UNIVERSITY OF NAIROBI

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IMPACT OF INTEREST RATE LIBERALISATION ON SECTORAL GROWTH IN KENYA- A PANEL STUDY

BY

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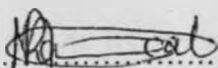
AUGUST 2008

DECLARATION

This research paper is my original work and has not been presented for a degree award in any other University.

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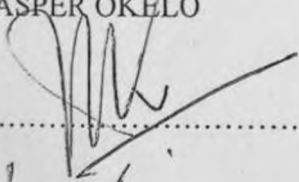
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DEDICATION

I dedicate this research work to my loving husband, Raymond Khasabuli, who was a source of strength until its completion. His words *'for success one has to burn the midnight oil'* are very fresh in my minds. I thank him for paying my fees and hence empowering me as a woman. On the other hand, my father- Jackson Musitia and my Mother- Getrude Mutua kept telling me to work hard. As for my sister Agnes who took care of my children namely: Prudence, Byron and Brans, may God bless her.

ACKNOWLEDGMENT

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ACRONYMS

FE   Fixed Effects

GDP   Gross Domestic Product

ISR   Institute of Social Research

PSID   Panel Studies of Income Dynamics

RE   Random Effects

SAP   Structural Adjustment Program

SNA 1993   System of National Accounts 1993

TDR   Treasury Discount Rate

ABSTRACT

This study empirically analyzes the impact of interest rate liberalization on economic growth in Kenya through its influence on sectoral performance and it also identifies policies that must accompany interest rate liberalization so to stimulate sectoral economic performance in Kenya. Its objective is to examine the impact of interest rate liberalization on GDP contribution per sector to the Kenyan economy. It is based on McKinnon-Shaw argument that financial deregulation (higher real interest rates) encourages savings and investment and predicts that under the presence of complementary policies, interest rate liberalization leads to growth.

In an attempt to empirically examine the linkage between interest rate and growth, the study employed a panel data analysis over the major sectors of the Kenyan economy which gives it a unique approach from other studies that have generally employed time series in showing the positive role of interest rate liberalization on economic growth. In this study, the Fixed Effects Panel Data Model was adopted as there was an assumption that there are different intercepts for each cross-sectional group.

The study analyzed a sample of 12 listed sectors using panel data for a period of 25 years (1982-2006). Policy variables associated to interest rate liberalization that stimulate sectoral growth were included as explanatory variables.

The results show that among the complimentary policies to interest rate liberalization, investment in physical capital has a greater positive impact on sectoral growth. Generally, the findings support the fact that financial deregulation (higher real interest rates) encourages savings and investment and predicts that under the presence of complementary policies, interest rate liberalization leads to growth.

CHAPTER ONE

1.0 INTRODUCTION

1.1 Background

Since the widespread acceptance of the idea of financial liberalization, many developing countries have implemented far-reaching financial reforms. The centre-piece of these reforms has been the liberalization of interest rates. However, with regard to interest rate liberalization, most of these countries have had predominantly traumatic experiences. In the wake of interest rate liberalization, Kenya, for example suffered sharp increases in interest rates, worsening inflation, unstable exchange rates and declining saving and investment rates. The major inflation episodes in Developing Countries between 1980-1996 [1] shows that the incidence of high inflation [2] in Kenya was experienced between 1992-1994 just after Kenya had liberalized her interest rates in 1991. Whether interest rate liberalization does indeed impact positively on economic growth as postulated by McKinnon (1973) and Shaw (1973) hypotheses remains a question for empirical investigation. This research attempts to investigate the impact of interest rate liberalization on the growth of different sectors of the Kenyan economy. The thrust of the argument here is that, interest rate liberalization may have had different effects on the sectoral performance which has contributed to economic growth in Kenya.

In an attempt to empirically examine this linkage, the study will employ a panel data analysis over the major sectors of the Kenyan economy which gives it a unique approach from other studies that have generally employed time series in showing the positive role of interest rate liberalization on economic growth. Mwega et al (1990), for instance, undertook a study to test the McKinnon-Shaw hypothesis in Kenya. They used a three equation model with data covering the period 1966-1985. The first equation in their model captured the hypothesis that real private saving rate is influenced positively by real deposit rate. The other two equations captured the hypotheses that, real money balances and demand for credit by the private sector are influenced by real deposit rate and real lending rate respectively. The equations were tested separately. The private saving rate equation parameters were estimated by both OLS and 2SLS methods while the others were estimated by OLS. The results showed that the cost of borrowing has a significant negative influence on the demand for credit to the private sector. The study evidence does not support the hypothesis that increase in the real deposit rate raises the private sector

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[1] Source: International Financial Statistics
[2] High inflation is defined as a change in the CPI in excess of 25 percent during the (years) in question

financial and non-financial savings which are then utilized to support a high level of credit supply for investment in the economy.

1.1.1 Sectoral Analysis

All the sectors of the Kenyan economy recorded impressive growths in the third quarter of 2007 with high growths being witnessed in Hotels and Restaurants, Construction, Electricity and Water, Manufacturing, Financial Intermediation and Agriculture. Provisional results for the first nine months from the Kenya National Bureau of Statistics estimate the economy to have grown by 6.9 per cent in 2007 compared to a growth of 5.8 per cent over the same period in 2006.

Agriculture sector growth is estimated to have grown by 7.7 per cent in the three quarters (nine months) of 2007 compared to a growth of 4.7 per cent in 2006 over the same period. The Manufacturing sector is also estimated to have grown on average by 8.3 per cent in the three quarters of 2007 compared to a growth of 7.1 per cent in 2006. In the three quarters of 2007, the Electricity and Water sector is estimated to have grown by 8.6 per cent compared to a decline of 1.2 per cent in 2006.The continued demand for distributive services enabled Wholesale and Retail Trade sector to grow by 7.0 per cent in the three quarters of 2007. Within the same period, Transport and Communication sector recorded an average growth of 8.5 per cent. Due to increased bed occupancy resulting from the continued rise in the number of tourists, the Hotel and Restaurant sector recorded an average growth of 12.6 per cent in 2007 compared to a growth of 11.9 per cent in 2006. The construction sector had an average growth of 10.3 per cent compared to 4.4 per cent in 2006 because of a rise in cement consumption which is a key indicator for the sector. Considering the Financial Intermediation sector, the average growth in the three quarters of 2007 was 7.9 per cent compared to 5.3 per cent in 2006. This was due to the increase in domestic credit, loans and deposits in the financial institutions.

1.1.2 Kenya's Economic Structure

The macroeconomic performance of the Kenyan Economy since independence can be assessed in the context of external shocks and internal changes that the economy had to adjust to. Four phases are identifiable; A rapid economic growth phase over the period between 1964 and 1973, an era of external shocks between 1974 and 1979 dominated by oil shocks and coffee boom, a period of stabilization and structural adjustment in the 1980s and the era of liberalization and declining donor inflows from 1990 to date. To address the macroeconomic instability, the government introduced liberalization and

deregulation of trade and exchange rate regimes, public and financial sector reforms through the Structural Adjustment Program(SAP).

The overall effect of changing circumstances has been declining. In spite of all these, the Kenyan economy has mixed growth performance in major economic sectors as indicated in table 1. Bearing in mind that Kenya's economic structure comprises of monetary and non-monetary sectors; in the monetary sector, agriculture continues to dominate followed by manufacturing in that order.

Table 1: Sector Shares in Real GDP (%) for selected Years

Main Sectors	1982	1987	1992	1997	2002	2006
Agriculture	28.36	26.48	24.22	22.36	24.86	24.23
Forestry and logging	0.39	0.39	0.48	0.59	0.50	0.43
Fishing	0.78	0.93	0.08	0.76	0.50	0.50
Mining and Quarrying	0.41	0.47	0.48	0.46	0.50	0.45
Manufacturing	9.99	10.48	11.14	11.01	9.74	9.93
Electricity and water supply	1.97	2.04	2.34	2.21	1.83	1.75
Construction	4.63	3.72	3.34	3.02	3.04	3.03
Wholesale and retail	7.25	8.23	8.18	9.19	8.89	9.44
Hotels and restaurants	2.32	2.04	1.81	1.74	1.21	1.44
Transport and communication	8.64	8.28	8.32	7.87	9.88	10.89
Financial intermediation, real estate, business services	4.86	5.32	6.27	7.80	7.00	6.38
Others[3]	18.11	22.31	23.65	22.29	22.15	20.03

SOURCES: Central Bank of Kenya and Kenya National Bureau of Statistics.

1.1.3 Transmission mechanisms

There are several channels through which interest rate liberalization (policy) influence sectoral growth (goal). One of them is the the interest rate channel. This is a standard Keynesian channel in which for the case of Kenya, if the Central Bank (policy) interest rate falls, market interest rates also falls to imply that the cost of borrowing has also dropped. This in turn encourages borrowing which is translated into increased investments and hence an increase in sectoral output. Whether interest rate liberalization indeed

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[3] Others includes Dwellings, owner occupied and rented; community, social and personal services; producers of government services;private households with employed persons and collection of firewood and water.

contributes to economic growth as postulated by McKinnon (1973) and Shaw (1973) remains an empirical issue.

Secondly, there is credit channel, also called the credit availability channel. It rests on the argument that it is not always the cost of funds that determines the availability of funds. Monetary policy can work through non-price credit rationing that is manifested through directed lending and/or due to the issue of imperfect information, it becomes possible for a commercial bank to deny an individual a loan. Thus high deposit rates would stimulate investment spending by allowing the supply of credit to expand in line with the financial needs.

Thirdly, is the other asset prices channel. It was proposed by the Monetarists who criticized Keynesian model in which the only alternative financial asset to money is bonds. In the Monetarist Model, there are a larger number of assets which compete for inclusion in households' portfolio like Real estates, Equity, Bonds e.t.c such that changes in the monetary policy affect their prices. In this case if the policy rate falls, price of equity rise and hence market value increases. This means Tobins q, net-worth, lending and investment increase. This eventually lead to sectoral growth.

The Neo-structuralists like Wijnbergen, (1982) emphasized that informal credit markets are an important source of residual financing (additional finance in excess of what is available to them from the formal system). This can have mixed impact of interest rate liberalization on growth and hence need for empirical analysis which the paper seeks to perform.

1.1.4 McKinnon Complementarity Hypothesis
Argues that complementarity exists between money balances (Savings) and investment (Physical capital). Positive and high interest rates stimulate savings and investment as long as interest rates do not exceed real rate of returns on investment. To arrive at this conclusion, McKinnon (1973) made the following assumptions:
(i) All economic units are confined to self-finance or outside money (no loans).
(ii) Investment is indivisible (lump-sum)

Potential investors therefore need to save or accumulate money balances to enable them undertake the lumpy investment. The incentive to do this comes from relatively low opportunity cost of accumulating money balances and the prerequisite for achieving

success is fiscal discipline because government deficits are financed by inflationary tax that may increase opportunity cost of holding money balances.

1.1.5 Shaw's Debt-intermediation Hypothesis

Shaw (1973) argues that financial deregulation (higher real interest rates) encourages savings and investment. This is because savers earn higher interest rate while investors are able to satisfy investment needs from increased accumulation of funds which hitherto could not be satisfied due to relatively high cost of searching for funds. According to this hypothesis, savings take place within the financial system and investment needs are satisfied by loans from the same system (inside money). What is saved is given out as loan hence the prerequisite for successful deregulation is free entry and competition in the banking sector so that the interest rates can adjust to equilibrate savings and investment.

1.1.6 The McKinnon-Shaw Model

McKinnon (1973) and Shaw (1973) argue that policies leading to repression of financial system reduce incentives to save and invest. They identified the key elements of financial repression as high reserve requirement, legal ceiling on bank lending and deposit rates, directed credit, restriction on foreign currency capital transactions and restriction on entry into the banking system. They rejected the monetary models of the Keynesians and the structuralists which tend to support financial repression on the grounds that the assumptions are erroneous in the context of developing countries. That argument led to the formulation of a model of financial and economic development which is given in its graphical form below.

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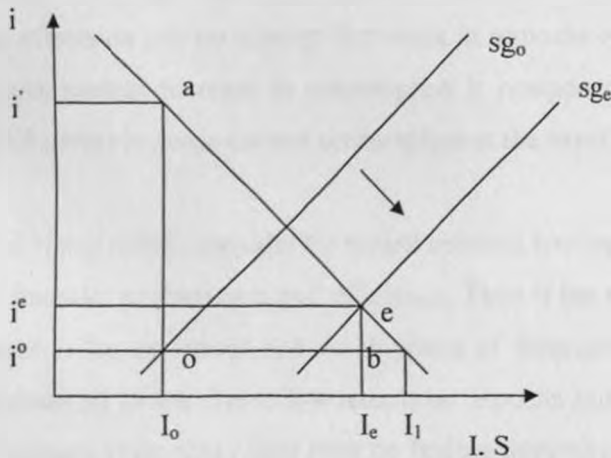
The model shows a repressed deposit rate of interest at i^o (ceiling on deposit rate of interest), causing low levels of savings and investment because economic units prefer to acquire fixed assets or consume more instead of saving. Low level of savings leads to credit rationing that is not based on price system but on considerations such as transaction costs, risk of default, quality of collateral, graft e.t.c. This creates room for inferior projects that reduce average efficiency of investment in the economy. Such investments are indicated by $i^o i^e$ b. Financial repression therefore engenders the sacrificing of high yielding investments for low yielding ones. Also increase in consumption while investment is declining retards economic development.

If interest rate is allowed to find its level, savings and investment (quantum and efficiency) would rise, leading to higher economic growth rate as shown in the movement of sg^o to sg^e. An optimum position will be achieved for the economy at point e showing higher levels of savings, investment and economic growth. This is what McKinnon-Shaw model expect from financial deregulation. For the optimum situation to be attained there is need for fiscal discipline in the public sector as well as healthy competition in the financial sector.

This model was the basis for financial sector reforms in developing countries in the 1990s. Country experiences show that application of the model actually led to quantitative increase in savings and investment at the macroeconomic level.

1.2 Problem statement

Although several attempts have been made to investigate the role of interest rate liberalization on economic growth in Sub-Saharan African countries, studies with specific reference to Kenya have been very scant. The majority of the studies done in Kenya, for instance, that of (Mwega et al 1990, Hyuha 1993) hold that high real interest rates have two separate effects on private savings that work in opposite directions. The substitution effect, in which savings increase as consumption is postponed to the future and wealth effect in which savers increase current consumption at the expense of savings.

Ndung'u and Ngugi (2000) consider the spread between lending and deposit rates as a key indicator of financial performance and efficiency. Thus if the spread is large, it works as an impediment to the expansion and development of financial intermediation because it discourages potential savers due to low returns on deposits and hence limits financing for potential borrowers Their study then rests on finding determinants of interest rate spread.

Such studies are of descriptive nature and have not concentrated specifically on the mechanism through which interest rate liberalization impacts on sectoral growth in Kenya.

In countries where such studies have been undertaken, findings on the role of positive real interest rates and their effect on sectoral growth are, at best inconclusive and their analytical framework is descriptive. A study in Uganda by Nannyonjo (2002) ,for example, just investigated the high interest rates between 1994 and 1998 and never came to a conclusion because the data set used did not capture the financial sector problems experienced between 1998 and 1999. Since panel data relate to individual sectors over time, there is bound to be heterogeneity in the units. The techniques of panel data estimation will take such heterogeneity explicitly into account by allowing for sector-specific effects.

Objectives, Research questions and significance of the study

1.3 Study objectives

The overall objective of this study is to empirically analyze the impact of interest rate liberalization on the economic growth in Kenya through its influence on sectoral performance and to identify policies that must accompany interest rate liberalization so that it stimulates sectoral economic performance in Kenya. The specific objectives are:

(a) To examine the impact of interest rate liberalization on GDP contribution per sector to the Kenyan economy.

(b) To bring a modest contribution to the debate on the effects of interest rate liberalization on sectoral growth in Kenya.

(c) Policy recommendations based on the above objectives.

1.4 Research Questions

Interest rate liberalization as a policy was regarded and adopted as an important component of economic reforms in Kenya in 1991. It is also justified by McKinnon-Shaw model as a policy that encourages savings, investments and hence economic growth as has been discussed in the literature. High interest rates also attracts capital inflow into the country via foreign portfolio investments and also being a condition given by World Bank, interest rate liberalization attracts capital via grants, Aids and loans from Multilateral financial institutions and International donor agencies. All these are expected to have been translated into greater levels of sectoral growth which are not observable in Kenya hence the following research questions arise:

1. Can interest rate liberalization be favourable to sectoral growth? Thus to what extend can a rise in interest rate increase the level of GDP contribution per sector?

2. Is interest rate liberalization alone sufficient to stimulate strongly the sectoral growth of Kenya? Thus should complementary policies such as political stability, investment in infrastructures and good political and economic governorship be put in place in order for Kenya to benefit fully from the effects of interest rate liberalization?

1.5 Significance of the study

This study will contribute towards the relevant existing literature on establishing whether interest rate liberalization exerts positive or negative influence on sectoral growth in Kenya. The period covered in this study will be between 1982 and 2006, covering both the regimes of financial repression and financial liberalization. This is based on System of National Accounts 1993 (SNA 1993) in which the economic survey 2004 presented revised national accounts aggregates for the period 1996 to 2003 in a special chapter. The main reasons for the revisions are adoption of the latest international guidelines as prescribed by the United Nations' SNA agreed on in 1993 , change of the base year from 1982 to a more recent base year of 2001 for the estimates at constant prices and availability of new data sources as well as improvements in methodology.

However, emphasis will be on the regime of financial liberalization. The study has been motivated by the current controversy over the positive role of interest rate on savings, financial deepening, investment efficiency and economic growth.

There are majority of studies done in Kenya and other sub-Saharan countries. Mwega et al (1990) ,for instance, undertook a study to test the McKinnon-Shaw hypothesis in Kenya. They used a three equation model with data covering the period 1966-1985. The first equation in their model captured the hypothesis that real private saving rate is influenced positively by real deposit rate. The other two equations captured the hypotheses that, real money balances and demand for credit by the private sector are influenced by real deposit rate and real lending rate respectively. The equations were tested separately. The private saving rate equation parameters were estimated by both OLS and 2SLS methods while the others were estimated by OLS. The results showed that the cost of borrowing has a significant negative influence on the demand for credit to the private sector. The study evidence does not support the hypothesis that increase in the real deposit rate raises the private sector financial and non-financial savings which are then utilized to support a high level of credit supply for investment in the economy. This study differs fundamentally in several ways from majority of the previous studies done in Kenya and

other sub-Saharan countries. First, the thesis assesses the impact of interest rate on sectoral growth giving it a panel study approach -an area which has not been extensively researched in Kenya. Second, the thesis critically discusses the challenges and prospects associated with interest rate liberalization in Kenya. Kenya's experiences with financial liberalization in general and interest rate liberalization in particular will be reviewed in order to relate these experiences to the presumptions of the theoretical literature on the one hand, and to serve as a precursor to the econometric investigations on the other hand.

To our knowledge, this study will be among the first to examine in detail the dynamics of interest rate liberalization in Kenya using modern econometric techniques because no study in Kenya has entailed an exhaustive investigation into this linkage by employing a panel study. The findings of this thesis will; contribute to the relevant existing literature, serve as a signal to Kenya and can also provide timely corrective options to countries that are contemplating financial liberalization within the same macro-economic framework.

This study is in line with the Kenya Vision 2030[4] which is based on three "pillars" namely; the economic pillar, the social pillar and the political pillar. The study whose focus is on the relationship between interest rates and economic growth complements the economic pillar which aims at providing prosperity of all Kenyans through an economic development programme aimed at achieving an average Gross Domestic Product (GDP) growth rate of 10% per annum over the next 25 years. This is because the paper will provide information to be used by experts in the Ministry of State for Planning, National Development and Vision 2030 to identify sectors with the most potential in driving Kenya's economic growth till 2030. The factor considered for economic impact is the potential to attract more investment locally and internationally.

The paper presents an early attempt to analytically identify complementary policies that need to be put in place in order for Kenya to benefit fully from the effects of interest rate liberalization. This is critical for policy analysis including the design of effective strategies in Kenya.

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[4] Kenya Vision 2030 is a Kenya's new long-run national planning strategy which was launched by H.E. President Mwai Kibaki on October 30th 2006.

1.5.1 Interest Rate Liberalization in Kenya (An Overview)

Two specific periods can be distinguished:

Prior to liberalization: this period was characterized by controls, fixing of interest rates and credit allocation i.e interest rates were determined through administrative controls, Republic of Kenya (1965).

Post liberalization: Is where interest rates are supposed to be determined by market forces and so far the outcome has been indeterminate. This was introduced in the Republic of Kenya (1986).

During the reform period (1990s) when interest rates were liberalized the issue was that interest rates should be market determined but the outcome is somewhat different because theory shows some indications of secondary financial repression. That is, interest rates, financial intermediation and credit allocation still contain some aspect of repression. The outcome shows that instead it is from repression to liberalization to secondary financial repression as indicated by Treasury Discount Rate (TDR) which is directly influenced by the Central Bank and is indirectly determined by the fiscal policy, an issue that was effected in the Donde bill.

Table 2:Trends of selected Interest Rates in Kenya between 1982-2006 (Interest Rate Spread)

Year	1982	1986	1990	1994	1998	2002	2006
Interest rate spread	1.02	2.17	3.5	21.05	12.97	13.6	9.43

SOURCES:

Economic Survey, various issues

Central Bank of Kenya, Annual, Quarterly and Monthly Reports

1.6 ORGANIZATION OF THE STUDY

The rest of this paper is organized as follows: Chapter two reviews the relevant literature (both theoretical and empirical) on interest rate liberalization. Methodology adopted and the estimation procedure used in the study are in Chapter three. Chapter four gives the findings of the paper and discussions. Chapter five presents the conclusions and the policy implications of the study.

CHAPTER TWO

2.0 LITERATURE REVIEW

2.1 Introduction

The literature on the impact of the real interest rates on sectoral economic growth is quite diverse. This survey of literature analyses both theoretical and empirical aspects of the impacts of real interest rates on economic performance of the major sectors of the Kenyan economy. An analysis of the various researchers' empirical work will be developed in the literature review with a view of improving it in this current study especially by employing panel data analysis.

2.1.1 The case for financial repression

Is where a financial system is kept small by a series of government interventions that have the effect of keeping very low interest rates that domestic banks can offer to savers. These government controls on the interest rates sometimes result in negative real interest rates in the wake of an inflationary situation. Repression may also be extended to include government restrictions that discourage the development of financial institutions and instruments leading to incomplete and fragmented financial markets. Keynes (1936), changed the way the world looked at the economy and the role of government in society. According to him,

$$S = f(y,r) \tag{2.1}$$

Where s -savings

y -income

r -interest rate

Savings increase when interest rate increases and hence investments also increase. Therefore motivation for financial repression is a fiscal one .That is the government wants to actively promote development but lacks the direct fiscal means to do so because of lack of political will or administrative constraints. It uses the financial system to fund development in two ways. First, by imposing large reserves and liquidity requirements on banks thereby creating a captive demand for its own non-interest bearing and interest bearing instruments. It thus finances its own high priority spending by issuing debt instruments (bonds and bills). Secondly, by keeping interest rates low through imposition of a ceiling on lending rates which creates excess demand for credit. It then requires a bank existing to set aside a fixed fraction of the credit available to priority sectors.

2.1.2 *The case for interest rate liberalisation*

Interest rate liberalisation can be characterized as part of the broader financial liberalization. Financial liberalization is broadly defined as the process of delegating to the market authority to determine who receives and grants credit, and at what price. Full financial liberalization involves six main dimensions: the elimination of credit controls, the deregulation of interest rates, free entry into the banking sector, central bank autonomy, and private ownership of banks and liberalization of international capital flows.

Until the early 1970s, it was believed that low interest rates would promote investment spending and economic growth in both developed and developing countries alike, in accordance with the Keynesian and neo-classical theories (Molho, 1986). The argument, which advocates that interest rate liberalization leads to financial development and eventually to economic growth, is based on the theoretical framework and analytical underpinning by McKinnon (1973) and Shaw (1973). The proposition of McKinnon and Shaw is that a repressed financial sector interferes with economic development in various ways. First, in a repressed economy the savings vehicles are not well developed, and the returns on savings are negative and unstable.

Second, financial intermediaries that collect savings do not allocate them efficiently among competing uses.

Third, firms are discouraged from investing because poor financial policies reduce the returns to investments thus making them uncertain and as a result, growth is retarded. Financial repression in this context is defined to entail artificially low deposit and loan rates that give rise to excess demand for loans and to non-price credit rationing McKinnon (1973) and Shaw (1973).

McKinnon (1973), for example, analyses an open economy with little possibility of external finance for the vast majority of investors. He argues that, because of the lumpiness of physical capital, savers may find it convenient to accumulate funds in monetary assets until they have enough resources to invest in higher yielding physical assets. In his thesis, McKinnon stipulates that deposits may serve as a "conduit" for capital formation, making deposits and capital complementary assets. The availability of deposits generating real rates of return may thus encourage both saving and capital accumulation. This, however, is in contrast with the neo-classical theory where the two assets (money and physical assets) are considered substitutes (see Odhiambo, 2006).

Shaw (1973) also stresses on the importance of positive real deposit rates as an inducement to save in a financially repressed economies. However, unlike McKinnon, Shaw emphasizes external rather than internal financial possibilities as the effective constraint on capital formation. Focusing on the role of deposits as a source of funds for financial intermediaries, Shaw argues that high deposit rates would stimulate investment spending by allowing the supply of credit to expand in line with the financial needs. Both McKinnon and Shaw's models focus specifically on financial repression in the form of deposit and/or loan interest rate ceilings. The real interest rate influences growth through its impact on savings and investment. The assumptions made by Mckinnon imply that savings and investment move together in the same direction (complementary behavior) as illustrated below:

$$M/P = f(Y, I/Y, i - \pi^e) \tag{2.2}$$

$$I/Y = f(r, i - \pi^e) \tag{2.3}$$

Where M/P=Real money balances (Savings)

Y=Level of economic activity

I/Y=Investment ratio (Investment/GNP)

$i - \pi^e$ =Real deposit rate of interest

r=Average rate of returns on physical assets

The complementarity is indicated by the derivatives;

$\partial(m/p)/\partial(I/Y) > 0$.......Which indicates that savings and investment move in the same direction (complementary).

$\partial(I/Y)/\partial(i - \pi^e) > 0$.......Which indicates that real deposit rate and investment move in the same direction. This is also implied in Shaws' equilibrium model as shown below;

$$M/P = f(Y, V, i - \pi^e)$$

$$\partial(m/p)/\partial(i - \pi^e) > 0$$

Where; M/P=Savings/investment loans, Y=Level of economic activity, V= opportunity cost of holding money balances (savings), $i - \pi^e$ =real deposit rate of interest.

Thus it follows that real deposit rate, savings and investment all move in the same direction.

However, it is worth noting that, while there is sufficient body of literature in support of the efficacy of interest rate liberalization theory, the theoretical arguments against interest rate liberalization are steadily growing in number and substance. Whether interest rate liberalization indeed contributes to economic growth as postulated by McKinnon (1973) and Shaw (1973) remains an empirical issue. Moreover, given that different countries have

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different financial infrastructures, such an outcome may differ from country to country and over time.

2.2 Theoretical literature review
According to conventional economic theory, high real interest rates have two separate effects on private savings that work in opposite directions, meaning that the overall effect is ambiquous. (Mwega *et al* 1990, Hyuha 1993). They have a substitution effect, in which savings increase as consumption is postponed to the future and wealth effect in which savers increase current consumption at the expense of savings.

The McKinnon-Shaw (1973) doctrine postulates that, under conditions of financial repression, the substitution effect dominates the wealth effect. It also postulates that, there is a portfolio effect in which an increase in real interest rates induces a shift in the composition of wealth portfolio from non-financial to financial intermediation.

McKinnon (1973) and Shaw (1973), argues that interest rates in the banking system should be liberalized to achieve faster sectoral economic growth. They attributed low growth and high inflation in Developing Countries at the time to the repression of the financial sectors by the existence of negative real interest rates, as a result of interest rate controls. Low interest rates unduly restrict the real flow of loanable funds, depressing the quantity and quality of productive investments. Financial liberalization which leads to higher interest rates also has two direct effects on productivity growth. First, it can increase loanable funds by attracting more households' and firms' savings to bank deposits. This makes it possible to finance larger and more complex projects than would be financed if every saver, or small groups of savers known to each other invested alone. Secondly, the process of selecting firms and projects with highest probabilities of success and rates of returns by banks and other financial intermediaries would raise the overall efficiency of investment in the economy.

Neostructuralists, while criticizing the McKinnon-Shaw view, used portfolio frameworks for the allocation of household assets to argue differently. They argued that, whether higher interest rates really increased the total of real loanable fund depends on the required reserve ratio and whether the increased holdings of real money balances came mainly at the expense of cash and inflation hedges or mainly of direct lending in the informal credit market (Buffie 1984). Therefore financial liberalization which leads to higher interest rates reduces the rate of economic growth by reducing the real supply of credit available to businesses. They were against the McKinnon-Shaw hypothesis of higher interest rates.

McKinnon (1973) proposition for economic growth emphasized the importance of financial deepening and high interest rates. His framework focuses on the response of real demand for money (broadly defined) and investment to alternative rates of return, under implicit assumption that these are the only two alternative forms of assets held by private sector. It is referred to as McKinnon complementarity hypothesis. His theoretical underpinning is that the economy of a typical less developed country is composed of household firms and the capital market is fragmented. The demand for money by household firms shift as they shift from consumption to investment because the latter is lumpy and requires a longer period of accumulation from a given income stream before disbursement. Therefore his proposition is that a rise in interest rates increases the volume of financial savings through the financial intermediaries and thereby raises investment funds, a phenomenon he calls the "conduit effect". The realized investment actually increases because of the greater availability of funds. This conclusion applies only when the capital market is in disequilibrium, that is, in a rationing situation where the demand for funds exceeds the supply.

Calvo (1992) analyzed critically the policy of high interest rate as an effective tool for stopping high inflation. He analyzed it in the context of the conventional IS-LM model. He looked at the effectiveness and desirability of relative high interest rates in stabilization programs. The conventional IS-LM approach gives strong support to a policy of high interest rates. It implies that tight money is effective in reducing economic activity and through the phillip's curve, is also effective in reducing inflation. Thus the higher the interest rates, the sooner the price stability will be achieved. However, the IS-LM model ignores two aspects of modern credit markets. First, the current world countries are close from a financial point of view. Hence, high interest rates are likely to signal expectations of a high devaluation or inflation. Second, high inflation rates make ex-ante real interest look much smaller than if the stabilization plans inflation target were to be achieved. As a consequence, banks may continue lending despite high nominal rates. With time, however, firms will find themselves in a serious financial strait which may eventually result in a state of generalized bankruptcy. He also analyzed the sustainability issues by analyzing longterm implications of raising the interest rates on bank deposits. He found that, it may result to a cut in money supply in the longer term, but does not call for an overall credit roll-back. Thus, high interest rates may jeopardize the success of an inflation stabilization program. Macroeconomic stability leads to high savings, investment and finally high growth rate.

2.3 Empirical literature review

Many researchers have been interested in the effects of interest rate liberalization on the Kenyan economy. Empirical literature that focuses on Kenya exists by such authors like Oshikoya, Mwega et al and Azam. However their findings are diverse just like those studies in other countries. Oshikoya (1992) examined the impacts of financial liberalization on savings, financial intermediation, investment and growth using data covering the period 1970-1989. His model constituted of five equations. He tested five hypotheses; the McKinnon-Shaw hypothesis; the McKinnon complementarity hypothesis; the hypothesis that low real deposit rate leads to credit availability; that high interest rate leads to high quantity and quality of investment and finally the hypothesis that high real interest rates leads to high economic growth. He found a mild support for the financial liberalization hypothesis that increased real deposit rate raise savings rate in 1980-1989, a positive correlation between the degree of financial deepening and growth rate, increase in real rates raise the level of investment and increase in real deposits rate promotes economic growth. The positive effect of real deposit rate on savings rate observed in 1980s is not statistically significant. The evidence is not robust across sub-periods. Other determinants, apart from real deposit rates, play a significant role in influencing savings investment and economic growth.

Mwega *et al* (1990) undertook a study to test the McKinnon-Shaw hypothesis in Kenya. They used a three equation model with data covering the period 1966-1985. The first equation in their model captured the hypothesis that real private saving rate is influenced positively by real deposit rate. The other two equations captured the hypotheses that, real money balances and demand for credit by the private sector are influenced by real deposit rate and real lending rate respectively. The equations were tested separately. The private saving rate equation parameters were estimated by both OLS and 2SLS methods while the others were estimated by OLS. The results showed that the cost of borrowing has a significant negative influence on the demand for credit to the private sector. The study evidence does not support the hypothesis that increase in the real deposit rate raises the private sector financial and non-financial savings which are then utilized to support a high level of credit supply for investment in the economy.

Azam (1995) observed that many researchers only take account of rate of interest on bank deposit and ignore the rate of return on some other asset that households may hold in their portfolios. Thus he tested the hypothesis that savings depend on a representative rate of return on household assets which is linked to the rate of interest on bank deposits via the

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asset market equilibrium. He found a positive and significant relationship between real rate of interest and the national saving rate in Kenya.

Fielding (1993) estimated similar structure of two equations, savings and investment equations for Kenya and Cote d'Ivoire. The functions captured factors affecting both the expected rate of return to investment and factors which may constrain the supply of funds for investment. He also examined the links between gross domestic investment and gross domestic savings. He carried out stationarity analysis and ascertained the order of integration before he estimated the two equations. He used the DW statistics and the Augmented Dickey-Fuller test to test for stationarity and obtain the order of integration for the two functions for both countries. He found that in Kenya, investors depended on domestic funds or on foreign concessional loans while other investors in Kenya appear to have access to foreign capital markets. Thus his results rejected the hypothesis of completely closed domestic capital market in case of Kenya since domestic funds, aid and concessional loans do affect the growth of investment. Other factors found to be equally important are those that reflect the rate of return on investment. The demand side factors were also found to be significant and suggested that some investors are able to borrow from the international capital markets.

Cote d'Ivoire is a member of the West African Monetary Union, a group of seven countries which share a common currency-the CFA Franc and a common central bank. He found that CFA membership has advantages of greater financial openness; more stable prices and an absence of forex rationing is an important advantage. Kenyan investment has been seriously impaired due to lack of forex. In this respect, zone CFA membership confers important advantages.

Kabubo and Ngugi, (1995) adopted Edwards and Khan semi-open economy interest rate model modified to reflect Kenya's situation. Their objectives were to explore the process of financial sector reforms; investigate the structure of interest rates and their determination across institutions and to examine factors that have influenced the determination of interests in the post liberalization period. They captured the influence of open market economy by including in their model the foreign interest rates and foreign exchange rate. They used monthly data for the period July 1991 to June 1994. The variables they included in their model are;

$$X = \left(CPI, e_t, i, (m-p), (y-p), i^* \right) \tag{2.4}$$

Where   X- Vector of the variables of interest

CPI- Inflation rate

e_t- expected depreciation of local currency

i- Domestic interest rate

(m-p)- real money balances

(y-p)- Real income

i^*- World interest rate

They found that both external and internal factors play a major role in determining the level of interest rates. The empirical results lead to their conclusion that nominal interest rate in Kenya is influenced by previous period interest rate, inflation rate, real money balances and open market factors. The results also supported Fisher's argument that there is positive relationship between expected future price level and the nominal interest rates. They also found that monetary shocks play a significant role in interest rate determination. Thus they concluded that monetary and fiscal policies are of great importance to sustain the liberalization efforts.

2.4 Overview of the literature

Most of the reviewed and existing literature on the impact of real interest rates on savings, investment and economic growth in developing countries is concentrated mainly in East Asia and Latin American countries. Very few have been done on African countries. These studies have virtually estimated the influence of most of macro-economic variables that impact on savings, investments and economic growth. However, majority of the studies are geared to testing the McKinnon-Shaw proposition that higher real interest rates raise the saving rate. The McKinnon (1973) and Shaw (1973) models discuss ways in which a repressed finance, that takes the form of interest rate ceiling, subsequently cause economic instability and retardation. They argue that in a developing economy, the distortion of financial prices, such as interest rates, reduces the real rate of growth and the size of the financial system in relation to the non-financial system. Increasing the real deposit rate therefore increases savings and rations out those low-yielding investments since they cease to be profitable at higher interest rates. Thus, the McKinnon-Shaw postulate is that real deposit rate to the surplus spenders is key to higher levels of investment and greater investment efficiency. This also leads to financial deepening since it encourages growth of financial assets and liabilities. As institutional development is encouraged within the financial system, individual surplus spenders and deficit spenders are tempted to switch from the informal to formal financial sector thereby integrating both the informal and the formal sectors.

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This will also lure investors to switch from inflationary hedges and foreign currency denominated financial assets to acquisition of domestic formal financial assets which eventually increases the range of financiall instruments available. This subsequently transforms the narrow, inefficient and fragmented financial system into a larger, complete and efficient capital market which in turn encourages economic development. Thus, McKinnon and Shaw postulate the interdependence between savings, investment and long-run economic growth, with deposit rate being the key link. According to the McKinnon-Shaw development hypothesis, government restrictions, in the form of interest rate ceilings, high reserve requirements and directed credit policies, hinder financial development which eventually retards economic growth.

From the above theoretical contributions, it is clear that a well functioning financial sector stimulates investment and the average rate of return on investment projects receiving loans. Therefore, this reflects the fact that financial sector development is positively correlated with economic growth. Although this is a widely held view, this theory is also criticized in many respects. Some critics of this Financial Repression Hypothesis argue that if the informal loan markets are prevalent as is the case in many developing economies, an increase in the real interest rate will not raise the savings rate where portfolio reallocation is away from the informal sector. The McKinnon-Shaw hypothesis is therefore criticized as being incomplete.

The literature reviewed demonstrates that interest rate liberalization has an essential role to play in sectoral growth, though some studies have reflected conflicting findings.For instance, the international evidence suggests that high savings rates are largely a result of rapid economic growth and not its cause. This may be due to problems of data limitations and statistical methodologies used.

The principal conclusion which emerges from the literature is thus that the effect of interest rate liberalization on sectoral growth in Kenya can be determined only empirically. Moreover, it is increasingly obvious that interest rate policy alone cannot strongly stimulate sectoral growth. The controversy on the effects of interest rate liberalization just like those of effects of trade openness leaves a simplistic manicheism (good/bad) to state in a more moderate way that: "interest rate liberalization is a good thing if good complementary policies are adopted." This is why the study not only aims at determining the effects of interest rate liberalization on sectoral growth of Kenya, but also

the policies which must be associated to interest rate liberalization so that it stimulates strongly growth.

CHAPTER THREE

3.0 METHODOLOGY

3.1 Conceptual framework

The basic theoretical framework for the study is based on the AK production function utilized by Montiel, (1996) to formalize the supply-leading hypothesis. In his production function, aggregate output is a linear function of the aggregate physical capital stock. Thus the supply-leading hypothesis can be stated as follows:

$$Y = AK \qquad\qquad\qquad 3.1$$

$$K = I \qquad\qquad\qquad 3.2$$

$$I = \mu sY \qquad\qquad\qquad 3.3$$

$$0 < \mu < 1$$

Where (3.1) is the aggregate production function in which output is expressed as a proportion of the capital stock (K). (3.2) describes the goods market equilibrium condition in which savings equal investment. (3.3) describes the dynamics of capital stock. It is assumed that the saving rate (s) is constant. The process of financial intermediation absorbs a fraction $(1 - \mu)$ of all savings which is directed into consumption (Montiel, 1996). Substituting (3.2) and (3.3) into (3.1) gives equation (3.4) below:

$$Y = A \mu sY \qquad\qquad\qquad 3.4$$

Differentiating equation (3.4) with respect to Y yields equation (3.5) which represents the behaviour of economic growth as shown below:

$$g_y = A \mu s \qquad\qquad\qquad 3.5$$

Where, g_y is the growth rate of real GDP.

Therefore, innovations in financial development can affect economic growth positively through three main channels. First, financial development may raise the saving rate, s. Second, it may raise A, the marginal productivity of the capital stock. Third, it may lead to an increase in the proportion of saving allocated to investment (or, equivalently, an increase in μ), a phenomenon that-in the spirit of McKinnon (1973), who emphasized the use of cash and bank deposits as a channel for capital accumulation by credit-constrained enterprises- we may call the "conduit" effect. As a result the supply-leading hypothesis propounds that financial development causes economic growth.

The emergence of the new generation of endogenous growth theories, (see Romer, 1986) have given the relationship between growth and financial factors a new impetus. These models postulate that savings behaviour directly influences not only equilibrium income levels but also growth rates . Thus, financial markets can have a strong impact on real economic activity.

3.2 Specification of Empirical Model

To measure the GDP contribution of each sector to the Kenyan economy ,we give the following general equation:

$$g_{it} = \delta_0 + \beta_1 lib_{it} + \sum_{i}^{3} \beta_j pc_{it} + \varepsilon_{it} \qquad 3.6$$

Where g_{it} represents sectoral growth, β_j are the slope coefficients; $j=1, 2...6$. lib_{it} represents an indicator of interest rate liberalization and pc_{it} represents complementary policies such as investment in physical or human capital, financial development, inflation and democratic institutions.

In their respective proxies, an indicator of interest rate liberalization and the complementary policies breaks equation (3.6) into equation (3.7) below. This is the actual equation to be estimated and it will be analyzed using panel data.

$$g_{it} = \delta_0 + \beta_1 lib_{it} + \beta_2 Inv_{it} + \beta_3 ch_{it} + \beta_4 df_{it} + \beta_5 Infl_{it} + \beta_6 demo + \varepsilon_{it} \qquad 3.7$$

Where $inv, ch, df, infl$ are respectively the rate of investment in physical capital, investment in human capital, financial development and consumer price index. *demo* and *lib* are respectively indicators of democracy and interest rate liberalization. To analyze the effect on sectoral growth, interest rate liberalization interacts with complementary policies such as investment in physical or human capital, financial development, inflation and democratic institutions.

Democracy is a measure of political regime. This variable provides an ordinal ranking of political regimes on a scale of 10 to -10 (democracy to authoritarian) where a 10 constitutes the highest democracy score. As a control variable, it is exogenous and may help a country attract higher levels of economic growth that is independent of political institutions and government policies. Panel analysis will more directly test the effects of democracy on individual sectors by utilizing fixed effects regressions.

This study adopts panel data estimation techniques in capturing the impact of interest rate liberalization on sectoral growth. This is because panel data consists of both cross-sectional and time series dimensions and hence it is expected to give unbiased parameter estimators, since it controls for individual specific effects.

A one-way error component model will be estimated which means that the error term, ε_{it}, will be decomposed into sector-specific effects and the error term. The estimation of equation (3.7) can be done using a pooled data, random estimation, fixed effect estimation or between effect estimation. For pooled data, equation (3.8) can be generalized as follows:

$$g_{it} = \delta_0 + \beta_1 lib_{it} + \beta_2 Inv_{it} + \beta_3 ch_{it} + \beta_4 df_{it} + \beta_5 Infl_{it} + \beta_6 demo + \varepsilon_{it} \qquad 3.8$$

Where $\varepsilon_{it} = \delta_i + \mu_{it}$

δ_i is the individual effect and varies across sectors or the cross sections unit but is constant across time, and may or may not be correlated with the explanatory variables. It is also noted that μ_{it} varies unsystematically (i.e. independently) across time and sectors.

The assumption made about the individual effects determines whether a random or a fixed effect is used. For random effects, δ_i is uncorrelated with independent variables, while for the fixed effects, δ_i is correlated with independent variables. Therefore expanding equation (3.8), we present equation (3.9) as follows:

$$g_{it} = \delta_0 + \beta_1 lib_{it} + \beta_2 Inv_{it} + \beta_3 ch_{it} + \beta_4 df_{it} + \beta_5 Inf_{it} + \beta_6 demo_{it} + \delta_i + \mu_{it} \qquad 3.9$$

3.3 Definition and source of data/variables

The data used in the estimation of equations (3.8) and (3.9) are annual. The period covered by the study goes from 1982 to 2006.The major sources of data will be secondary data from Statistical Abstract 2007 (Kenya National Bureau of Statistics-Republic of Kenya). Definitions and sources of variables are recapitulated in table 3:

Table 3: Definitions and sources of variables

Variables	Definition	Source
G	GDP contribution of each sector	Kenya National Bureau of Statistics-Republic of Kenya
Lib	Interest rate liberalization	The author
Inv	Gross domestic investment as share of GDP (%)	Kenya National Bureau of Statistics
Ch	Human capital (measured by secondary school enrolment)	Kenya National Bureau of Statistics
Df	Financial development (domestic credit to private sector in % of GDP	Central Bank of Kenya Statistical Bulletins
Infl	Inflation (consumer price index)	Central Bank of Kenya Statistical Bulletins
Demo	Democracy (scores varying between -10 et 10	Political regime characteristics and transition, 1982-2007)

SOURCE: the author

3.4 Estimation Technique

This study uses panel data analysis technigue. This will be a panel regression involving cross-sectoral data from agriculture, manufacturing e.t.c. The choice of sectors is based on their contribution towards economic growth in Kenya. The aim of this estimation choice will be to capture the effect of certain cross-sector variables on economic indicators such as economic growth of Kenya. Panel data involves pooling of observations on a cross-section of cases such as households or countries over time (Baltagi 2003).

3.4.1 Rationale for using panel data

Easterly *et al* (1997) confirm that the estimates of policy effects on growth obtained using panel data are more consistent and efficient than those obtained using cross-sectional data for the following several reasons:

(i) Controlling for individual heterogeneity: As Baltagi (2003) noted that individuals, firms or states are heterogeneous. Panel data enables us to control for sector- and time-invariant variables which if omitted, in the case of time series would produce biased results.

(ii) Panel data give more informative data, more variability, less collinearity among variables, more degrees of freedom and more efficiency as pointed out by Baltagi (2003). The cross-section dimension adds a lot of variability.

(iii) Panel data are better placed to handle the dynamics of adjustment. Repeated cross-section studies over time show any changes in the economy.

(iv) Panel data allow us to construct and test more complicated behavioral models than time series data e.g testing for technical efficiency.

(v)There is accuracy because data is usually gathered in micro-units.

(vi) Panels are useful especially when designed to study the nature and causes of economic growth Baltagi (2003). Panel studies of income-dynamics (PSID) were used by The Institute for Social Research (ISR) at Michigan University to monitor and explain changes in economic well being and to study the effects of economic and social programs. In the same vein, this study will aim to ascertain the effects of interest rate liberalization on the performance of the major sectors of the Kenyan economy.

3.4.2 Types of panel Analytic Models

There are a number of panel data analytic models and these are: Constant Coefficients Fixed Effects and Random Effects Models. This study shall adopt the Fixed Effects Model as there is an assumption that there are different intercepts for each cross-sectional group. These sector specific variables are assumed to be constant over time. We use Fixed Effects Model since we want to control for omitted variables that differ within cases but constant over time. Also the choice of Fixed Effects (FE) model over the Random Effects (RE) model is that under FE there is a realistic assumption that explanatory variables are correlated with the error term. The RE model assumes that the error term is Gaussian and that there is orthogonality between the error terms and the explanatory variables- an assumption that is far fetched.

The empirical studies reveal that sectoral growth can be determined by several variables. However, taking into account the aims of the study, besides interest rate liberalization, some variables which represent policies which must be associated to interest rate liberalization so that it stimulates strongly sectoral growth were retained as explanatory variables. These variables are:

(a) the investment in human capital as a complementary policy of interest rate liberalization will enable Kenya to adopt easily new technologies so that through the credit availability channel, there will be an increase in the productivity of factors.

(b) the financial systems development; Levine (1997) argues that the financial system plays a crucial role in development through the reduction of information and transaction costs and that its efficiency in reducing these costs influences savings rates, investment decisions, technological innovation and long-run growth rates. He further argues that while the basic functions of the financial system are the same across countries and time, there are huge differences in the quality of financial services provided and the institutional structure of the financial system.

In recent years, the policy advice and technical support of the World Bank and other international financial institutions were/are motivated by the view that stable, efficient and competitive financial systems are necessary for growth and development in a market oriented economy (World Bank, 1989).

(c) fight against inflation should be another complementary policy of interest rate liberalization because the real depreciation is more harmful for open economies. (Romer, 1986).

(d) the promotion of good institutions like democratic institutions. Indeed, such institutions will allow Kenya to resolve peacefully social conflicts, to ensure more social equality through taxation and redistribution, to fight against corruption, to guarantee the protection of human rights and equitable application of law. Rodrik (1998) showed the importance of institutions in the management of conflicts and the capacity of states to face economic shocks. He estimates that even if democratic institutions do not involve strong economic growth, they can make growth rates more stable.

(e) the investment in physical capital which is generally known as factor accumulation. Many studies suggest that the accumulation of physical capital represents more than half of the positive effect of liberalization on economic growth.

3.5 Expected Results

The results expected from the estimation of equations (3.8) and (3.9) are recapitulated in the following table:

Table 4: Expected Results

Variables	Expected signs
Investment in physical capital	+
Human capital	+
Financial development	+
Inflation	-
Democracy	+
Interest rate liberalization	+ or -
Interest rate liberalization + Investment	+
Interest rate liberalization + Human capital	+
Interest rate liberalization + Financial development	+
Interest rate liberalization + Inflation	–
Interest rate liberalization + Democracy	+

SOURCE: The author

CHAPTER FOUR

4.0 RESULTS AND FINDINGS

4.1 Summary Statistics

This section gives the summary of the main variables that have been used in the estimation of the model and their correlation results. We particularly give the mean, standard deviation, the minimum, maximum, skewness and kurtosis values of the variables.

Table 5: Descriptive Statistics of the Variables

Variable	Obs	Mean	Std. Dev.	Min	Max	Skewness	Kurtosis
Contr	120	77912.76	82903.83	4201.83	301590.5	1.13	3.13
Infl	120	9.18	4.22	2	16.6	0.10	2.23
Df	120	36.67	26.64	5.54	117.64	0.72	2.94
Ch	120	830121.9	109529.3	687473	1030080	0.24	1.92
Inv	120	847.30	96.80	753.61	1000.3	0.65	1.64

The results in table 5 above shows that the highest sectoral contribution is Ksh. 301590.5 and this is from the Agricultural Sector. This was attained in 2006 a time during which interest rate was as high as 9.43 units and investment was at its maximum figure of Ksh.1000.3 Million. Secondary School enrolment had also increased to 1030080 Students per year and Credit distribution to the private sector was Ksh. 117.64 Million. With the minimum level of inflation at 2 units, interest rate liberalization impacted positively on sectoral growth because even the manufacturing sector registered Ksh. 123626.1 Million and the Transport and Communication sector registered Ksh. 135465.5 Million. The rest of the sectors registered sectoral contributions that are far much greater than the minimum of Ksh.4201.83 Million shown in the table. This is in line with the expected signs of the results in table 4 .

The results also show that the variable human capital (ch) is highly dispersed as shown by the standard deviation of 109529.3 and the mean of 830121.9. This implies that there is high variation in the human capital contribution across sectors, this result is consistent with the research question (2) of the study.

From the statistics, one can also deduce that sectoral growth (contr) vary much around its mean. This shows that there is much fluctuations of contr in the Kenyan sectors. This is in line with Calvo (1992) argument that macroeconomic stability leads to high savings, investment and finally high growth rate orelse otherwise.

The sector-specific results show that generally under interest rate liberalisation, the maximum value contributed by each sector towards GDP growth is more than twice the minimum value except for the construction sector. For instance, Table 9(b) in the appendices shows that the maximum contribution by the Forestry and Logging sector is 5474 while its minimum contribution is 2258. Since a minimum value contributed by the construction sector is 23537 and the maximum value is 37665, it then means that over the years when interest rates were liberalised, different sectors contribute differently towards GDP growth. Contribution from the Agriculture sector is also relatively highly dispersed as shown by the standard deviation of 39085 and the mean value of 214866 . This implies that increase in interest rates improved the access of Agriculture Sector to financial resources hence its greater contribution towards GDP growth, a phenomenon that is consistent with Nyangito, Nzuma, Ommeh, Mbithi, (2004), who urge that the agricultural sector accounts for about 27 Percent of the GDP and employs more than two thirds of the labour force while accounting for about 70 Percent of export earnings.They view Agriculture as the source of raw materials for agro-based industries and that the sector directly generates a significant proportion of family incomes-helping to stem rural-urban migration.They also argue that agriculture creates off-farm jobs that supplement farm incomes.

The impact of interest rate liberalization has been positive with increased sectoral economic growth. This is evident from the positive standard deviations of table 5 above that point out to the argument that increase in interest rate cause the lending to the private sector to increase in relative terms.

The table also gives tests for normality of the variables using skewness and kurtosis. Skewness characterizes the degree of asymmetry of a distribution around its mean with positive skewness indicating a distribution with an asymmetric tail extending towards more positive values and negative skewness indicating a distribution with an asymmetric tail extending towards negative values. For data that is normally distributed, the value of skewness should be zero. From the table, all variables are positively skewed but not all variables are normally distributed.

Kurtosis, on the other hand indicates the relative peakedness or flatness of a distribution compared with the normal distribution. Positive kurtosis indicates a relatively peaked distribution and negative kurtosis indicates a relatively flat distribution. For data that is normally distributed, the value of kurtosis is supposed to be three. In this regard, the results show that all variables are relatively peaked. For instance, the variable investment is relatively peaked at 1.64 and hence we do not have a flat distribution.

4.2 Correlation Results

Table 10 in the appendices reports part of the correlation matrix for the 120 observations of the pooled data set.

High correlation of 0.985 is seen between the Contributions from Mining and Quarrying and Other sectors towards GDP growth. This may be because materials produced from the Mining and Quarrying industry are used in Dwellings;owner occupied and rented.

There exists little correlation of 0.010 between the Fishing Sector and the Construction sector. This is because the two sectors are not complementary to each other.

Most of the independent variables have the expected correlation with the dependent variable. From Table 10 in the appendices, during the period of interest rate liberalization, inflation is generally negatively correlated with sectoral contributions as expected. This can be explained by the fact that real depreciation is more harmful for open economies,(Romer,1986)

Investment in human capital is positively correlated with sectoral contributions as expected. The positive relationship between them emanates from the fact that an educated population easily adopts new technologies and hence through the credit availability channel,there will be an increase in the productivity of factors. This in turn leads to sectoral growth in terms of the sectors contribution toward GDP.

Financial intermediation is also positively related with sectoral contributions as expected. This is in line with the fact that the basic function of a financial system is to provide a means of and facilitate payments in the economy (Bain 1981). Thus, an efficient and well developed financial system is indispensable to the process of economic development. It facilitates the mobilization of financial resources through high interest rates from savers

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with surplus of funds, to entrepreneurs and other borrowers with fund shortages, who then take the lead in ventures of economic development. This, in turn, increases sectoral contributions towards GDP.

4.3 REGRESSION RESULTS

Table 6: Summary of the Model Estimations (1982-2006)
Dependent Variable: ln_contr

Variable	RE Model	FE Model
C	3.3763	-
	(0.1852) *	-
Infl	0.0014	-0.0003
	(0.6845)	(0.8308)
Df	-0.0009	-0.0017
	(0.5247)	(0.0025)**
ln_ch	0.1015	0.253
	(0.5645)	(0.0005)***
ln_inv	0.8176	0.484
	(0.639)	(0.0072)**
Lib	0.0214	0.006
	(0.2998)*	(0.4523)*
	Random Effects	**Fixed Effects**
_Agric-c	1.9192	5.6744
_Forel-c	-1.9435	1.8119
_Fish-c	-1.7774	1.9773
_MinQ-c	-1.9944	1.7943
_Manf-c	1.0768	4.8697
_ElectW-c	-0.6692	3.0924
_Constr-c	-0.0952	3.7078
_Wholer-c	0.9669	4.7519
_Hotr-c	-1.0213	2.7668
_Transc-c	0.9474	4.7105
_Finrb-c	0.7680	4.5888
_Others-c	1.8257	5.5984
	Diagnostic Statistics	
R-sq:	0.9939	0.99996
Adjusted R- sq:	0.9937	0.99995
F-statistic	-	660413
Prob. (F-statistic)	-	0.00000
Durbin-Watson stat.	0.6639	0.81572

NOTE: P-Values are in parenthesis.

*,**,*** 10%, 5%, 1% levels of significance respectively.

The discussions below are the results of the best model, Fixed effects model. This study adopted the Fixed Effects Model as there was an assumption that there are different

intercepts for each cross-sectional group. These sector specific variables were assumed to be constant over time. We used Fixed Effects Model since we want to control for omitted variables that differ within sectors but constant over time. Also the choice of Fixed Effects (FE) model over the Random Effects (RE) model is that under FE there is a realistic assumption that explanatory variables are correlated with the error term. The RE model assumes that the error term is Gaussian and that there is orthogonality between the error terms and the explanatory variables- an assumption that is far fetched.

Logarithm transformation was done to overcome violations of the homoscedasticity assumption and hence following the estimation of sectoral contribution, the functional relationship was estimated to capture the determinants of sectoral growth using the Fixed Effects model. The dependent variable is the sectoral growth (ln_contr) and the explanatory variables are rate of investment in physical capital (ln_Inv), investment in human capital (ln_ch), financial development (Df) and consumer price index (infl).

Results from the Fixed Effects Model show that all variables determining sectoral growth except inflation are significant although at different degree levels.

The variable inflation (Infl) has a coefficient of -0.0003 though not significant. This implies that inflation has no role in explaining ln_contr because of the high probability of 0.8308.

Another variable, Financial Development (DF) has a coefficient of -0.0017 and probability=0.0025. This means that a unit increase in domestic credit to private sector in % of GDP leads to a reduction of sectoral contribution by 0.0017 units . This finding is not expected though it is in line with the argument that during financial development, money is lost in the monitoring process and hence the overall effect on GDP growth may be negative and significant.

The variable Investment in human capital (ln_CH) is postively related with the dependent variable (as expected). It has a value of 0.253 to mean that higher secondary school enrolment increases sectoral contribution. This shows that investment in human capital is of impotance to the economic growth of Kenya during this period of interest rate liberalization and the probability of 0.0005 shows that this variable is a determinant of sectoral growth at 1% significance level.

Similarly, ln_Inv which represents Gross Domestic investment as share of GDP(%) has a value of 0.484 which bears the predicted positive sign on sectoral growth and is significant in explaining the dependent variable at 5% significant level.

Lib, which is the financial liberalization proxy has a coefficient of 0.006 and is significant at 10% . The positive sign implies that a unit increase in intereat rate leads to a 0.006 increase in economic growth. This has empirically proved the McKinnon (1973) and Shaw (1973) hypothesis that interest rate liberalisation does indeed impact positively on economic growth.

We observe that all variables except inflation are significant in determining sectoral growth in the FE models. Also the high R-squared showed that variations in the dependent variable are explained by sector variables. This observation concur with the research question (2) in which a suggestion that complementary policies should be put in place in order for Kenya to benefit fully from the effects of interest rate liberalization. We also do not have negative parameters for all sectors. This implies that the identified variables tend to promote sectoral growth in Kenya. Additionally, the FE model fit data well as shown by the prob.(F-statistic) of 0.00000.

4.4 RESULTS OF THE CROSS EQUATION RESTRICTIONS (Wald Test Results)

The cross equation restrictions are an important policy tool that is performed to show, for instance, if the effects of a certain independent variable like inflation are the same for say agriculture and other sectors. This can be important in the process of selecting firms and projects with highest probabilities of success and rates of returns by banks and other financial intermediaries in order to raise the overall efficiency of investment in the economy hence sectoral growth.

We present the Wald Test for the independent variables as follows:

Table7(a): Inflation (Infl)

Null hypotheses	F-stat.	Prob.	Conclusion
The effects of inflation are the same for all sectors	0.5949	0.6188	Yes because the P-value 0.6188 is not statistically significant

Table7(b): Financial Development (DF)

Null hypotheses	F-stat.	Prob.	Conclusion
The effects of Financial Development are the same for all sectors	1.3703	0.2558	No because the value 0.2558 is statistically significant

Table7(c): Human Capital (Ch)

Null hypotheses	F-stat.	Prob.	Conclusion
The effects of secondary school enrolment are the same for all sectors	11.3048	0.0000	No because the value 0.0000 is statistically significant

Table7(d):Gross Domestic Investment (Inv)

Null hypotheses	F-stat.	Prob.	Conclusion
The effects of Gross domestic investment as share of GDP (%) are the same for all sectors	1.8052	0.1463	No because the value 0.1463 is statistically significant

Table7(e):Interest Rate Liberalization

Null hypotheses	F-stat.	Prob.	Conclusion
The effects of interest rate liberalization are the same for all sectors	0.3729	0.5426	Yes because the value 0.5426 is not statistically significant

The explanatory variable interest rate liberalization (Lib) is statistically significant in determining growth in the FE model. The Wald test in table 7(e) above shows that its effects on growth are the same for all sectors.

CHAPTER FIVE

5.0 CONCLUSIONS AND RECOMMENDATIONS

5.1 Conclusions

In this study, the Fixed Effects Model was adopted as there was an assumption that there are different intercepts for each cross-sectional group. These sector specific variables were assumed to be constant over time. We used Fixed Effects Model since we want to control for omitted variables that differ within sectors but constant over time. Also the choice of Fixed Effects (FE) model over the Random Effects (RE) model is that under FE there is a realistic assumption that explanatory variables are correlated with the error term. The RE model assumes that the error term is Gaussian and that there is orthogonality between the error terms and the explanatory variables- an assumption that is far fetched. In an attempt to empirically examine the linkage between interest rate and growth, the study employed a panel data analysis over the major sectors of the Kenyan economy which gives it a unique approach from other studies that have generally employed time series in showing the positive role of interest rate liberalization on economic growth.

This study empirically analyzes the impact of interest rate liberalization on the economic growth in Kenya through its influence on sectoral performance and it also identifies policies that must accompany interest rate liberalization so that it stimulates strongly sectoral performance in Kenya. Its objective is to examine the impact of interest rate liberalization on GDP contribution per sector to the Kenyan economy. It is based on McKinnon-Shaw argument that financial deregulation (higher real interest rates) encourages savings and investment and predicts that under the presence of complementary policies, interest rate liberalization leads to growth.

The study analyzed a sample of 12 listed sectors using panel data for a period of 25 years (1982-2006). Variables which represent policies which must be associated to interest rate liberalization so that it stimulates strongly sectoral growth were retained as explanatory variables. These variables are: investment in human capital, financial systems development, inflation, good institutions like Democratic institutions and investment in physical capital. Given that institutional variables like democracy are non-existent for African countries, Kenya not being an exception huge amount of time is required to clean up the data so that it can be used hence the variable Democracy was dropped.

In this present study, we have identified the main complimentary policies to interest rate liberalization. The econometric estimations have produced relevant results consistent with what has been previously reported in the literature. For instance, in terms of complementary policies, investment in physical capital has a greater positive impact on sectoral growth followed by investment in human capital. Generally, the findings support the fact that financial deregulation (higher real interest rates) encourages savings and investment and predicts that under the presence of complementary policies, interest rate liberalization leads to growth.

5.2 Policy Implications and recommendations

The following policy recommendations come from the findings of this paper. We noted that:

the crucial importance is not only of raising more saving in Kenya, but of channelling savings towards the most productive investments. Only by increasing the productivity of Kenya's saving and investment can growth be renewed, incomes raised and employment generated. The allocation of savings between the public and private sector, and within each towards its most productive uses, is the central role of the financial system. We propose that this can be done by providing mass education.

A policy of moderate financial repression at positive interest rates may actually boost aggregate investment and growth in the Kenyan economy by transferring income from depositors, primarily households, to borrowers, primarily firms.

In terms of policy implications, we can deduce a policy guideline of aggressive human capital development. This will serve as a key factor in improving growth just like investment in physical capital

Results concur with the AK growth model which predict that permanent changes in government policies affecting investment rates should lead to permanent changes in a country's GDP growth.

5.3 Limitations of the Study

The main challenge experienced in this study is data availability. Several sources were used and it is either data is not recorded at all or that the data recorded is inconsistent and unsystematic. In the course of data collection, there was also a problem of lack of upto date data. Nevertheless, in the absence of such data, we extrapolated the available data to

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find the missing values for financial intermediation and therefore this paper makes an important contribution to understanding the interplay of interest rate liberalization and growth.

Other institutional variables like democracy are non-existent for African countries, Kenya not being an exception. Therefore huge amount of time is required to clean up the data so that it can be used.

The area of study is also so wide hence specific effects or impacts on every sector has not been fully explored.

5.4 Areas for Further Research

This study uses panel data to find out the effect of interest rate liberalization on sectoral growth in Kenya. In this view, more studies should come up to focus on the cross-sectional and time series analysis of the determinants of sectoral growth so as to better understand the dynamics of sectoral growth over a period of time.

This analysis and the results generated, point to a new research agenda.This is on the examination of the effects of interest rate liberalization on sectoral employment.This is a second specific objective of the study but was not explored due to time limit.

Additionally, in this study we found that interest rate liberalization alone is not sufficient to stimulate strongly sectoral growth in Kenya. There are complementary policies such as political stability, investment in infrastructures and good political and economic governorship which inhibit sectoral growth. There is need for further research that will entail introducing more dynamics into the analysis to explain the residual effects. For instance, due to time limit, Democracy as a control variable was not considered in the Kenyan Context. Therefore, to ensure that the estimation results are consistent, efficient and robust, an empirical model should not be limited to observable fundamentals but it should have an institutional dimension in order to yield richer insights for informing policy.

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Appendix 1 (a): Results of the Fixed Effects Model

Dependent Variable: CONTR?
Method: GLS (Cross Section Weights)
Date: 10/30/08   Time: 13:02
Sample: 1997 2006
Included observations: 10
Total panel (balanced) observations 120

Variable	Coefficient	Std. Error	t-Statistic	Prob.
INFL?	64.32476	184.4615	0.348716	0.7280
DF?	-65.03460	76.15533	-0.853973	0.3951
CH?	0.016482	0.011442	1.440508	0.1528
INV?	53.08936	25.68319	2.067085	0.0412
LIB?	955.3016	1020.802	0.935835	0.3515
Fixed Effects				
_AGRIC--C	184151.9			
_FOREL--C	-64694.70			
_FISH--C	-63687.66			
_MINQ--C	-62398.63			
_MANF--C	38129.07			
_ELECTW--C	-50360.38			
_CONSTR--C	-33993.49			
_WHOLER--C	27538.88			
_HOTR--C	-54228.76			
_TRANSC--C	27926.29			
_FINRB--C	9875.078			
_OTHERS--C	158700.7			

Weighted Statistics

R-squared	0.992460	Mean dependent var	97811.25
Adjusted R-squared	0.991289	S.D. dependent var	97045.17
S.E. of regression	9057.350	Sum squared resid	8.45E+09
F-statistic	3389.579	Durbin-Watson stat	0.399660
Prob(F-statistic)	0.000000		

Unweighted Statistics

R-squared	0.987425	Mean dependent var	77912.76
Adjusted R-squared	0.985472	S.D. dependent var	82903.83
S.E. of regression	9992.695	Sum squared resid	1.03E+10
Durbin-Watson stat	0.327210		

Appendix 1 (b): Results of the Fixed Effects Model

Dependent Variable: LN_CONTR?
Method: GLS (Cross Section Weights)
Date: 10/30/08   Time: 12:36
Sample: 1997 2006
Included observations: 10
Total panel (balanced) observations 120

Variable	Coefficient	Std. Error	t-Statistic	Prob.
INFL?	-0.000306	0.001430	-0.214250	0.8308
DF?	-0.001696	0.000547	-3.100374	0.0025
LN_CH?	0.253304	0.070384	3.598894	0.0005
LN_INV?	0.484141	0.176524	2.742635	0.0072
LIB?	0.006245	0.008276	0.754525	0.4523
Fixed Effects				
_AGRIC--C	5.674499			
_FOREL--C	1.811921			
_FISH--C	1.977287			
_MINQ--C	1.794295			
_MANF--C	4.869676			
_ELECTW--C	3.092373			
_CONSTR--C	3.707772			
_WHOLER--C	4.751920			
_HOTR--C	2.766822			
_TRANSC--C	4.710474			
_FINRB--C	4.588817			
_OTHERS--C	5.598379			

Weighted Statistics

R-squared	0.999961	Mean dependent var	22.26631
Adjusted R-squared	0.999955	S.D. dependent var	16.05516
S.E. of regression	0.107756	Sum squared resid	1.195972
F-statistic	660412.9	Durbin-Watson stat	0.815723
Prob(F-statistic)	0.000000		

Unweighted Statistics

R-squared	0.994171	Mean dependent var	10.49880
Adjusted R-squared	0.993266	S.D. dependent var	1.393107
S.E. of regression	0.114320	Sum squared resid	1.346121
Durbin-Watson stat	0.660005		

Appendix 2 (a): Results of the Random Effects Model

Dependent Variable: CONTR?
Method: GLS (Variance Components)
Date: 10/30/08   Time: 12:57
Sample: 1997 2006
Included observations: 10
Total panel (balanced) observations 120

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	6741.303	56941.62	0.118390	0.9060
INFL?	-146.2111	303.5357	-0.481693	0.6309
DF?	-44.05452	121.3360	-0.363079	0.7172
CH?	0.041486	0.018828	2.203399	0.0296
INV?	39.93909	42.36048	0.942839	0.3478
LIB?	494.7619	1680.850	0.294352	0.7690
Random Effects				
_AGRIC--C	174834.6			
_FOREL--C	-73789.06			
_FISH--C	-72762.43			
_MINQ--C	-72375.15			
_MANF--C	27997.33			
_ELECTW--C	-59617.79			
_CONSTR--C	-44350.43			
_WHOLER--C	17620.84			
_HOTR--C	-64187.30			
_TRANSC--C	18586.91			
_FINRB--C	-978.2306			
_OTHERS--C	149020.7			

GLS Transformed
  Regression

R-squared	0.987371	Mean dependent var	77912.76
Adjusted R-squared	0.986817	S.D. dependent var	82903.83
S.E. of regression	9518.884	Sum squared resid	1.03E+10
Durbin-Watson stat	0.296225		

Unweighted Statistics
  including Random
    Effects

R-squared	0.988077	Mean dependent var	77912.76
Adjusted R-squared	0.987554	S.D. dependent var	82903.83
S.E. of regression	9248.883	Sum squared resid	9.75E+09
Durbin-Watson stat	0.313773		

Appendix 2 (b): Results of the Random Effects Model

Dependent Variable: LN_CONTR?
Method: GLS (Variance Components)
Date: 10/30/08   Time: 12:41
Sample: 1997 2006
Included observations: 10
Total panel (balanced) observations 120

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	3.376295	2.533020	1.332913	0.1852
INFL?	0.001447	0.003552	0.407325	0.6845
DF?	-0.000903	0.001415	-0.638159	0.5247
LN_CH?	0.101459	0.175576	0.577866	0.5645
LN_INV?	0.817613	0.436914	1.871335	0.0639
LIB?	0.021404	0.020547	1.041673	0.2998
Random Effects				
_AGRIC--C	1.916168			
_FOREL--C	-1.943460			
_FISH--C	-1.777382			
_MINQ--C	-1.994383			
_MANF--C	1.076822			
_ELECTW--C	-0.669222			
_CONSTR--C	-0.095174			
_WHOLER--C	0.966899			
_HOTR--C	-1.021286			
_TRANSC--C	0.947365			
_FINRB--C	0.767995			
_OTHERS--C	1.825659			

GLS Transformed
  Regression

R-squared	0.993917	Mean dependent var	10.49880
Adjusted R-squared	0.993650	S.D. dependent var	1.393107
S.E. of regression	0.111010	Sum squared resid	1.404858
Durbin-Watson stat	0.663877		

Unweighted Statistics
  including Random
    Effects

R-squared	0.994259	Mean dependent var	10.49880
Adjusted R-squared	0.994007	S.D. dependent var	1.393107
S.E. of regression	0.107849	Sum squared resid	1.325968
Durbin-Watson stat	0.703375		

Estimation Equations (Summary of the model)

LN_CONTR_AGRIC = C(6) + C(1) + C(2)*INFL_AGRIC + C(3)*DF_AGRIC + C(4)*LN_CH_AGRIC + C(5)*LN_INV_AGRIC

LN_CONTR_FOREL = C(7) + C(1) + C(2)*INFL_FOREL + C(3)*DF_FOREL + C(4)*LN_CH_FOREL + C(5)*LN_INV_FOREL

LN_CONTR_FISH = C(8) + C(1) + C(2)*INFL_FISH + C(3)*DF_FISH + C(4)*LN_CH_FISH + C(5)*LN_INV_FISH

LN_CONTR_MINQ = C(9) + C(1) + C(2)*INFL_MINQ + C(3)*DF_MINQ + C(4)*LN_CH_MINQ + C(5)*LN_INV_MINQ

LN_CONTR_MANF = C(10) + C(1) + C(2)*INFL_MANF + C(3)*DF_MANF + C(4)*LN_CH_MANF + C(5)*LN_INV_MANF

LN_CONTR_ELECTW = C(11) + C(1) + C(2)*INFL_ELECTW + C(3)*DF_ELECTW + C(4)*LN_CH_ELECTW + C(5)*LN_INV_ELECTW

LN_CONTR_CONSTR = C(12) + C(1) + C(2)*INFL_CONSTR + C(3)*DF_CONSTR + C(4)*LN_CH_CONSTR + C(5)*LN_INV_CONSTR

LN_CONTR_WHOLER = C(13) + C(1) + C(2)*INFL_WHOLER + C(3)*DF_WHOLER + C(4)*LN_CH_WHOLER + C(5)*LN_INV_WHOLER

LN_CONTR_HOTR = C(14) + C(1) + C(2)*INFL_HOTR + C(3)*DF_HOTR + C(4)*LN_CH_HOTR + C(5)*LN_INV_HOTR

LN_CONTR_TRANSC = C(15) + C(1) + C(2)*INFL_TRANSC + C(3)*DF_TRANSC + C(4)*LN_CH_TRANSC + C(5)*LN_INV_TRANSC

LN_CONTR_FINRB = C(16) + C(1) + C(2)*INFL_FINRB + C(3)*DF_FINRB + C(4)*LN_CH_FINRB + C(5)*LN_INV_FINRB

LN_CONTR_OTHERS = C(17) + C(1) + C(2)*INFL_OTHERS + C(3)*DF_OTHERS + C(4)*LN_CH_OTHERS + C(5)*LN_INV_OTHERS

Substituted Coefficients:

LN_CONTR_AGRIC = 1.91775381 + 5.586841584 + 0.0003161950352*INFL_AGRIC - 0.0008389804284*DF_AGRIC + 0.146288402*LN_CH_AGRIC + 0.4375496798*LN_INV_AGRIC

LN_CONTR_FOREL = -1.941521817 + 5.586841584 + 0.0003161950352*INFL_FOREL - 0.0008389804284*DF_FOREL + 0.146288402*LN_CH_FOREL + 0.4375496798*LN_INV_FOREL

LN_CONTR_FISH = -1.77539093 + 5.586841584 + 0.0003161950352*INFL_FISH - 0.0008389804284*DF_FISH + 0.146288402*LN_CH_FISH + 0.4375496798*LN_INV_FISH

LN_CONTR_MINQ = -1.995130574 + 5.586841584 + 0.0003161950352*INFL_MINQ - 0.0008389804284*DF_MINQ + 0.146288402*LN_CH_MINQ + 0.4375496798*LN_INV_MINQ

LN_CONTR_MANF = 1.075646316 + 5.586841584 + 0.0003161950352*INFL_MANF - 0.0008389804284*DF_MANF + 0.146288402*LN_CH_MANF + 0.4375496798*LN_INV_MANF

LN_CONTR_ELECTW = -0.667822738 + 5.586841584 + 0.0003161950352*INFL_ELECTW - 0.0008389804284*DF_ELECTW + 0.146288402*LN_CH_ELECTW + 0.4375496798*LN_INV_ELECTW

LN_CONTR_CONSTR = -0.0971291843 + 5.586841584 + 0.0003161950352*INFL_CONSTR - 0.0008389804284*DF_CONSTR + 0.146288402*LN_CH_CONSTR + 0.4375496798*LN_INV_CONSTR

LN_CONTR_WHOLER = 0.9663594357 + 5.586841584 + 0.0003161950352*INFL_WHOLER - 0.0008389804284*DF_WHOLER + 0.146288402*LN_CH_WHOLER + 0.4375496798*LN_INV_WHOLER

LN_CONTR_HOTR = -1.0220162 + 5.586841584 + 0.0003161950352*INFL_HOTR - 0.0008389804284*DF_HOTR + 0.146288402*LN_CH_HOTR + 0.4375496798*LN_INV_HOTR

LN_CONTR_TRANSC = 0.9485941352 + 5.586841584 + 0.0003161950352*INFL_TRANSC - 0.0008389804284*DF_TRANSC + 0.146288402*LN_CH_TRANSC + 0.4375496798*LN_INV_TRANSC

LN_CONTR_FINRB = 0.7645718605 + 5.586841584 + 0.0003161950352*INFL_FINRB - 0.0008389804284*DF_FINRB + 0.146288402*LN_CH_FINRB + 0.4375496798*LN_INV_FINRB

LN_CONTR_OTHERS = 1.826085885 + 5.586841584 + 0.0003161950352*INFL_OTHERS - 0.0008389804284*DF_OTHERS + 0.146288402*LN_CH_OTHERS + 0.4375496798*LN_INV_OTHERS

Table 8: Real Interest Rates and Spread for 1982-1997

Year	Real Deposit Rate	Real Lending Rate	Spread
1982	-1.3	-0.28	1.02
1983	2.53	5.56	3.03
1984	0.69	3.28	2.59
1985	7.14	9.5	2.36
1986	-1.4	0.77	2.17
1987	0.08	3.96	3.88
1988	-1.22	1.2	2.42
1989	-1.17	3.23	4.40
1990	-4.61	-1.11	3.5
1991	-0.48	3.95	4.43
1992	-14.11	-9.42	4.69
1993	-19.05	-15.99	3.06
1994	6.78	27.83	21.05
1995	5.43	20.5	15.07
1996	3.82	16.03	12.21
1997	7.4	20.7	13.3
1998	7.89	20.86	12.97
1999	6.15	19.35	13.2
2000	4.51	17.91	13.4
2001	5.42	19.22	13.8
2002	4.83	18.43	13.6
2003	1.38	11.56	10.18
2004	0.98	10.46	9.48
2005	1.38	10.26	8.88
2006	4.35	13.78	9.43

SOURCE: Calculated using data from Central Bank Statistical Bulletins.

Real Interest Rate=(Interest rate-Inflation/1+Inflation)*100

Table 9 (a): Descriptive Statistics of the Variables

	CH_A GRIC	CH_CONSTR	CH_ELECTW	CH_FINRB	CH_FISH	CH_FOREL
Mean	665876	665876	665876	665876	665876	665876
Median	632388	632388	632388	632388	632388	632388
Maximum	1030080	1030080	1030080	1030080	1030080	1030080
Minimum	437207	437207	437207	437207	437207	437207
Std. Dev.	165082	165082	165082	165082	165082	165082
Skewness	0.5365	0.5365	0.5365	0.5365	0.5365	0.5365
Kurtosis	2.3966	2.3966	2.3966	2.3966	2.3966	2.3966
Jarque-Bera	1.5785	1.5785	1.5785	1.5785	1.5785	1.5785
Probability	0.4542	0.454191	0.4542	0.4542	0.4542	0.4542
Observations	25	25	25	25	25	25

	CH_HOTR	CH_MANF	CH_MINQ	CH_OTHERS	CH_TRANSC	CH_WHOLER
Mean	665876	665876	665876	665876	665876	665876
Median	632388	632388	632388	632388	632388	632388
Maximum	1030080	1030080	1030080	1030080	1030080	1030080
Minimum	437207	437207	437207	437207	437207	437207
Std. Dev.	165082	165082	165082	165082	165082	165082
Skewness	0.5365	0.5365	0.5365	0.5365	0.5365	0.5365
Kurtosis	2.3966	2.3966	2.3966	2.3966	2.3966	2.3966
Jarque-Bera	1.5785	1.5785	1.5785	1.5785	1.5785	1.5785
Probability	0.4542	0.4542	0.4542	0.4542	0.4542	0.4542
Observations	25	25	25	25	25	25

Table 9 (b) : Descriptive Statistics of the Variables

	CONTR_AGRIC	CONTR_CONSTR	CONTR_ELECTW	CONTR_FINRB	CONTR_FISH	CONTR_FOREL
Mean	214866	28676	17406	56322	6548	4187
Median	204886	27804	18769	58049	6532	4645
Max.	301591	37665	22479	79426	8428	5474
Min.	162897	23537	11311	27942	4457	2258
Std. Dev.	39085	3616	3603	17930	1163	1237
Skewness	0.6145	0.7081	-0.2895	-0.2084	-0.1523	-0.4169
Kurtosis	2.3853	2.8586	1.7305	1.4797	1.7940	1.5174
Jarque-Bera	1.9671	2.1099	2.0281	2.5886	1.6118	3.0138
Prob.	0.3740	0.3482	0.3628	0.2741	0.4467	0.2216

	CONTR_HOTR	CONTR_MANF	CONTR_MINQ	CONTR_OTHERS	CONTR_TRANSC	CONTR_WHOLER
Mean	14380	90026	4061	192397	76071	74427
Median	14267	94076	4174	200710	70289	70784
Max.	20593	123626	5554	249277	135466	117524
Min.	9899	57365	2354	124047	49620	41652
Std. Dev.	2450	17670	914	37541	23097	20623
Skewness	0.3730	-0.3075	-0.3266	-0.3350	1.0887	0.1405
Kurtosis	3.1713	2.3245	2.2830	2.0185	3.3225	2.1622
Jarque-Bera	0.6104	0.8694	0.9799	1.4711	5.0465	0.8133
Prob.	0.7370	0.6474	0.6126	0.4792	0.0802	0.6659

Table 10: Correlation Matrix Table.

	31	INFL_FOREL	INFL_FISH	INFL_MINQ	INFL_MANF	INFL_ELECTW
CONTR_AGRIC	-0.282	-0.282	-0.282	-0.282	-0.282	-0.282
CONTR_FOREL	-0.181	-0.181	-0.181	-0.181	-0.181	-0.181
CONTR_FISH	0.087	0.087	0.087	0.087	0.087	0.087
CONTR_MINQ	-0.164	-0.164	-0.164	-0.164	-0.164	-0.164
CONTR_MANF	-0.098	-0.098	-0.098	-0.098	-0.098	-0.098
CONTR_ELECTW	0.108	0.108	0.108	0.108	0.108	0.108
CONTR_CONSTR	-0.276	-0.276	-0.276	-0.276	-0.276	-0.276
CONTR_WHOLER	-0.255	-0.255	-0.255	-0.255	-0.255	-0.255
CONTR_HOTR	0.465	0.465	0.465	0.465	0.465	0.465
CONTR_TRANSC	-0.177	-0.177	-0.177	-0.177	-0.177	-0.177
CONTR_FINRB	-0.239	-0.239	-0.239	-0.239	-0.239	-0.239
CONTR_OTHERS	-0.134	-0.134	-0.134	-0.134	-0.134	-0.134

	INFL_CONSTR	INFL_WHOLER	INFL_HOTR	INFL_TRANSC	INFL_FINRB	INFL_OTHERS
CONTR_AGRIC	-0.282	-0.282	-0.282	-0.282	-0.282	-0.282
CONTR_FOREL	-0.181	-0.181	-0.181	-0.181	-0.181	-0.181
CONTR_FISH	0.087	0.087	0.087	0.087	0.087	0.087
CONTR_MINQ	-0.164	-0.164	-0.164	-0.164	-0.164	-0.164
CONTR_MANF	-0.098	-0.098	-0.098	-0.098	-0.098	-0.098
CONTR_ELECTW	0.108	0.108	0.108	0.108	0.108	0.108
CONTR_CONSTR	-0.276	-0.276	-0.276	-0.276	-0.276	-0.276
CONTR_WHOLER	-0.255	-0.255	-0.255	-0.255	-0.255	-0.255
CONTR_HOTR	0.465	0.465	0.465	0.465	0.465	0.465
CONTR_TRANSC	-0.177	-0.177	-0.177	-0.177	-0.177	-0.177
CONTR_FINRB	-0.239	-0.239	-0.239	-0.239	-0.239	-0.239
CONTR_OTHERS	-0.134	-0.134	-0.134	-0.134	-0.134	-0.134