	0.5653	38.54	0.000
Operating	-0.00004334	0.00002336	-1.86	0.070
Interest	0.00012420	0.00002750	4.52	0.000
Capital	0.00003617	0.00002923	1.24	0.222

The multiple linear regression model can be derived from Table 4.4 above as

$$\text{BASE RATE} = 21.8 - 0.000043 \text{ OPERATING} + 0.000124 \text{ INTEREST EXPENSE} + 0.000036 \text{ CAPITAL}$$

Hypothesis for testing the coefficients in the regression model above is given by

$$H_0: \beta_j = 0$$

$$H_1: \beta_j \neq 0 \quad \text{where } j = 1, 2, 3.$$

From Table 4.4 since the independent variables operating expense and capital with p-values 0.070 and 0.222 respectively are each greater than the significance level of 0.05. This shows that there is sufficient evidence to conclude that the coefficients of these variables are each equal to zero and hence these factors are not significant in predicting the base rate of the banks. However, the p-value = 0.000 of interest expense is less than the significance level of 0.05 and therefore there is enough evidence to conclude that the coefficient of interest expense is not equal to zero. Thus, interest expense is relevant in predicting base rate of the banks.

From the above regression model, it can be deduced that a unit increase in interest expense will cause the base rate of the banks to increase by 0.000124, controlling for other factors.

About 39.1% of the variability in the base rate of the banks was explained by the independent variables with a standard error of about 6.34439. Refer to Table 1 in Appendix B.

Table 4.4 Analysis of Variance

Source	Df	SS	MS	F	P-value
Regression	3	1187.77	395.92	9.84	0.000
Residual error	46	1851.56	40.25		
Total	49	3039.33			

Hypothesis for testing model fitness

H_0 : the model does not fit the data set

H_1 : the model fit the data set

The p-value = 0.000 of the regression model is less than the significance level of 0.05, this means that we reject the null hypothesis and conclude there is sufficient evidence to show that the model fit well the data set used.

Table 4.5 Pearson Correlation mean base rate and policy rate and Tbill

	MEAN BASE RATE	POLICY RATE	TBILL
MEAN BASE RATE	1.00		
POLICY RATE	0.291	1.00	
TBILL	-0.153	0.895	1.00

Table 4.5 shows Pearson correlation statistics used to measure association between the base rates, T bill and the policy rates. It can be shown that 0.291 Pearson correlation shows a weak correlation between base rates and the policy rates. This shows that policy rates have fairly weak positive impact on base rates set by commercial banks with base rates increasing with increasing policy rates resulting in increasing base rates.

Also, from 4.5, it can be shown that -0.153 Pearson correlation shows a weak negative correlation between the base rates and the T bill. This shows that T bill have fairly weak negative impact on the base rates with increasing base rates resulting in decreasing base rates.

Table 4.6 Pearson Correlation means base rate and GDP and inflation

	MEAN BASE RATE	GDP	INFLATION
MEAN BASE RATE	1.00		
GDP	0.786	1.00	
INFLATION	0.930	0.798	1.00

Table 4.6 shows Pearson correlation statistic used to measure association between base rate, gross domestic product (GDP) and Inflation. It can be shown from the table that, 0.786 Pearson correlations shows a strong positive correlation between base rates and GDP. This shows that GDP has strong positive relationship with base rate.

Also, 0.930 Pearson correlations show a strong positive correlation between base rates and inflation. This shows that Inflation has strong positive relationship with base rate.

CHAPTER FIVE

CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

To determine the factors that impact lending rates in Ghana a number of objectives were set and data collected in order to determine such factors. Among the objectives set were,

- a. Identify the firms specific factors impacting lending rates in Ghana.
- b. Identify the banking industry factors or characteristic impacting lending rates in Ghana.
- c. Identify macroeconomic factors impacting lending rates in Ghana.

For the firms specific factors, data regarding individual banks were collected using simple random sampling to select 10 banks in the country. The factors that were considered were,

- a. Stated capital of the individual banks
- b. Interest expense
- c. Profit of the banks
- d. Operating expense

Also, for the banking industry factors, data regarding characteristics of the banking industry in Ghana were collected. The factors considered were,

- a. The policy rates as set by the central bank
- b. The treasury bill rates (T-bill rates)

Lastly, for the macroeconomic factors, data regarding economic conditions in the country were collected. The factors considered were,

- a. Gross domestic product
- b. Inflation

5.2 Conclusions

It was determined that for bank specific factors, only interest expense was significant in determining lending rates. Lending rate was found to increase with increasing interest expense. This was ascertained using Pearson correlation the best subsets and the Mallows statistic, C_p at a significance level of 0.05. Lending rate was regressed on operating expense, stated capital profit of the banks and interest expense. Operating expense, stated capital and profit of the banks were found not to impact lending rates using the data received.

Also, for the banking industry factors that impact lending rates, it was ascertained that the policy rates and the T-bill rates were significant in predicting the lending rates in Ghana. Lending rates was found to increase with increasing policy rate but decrease with increase in T-bill rates. This was also determined using the Pearson correlation analysis at a significant level of 0.05. Lending rate was regressed on T-bill and policy rates and both were found to impact lending rates.

Finally, for macroeconomic factors that impact lending rates, inflation and gross domestic product were found to impact lending rate with increasing inflation and gross domestic product resulting in increasing lending rates. This was also determined using Pearson correlation analysis at a significant level of 0.05. Lending rate was regressed on rate of inflation and gross domestic product. Both were found to be significant in predicting lending rate in Ghana.

5.3 Recommendations

In predicting lending rates in Ghana, the interest expense, the rate of inflation, the gross domestic product, the policy rate and the T-bill rates should be considered. Banks should consider these factors in setting their lending rate. Increasing policy rate should lead to increase in lending rate. That is if central bank increases policy rate banks will pass the increase to customers by increasing lending and the vice versa. Therefore in regulating the lending rate, central bank can adjust the policy rate in order to either increase or decrease lending rate.

Also the interest paid on deposits by individual banks is a major factor banks in Ghana should consider in setting their lending rates. The higher the interest paid on these deposits the more the lending rate will be and the smaller the interest paid the lower the lending rate will be.

The rate of inflation in Ghana should be considered in determining lending rates in Ghana.

Increasing rate of inflation should lead to increase lending rates. Hence banks in Ghana should be increasing lending rates if the rate of inflation is rising.

Banks in Ghana would also be increasing lending rates if T-bill rates are rising and also decrease their lending rate if T-bill rate is falling. Hence T-bill rates should be considered in predicting lending rate of banks in Ghana.

REFERENCE

- Abel A. and Bernanke B.(2005), Macroeconomics, 5th ed. Addison-Wesey Publication, Boston (pp 56-60).
- Bawumia M, Belnye F and Ofori M E (2005), The determination of Bank interest spreads in Ghana: an empirical analysis of panel data. Bank of Ghana Publication 2005. WP/BOG-2005/09.
- Bhole L. M (1992): Financial institutions and markets, Tata Mcgraw Hill publication New Delhi, (pp 447-464).
- Berenson M.L., and Levine D.M. (1999). Basic Business Statistics: Concepts and Applications. Prentice Hall, Upper Sadle River, New Jersey 07458, U.S.A. (Pp 889-890)
- Cooper S. and Fraser D.R. (1990): The financial markets place, Wesley Publication Company Massachuaes, New York (pp 156-182).
- Deutsche Bundesbank, (2001). Deutsche Bundesbank monthly reports July 2001: Real interest rates: movements and determinants.
- Folawewo O. A., Tennant D. (2008), Determinants of interest spreads in Sub-Saharan African countries: a dynamic panel analysis. Unpublished
- Hakan B. and kamuran m. (1999), Determinants of interest rates in Turkey. The central bank of the republic of Turkey publication, 1999. Discussion paper 9902.
- Hernam O. J. and Pinas M. F.(2005), The maturity of loan commitments to small businesses: an empirical analysis.
- Hendric S and Williamson P. (1996): The economies of financial markets Oxford University press, (pp 141-167).
- Kwan S. (2005), Inflation Expectation; how the markets speaks, FRBSF Economic letter No.2005-25
- Mankiw N. G. (2007), Macroeconomics 6th ed.Worth publication, New York (pp 35-37).
- Mishkin F, (1981), The Real Interest Rates: An Empirical Investigation (pp155-200).
- Murfin J. (2010) Supply-side determinants of loan contract strictness.

APPENDIX A

FINANCIAL DATA OBTAINED FROM TEN BANKS

YEAR	OPERATING	PROFIT	INTEREST	CAPITAL	BASE	BANK
5	83712.00	57497	36073.00	61131.00	27.70	1.00
4	71568.00	33187	34134.00	13131.00	27.70	1.00
3	47770.00	33038	30727.00	13131.00	19.49	1.00
2	39741.00	30748	18349.00	13131.00	19.24	1.00
1	32705.90	23215.2	14063.00	13131.00	22.24	1.00
5	151895.00	-20291	55865.00	115046.00	27.75	2.00
4	125634.00	-7350	55338.00	46096.00	27.75	2.00
3	69177.00	30387	25249.00	7000.00	19.50	2.00
2	36800.00	31530	13733.00	7000.00	21.25	2.00
1	27597.70	26903	9791.80	7000.00	22.25	2.00
5	73723.00	53043	44609.00	100000.00	28.00	3.00
4	55111.00	33745	24381.00	16400.00	27.00	3.00
3	32010.00	22742	13966.00	16400.00	19.25	3.00
2	23565.60	16238.6	10773.70	16400.60	21.25	3.00
1	18377.30	11454.3	8971.50	7298.10	22.25	3.00
5	140194.10	18117.2	134311.70	72000.00	28.75	4.00
4	118482.70	37004.9	49610.40	72000.00	26.00	4.00
3	99312.70	32267.2	22347.40	72000.00	18.50	4.00
2	80313.40	25540.6	14986.30	12000.00	21.00	4.00
1	63914.60	12661.8	14015.70	2000.00	22.00	4.00
5	63610.80	12668.3	39603.10	50000.00	28.50	5.00

4	59711.90	14934.8	20474.90	50000.00	25.50	5.00
3	44695.80	11597.9	11298.80	20000.00	18.00	5.00
2	32195.10	10765	11066.60	20000.00	19.50	5.00
1	25125.90	7467	10550.00	20000.00	20.50	5.00
5	24439.30	3435.80	30,032.3	7,100.0	27.0	6.00
4	19685.40	4393.80	17,239.1	7,100.0	27.0	6.00
3	13419.70	2754.20	11,974.5	7,100.0	19.5	6.00
2	11280.90	1730.70	6,988.7	7,180.0	21.5	6.00
1	7902.80	2300.70	6,347.3	4,080.0	22.5	6.00
5	23971.70	11181.4	27819.50	25000.00	27.50	7.00
4	19683.80	9560.40	14189.30	7000.00	27.50	7.00
3	13357.00	8009.20	6828.10	7000.00	19.50	7.00
2	10042.80	5605.40	4199.10	7000.00	21.50	7.00
1	7487.80	4529.60	4925.50	1000.00	22.50	7.00
5	54237.20	19293.1	10820.10	62393.60	25.70	8.00
4	43091.90	15521.7	7002.00	7000.00	24.25	8.00
3	36798.30	11589.1	7740.10	7000.00	18.90	8.00
2	32792.00	9900.30	8378.00	7000.00	21.60	8.00
1	28405.40	9285.70	7874.90	7000.00	22.50	8.00
5	24654.00	8878.00	41714.00	25000.00	27.00	9.00
4	20702.00	7976.00	21707.00	8272.00	27.00	9.00

3	14181.00	4745.00	12376.00	8008.00	19.50	9.00
2	8629.30	4550.20	6849.50	7142.90	21.50	9.00
1	6480.10	2802.70	5184.80	7142.80	22.50	9.00
5	19938.10	6458.70	40746.90	7200.00	27.75	10.00
4	16146.00	6847.00	16361.00	7200.00	27.75	10.00
3	9117.00	1563.00	7661.00	7200.00	19.5	10.00
2	4116.60	-417.20	3119.10	7200.00	19.5	10.00
1	2670.20	439.60	3206.10	1379.20	22	10.00

Policy rate	T bill	Mean Base rate
16.83	15.24	27.57
14.33	10.17	26.75
12.67	9.94	19.16
15.79	18.15	20.78
18.29	25.26	22.14

GDP	Inflation	Mean Base Rate
21,746.8	25.26	27.57
17,451.6	18.15	26.75
14,045.8	9.94	19.16
11,672.0	10.17	20.78
9,726.1	15.24	22.14

APPENDIX B

Table 1 Summary of Regression Statistics

Standard error	R-square	R-square adjusted
6.34439	39.1	35.1

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