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**BANK EFFICIENCY IN KENYA: ARE FOREIGN BANKS MORE
EFFICIENT THAN DOMESTIC BANKS?**

PAUL ESEREA MALOBA

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**BANK EFFICIENCY IN KENYA: ARE FOREIGN BANKS MORE EFFICIENT THAN
DOMESTIC BANKS?**

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**A thesis submitted in partial fulfillment of the requirements for the Degree of
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School of Management and Commerce

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Bank efficiency in
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Abstract

Banks in their role of financial intermediation facilitate transfer of funds from surplus units to deficit units. Efficient banking institutions therefore ensure that allocation of funds is prioritized to viable investments and thus spur economic growth. This study employs a non-parametric DEA methodology to measure efficiency levels of Kenyan banks over the period 2004 to 2010. The differences in efficiency between foreign banks and domestic banks are then evaluated. Further, the study sought to establish the sources of bank efficiency for banks in Kenya. Foreign banks were found to be more efficient compared to domestic banks. However, an analysis of efficiency based on bank size reveal that large domestic banks are more efficient compared to large foreign banks. Estimation results further suggest that foreign banks import systemic inefficiencies. Foreign banks were found to have an appetite for government securities, further investigation is necessary to establish the motivation by foreign banks towards government securities.

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Abbreviations

ATM – Automatic teller machines

CBK – Central bank of Kenya

DEA – Data Envelopment Analysis

DFA – Distribution Free Approach

DMU - Decision Making Units

ERS – Economic Recovery Strategy

FDH – Free Disposal Hull

MFIs- Micro Finance Institutions

SACCOs - Saving and Credit Co-operative Society

SFA – Stochastic Frontier Approach

SMEs – Small and Medium sized Enterprises

TFA – Thick Frontier Approach

Branchless banking – Means of delivering financial services without using bank branches. E.g. The use of third party outlets to act as agents for financial services or the use mobile phones to conduct customer transactions

Comparative advantage – The ability of a country to exhibit superiority in efficiency of its processes. Banks that operate in countries that have developed financial markets are capable of exhibiting superiority when they operate in countries with less developed financial markets.

CHAPTER ONE

1 INTRODUCTION

1.1 Background of the Study

A bank is a key player in an economic growth of a nation. Banks enhance economic growth by channeling funds from surplus savings units to deficit investment units. Therefore, Inefficient allocation of funds by inefficient banking institutions results to insufficient appropriation of savings to investments (Levine, 1997).

Bank efficiency is described as the ability for a bank to convert input resources into optimal outputs (Fried et al., 1993). Alternatively, bank efficiency can be described as achieving a given level of output by using minimal input resources. Therefore, efficient banks enhance performance through increased value addition to bank owners.

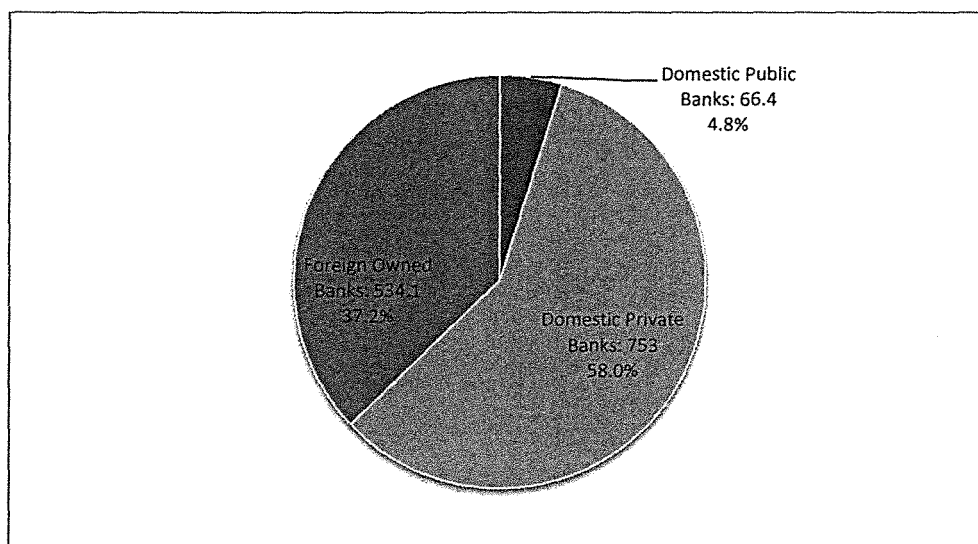
Most African financial systems before independence, as was the case for the Kenyan financial system, comprised solely of foreign banks (Brownbridge et al., 1998). Domestic banks emerged later as a result of governments assuming ownership in major banks. According to Central Bank of Kenya (CBK), foreign banks are defined as banking institutions that have more than 50% of foreign ownership. Domestic banks on the other hand are defined as banks that have at least 50% domestic ownership ("CBK Bank Supervision Annual Report", 2010). The Kenyan financial system had been largely restricted till 1980s when major reforms were undertaken to strengthen and liberalize the financial markets.

Currently, the Kenyan banking sector is one of the most developed in Sub-Saharan Africa. As of 2008, the sector had a private credit to GDP ratio of 23.7% compared to a median of 12.3% for Sub-Saharan Africa (Beck et al., 2011). In recent years, the Kenyan banking sector has experienced an exponential growth in terms of loans as a percentage of GDP. A growth that is also visible in terms of increased points of service for customers: Increased number of bank branches and automatic teller machines (ATMs) (FinAccess 2010 survey, 2010).

CBK is mandated with the supervisory role of financial institutions in Kenya. As at December 2010 the banking sector had 42 commercial banks and 1 mortgage finance company; excluding

one bank that was under suspension by CBK. Out of the 43 banking institutions, 31 are domestically owned whereas 13 are foreign owned (see Appendix 1: A list of Kenyan Banks as at 2010. Despite the low composition of the total number of banking institutions, foreign owned banks have a significant impact in the Kenyan banking sector. Foreign banks comprise 37% of the total net assets of Kenyan banking institutions (Figure 1.1).

Figure 1.1: Assets base of Kenyan Banks (in Ksh. billions)



Source, ("CBK Bank Supervision Annual Report", 2010).

Foreign banks are known to improve the quality and availability of financial services, by enhancing competition and the use of modern banking technology (Levine, 1996). Foreign banks employ comparative advantage to gain a competitive edge and operate efficiently. As a result domestic banks are enticed to emulate foreign banks in order to become competitive. For a long while, foreign banks have been pace setters of best practice in the Kenyan financial system. In turn, domestic banks have managed to improve performance by mimicking strategies of foreign banks. As a result, the Kenyan financial system improved in terms of technological advancement, competitiveness and efficiency.

Despite many advantages that foreign banks bring to a financial system; foreign banks also have known limitations. Consequently blanket imitation of foreign bank strategies could be detrimental to domestic financial systems. Peek and Rosengren, (2000) and Stiglitz, (1993), observe that foreign banks weaken the stability of domestic banks through increased

competition. Furthermore, foreign banks are argued to lack shared interest with domestic banking system regulators. The lack of shared objectives consequently weakens supervisory bodies of domestic banking sector.

Kenya's banking regulator CBK, has been propagating a strategy towards financial deepening through branchless banking in the recent past ("CBK Bank Supervision Annual Report", 2010). Financial deepening, which includes outreach of financial services to households, is geared toward poverty eradication and economic growth. "FinAccess 2009 survey", (2009) reported that 33% of Kenya's bankable population remains totally excluded from any form of financial services. In addition, only 41% of the population was reported to use formal financial services as at 2009; an improvement from 2006, when only 26% of the population accessed formal financial services. The improvements were largely attributable to the expansion of semi-formal service providers: mobile-phone based money transfer service: M-Pesa; Saving and Credit Co-operative Society (SACCOs); and Micro Finance Institutions (MFIs). As noted by Allen et al., (2011), foreign banks had the least impact on financial deepening compared to domestic and state influenced banks. Foreign banks prefer large corporate organizations while ignoring small and medium sized enterprises (SMEs), entrepreneurs and households. It follows therefore that foreign banks and domestic bank regulators do not have shared interests. Nonetheless, Kenyan domestic banks have been observed to improve performance from focusing on SMEs. Clearly, blindly emulating strategies of foreign banks may not necessarily lead to increased performance.

Kenyan banks have been observed to exhibit monopolistic competition characteristics (Mwega, 2011). According to the National Financial Access Survey released in 2010 (FinAccess, 2010), the level of concentration of financial institutions in one area is significant. Fifty four percent of all banking institutions have physical locations in the capital city, Nairobi. Furthermore, all commercial banks have their headquarters in the capital city and only operate in other areas through branch networks. Of all banks operating in Kenya however, foreign banks have been evident to be less competitive compared to domestic banks (Mwega, 2011). Low competitive levels of foreign banks have been attributed to: focus on large corporate as opposed to SMEs and household. Another contributor towards low competitive levels of foreign banks is slow decision making process. Slow decision making process hinders speedy adoption of localized innovative strategies like mobile and branchless banking. Foreign banks have also been fronted to apply

global strategies of multinationals. Unfortunately, these strategies are at times not aligned to competitive strategies for domestic markets. Low competition gives banks less incentives to be efficient.

1.2 Problem Statement

In developing nations, foreign banks tend to perform better than domestic banks by employing comparative advantage. Foreign banks use comparative advantage in technology, expertise and access to foreign markets, to gain a competitive edge. As a result domestic banking institutions are compelled to emulate foreign bank strategies in order to maintain a competitive edge. In Kenya, foreign banks have constantly set the pace of best practice for banks. Despite the superiority of foreign banks, some foreign bank strategies do not lead to improved performance.

For example, some domestic banks in Kenya focused on SMEs and reported increased performance as a result (Allen et al., 2011). Foreign banks tend to concentrate on large corporates instead. The focus on large corporates, is a global strategy for foreign banks that may not suit domestic market conditions. Additionally, lack of focus towards SMEs and households goes against the wishes of the domestic regulator: CBK. Foreign banks have been observed to have the least impact on financial deepening strategy propagated by CBK. Strategies of foreign banks therefore may weaken the effectiveness of domestic regulators. Furthermore, foreign banks have also been observed to be less competitive in Kenya (Mwega, 2011). Foreign banks are slow at adopting innovative strategies like mobile and branchless banking. Institutions that are uncompetitive have less motivated to be efficient. Clearly, blindly emulating foreign banks strategies could lead to suboptimal performance or weak domestic banking systems. There is need therefore to establish whether foreign banks efficiently maximize their outputs compared to domestic banks. There is need to establish the most efficient banks and some of their sources of efficiency that should be emulated.

According to banking efficiency literature, foreign banks are argued to draw from their comparative advantage to operate more efficiently in domestic nations. Ideally, foreign banks that originate from nations with favourable regulatory and market conditions should be more efficient compared to other banks. A counter argument however, postulates that domestic banks have the advantage of understanding local market conditions better than other banks. Existing

literature in banking efficiency however, is inconclusive as to whether foreign owned banks are more efficient than domestic owned banks in developing nations (Berger, 2007).

1.3 Objective of the Study

The study had the following objectives:

1. To evaluate bank efficiency levels in Kenya over the seven year period: 2004 to 2010.
2. To investigate efficiency difference between foreign owned banks and domestic owned banks in Kenya
3. To establish the determinants of bank efficiency for banks operating in Kenya.

1.4 Limitations of the Study

The study measured the input and output variables based on publically available financial accounting reports, thus subjecting the study to known weaknesses financial accounting information. Financial accounting reports assume that a snap shot position in a bank's financials is representative whole year's operations. A supposition that is highly unlikely. Additionally, accounting entries are subject to human errors.

The other weakness of the study is in the linear programming methodology used: DEA. DEA is particularly sensitive to inaccurate data; for example, outliers are considered to be (in)efficiencies in a DEA analysis. The other weakness of DEA is the assumption that efficient decision making units (DMU) are only as efficient as other DMUs within the sample (Miller and Noulas, 1996). It is however possible that a more efficient DMU, which could have redefined the efficient frontier, was not selected. Omission of a more efficient DMU will lead to underestimation of relative efficiency scores. The study has nonetheless followed the same structure as employed by many other researchers (Miller and Noulas, 1996; Sathye, 2001; Havrylchyk, 2006; Hauner and Peiris, 2008)

1.5 Significance of the Study

Banks in their role of financial intermediation facilitate transfer of funds from surplus units to deficit units. Efficient banking institutions therefore ensure that allocation of funds is prioritized to viable investments. For example, technological innovation is encouraged when funds are only allocated to those entrepreneurs with a greater chance of developing successful products or production processes (Schumpeter, 1912). Indeed literature empirically substantiates a first order relationship between financial development and economic growth. Moreover, literature gives evidence of financial sector development being a predictor of: future economic growth rate; accumulation of capital; and change in technology (Levine, 1997). Clearly financial sector development is imperative for economic growth and it can be achieved through improved efficiency in financial sector institutions. Therefore, evidence of sources and determinants of efficiency are important for benchmarking by banking institutions. Additionally, sources and determinants of efficiency can be applied as a basis for policy decisions. For example, given that public listing in the stock market has a significant positive influence on bank efficiency, banks could be encourage to list their shares publicly. Moreover, innovative branchless banking strategies should be encouraged. Branchless banking strategies appear to have made large domestic banks more efficient compared to large foreign banks.

Another significance of the study is contribution to existing literature on empirical bank efficiency studies. Literature on Kenyan banks' efficiency based best practice methodologies, hugely lacks. Furthermore, existing literature is inconclusive as to whether foreign owned banks are more efficient than domestic owned banks in developing nations (Berger, 2007). The study provides evidence in support of foreign banks being more efficient compared to domestic banks. Interestingly though, domestic banks have been constantly closing the gap. In fact, when banks are grouped according to peers of large, medium and small banks; large domestic banks outperformed large foreign banks in terms of efficiency. Domestic medium sized banks became more efficient compared to foreign medium sized banks after 2008.

1.6 Organization of the Rest of the Thesis

The rest of the paper is organized as follows; chapter two discusses the theoretical basis advising this study: the theory of financial intermediation. The chapter reviews and critiques existing literature on bank efficiency studies. Moreover, the chapter identifies areas which are either inadequately covered or which have not been addressed conclusively. Chapter three evaluates the methodology used to conduct the study. The variables for the study, the sources of data, and the analytical technique to be applied are also discussed. Chapter four focuses on data analysis; and presentation and interpretation of findings. Chapter five discusses the research findings. Finally, chapter six presents conclusions, recommendations and areas for further research.

CHAPTER TWO

2 LITERATURE REVIEW

2.1 Introduction

The aim of the study is to evaluate banking sector efficiency in Kenya within the period 2004 to 2010. The study also evaluates the difference in efficiency levels between foreign owned banks and domestic owned banks. Further, the study sought to identify some of the sources of efficiency for banks. This chapter discusses the theoretical basis for the study: The intermediation theory that explains bank behavior. The chapter also reviews and critiques literature on bank efficiency studies and establishes an existing gap in the literature. Finally, the chapter discusses the variables applied in the research and how they fit in the theoretic framework.

Fried et al. (1993) describes bank efficiency as the ability of a bank to convert input resources into optimal outputs or achieving a given level of output by using minimal input resources. It is evaluated as a ratio of a bank's outputs to inputs, or a ratio of a bank's inputs to outputs. Thus to measure efficiency it is imperative to determine the inputs and outputs of a production unit. Care must be taken however in order to select the right input and output variables, lest measured inefficiencies be a result of poor choice of variables. For accurate efficiency measurement therefore, variables that represent the economic objectives of a production units should be chosen (Stigler, 1976). Economic objectives of a production unit are understood well under the premise of the unit's behavior and economic decision making process. Since banking institutions are financial intermediaries their behavior is analyzed under the financial intermediation theory.

2.2 The theory of Financial Intermediation

Bhattacharya and Thakor (1993), in their assessment of existing literature on financial intermediation, described financial intermediaries as agents responsible for transferring surplus funds from savers to deficit units. According to them, the development of the theory on financial intermediaries defines two main roles of financial intermediaries: providing brokerage and Qualitative Asset Transformation. As a broker, a financial intermediary convenes transactions

between two or more providers and users of capital without altering the nature of the claim of either party. An example is offering financial advice or issuing a security offer to the market. Qualitative asset transformation takes place when a financial intermediary alters the nature of the claim whose exchange it is facilitating. For example: converting small riskless deposits into large risky loans. These functions are described by Bryant (1980) and Diamond and Dybvig (1983) as liquidity creation and they are described by Diamond (1984), Ramakrishnan and Thakor (1984) and Boyd and Prescott (1986) as risk transformation.

Franklin and Santomero (1998), Suggested that the basis of the existence of financial intermediaries is the idea that: given perfect markets with perfect information and negligible friction in conducting transactions, then financial intermediaries become redundant. In other words, financial intermediaries exist only because markets are imperfect. Market imperfection ensures that savers and investors are not able to find each other and transact at optimal prices, at no extra costs. Additionally, given the fact that in practice financial intermediaries have been vital since ancient times; then the source of their importance has been fostered by information asymmetry, and the friction of transaction costs. These ideas have been extensively explored by several other researchers. For instance, Gurley and Shaw (1960) suggested that some fixed costs of transactions like asset valuation are too expensive for individuals. However, financial intermediaries are able to spread asset valuation costs over many transactions. Leland and Pyle (1977) and Diamond (1984) were of the view that financial intermediaries assume the position of asset monitors. As asset monitors, financial intermediaries are able to invest in assets for which they have special information on, thus benefiting from information asymmetry. Gale and Hellwig (1985), Campbell and Kracaw (1980) and Boyd and Prescott (1986) are the other authors who agree with the view that financial intermediaries as asset monitors, benefit from information asymmetry.

In recent years, financial intermediation theory has been critiqued for being out of line with modern financial intermediation practices. (Franklin and Santomero, 1998) in a critique of traditional intermediation theory, argued that the theory does not capture the changing dynamics of intermediaries. The authors observed that traditional financial intermediary theory focuses a lot on obsolete products and services of financial intermediary institutions. Traditional intermediation theory depicts the role of financial intermediaries as: reduction of friction of

transaction costs and reduction of information asymmetry. Franklin and Santomero, (1998) contrast the opinion of traditional intermediation theory. They suggest that there exist more important roles of financial intermediaries in modern times. The roles are described as: facilitating risk transfer, facilitating participation in the financial sector, and dealing with complex financial instruments and markets. For example, if mutual funds only existed for diversification and reduction of transaction costs; then the decrease of transaction costs in early 1970's at the New York Stock Exchange, should have seen a reduction in investments by mutual funds. Similarly, technological advancements should have reduced information asymmetry, making mutual funds more and more unnecessary. On the contrary, mutual funds actually increased their participation in the New York Stock exchange. Increased participation signaled that the importance of mutual funds went beyond transaction costs and information asymmetry.

Another contribution to the development of financial intermediation theory is given by Scholtens and Van Wensveen (2000). In a critique of Franklin and Santomero (1998)'s "Theory of financial intermediation", the researchers concur with the idea that financial Intermediaries theory, based on traditional paradigms of existence, are extinct. Given modern trends towards market transparency, the arguments that favour information asymmetry no longer hold water. Additionally, the authors concur with the proposition that financial intermediaries' role is not just filling the gap of information asymmetry and reducing participation costs. Financial intermediaries also play role of risk management as suggested by Franklin and Santomero (1998). Scholtens and Van Wensveen (2000) however, disagree with the suggestion that risk management is a relatively new concept in financial intermediation. Moreover, the authors make a further contribution to the theory of financial intermediation. They propose that financial intermediaries' role should be based on dynamic markets rather than just perfect markets. Financial intermediaries should be seen to act as independent market parties who create new value adding products for their clients. Thus financial intermediation should also be seen as a value creating economic process.

2.3 Modeling Bank Behavior Based on Financial Intermediation Theory

Stigler (1976) proposed a key fundamental for modeling a bank's behavior or its production process. The key fundamental is a good understanding of a bank's economic objectives and its economic decision making process. The theory of financial intermediation defines a bank's

economic objectives. However, in modeling the production process of banks, two opposing approaches have been adopted: production approach and intermediation approach. There is no consensus amongst researchers as to which approach is superior.

The production approach, as described by the pioneers of the approach: Sherman and Gold (1985); Ferrier and Lovell (1990); and Fried et al. (1993), depicts a bank as a producer of financial services to account holders. These services include deposit transactions and processing documents such as loan applications and credit reports. The production approach identifies input measures to a bank's production process as: labour and physical capital. Outputs of a banking production process on the other hand are defined as loans and deposits.

The intermediation approach which is credited to Sealy Jr and Lindley (1977), considers banks to be financial intermediaries. Banks are taken to be financial intermediaries who convert and transfer financial assets between surplus units and deficit units. In their study, Sealy Jr and Lindley, (1977), aimed to capture both the technical production sense and the economic production sense of banks. The technical production sense is described as transformation of inputs to outputs. The economic production sense on the other hand, is described as ensuring value addition to inputs by developing outputs with higher market prices than inputs. Under the intermediation approach the production process of a financial institution is described as: the use of loanable funds, serviced by a firm's capital: labour and material input, to produce earning's assets. The intermediation approach identifies loans issued, other earnings assets: securities or deposits with other banks, and non interest revenue: fee based products and services, as outputs. For the intermediation approach, the number of employees, physical capital and borrowed funds or loanable funds, are taken to be inputs to financial intermediation. Several research papers have employed the intermediary approach (Aly et al., 1990; Zaim, 1995; Berger and Mester, 1997; DeYoung and Hasan, 1998; Isik and Hassan, 2002; Havrylchyk, 2006; Hauner and Peiris, 2008)

The main disconnect between the intermediary and production approach lies on the treatment of charges imposed on customer services. The production approach treats charges on customer services as outputs to a production process. The intermediation approach on the other hand, treats customer charges as input resources. According to Sealy Jr and Lindley (1977), customers always pay a fee for transaction services that do not cover the cost of providing the service paid for. service to customers therefore could be evaluated as a bit of both input and output.

Berger and Humphrey (1997), advise that the production approach is more appropriate for bank branch efficiency studies. The intermediary approach on the other hand, has been observed to be apt for evaluation of financial institutions as a whole rather than branches. Additionally, the authors merit the intermediary approach for including interest expense on loans as an input to a bank's production process. In modern times, interest expense has been accounts for between half to two thirds of total costs of banks.

2.4 Empirical Studies on Bank Efficiency

Bank efficiency studies greatly increased in the 1990s, influenced by deregulation in the US banking industry in the 1980s. In their survey of bank efficiency studies Berger and Humphrey (1997) observed 130 papers on efficiency of financial institutions done in 21 countries; with 89% of them conducted in the 1990s. Despite the growing number of bank efficiency studies, most studies have been conducted in developed nations, mainly US and Europe with little research done in developing nations (Hauner and Peiris, 2008).

2.5 Bank Efficiency Studies Comparing Foreign Banks against Domestic Banks

Bank efficiency disparity between foreign owned banks and domestically owned banks has been a subject of a long standing debate. Emerging disparity in views makes studies comparing domestic and foreign bank efficiency an area that requires further research (Berger, 2007). Bank efficiency studies had the general conclusion that foreign owned banks are less efficient than locally owned banks in developed countries. The position is reversed in developing nations and transition countries where foreign owned banks have been argued to be more efficient than domestic owned banks. Several recent papers on bank efficiency however contrast the view foreign banks are more efficient in developing nations.

Several reasons have been fronted in a bid to explain why foreign owned banks are more or less efficient compared to domestic owned banks. Berger et al. (2000), in their bank efficiency analysis in five home countries: France, Germany, Spain, United Kingdom (UK) and United states (US); tried to explain the determinants of the difference in efficiency levels between foreign owned and domestic owned banks. Two hypotheses were used to explain disparity in efficiency between foreign owned institutions and domestic owned institutions: *home field*

advantage hypothesis and *global advantage hypothesis*. Based on the home field advantage hypothesis, domestic owned institutions operate more efficiently in comparison to their foreign owned counterparts. The advantage is as a result of diseconomies faced by institutions with foreign ownership when they conduct operations or monitoring from a distance. Operating problems include high costs of convincing managers to work abroad and possible conflicts between staff from different nations. Monitoring problems include difficulties in evaluating managers' efforts relative to their market of operation, from a far. Miller and Parkhe (2002) describe these diseconomies of operations as the 'cost of foreignness'. The global advantage hypothesis argues that some foreign institutions are able to use their comparative advantage in superior managerial skills and optimal fund raising, to overcome cross-border disadvantages. A limited version of the global advantage hypothesis: *limited global advantage hypothesis*; argues that only institution from a few countries are able to overcome cross-border disadvantages, and operate more efficiently compared to domestic owned institutions. The conjecture proposes that perhaps not all foreign institutions are more (in)efficient; and that only institutions from a few nations are capable of overcoming the cost of foreignness, and operate more efficiently. This study aims to test whether the limited global hypothesis is applicable to the Kenyan banking sector. Berger et al. (2000) found evidence for limited global advantage hypothesis; however on average domestic owned banks were found to be more efficient in support of the home advantage hypothesis. These results were consistent with other research studies done in developed nations, mainly the US and Europe (Chang, I. Hasan, and Hunter, 1998; DeYoung and Nolle, 1996; I. Hasan and Hunter, 1996; Mahajan, Nanda Rangan, and Zardkoohi, 1996; Miller and Parkhe, 1999).

Sturm and Williams (2004) however, observed an inconsistency with the finding that domestic owned banks are more efficient than foreign owned banks in developed nations. In a study of the Australian banking industry during the post deregulation period 1988 to 2001, Sturm and Williams (2004) found foreign owned banks to be more efficient than domestic owned banks. The study investigated the impact of foreign bank entry on bank efficiency in Australia. The study used data envelopment analysis (DEA), malmquist indices and stochastic frontier analysis (SFA) methodologies. These methodologies are common in bank efficiency studies and are known as frontier analysis techniques.

Frontier analysis techniques analyze how well (compared to its peers), decision making units (DMU) utilize a set of input resources to produce a set of outputs. DMUs in bank efficiency studies are represented by bank branches or banks. Frontier analysis techniques develop a best practice frontier for a sample of DMUs which represent a set of best practice decision making units. Efficiency scores for all DMUs are then determined based on the frontier. SFA is a parametric technique of measuring efficient frontiers and eventual relative efficiencies. It has a drawback of assuming an existing distribution for the efficient frontier and uses this as a basis for measuring relative efficiencies. Its main advantage is the capability of measuring residuals and separate inefficiencies from random errors in order to improve the accuracy of estimated efficiencies; that is, establishing unusual observations that could be due to chance or recording error rather actual (in)efficiencies (Berger and Humphrey, 1997). DEA is a nonparametric technique for measuring efficient frontiers. It has the advantage of not imposing any particular functional form. It however has a drawback of not distinguishing between random errors and inefficiencies thus making it sensitive to outliers (Avkiran, 1999).

Some Bank efficiency studies done in European transition economies and some developing nations lean more towards the global advantage hypothesis; foreign owned banks appear to be more efficient than domestic owned banks. In Poland for example, Havrylchyk (2006) investigated the efficiency of polish banks in the period 1997 to 2001 using DEA. Domestic owned banks were found to be less efficient than foreign owned banks however there was evidence of limited global advantage hypothesis. The study measured cost, allocative, technical, pure technical and scale efficiency of polish banks based on the intermediation approach of modeling bank production process. Technical efficiency is the ability to produce as much output as the input resources allow; or the ability to use as little input as the production output allows, essentially it is the reduction of wastage in production (Fried et al., 1993). A formal definition of technical efficiency is given by Koopmans (1951), who defined it as, A point at which an increase of an output will necessitate a decrease in at least one other output or require an increase of at least one input; Whereas a decrease in input will necessitate an increase in at least one other input or a decrease in at least one output. A production unit that can produce the same amount of output even after at least one input resource has been decreased; or use the same amount of input resources to produce more of at least one output, is technically inefficient. Allocative efficiency is achieved when a combination of inputs with minimum costs is chosen to achieve a desirable

level of output. A profit maximizing firm makes optimal decisions such that the technical rate of substitution is the same as the ratio of prices of resources (Banker et al., 1984).

In a different bank efficiency study, Hasan and Marton (2003) studied the Hungarian banking industry during the transitional process; when the banking industry was being transformed from a centralized economy, to a market-oriented system: the period 1993 to 1997. The study used SFA method to establish efficient frontier and inefficient institutions. Foreign owned banks were found to be more efficient compared to their domestic owned counterparts. In a cross-country study, Bonin et al. (2005) used a sample of 225 banks from eleven transition countries to investigate the impact of foreign ownership on profit and cost efficiency; using SFA methodology. The study found foreign owned banks to be more efficient than domestic owned banks. Other transition economies studies that arrive to this same conclusion include (Claessens et al., 2000; Grigorian and Manole, 2006; Micco et al., 2004; Yildirim and Philippatos, 2007)

2.6 Bank efficiency research in developing nations

In studies of developing nations, there is lack of consensus as whether foreign banks are more efficient than domestic banks. The lack of consensus makes further research, in bank efficiency difference between domestic and foreign banks, an area of interest.

Research in Latin American countries has had mixed conclusions with regard to foreign banks and domestic banks' efficiency. Barajas et al., (2000) for example, evaluated the performance of foreign owned banks against the performance of domestic owned banks in Columbia. The study analyzed bank performance during the period after financial liberalization measures undertaken in 1990. Foreign owned banks were observed to be more efficient than domestic owned banks. Berger et al. (2005) concur with this view in their study of Argentinean banks. A conflicting view is observed by Crystal et al. (2001), who investigated the performance levels in the Latin American banking industry. The study assessed performance levels in the years 1995 to 2000: the period after the upsurge of foreign ownership in Latin America banking industry (Argentina, Brazil, Chile, Colombia, Mexico, Peru, and Venezuela). However this study applied a different methodology from frontier analysis. The study was based on rating agency ratings and balance sheet behavioral indicators. The study found no significant difference between foreign banks and domestic banks' performance.

In India, Bhattacharyya et al. (1997) found foreign owned banks to be more efficient than domestic owned banks however foreign owned banks were inefficient compared to publicly owned banks. The study covered the period 1986 to 1991 and used DEA and SFA methodology to calculate efficiency scores. A more recent study by Sensarma (2006) covering the period 1986 to 2000, found foreign banks in India to be the worst performers. The study measured efficiency using SFA and determined productivity measures based on SFA efficiency estimates. A value added approach of modeling bank behavior was applied. A study of the Thai banking sector by Chansarn (2007), comparing foreign owned banks efficiency to that of domestic owned banks using total factor productivity (TFP). The study found efficiency levels to be indifferent.

2.7 Bank efficiency studies in Africa

Very little research on bank efficiency has been done for African nations (Hauner & Peiris, 2008); and still, in the little that has been done there are mixed conclusions with regard to bank efficiency difference between foreign and domestic banks. Figueira et al. (2006) in their study: Does ownership affect the efficiency of African banks? Applied DEA and SFA efficiency measures, and ratios to examine bank efficiency levels in Africa; across different ownership categories in the period 2001 to 2002. The study included a sample of 40 African countries in the North African and Sub-Saharan region. The study defined its input variables as labour costs, operational costs, capital costs taken as interest charge on fixed assets and interest expense as input variables; whereas loans and other earnings assets were treated as outputs. State owned banks were found to outperform privately owned banks. However privately owned banks that were foreign owned, outperformed state owned banks; intimating that foreign owned banks exercise their comparative advantage to overcome the liability of foreignness thus performing better. This study had the disadvantage of limited data hence the limited scope of two years that the study considered.

Another cross nation study that covers African nations gives contrasting conclusions as regards the superiority of foreign owned banks in performance. Micco et al. (2004) found foreign owned banks in South Africa and North Africa to be more inefficient compared to domestic owned banks. The study covered 119 countries over an 8 year period: 1995 to 2002. A similar divergent view is also observed in a study of West African banks, in the West African Economic and Monetary Union (WAEMU) region: Benin, Burkina Faso, Cote d'Ivoire, Mali, Niger, Senegal

and Togo; where local private banks were found to be more efficient than foreign owned banks. The study applied both parametric frontier technique, SFA and non-parametric frontier technique, DEA; during the post reform period 1993 to 1996 (Kablan, 2007).

Nation specific studies covering African are limited and most of them quite recent showing an increasing interest of research in this area. In a study of Ugandan banking sector, Hauner & Peiris (2008) investigated the impact of banking reforms on efficiency and competition. Based on a sample 14 Ugandan banks in the period 1999 to 2004; the study applied the non-parametric technique, DEA and an intermediary approach of modeling bank behaviour. Improved overall technical efficiency in the banking sector as a result of bank reforms was reported. Foreign banks and larger banks were also found to be more efficient.

A contrasting view as regards efficiency of foreign owned and domestic owned banks is seen in a study of Ghanaian banks. Frimpong (2010) assessed relative efficiency of Ghanaian banks for the year 2007. The study applied the intermediation approach and DEA methodology. Private domestic banks were found to be more efficient than foreign owned banks. The study's main limitation was the limited period of the study of one year, which increases the possibility of the average efficiency scores being due to chance.

The author is not aware of any research examining bank efficiency difference between foreign and domestically owned banks in Kenya. For instance, Sakina (2006) investigated the X-efficiency of commercial banks in Kenya and its relationship to economies of scale. The study evaluated 33 banks over the period 2000 to 2005, based on stochastic econometric cost frontier approach. Commercial banks' X-efficiency was found to be related to bank size; with evidence of smaller banks being more inefficient compared to large banks. This study however did not compare efficiency levels based on ownership structure: domestic versus foreign. Additionally, annual efficiency measurements was not possible, this could have enabled the assessment of effects of bank reform strategies on efficiencies. Kisaka and C. Kimani (2009) measured the efficiency of Kenyan commercial banks; and made an effort to assess whether there is a relationship between stock prices of financial institutions, and efficiency levels. The study measured cost and profit efficiency of banks in the period 1998 to 2006 based on DEA frontier approach. Cost efficiency was found to be declining over the period in question; a significant correlation between stock prices of financial institutions and changes in efficiency levels was

also established. This study on the other hand did not compare domestic and foreign banks efficiency levels.

Beck et al., (2011), investigated the stability, efficiency and outreach of Kenyan banks, given that the Kenyan financial sector is the most prominent one amongst east African countries. Kenyan banks' stability was observed to have improved due to improved asset quality and liquidity positions. Interest rates spreads were observed to have declined whereas outreach was seen to be limited with slight improvements over recent years. The paper however, employed a non-structural efficiency measure, by using interest spreads as a proxy for efficiency, a method that is not based on the theory of bank behavior (Chen, 2009).

A common aspect missing in empirical studies from African countries is the test of the limited global hypothesis proposed by (Berger et al., 2000). This study will further contribute to bank efficiency studies by testing this hypothesis.

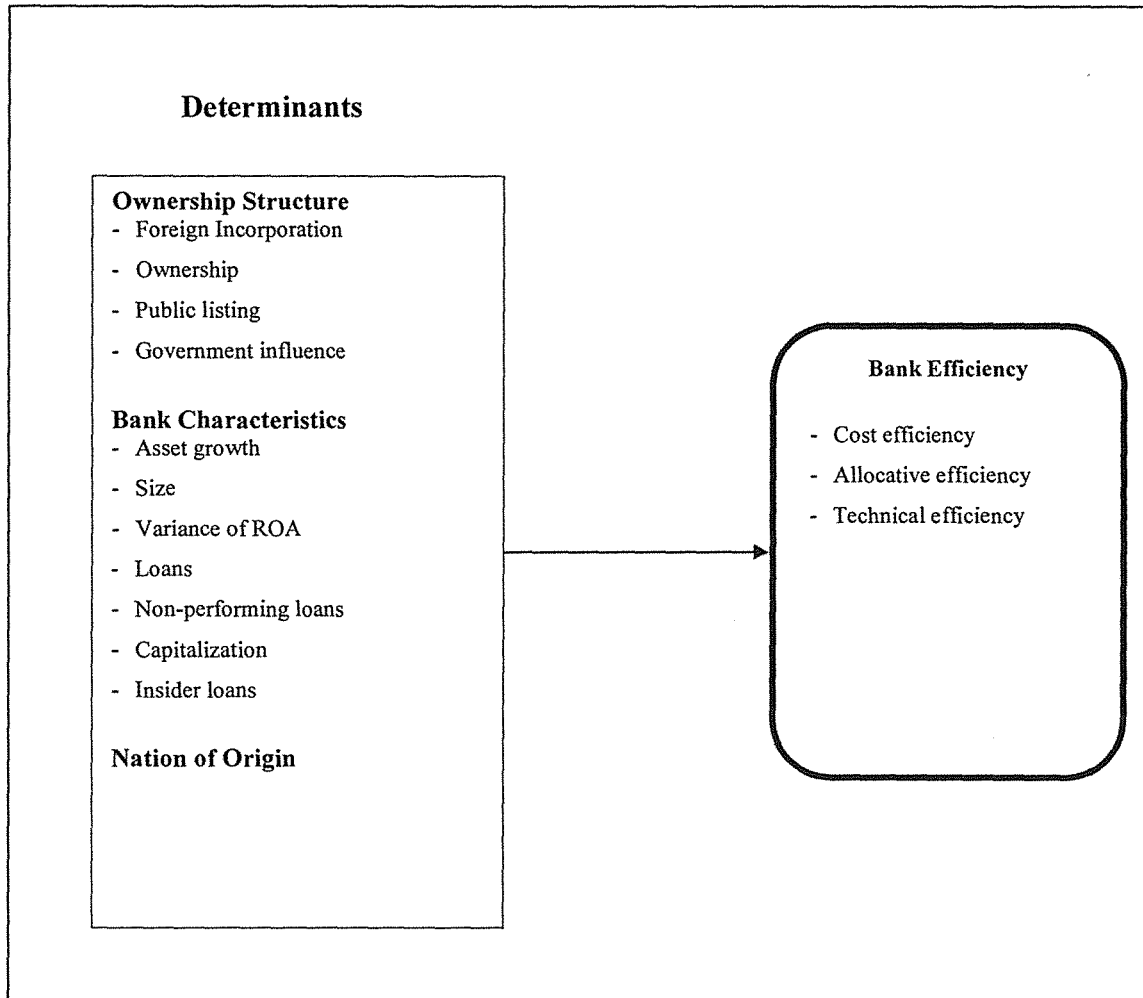
2.8 Research gap

In summary, there is lack of consensus in literature as to the efficiency difference between foreign owned banks and domestic owned banks. Bank efficiency studies have mixed conclusions regarding efficiency levels of foreign owned banks compared to domestic banks. Some researchers are of the proposition that foreign owned banks are less efficient than locally owned banks in developed countries whereas foreign owned banks are more efficient than locally owned banks in developed nations. Other studies however, especially those conducted in developing nations and some from African countries, contravene this proposition. This disparity on bank efficiency studies; makes studies comparing domestic and foreign bank efficiency, an area that requires further research (Berger, 2007).

This study also aims to investigate further the limited global hypothesis proposed by Berger et al. (2000). The hypothesis argues that only banking institutions from a few nations overcome diseconomies of cross-border operations and perform more efficiently than other banks.

2.9 Conceptual Framework

Figure 2.1: Conceptual Framework



2.10 Determinants of Bank Efficiency

2.10.1 Measurements of Efficiency

Bank efficiency studies make use of frontier analysis in determining bank efficiency levels. There is no consensus in literature as regards the preferred method of studying the efficiency of financial institutions. Five main approaches have been applied in frontier analysis literature: data envelopment analysis (DEA), free disposal hull (FDH), stochastic frontier approach (SFA), thick frontier approach (TFA) and distribution free approach (DFA) (Berger and Humphrey, 1997). DEA and FDH are nonparametric techniques of measuring efficient frontiers. The nonparametric techniques have the advantage of not imposing any particular functional form. However, the techniques have a drawback of not distinguishing between random errors and inefficiencies thus making them sensitive to outliers. SFA, TFA and DFA are parametric techniques of measuring efficient frontiers and eventual relative efficiencies. The techniques assume an existing distribution for the efficient frontier and use the distribution as a basis for measuring relative efficiencies. Nevertheless, parametric frontier analysis techniques have the advantage of measuring residuals thus separating inefficiencies from random errors. In other words, the techniques establish unusual observations that could be due to chance or recording error rather actual (in)efficiencies. The main drawback of parametric techniques is the risk of overstating efficiency levels when functional forms are poorly specified.

This study applies the nonparametric technique, DEA. DEA is a linear programming technique developed by (Charnes, Cooper, and Rhodes, 1978). DEA is advantageous as it does not assume a specific production technology and thus imposing a preconceived structure on the data, while determining efficient decision making units (Banker et al., 1984; Mester, 1996). DEA also does not assume any functional form and efficiency is measured relative to actual observed sample data of efficient units. The ability to apply DEA with only a small number of observations makes it especially useful for conducting year by year analysis in order to monitor effects from regulations and technology (Evanoff & Israilevich, 1991; Havrylchyk, 2006). DEA also allows computation of overall cost, technical and allocative efficiencies.

Technical efficiency is the ability to produce as much output as the input resources allow; or the ability to use as little input as the production output allows, essentially it is the reduction of wastage in production (Fried et al., 1993). A formal definition of technical efficiency is given by Koopmans (1951), who defined it as, A point at which an increase of an output will necessitate a decrease in at least one other output or require an increase of at least one input; Whereas a decrease in input will necessitate an increase in at least one other input or a decrease in at least one output. A production unit that can produce the same amount of output even after at least one input resource has been decreased; or use the same amount of input resources to produce more of at least one output, is technically inefficient. Allocative efficiency is achieved when a combination of inputs with minimum costs is chosen to achieve a desirable level of output. A profit maximizing firm makes optimal decisions such that the technical rate of substitution is the same as the ratio of prices of resources (Banker et al., 1984).

DEA analyses how well decision making units (DMU) utilize a set of input resources to produce a set of outputs. The DMUs in bank efficiency studies are represented by bank branches or banks. DEA develops a best practice frontier for a sample of DMUs which represent best practice decision making units, efficiency scores for all DMUs are then determined based on the frontier. For an in depth analysis of DEA in its application as a bank efficiency measure, the reader is referred to (Avkiran, 1999).

One of the main disadvantages of DEA is the assumption that the data collected is accurate (Mester, 1996). Much as for all empirical analysis conducted unreliable data is always a weakness, DEA is particularly very sensitive to inaccurate data since the efficient frontier and subsequent efficiency measure are based on the data. For example, outliers are considered to be (in)efficiencies in a DEA analysis. Another limitation of DEA is that efficient decision making units (DMU) are only as efficient as other DMUs within the sample, it is possible that a more efficient DMU that could have redefined the efficient frontier was not selected, thus underestimating relative efficiency scores (Miller and Noulas, 1996). This study surmounted this problem by covering all the banks in population. (for a comprehensive review of pitfalls and protocols of DEA see Dyson et al., (2001)).

Despite these shortcomings of DEA, Berger and Humphrey (1997) in their survey of bank efficiency studies observed 69 studies that applied nonparametric techniques compared to 62

studies which applied parametric techniques. Of the 69 studies that applied non-parametric techniques 62 of them used DEA. This goes to show how DEA frontier technique is popular amongst researchers in determining bank efficiency levels. Studies that have used DEA in analyzing bank efficiency include;(Yue, 1992; Berg et al., 1993; Favero and Papi, 1995; Wheelock and Wilson, 1995; Miller and Noulas, 1996; Resti, 1997; Sathye, 2001; Havrylchyk, 2006; Figueira, Nellis, and Parker, 2006; Hauner and Peiris, 2008).

2.10.2 Input and Output Variables for measuring Efficiency

DEA assesses how well input variables of decision making units are converted to output variables. The input and output variables used in the study to determine bank efficiency were determined based on intermediary approach, similar to studies by other researchers (Aly et al., 1990; Zaim, 1995; Berger and Mester, 1997; DeYoung and I. Hasan, 1998; Isik and Hassan, 2002; Havrylchyk, 2006; Hauner and Peiris, 2008). Intermediary approach uses loans issued, other earnings assets (securities or deposits with other banks) and non interest revenue (fee based products and services) as outputs. Input resources are considered to be Employees, physical capital and borrowed funds or loanable funds. Number of employees was omitted from the study since banks consider this information confidential and was thus not available, other studies that did not include labour as part of inputs include (Drake and Hall, 2003; Hauner and Peiris, 2008). All input and output variables were obtained from financial reports of banks which have to be published publicly as a regulatory requirement.

Output Variables

The Study considers three output variables: Total loans issued, government securities and fees and commission charges. The choice of output variables follows other studies conducted (Havrylchyk, 2006; Sturm and Williams, 2008; Sufian, 2011). Loans were considered as total loans and advances net of provision for loan loss in line with Grigorian and Manole, (2006); a treatment that ensured that loans are of comparable quality. On average, government securities constitute the second highest composition of total assets for Kenyan banks, with 24% as at 2010. Net loans and advances has the highest composition with 52%. Total investments in government securities was therefore treated as the other input variable.

Input Variables

Input variables for study were taken to be: loanable funds and physical fixed assets. The choice of input variables is in line with other researchers who opted for similar treatments (e.g., Chen, 2009; Drake and Hall, 2003; Sathye, 2001; Sufian, 2011). Loanable funds is many a times treated as the addition of demand deposits and time deposits and borrowed funds (Isik and Hassan, 2002; Sathye, 2001; Sufian, 2011). In this study, loanable funds were considered to be the sum of customer deposits, deposits by other banking institutions and borrowed funds; additionally however, different from other research, shareholder's funds were also include in this category. This treatment was necessitated by the observation from some banks, whose equity constituted a very significant proportion of total assets, for some banks it was as high as 60%. Treating loanable funds as just deposits and borrowed funds would have resulted in distorted high efficiency scores for these banks.

Input Prices

In order to determine allocative efficiencies, input prices were determined as follows: interest on deposits divided by loanable funds was taken as the input price for loanable funds; whereas depreciation expense divided by fixed assets was taken to be the input price for fixed assets In line with other research (Chen, 2009; Havrylchyk, 2006; Isik and Hassan, 2002).

2.10.3 Ownership Structure

Several studies have postulated that the existing organization ownership form gives an incentive to control costs thus exhibiting higher efficiency (Aly et al., 1990; Berger and Mester, 1997; Isik and Hassan, 2002; Mester, 1993). For example, Isik and Hassan, (2002) argue that research on existing differences in efficiency across varying organizational forms and ownership forms are a good basis for policy formulation on banking business. For instance, effects of organizational form can provide direction on privatization of state owned banks or advise on private mergers and acquisitions.

Foreign Ownership

Bank efficiency disparity between foreign owned banks and domestically owned banks has been a subject of a long standing debate. Research in developing nations is inconclusive as to whether foreign banks are more efficient than domestic banks (Berger, 2007). Hauner and Peiris, (2008) observed domestic banks to be inefficient compared to foreign banks in a Ugandan study. Micco et al., (2004) on the other hand, found domestic banks to be more efficient in some African countries yet more inefficient in other countries. Contrasting observations have been made in other studies. For example, Sufian, (2011) in a study of Malaysian banks and Frimpong, (2010) for a study of Ghanaian banks, found domestic banks to be more efficient compared to foreign banks.

Public listing

Public listing is a control variable that controls for those banks that have been listed in the Kenyan stock exchange: Nairobi Stock Exchange (NSE). According to market discipline hypothesis, Publicly listed banks are expected to be more efficient since the stock holders of the bank exert discipline on bank managers influencing them to be more efficient (Berger and Mester, 1997). Sufian, (2011) in a study of Malaysian banks found publicly listed banks to have improved productivity. Isik and Hassan, (2002) observed similar findings for Turkish banks whereas Havrylchyk, (2006), found no significant relationship in the investigation of Polish banks.

Foreign Incorporation

According to the CEO of Bank of India, a foreign bank that got incorporated locally in 2010, local incorporation improves the effectiveness and speed of decision making hence performance ("The Banking Survey 2011," 2011). Local managers understand the market better than managers based in foreign countries thus reducing the liability of foreignness subject to foreign banks (Miller and Parkhe, 2002). The variable of incorporation therefore, is meant to evaluate whether those banks that are incorporated in foreign countries perform poorly in terms of efficiency.

Government influence

Bank efficiency studies conclude that banks with government influence, either owning shares directly or through state corporation, negatively influence efficiency (Isik and Hassan, 2002; Sensarma, 2006). Other studies however found no significant influence of state ownership on bank efficiency (Havrylchyk, 2006; Sufian, 2011). According to Boycko et al., (1996), State influenced banks may not necessarily pursue a profit objective but rather operate to fulfill politician's aims. For this reason state influenced banks will be expected to be less efficient. Furthermore state influence banks may lack budget constraints experienced by private banks; which is a driver for efficient utilization of resources (Isik and Hassan, 2002).

2.10.4 Bank Characteristics

Asset growth

Asset growth is measured as present year's total assets divided by previous year's total assets (Havrylchyk, 2006). This measure captures the ability for banks to manage fast growth. The Kenyan banking sector has especially seen numerous banks shifting from lower tier peer groups to higher tier peer groups since 2000. CBK classifies bank peer groups based on asset size with large banks being banks with Ksh.15 billion and above. Small banks are banks with an asset base below 5 billion whereas banks with asset size between 5 billion and 15 billion are classified as medium sized banks. Banks with a high growth rate will be expected to be inefficient since managers get overwhelmed with growth management leading to over utilization of input resources.

Size

The effect of bank size on efficiency is assessed based on the log of total assets (Havrylchyk, 2006; Isik and Hassan, 2002; Sathye, 2001; Sensarma, 2006; Sufian, 2011). Some researchers have found bank size to have an insignificant effect on efficiency (Havrylchyk, 2006; Sathye, 2001). Other researchers however reported that large banks have a negative impact on efficiency (Hasan and Marton, 2003; Isik and Hassan, 2002; Sensarma, 2006; Sufian, 2011). The high

efficiency of small banks can be attributed to the high competition in their area of operation which is normally urban areas (Isik and Hassan, 2002).

Variance of ROA

Variance of ROA is used to assess risk as argued by Isik and Hassan, (2002). Building on a previous research by DeYoung, (1998) the authors postulate that non performing managers are also timid towards risk thus leading towards a positive relationship between risk and variance in ROA. (Havrylchyk, 2006; Isik and Hassan, 2002) used variance of ROE to determine the relationship between cost efficiency and risk and reported a significant positive relationship for Turkish banks. Notwithstanding, Berger and Mester, (1997) in the study of US banks, observed a significant negative relationship.

Proportion of Loans

The proportion of loan business in a banks is measured as total loans divided by total assets. The proportion of loans issued of total assets measures bank business specialty, and assesses whether banks with large loan portfolios outperform other banks which concentrate less in issuing loans. (Chen, 2009; Havrylchyk, 2006; Isik and Hassan, 2002). Isik and Hassan, (2002), hypothesized that banks with higher loan portfolios, compared to investments in securities, exhibit lower cost efficiencies since the cost of issuing, maintaining and monitoring loans is higher. Altunbas et al., (2000) on the other hand employed the loans to total assets ratio to assess the level of liquidity in a bank. Isik and Hassan, (2002) found a positive relationship between loan asset portfolio and bank efficiency whereas the contrast was observed by Havrylchyk, (2006)

Non-performing loans

The level of non-performing loans, measured as the proportion of non-performing loans of total loans, is an indicator of asset quality (Havrylchyk, 2006). Chen, (2009) however, uses the non-performing loans variable to measure risk; arguing that banks that engage in riskier loans will end up with a higher level of non-performing loans. Havrylchyk, (2006) observed a significant negative result for efficiency against non-performing loans, implying that problem loans give rise to higher monitoring and enforcement costs.

Capitalization

The variable of capitalization is taken to be the amount of share and supplementary capital divided by total assets (Havrylchyk, 2006). According to Kwan and Eisenbeis, (1995) increased capitalization improves efficiency. Even so, contrasting views were reached by Akhigbe and McNulty, (2005); and Sufian, (2011); nonetheless, Other researchers found no significant impact of capitalization on efficiency (Havrylchyk, 2006; Sathye, 2001).

Insider loans

Insider loans was applied to measure a bank's integrity. Insider loans increase when manager misuse their control to issue loans (Laeven, 2001). Manager tend to extend credit to themselves at favourable rates to the detriment of a banks . Insider loans was postulated to have a negative effect on efficiency.

2.10.5 Nation of Origin

In a bid to explain why foreign owned banks are more, or less efficient compared to domestic owned banks, two ideas have been have been fronted: *home field advantage hypothesis* and *global advantage hypothesis*. *home field advantage hypothesis* argues that domestic owned institutions operate more efficiently since foreign banks incur high costs of operating and monitoring from a distance, and cultural differences (Miller and Parkhe, 2002). The *global advantage hypothesis* on the other hand, argues that foreign institutions are able to use their comparative advantage in superior managerial skills and optimal fund raising, to overcome cross-border disadvantages. Nevertheless Berger et al. (2000), introduced a limited version of the global advantage hypothesis: *limited global advantage hypothesis*. In the limited global advantage hypothesis, it is argued that only foreign institutions from a few countries are able to overcome cross-border disadvantages, and operate more efficiently compared to domestic owned institutions. It is argued that only foreign banks originating from nations with favourable regulatory and market conditions are capable of outperforming domestic banks.

The limited global advantage hypothesis is tested by including a dummy for the nation of origin for foreign banks in an econometric model of bank efficiency. Havrylchyk, (2006) and Sufian, (2011) found evidence of the limited form of the global advantage hypothesis. Sturm and Williams, (2008) however did not find evidence of the limited global hypothesis in a study of Australian banks; they attributed this to increased foreign banks' incumbency in host nations.

CHAPTER THREE

3 METHODOLOGY

3.1 Introduction

This chapter evaluates the methodology applied in the study. The techniques used to determine bank efficiency levels for Kenyan banks are discussed. Additionally, the chapter discusses the research design applied and the population from which data was collected.

3.2 Research Design

In order to evaluate improvements in banks' productivity over the period 2004 to 2010, a panel data of Kenyan banks during this period was collected. The data was collected from financial statements of the banks which are publicly available as a regulatory requirement. Cross-sectional data is necessary for the computation of relative efficiency of banks in each year under consideration. Panel data structure was additionally necessitated by the research methodology tool, malmquist index, which computes efficiency improvements, year on year (Brissimis et al., 2008).

3.3 Target Population and Sample Size

Given that the objective study was to evaluate efficiency levels of banks in Kenya over the period 2004 to 2010, then the target population was taken to be all Kenyan banks. The study considered all 43 Kenyan banks that were in existence as 2010. Banks that were not in existence for the whole period of 2004 to 2010 were excluded from the study. Additionally, banks that underwent mergers and acquisitions were also eliminated. Eventually, only 36 banks were considered for the study.

Based on the research methodology applied: DEA, a minimum sample size had to be selected. In order to effectively differentiate between efficient and inefficient banks the sample size had to be larger than the product of the number of inputs and outputs (Sathye, 2001). The other rule of the thumb, is to select a sample size that is at least three times larger than the sum of the number of

inputs and outputs (Sinuany-Stern et al., 1994). The study satisfied both these recommendations by employing two inputs and three outputs on a sample size of 36 banks.

3.4 Data Description and Collection

Data collected in the study was based on questionnaires and financial reports of banks. Questionnaires were targeted to senior bank managers of all 43 Kenyan banks. However, the questionnaires only had 42 successful respondents.

Financial reports data collected in this study was based on bank production process as described by the intermediary approach. According to the intermediary approach proposed by Sealy and Lindley (1977), a bank uses physical capital and borrowed funds to generate loans, other earnings assets and non interest revenue. The research therefore employed loanable funds and fixed assets as input variables and loans and advances to customers net of provisions for bad debt; Kenya government securities; and fees and commissions income as output variables. In order to calculate allocative efficiency, the prices of input variables were required. The price of loanable funds was taken to be interest on deposits divided by total customer deposits. The price of fixed assets on the other hand, was taken to be depreciation divided by fixed assets.

Data was collected for all Kenyan banks between the period 2004 and 2010. 43 banks were in existence as at 2010. Of the 43 banks, only 36 banks qualified for analysis since banks that were not in existence over the period were omitted. Additionally banks that underwent mergers or acquisitions over the period were also omitted. The data was obtained from annual financial reports which are publically available. Banks that have not been in existence for all this period were omitted from the study in order to ensure consistency. All the values for the input and output variables were then recorded in millions of Kenyan shillings.

3.5 Data Analysis

A nonparametric technique, Data Envelopment Analysis (DEA), was applied to measure overall cost efficiency, technical efficiency and allocative efficiency. DEA is a linear programming technique developed by (Charnes, Cooper, and Rhodes, 1978).

Technical efficiency is the ability of a Decision Making Unit (DMU) to maximize outputs given a level of inputs, or minimize inputs given a level of outputs. Allocative efficiency on the other hand, is the ability of a DMU to select an optimal mix of inputs, given input prices, in order to produce a given level of output. Overall cost efficiency is the product technical and allocative efficiency.

DEA analyses how well a DMU utilizes a set of input resources to produce a set of outputs. DMUs in bank efficiency studies are represented by bank branches or banks. DEA develops a best practice frontier for a sample of DMUs which represent best practice decision making units; efficiency scores for all DMUs are then determined based on the efficient frontier.

Given a set of n DMUs $\forall j = 1, 2, \dots, n$, utilizing quantities of inputs: $X \in \mathbb{R}_+^m$, to produce quantities of output: $Y \in \mathbb{R}_+^k$; we denote x_{ij} and y_{rj} as the amount of the i^{th} input and r^{th} output respectively used by the j^{th} DMU. Thus the model for calculating technical efficiency is described as follows:

$$\max_{u,v} h_0 = \frac{\sum_{r=1}^k u_r y_{r0}}{\sum_{i=1}^m v_i x_{i0}}$$

Subject to:

$$\frac{\sum_{r=1}^k u_r y_{rj}}{\sum_{i=1}^m v_i x_{ij}} \leq 1; j = 1, 2, \dots, n$$

$$\sum_{i=1}^m v_i x_{i0} = 1$$

$$v \geq 0; i = 1, 2, \dots, m$$

$$u_i \geq 0; r = 1, 2, \dots, k$$

Model 1

where

x_{ij} = the amount of input i utilized by the j^{th} DMU

y_{rj} = the amount of output r produced by the j^{th} DMU

v_i = weight given to the input i

u_r = weight given to the output r

The linear programming problem will be solved n times; once for each DMU. The weights will be selected to enable each DMU to obtain the highest possible efficiency score. Efficiency score will lie between 0 and 100%, with a score of 100% representing the most efficient DMU that lies on the frontier. For an in depth analysis of DEA in its application as a bank efficiency measure, the reader is referred to (Avkiran, 1999).

3.6 Malmquist Productivity Change Index

Malmquist productivity change index proposed by Färe et al. (1994), was employed to estimate Total factor Productivity Change (TFP). TFP exploits the relationship of distance functions to the technical efficiency frontiers, to measure year on year productivity change. The model is defined as

$$M_0(y_s, x_s, y_t, x_t) = \left[\frac{d_0^s(y_t, x_t)}{d_0^s(y_s, x_s)} \times \frac{d_0^t(y_t, x_t)}{d_0^t(y_s, x_s)} \right]^{1/2} \quad \text{Model 2}$$

Where:

M_0 = productivity change between the base period s and a time period t

$d_0^s(y_t, x_t)$ = represents the distance from period t observation to period s (base period) frontier.

$d_0^t(y_t, x_t)$ = represents the distance from period t observation to period t frontier.

$d_0^s(y_s, x_s)$ = represents the distance from period s observation to period s (base period) frontier.

$d_0^t(y_s, x_s)$ = represents the distance from period s observation to period t frontier.

The frontier used in this model is based on DEA. An M_0 value that is greater than 1 indicates a positive TFP growth, whereas an M_0 value that is less than 1 indicates a negative TFP growth. An M_0 value equal 1 indicates a constant TFP growth.

The data was analyzed and relative efficiency levels determined using the DEAP computer program (Coelli, 1996). Efficiency measures were evaluated annually in order to observe the trend of efficiency scores over the period 2004 to 2010.

3.7 Chapter Summary

The chapter evaluated the methodology used in this research. In order to evaluate banking efficiency over the period 2004 – 2010, a panel data of all banks for the period was collected. As at 2010, the total number of banking institutions was 43, of these only 36 qualified for the analysis. Data was collected and recorded in millions of shillings from financial statements of banks and questionnaires. Thereafter, non-parametric linear programming techniques: DEA and Malmquist index, were employed to determine relative efficiency levels and efficiency improvements. Relative efficiency measures were determined with the aid of a DEAP version 2.1 computer program.

The variables used in the analysis were: loanable funds and fixed assets for input variables and loans and advances to customers net of provisions for bad debt; Kenya government securities; and fees and commissions income for output variables. In order to calculate allocative efficiency, the prices of input variables were determined as; interest on deposits divided by total customer deposits for the price of loanable funds. Depreciation divided by fixed assets was taken to be the price of fixed assets.

CHAPTER FOUR

4 PRESENTATION OF RESEARCH FINDINGS

4.1 Introduction

This chapter presents a report on data analysis and findings of the results. The results from financial statements and resultant efficiency scores have been presented. Thereafter, a report on data analysis of the questionnaires from Bank Managers is also presented. Analysis and presentations include: descriptive statistics of the variables employed in data analysis, average efficiency scores between domestic and foreign banks, results of non-parametric tests: Mann-Whitney U Test, Kolmogorov-Smirnov Test and Kruskal-Wallis Tests, finally the results of an econometric model that examine banking efficiency determinants are presented.

4.2 Data Analysis Presentation

Data was collected and analyzed from two main sources: Questionnaires and banks' financial reports. Questionnaires were prepared to investigate perceptions on efficiencies by senior bank managers. The questionnaire was distributed and was completed using an online form. Senior managers from all the 43 Kenyan banks were targeted to respond. Due to the sensitive nature of banking information, employees from some of the banks were apprehensive about giving their views. Managers from 29 banks successfully completed the form. However since multiple responses from a single bank was permitted the total number of respondents was 42.

Financial reports from all the 43 banks that operated in Kenya as at 2010, were considered for empirical efficiency analysis. Banks that had not been in operation within the period 2004 – 2010 were omitted. The banks omitted included one domestic bank: Family bank, and two foreign banks: Gulf bank and UBA Kenya Ltd. Charter house bank was omitted since its license had been suspended by CBK. As suggested by Hauner and Peiris, (2008), banks that merged within the period 2004 to 2010 were omitted from the analysis. Other alternatives suggested for dealing with cases of mergers and acquisitions include: using the larger bank in the analysis of the period before the merger or acquisition; or by combining the assets of both banks before the merger or acquisition. Four banks were affected by mergers and acquisition during the period: Southern

Credit bank which was acquired by Equatorial bank and CFC bank which merged with Stanbic bank.

The variables used in the efficiency analysis were obtained from annual financial reports for banks which are publicly published annually. Output variables were taken to be: loans and advances to customers net of provisions for bad debt; Kenya government securities; and fees and commissions income. Input quantities on the other hand were taken to be: loanable funds and fixed assets.

Loans and advances to customers were considered net of provision for loan loss in line with Grigorian and Manole, (2006), in order to ascertain that loans are of comparable quality. Loanable funds were considered to be the addition of shareholder's funds and customer deposits. A consideration that was necessitated by the observation from some banks, whose equity constituted a very high percentage of loans issued. Treating loanable funds as just customer deposits would have resulted in distorted high efficiency scores for these banks.

In order to determine allocative efficiencies; interest on deposits divided by total customer deposits was taken as the input price for loanable funds, whereas depreciation divided fixed assets was taken to be the input price for fixed assets.

4.3 Descriptive Statistics

Table 4.1 shows a summary of the variables used in the DEA analysis for selected years. A quick look at the data shows that on average foreign banks dominate domestic banks over the period in terms of loans issued, government securities and fees and commissions. The difference is widest in 2004, this gap however declines exponentially over time through to 2010. This is an indicator that on average domestic banks have been improving faster than foreign banks.

Table 4.1: Summary of Variables Applied in the DEA Model for Selected Years (in Millions of Kenya Shillings)

Summary of the Variables ^a Applied in the DEA Model for Selected Years (In millions of Kenya shillings)									
Year			Y1	Y2	Y3	X1	X2	P1	P2
2004	D	Mean	5,965.72	1,716.11	322.96	9,879.85	1,513.54	0.02	0.38
		S.D.	9,125.61	3,189.80	720.89	14,527.33	2,746.44	0.02	0.21
	F	Mean	10,896.54	5,891.36	719.89	19,966.10	2,823.96	0.02	0.49
		S.D.	18,829.85	8,445.98	1,549.80	29,894.34	5,533.34	0.01	0.34
	2006	Mean	8,072.99	2,355.11	459.25	14,168.85	1,812.92	0.04	0.41
		S.D.	11,009.69	4,107.99	916.27	20,449.84	3,306.08	0.02	0.23
2009	D	Mean	14,319.58	7,501.80	749.73	25,547.40	3,692.24	0.03	0.52
		S.D.	22,156.29	9,763.67	1,490.67	34,641.13	5,339.86	0.01	0.41
	F	Mean	16,349.35	4,873.62	845.17	28,787.56	5,095.15	0.05	0.40
		S.D.	23,791.21	7,478.99	1,686.37	43,368.40	10,870.13	0.02	0.33
	2010	Mean	22,947.82	12,475.23	1,041.48	39,707.54	5,180.12	0.04	0.55
		S.D.	29,493.11	15,420.53	1,861.03	47,071.51	6,396.38	0.02	0.58
2010	D	Mean	22,338.56	6,106.80	981.64	38,080.92	6,332.52	0.04	0.30
		S.D.	34,745.37	10,021.74	1,982.95	56,840.78	9,315.14	0.02	0.26
	F	Mean	24,842.82	16,170.27	1,216.91	46,658.45	6,932.16	0.03	0.48
		S.D.	28,582.61	19,571.93	2,181.63	50,499.02	6,879.30	0.02	0.51
	Combined	Mean	11,958.03	3,484.63	618.12	20,480.53	3,140.82	0.04	0.39
		S.D.	20,273.58	6,287.76	1,331.54	34,191.28	6,461.97	0.02	0.24
	F	Mean	18,014.45	9,065.35	901.94	31,514.67	4,614.70	0.03	0.51
		S.D.	25,892.96	12,063.38	1,712.28	39,867.80	6,374.97	0.02	0.46

^aLoans and Advances (Y1), Government Securities (Y2), Fees and Commissions (Y3), Loanable Funds (X1), Fixed Assets (X2), Price of Loanable Funds (P1), Price of Fixed Assets (P2), Domestic Banks (D), Foreign Banks (F)

A closer scrutiny of the table shows that on average foreign banks have a higher portion of their portfolio in government securities compared to domestic banks. A similar observation is evident for domestic banks which on average have a larger portion of their portfolio in loans compared to foreign banks. These observations are contrary to other studies which observe domestic banks to be more active in safe treasury bonds compared to loans (Havrylchyk, 2006). Additionally,

foreign banks are observed to pay cheaper input prices, on average, for customer deposits compared domestic banks. The low costs could be attributed to the fact that majority of foreign banks clients are corporate clients and consider foreign banks to be reputable and a good insurance for their funds. Domestic banks on the other hand enjoy lower prices for their fixed assets.

The study however, analysed variables based on publically available financial accounting reports, thus subjecting the study to known weaknesses of financial accounting information. Financial accounting reports assume that a snap shot position in a bank's financials is representative of whole year's operations, a supposition that is highly unlikely. Additionally, accounting entries are subject to human errors.

4.4 Findings

Of the total of 43 banks that were targeted to fill the questionnaire, the survey only had successful respondents from 29 banks. Due to the sensitive nature of banking information, employees from some of the banks were apprehensive about giving their views. Given that multiple responses from a single bank was permitted, the total number of respondents was 42. From the total number of bank managers who responded, 38% of them perceived foreign banks to be more efficient whereas 25% perceived domestic banks to be more efficient. 38% of the Bank Managers were indifferent with regards to foreign banks and domestic banks efficiency difference. Majority of the bank managers were of the opinion that small banks are more efficient than large banks. 63% of the managers believed that small banks were more efficient compared to 37% considered large banks to be more efficient. An opinion that is in agreement with empirical results from DEA analysis.

Bank Managers attributed the sources of foreign banks efficiency to: Focus on corporate clients and advanced technology. Domestic banks on the other were perceived to derive efficiency from: Focus on SMEs, faster decision making process, mobile banking, numerous branch networks and a better understanding of the domestic market. Foreign banks were also perceived to engage more in investments and foreign exchange trading, compared to domestic banks.

Since 2004, Bank Managers perceive that the banking sector has been improving gradually in efficiency. The banking sector is perceived to have been most efficient in 2009 and 2010.

Table 4.2: Bank Efficiency Scores between Domestic and Foreign Banks^a

<i>Year</i>		<i>TE</i>	<i>AE</i>	<i>CE</i>	<i>TFP</i>
2004	Domestic	0.793	0.725	0.585	
	Foreign	0.897	0.790	0.708	
	Mean	0.825	0.745	0.622	
2005	Domestic	0.833	0.791	0.671	0.984
	Foreign	0.918	0.854	0.786	0.999
	Mean	0.859	0.810	0.706	0.989
2006	Domestic	0.806	0.820	0.675	0.990
	Foreign	0.919	0.853	0.796	0.977
	Mean	0.841	0.830	0.712	0.986
2007	Domestic	0.792	0.818	0.659	1.041
	Foreign	0.834	0.848	0.725	0.999
	Mean	0.804	0.827	0.679	1.028
2008	Domestic	0.816	0.916	0.755	1.050
	Foreign	0.825	0.894	0.752	1.029
	Mean	0.818	0.909	0.754	1.044
2009	Domestic	0.721	0.881	0.642	0.977
	Foreign	0.848	0.821	0.698	1.096
	Mean	0.760	0.863	0.659	1.013
2010	Domestic	0.343	0.676	0.219	10.418
	Foreign	0.266	0.513	0.153	3.704
	Mean	0.319	0.626	0.199	8.366

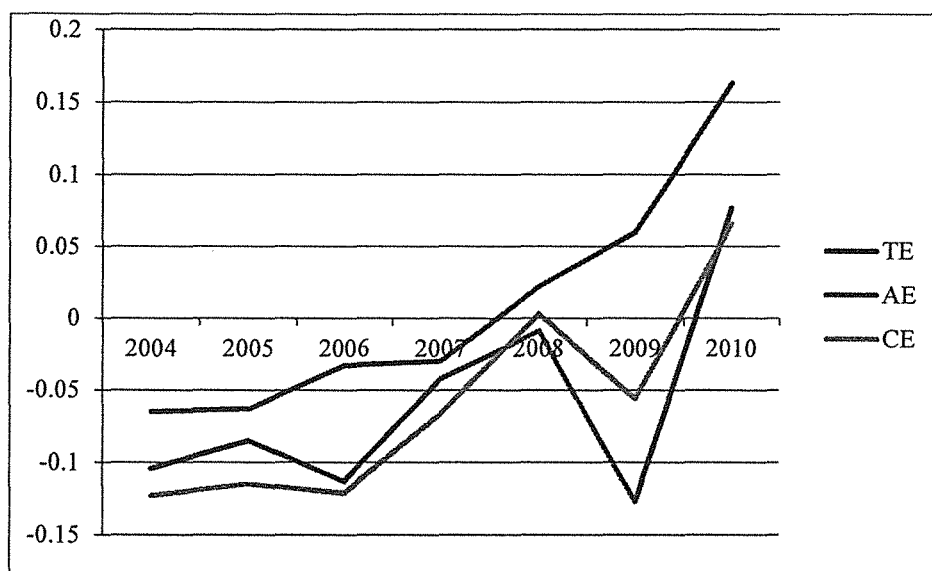
^a TE – Technical Efficiency, AE - Allocative Efficiency, CE - Cost Efficiency, TFP – Total Factor productivity

4.5 Empirical Findings

To determine efficiency levels of Kenyan banks, the DEA model is employed to calculate cost efficiency. In order to establish the sources of efficiency, cost efficiency scores are further analyzed into technical efficiency and allocative efficiency. Finally, Total factor productivity change from year to year is evaluated in order to assess efficiency improvements for the banks. The results have been provided in Table 4.2. The efficiency score calculated are higher than those calculated by Kamau, (2010) however the trend is similar. The difference can be attributed to the different time periods considered in the two studies. Furthermore, this study only considered banks in operation throughout the whole study period.

Foreign banks in general depict higher overall cost efficiency compared to domestic banks, an observation consistent with other research performed in developing nations (Hauner and Peiris, 2008; Kamau, 2010). However, by sub-analyzing cost efficiency into technical and allocative efficiency, domestic banks exhibit a lower allocative efficiency between the period: 2004 to 2007.

Figure 4.1: Efficiency gap between domestic banks and foreign banks.



TE – Technical Efficiency, AE - Allocative Efficiency, CE - Cost Efficiency,

Domestic banks nonetheless, outperforming foreign banks in terms of efficiency, in the later years: 2008 to 2010. The improvement signifies that domestic banks have managed to source for cheaper input resources compared domestic banks. As shown in Figure 4.1, domestic banks have constantly narrowed the efficiency difference between domestic and foreign banks. Indeed, total factor productivity change (TFP) shows a great improvement in efficiency for domestic banks year on year. The improvement in efficiency can be attributed to adoption of innovative, branchless banking strategies by domestic banks. Additionally, Increased improvement in efficiency by domestic banks can be attributed to the global financial crisis of 2008. Foreign banks' efficiency drastically declines after 2008. Foreign banks display higher technical

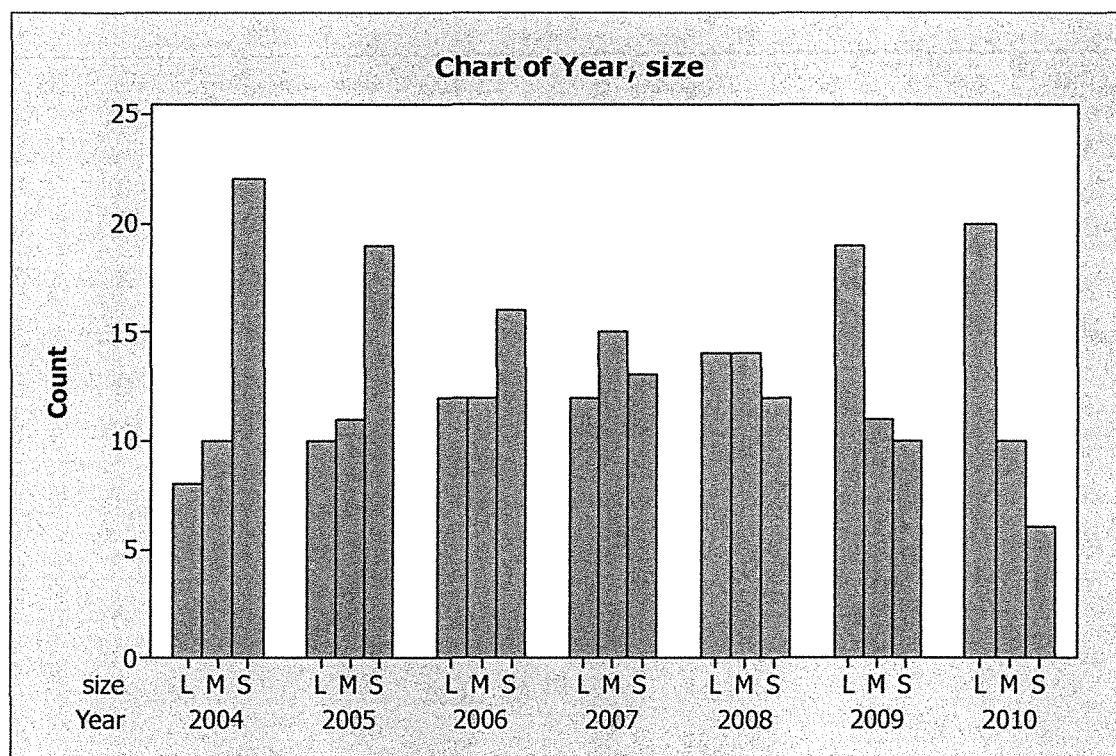
efficiency in all years other than 2010. This can be attributed to foreign banks' ability to overcome their disadvantage of foreignness by using their comparative advantage in technology and expertise to outperform domestic banks (Miller and Parkhe, 2002). An observation that is consistent with other research conducted in emerging markets (Chen, 2009; Grigorian and Manole, 2006; Hasan and Marton, 2003; Hauner and Peiris, 2008; Havrylchyk, 2006; Kamau, 2010)

Over the period 2004-2010 domestic banks have managed to narrow the gap in efficiency and in 2010 domestic banks outperformed foreign banks. Indeed as seen in the total factor productivity score, domestic banks have been improving in efficiency better than foreign banks. Albeit in 2010, efficiency levels are generally low.

domestic banks have a lower allocative efficiency between 2004 to 2007, whilst outperforming foreign banks in the later year: 2008 to 2010. The improvement signifies that domestic banks have managed to source for cheaper input resources compared domestic banks. Indeed, total factor productivity change (TFP) shows a great improvement in efficiency for domestic banks year on year. This change is largely due to the global financial crisis of 2008 that mostly affected developed nations' institutions. Foreign banks have higher technical efficiency in all years other than 2010. This can be attributed to foreign banks' ability to overcome their disadvantage of foreignness by using their comparative advantage in technology and expertise to outperform domestic banks (Miller and Parkhe, 2002). An observation that is consistent with other research conducted in emerging markets (Chen, 2009; Grigorian and Manole, 2006; Hasan and Marton, 2003; Hauner and Peiris, 2008; Havrylchyk, 2006; Kamau, 2010)

Over the period 2004-2010 domestic banks have managed to narrow the gap in efficiency and in 2010 domestic banks outperformed foreign banks. Indeed as seen in the total factor productivity score, domestic banks have been improving in efficiency better than foreign banks. Albeit in 2010, efficiency levels are generally low.

Figure 4.2: Histogram of Bank Size over the Period 2004-2010



4.6 Bank Efficiency scores based on bank size

The Kenyan banking sector has seen a big shift from small banks to large banks since 2004 as shown in Figure 4.2. Where bank size, according to “CBK Bank Supervision Annual Report,” (2010), were defined as follows: Large banks were taken to be those banks with assets above 15 billion shilling; medium banks were those banks with assets between 5 billion shillings and 15 billion shillings; whereas small banks were those banks with assets below 5 billion shillings. In order to provide a better insight on banking efficiency therefore, banks were classified into peer groups of large, medium and small banks. The results of this analysis have been displayed in Table 4.3.

Table 4.3: Bank Efficiency Scores between Domestic and Foreign Banks by Bank Size^a

		<i>TE</i>	<i>AE</i>	<i>CE</i>	<i>TFP</i>			<i>TE</i>	<i>AE</i>	<i>CE</i>	<i>TFP</i>
<i>Large Banks</i>						<i>Medium Banks</i>					
2004	D	0.856	0.646	0.552		2004	D	0.837	0.808	0.687	
	F	0.840	0.523	0.400			F	0.921	0.943	0.865	
2005	D	0.890	0.798	0.714	0.987	2005	D	0.820	0.888	0.734	0.881
	F	0.887	0.832	0.734	1.007		F	0.899	0.911	0.830	0.928
2006	D	0.889	0.871	0.784	0.998	2006	D	0.826	0.870	0.726	0.994
	F	0.897	0.766	0.707	1.029		F	0.924	0.911	0.848	0.981
2007	D	0.865	0.801	0.698	0.980	2007	D	0.785	0.916	0.724	1.025
	F	0.773	0.738	0.590	0.923		F	0.848	0.897	0.770	0.996
2008	D	0.847	0.939	0.795	1.044	2008	D	0.896	0.952	0.856	1.076
	F	0.799	0.848	0.698	0.999		F	0.817	0.919	0.757	1.040
2009	D	0.784	0.880	0.699	0.991	2009	D	0.720	0.940	0.673	0.985
	F	0.812	0.846	0.688	1.109		F	0.882	0.702	0.621	1.064
2010	D	0.314	0.602	0.169	4.074	2010	D	0.224	0.814	0.218	6.246
	F	0.331	0.424	0.181	4.411		F	0.094	0.751	0.078	1.818
<i>Small Banks</i>											
2004	D	0.752	0.717	0.552							
	F	0.916	0.859	0.799							
2005	D	0.812	0.744	0.622	1.031						
	F	0.984	0.807	0.795	1.083						
2006	D	0.748	0.766	0.585	0.983						
	F	0.980	0.859	0.842	0.742						
2007	D	0.747	0.751	0.580	1.096						
	F	1.000	1.000	1.000	1.319						
2008	D	0.718	0.864	0.632	1.034						
	F	1.000	1.000	1.000	1.131						
2009	D	0.606	0.804	0.494	0.940						
	F	1.000	1.000	1.000	1.097						
2010	D	0.539	0.663	0.320	27.974						
	F	-	-	-	-						

^a D – Domestic Banks, F – Foreign banks, TE – Technical Efficiency, AE - Allocative Efficiency, CE - Cost Efficiency, TFP – Total Factor productivity

For large banks, domestic banks outperform foreign banks in overall cost efficiency. The superiority largely emanates from allocative efficiency, implying that large domestic banks are able to source for cheaper input resources compared to large foreign banks. Large domestic banks also have higher technical efficiency scores for most of the years under analysis. This can be attributed to large domestic banks being quick at implementing innovative strategies. Another possibility of poor performance by foreign banks could be due to the long periods that large foreign banks have been operational in Kenya; as evidenced by Sturm and Williams, (2008), increased domestic market incumbency negatively affects foreign bank efficiency.

The global financial crisis impact is also evident among medium sized banks. Foreign medium sized banks have a higher overall cost efficiency before 2008 after which they are outperformed by domestic banks. A similar trend is observed in the analysis of allocative efficiency, a sign that medium sized domestic banks were able to source for lower cost input resources compared to domestic banks after 2008. Small foreign banks outperform small domestic banks in overall cost, technical and allocative efficiency. Small foreign banks have also been depicting a consistent improvement in efficiency as is seen from the total factor productivity change. Foreign banks' number in the small bank peer group has been dwindling and there was no small foreign bank in 2010.

4.7 Non-Parametric Tests on Bank efficiency Scores

Next, we measure whether the efficiency scores for foreign and domestic banks came from the same distribution. Non-parametric tests; Mann-Whitney U Test, Kolmogorov-Smirnov Test and Kruskal-Wallis Test were applied and the results presented in Table 4.4. The parametric, test t-test, could not be applied due the nature of relative efficiency scores which are negatively skewed towards the efficient frontier. Mann-Whitney U Test and Kruskal-Wallis Test were applied to test the null hypothesis that foreign banks and domestic banks have the same location. Kolmogorov-Smirnov Test was applied to test the null hypothesis that foreign and domestic banks have equal of distributions of efficiency score.

Table 4.4: Non- Parametric tests testing whether Domestic and Foreign Banks came from the same Distribution

		<i>Mann-Whitney U Test</i>	<i>Kolmogorov- Smirnov Test</i>	<i>Kruskal- Wallis Test</i>
2004	TE	0.029**	0.034**	0.028**
	AE	0.292	0.429	0.279
	CE	1.95	0.474	0.185
2005	TE	0.093*	0.138	0.087*
	AE	0.477	0.771	0.46
	CE	0.207	0.638	0.198
2006	TE	0.024**	0.053*	0.025**
	AE	0.52	0.909	0.502
	CE	0.132	0.387	0.13
2007	TE	0.542	0.705	0.534
	AE	0.636	0.873	0.618
	CE	0.378	0.57	0.363
2008	TE	1	0.994	0.986
	AE	0.565	0.474	0.559
	CE	0.892	0.873	0.891
2009	TE	0.093*	0.12	0.086*
	AE	0.324	0.4	0.309
	CE	0.456	0.604	0.438
2010	TE	0.542	0.939	0.536
	AE	0.276	0.286	0.272
	CE	0.261	0.181	0.257
Overall	TE	0.009***	0.003***	0.009***
	AE	0.684	0.305	0.684
	CE	0.087*	0.125	0.087*

TE – Technical Efficiency, AE – Allocative Efficiency, CE – Cost Efficiency. Mann-Whitney U and Kruskal–Wallis Tests are non-parametric tests that test the shift in the location of the distribution, Kolmogorov–Smirnov Test is a non-parametric test that tests for the equality of distributions.

*10% significance

**5% significance

***1% significance

Mann-Whitney U Test and Kruskal–Wallis Test rejected the null hypothesis for technical efficiency for most of the years: 2004, 2005, 2006 and 2009; implying that there was a significant shift of location between domestic and foreign banks. A similar observation is made when considering a distribution for all years. This observation is similar to what was observed by Havrylchuk, (2006) in a study of polish banks. The tests did not reject the null hypothesis for the

distributions of allocative and overall cost efficiency for the individual years. However, the null hypothesis for cost efficiency for all years combined was rejected at 10% significance level, implying that there was a shift in location for cost efficiency.

4.8 Determinants of Efficiency

In order to establish the determinants of efficiency we run an econometric model. The model tests three main components: Governance of the banks, Country of origin effects and Bank characteristics. Under governance, the model analyses the effects of foreign incorporation using a dummy variable that takes a value of 1 if a bank is incorporated in a foreign country and 0 otherwise. Additionally, the impact of public listing on efficiency is evaluated using a dummy variable that takes a value of 1 for a bank that is listed in the Nairobi Stock Exchange (NSE) and 0 otherwise. Finally under governance, the model assesses whether banks that have a direct or indirect treasury influences differ in efficiency. The model applies a dummy variable that takes a value of 1 for banks that are directly or indirectly control by the Kenyan government, and a value of 0 otherwise.

To assess the limited global hypothesis proposed by Berger et al., (2000) the model assessed whether banks from certain foreign countries tend to outperform other banks. The model employed country variables for foreign banks representing their country of origin. Seven countries: Mali, India, UK, USA, Switzerland, Togo and Pakistan; were identified as having had banks operating in Kenya within that period. The dummy variable used, takes a value of 1 for a bank whose ownership origin is from Mali, India, UK, USA, Switzerland, Togo and Pakistan, respectively, and 0 otherwise.

Finally the third component to be captured is bank specific characteristics. *Asset Growth* variables was employed measuring the rate of growth of bank assets. *Asset growth* was calculated as current year's total assets divided by total assets for the previous year. *Loan Loss Provision* variable was used to assess whether the size of provisions for loan loss, a proxy for the size of bad debts, is a determinant for efficiency. The variable was treated as loan loss provision divided by total loans, excluding loans to other financial institutions. The level of loans issued was captured using the variable: *Loans/Total Assets*. The variable was calculated as, loans and advances, excluding loans to other financial institutions divided by total assets.

The variable *capitalization* was taken to be, the amount of share and supplementary capital divided by total assets; *Variance of ROA* variable was taken as the variance of return on assets; Bank size was assessed using the variable, *Log of Total Assets*, which was calculated as the logarithm of total assets; and finally, *Insider Loans variable was computed as total insider loans divided by total assets*. The results of the model have been presented in Table 4.5. The diagnostics that check for the reliability of the model, were all found to good and have been presented in Appendix 2: Regression model diagnostics that check for reliability.

Banks that have been incorporated in foreign countries appear to have a positive influence on technical efficiency, allocative efficiency and overall cost efficiency but are seen to have a negative influence on total factor productivity. These effects are however insignificant to make any conclusions on the effects of foreign incorporation. Foreign incorporated banks were expected to be less efficient due to diseconomies of foreign operations, as described by Berger et al., (2000), that result from differences in culture, language and other factors. As stated by the CEO of Bank of India, local incorporation increases the speed and effectiveness of strategic decision, since local managers understand the market better than do foreign based managers “The Banking Survey 2011,” (2011).

Banks that were listed in the Nairobi Stock Exchange were found to have a significant positive effect on technical efficiency, allocative efficiency and cost efficiency; this finding is consistent with Isik and Hassan, (2002) in their investigation on Turkish banks and Sufian, (2011), in a study of Malaysian banks. This is in support to market discipline hypothesis which argues that market discipline is instilled upon those banks whose shares are publicly traded, influencing them to be more efficient.

Table 4.5: Regression Model of Efficiency Measures and Bank Characteristics

<i>Measured Factor</i>	<i>TE</i>	<i>AE</i>	<i>CE</i>	<i>TFP</i>
<i>Governance</i>				
Foreign Incorporation	.106 (1.132)	.072 (0.979)	.132 (1.402)	-2.902 (-1.110)
Publicly Listed	0.396*** (5.559)	0.107* (1.920)	0.365*** (5.139)	1.918 (0.968)
State	0.102* (1.655)	-0.102** (-2.121)	.021 (0.333)	-0.500 (-0.291)
<i>Country Dummies</i>				
Mali	-.168 (-1.199)	-0.181* (-1.658)	-.206 (-1.469)	2.041 (0.524)
India	0.233*** (2.679)	0.181*** (2.668)	0.349*** (4.022)	-2.903 (-1.199)
UK	.142 (1.573)	-.080 (-1.143)	.035 (0.384)	-2.168 (-0.864)
USA	.109 (1.205)	-.038 (-0.537)	.057 (0.630)	-.300 (-0.120)
Switzerland	.004 (0.039)	-.060 (-0.845)	-.059 (-0.644)	-.076 (-0.030)
Togo	.014 (0.131)	-.100 (-1.209)	-.010 (-0.094)	-2.683 (-0.910)
Pakistan	.055 (0.402)	.085 (0.796)	.191 (1.403)	-3.512 (-0.926)

TE – Technical Efficiency, AE - Allocative Efficiency, CE - Cost Efficiency, TFP – Total Factor productivity

Independent variables were determined as follows: *Foreign Incorporation*: A dummy that takes value of 1 in case a bank is foreign incorporated and 0 otherwise; *Publicly Listed*: A dummy that takes value of 1 for a bank listed in the Nairobi Stock Exchange and 0 otherwise; *State*: A dummy that takes a value of 1 for banks that are directly or indirectly controlled by treasury and 0 otherwise. *Mali, India, UK, USA, Switzerland, Togo and Pakistan*: A dummy that takes value of 1 for a bank whose ownership origin is from Mali, India, UK, USA, Switzerland, Togo and Pakistan, respectively, and 0 otherwise; *Asset Growth*: Total assets for the current year divided by total assets for the previous year; *Loan Loss Provision*: Loan loss provision divided by total loans, excluding loans to other financial institutions; *Loans/Total Assets*: Loans and advances, excluding loans to other financial institutions divided by total assets; *Capitalization*: Amount of share and supplementary capital divided by total assets; *Variance of ROA*: variance of return on assets; *Log of Total Assets*: Logarithm of total assets; *Insider Loans*: Total insider loans divided by total assets

*10% significance

**5% significance

***1% significance

Table 4.5, continued in the next page...

Table 4.5 continued...

Measured Factor	TE	AE	CE	TFP
<i>Bank Specifics</i>				
Assets Growth	.000 (0.423)	-6.971E-05 (-0.182)	-9.207E-05 (-0.188)	.006 (0.411)
Loan Loss Provisions	-0.258*** (-3.323)	-.013 (-0.212)	-0.251*** (-3.234)	-.508 (-0.236)
Loans/Total Assets	0.302* (1.675)	0.558*** (3.967)	0.662*** (3.677)	-14.098*** (-2.813)
Capitalization	-0.645*** (-2.867)	-0.518*** (-2.946)	-0.751*** (-3.339)	-19.954*** (-3.185)
Variance of ROA	-.177 (-0.177)	-1.832** (-2.355)	-1.155 (-1.160)	127.449*** (4.595)
Log of Total Assets	-0.328*** (-5.712)	-0.124*** (-2.774)	-0.305*** (-5.309)	-3.047* (-1.907)
Insider Loans	.006 (0.452)	.004 (0.362)	.007 (0.509)	.223 (0.609)
Constant	1.896*** (6.869)	1.135*** (5.264)	1.558*** (5.650)	23.018*** (2.996)
Adjusted R-square	.230	.233	.298	.082
F- Value	4.773***	4.851***	6.357***	2.126***
Durbin-Watson	1.349	1.465	1.444	1.650

TE – Technical Efficiency, AE - Allocative Efficiency, CE - Cost Efficiency, TFP – Total Factor productivity

Independent variables were determined as follows: *Foreign Incorporation*: A dummy that takes value of 1 incase a bank is foreign incorporated and 0 otherwise; *Publicly Listed*: A dummy that takes value of 1 for a bank listed in the Nairobi Stock Exchange and 0 otherwise; *State*: A dummy that takes a value of 1 for banks that are directly or indirectly controlled by treasury and 0 otherwise. *Mali, India, UK, USA, Switzerland, Togo and Pakistan*: A dummy that takes value of 1 for a bank whose ownership origin is from Mali, India, UK, USA, Switzerland, Togo and Pakistan, respectively, and 0 otherwise; *Asset Growth*: Total assets for the current year divided by total assets for the previous year; *Loan Loss Provision*: Loan loss provision divided by total loans, excluding loans to other financial institutions; *Loans/Total Assets*: Loans and advances, excluding loans to other financial institutions divided by total assets; *Capitalization*: Amount of share and supplementary capital divided by total assets; *Variance of ROA*: variance of return on assets; *Log of Total Assets*: Logarithm of total assets; *Insider Loans*: Total insider loans divided by total assets

*10% significance

**5% significance

***1% significance

Banks that have a direct or indirect government influence, had a significant positive impact on technical and allocative efficiency, albeit an insignificant impact on cost efficiency. This is in line with a study assessing Indian banks Bhattacharyya et al., (1997). This is however surprising and differ from other recent studies on banking efficiency (Isik and Hassan, 2002; Sensarma, 2006). State owned banks are expected to be inefficient since instead of necessarily prioritising profit optimization objective they may instead endeavor to satisfy political intents

(Boycko et al., 1996). Indeed in the Kenyan banking sector state influenced banks were under a threat failing before major restructuring that brought a turnaround in performance. Improved efficiency could be an indicator of reduced political influence, improved political good will or effects of performance based contracts that are compulsory for parastatal heads.

In line with Berger et al., (2000), country dummies were employed to analyse the limited global hypothesis. Banks from India were found to be significantly technical, allocative and cost efficient. The dummy Mali was only significantly allocative efficient. The limited global hypothesis argues that only institutions from a limited number of nations with favourable regulatory and market conditions are capable of operating more efficiently than other institutions. The study documented institutions from the US as part of the limited number of nations. Since only Indian banks appear to be significantly efficient whereas US institutions do not exhibit significant impact, this study does not find evidence in support for the limited global hypothesis. Sturm and Williams, (2008) also documented no evidence of the limited global hypothesis for Australian banks and attributed it to increased foreign banks' incumbency that leads the overuse of inputs; a scenario that is identical to Kenyan foreign banks.

In the assessment of banks' characteristics, fast growth in assets did not have an influence on efficiency. Asset growth therefore did not result to the inability of managers to control costs. This was in line with findings by Havrylchyk, (2006). Loan loss provisions, negatively impacted technical efficiency and cost efficiency significantly, an indication that banks with riskier loan portfolios displayed low efficiency. These findings were in agreement with other prior research (e.g., Berger and Humphrey, 1992; Resti, 1997; Sufian, 2011)

Variance of return on assets had a negative influence on efficiency but was only significant for allocative efficiency. It appears that aggressive managers who undertake riskier decisions tend to incur higher input costs. This is in line with what was observed by Berger and Mester, (1997), for US banks. Bank size measured as the size of total asset had a negative impact on efficiency, a view that contrasts Hauner and Peiris, (2008) in a study for Ugandan banks. But agree with other studies that had similar findings (Isik and Hassan, 2002; Sufian, 2011). Given the Kenyan banking sector where small banks focus more on corporate clients and scarcely indulge in retail business, only large banks have branches spread throughout rural areas. All banks nevertheless, have heavy concentration in major cities a region which is the only target market for small

banks. This increased competition forces small banks to be more efficient. Large banks do not have heightened competition in their expanded market. Another explanation for the efficiency difference between large and small banks could be the obvious high costs of operating numerous branches in rural areas.

Insider loans had an insignificant effect on efficiency.

4.9 Chapter Summary

This chapter presented empirical findings of the thesis and established bank efficiency levels between foreign and domestic banks. Additionally, data analysis from questionnaires was also presented. Average efficiency scores between domestic and foreign banks were presented and they showed foreign banks to be more efficient on average. However an analysis that subdivided banks into large, medium and small banks showed domestic large banks to outperform foreign banks.

The chapter conducted non-parametric tests: Mann-Whitney U Test, Kolmogorov-Smirnov Test and Kruskal-Wallis to examine the shift of location between domestic and foreign banks. Domestic banks were found to be significantly different from foreign banks on technical efficiency. Finally the chapter presented results from an econometric model that examined the determinants banking efficiency.

CHAPTER FIVE

5 DISCUSSIONS

5.1 Introduction

The research objective was to investigate bank efficiency levels, evaluate efficiency difference between foreign and domestic banks, and eventually attempt to establish the sources of these efficiencies. The previous chapter evaluated research data and conducted empirical investigations on Kenyan banks and determined the sources of banking efficiency. This chapter extends the discussions on the research findings in tandem with the research objectives and generalizes on findings from varied empirical analyses.

5.2 Banking Efficiency levels in Kenya

The research employs a non-parametric, linear programming technique: Data Envelopment Analysis (DEA), to establish banking efficiency levels in Kenya over the period 2004 to 2010. On average, banks exhibited high efficiency levels of 0.74 for technical efficiency; 0.80 for allocative efficiency and 0.62 for overall cost efficiency. The results indicated that all banks are relatively as efficient as the most efficient banks in Kenya. The results are characteristic of competitive markets that operate with fewer restrictions. Therefore, fewer banks are able to accrue unfair advantage over others.

On average, foreign banks outperform domestic banks on overall cost efficiency with an average of 0.66 compared to 0.60 for domestic banks. Foreign banks, appear to use their comparative advantage of superior technology, cheap sources of funds and expertise. As suggested by Berger et al., (2000), foreign banks employ their comparative advantage to overcome the liability of foreignness and outperform domestic banks in terms of efficiency. The liabilities of foreignness are described by Miller and Parkhe, (2002), as: cultural differences and poor understanding of domestic markets.

5.3 Sources and determinants banking efficiency

In order to establish the sources of banking efficiency, technical and allocative efficiencies were calculated. The efficiency scores reveal that the sources of efficiency for foreign banks are technical efficiency rather than allocative efficiency. Foreign banks on average, have a technical efficiency score of 0.79 compared to 0.73 for domestic banks. In a sense, foreign banks are capable of converting a given level of input resource to more output compared to domestic banks. Indeed foreign banks are observed to dominate domestic banks in terms of loans issued, government securities and fees and commissions.

Domestic banks however outperform foreign banks in allocative efficiency, albeit with a small margin. Domestic banks report an average allocative efficiency score of 0.804 compared to 0.796 for foreign banks. Domestic banks have a lower allocative efficiency over the period 2004 to 2007, whilst outperforming foreign banks in the later years: 2008 to 2010. The superiority of domestic banks compared to foreign banks in allocative efficiency, is an indicator that domestic banks are better at selecting good combination of input resources. Domestic banks are better able to source for cheaper input resources compared to foreign banks given that they are operating in their own backyard. The advantage of cheaper input resources for domestic banks is more evident for fixed assets. On the other hand, foreign banks pay cheaper prices, on average, for customer deposits compared domestic banks. Havrylchyk, (2006), attributes the cheaper prices to the fact that majority of clients for foreign banks' are corporate clients. Corporate clients consider foreign banks to be reputable and a good insurance for their funds.

From the measures of banking efficiency improvements, Total Factor Productivity (TFP), Domestic banks showed a greater improvement with an average growth of 2.21 compared to a growth of 1.26 for foreign banks. In general, Kenyan bank's efficiency levels improved over the period 2004 – 2010, with a TFP of 1.92. Bank managers attributed the improvement to favourable economic conditions. The improvement in efficiency especially in 2010, can be attributed to the concentration in bank business. Domestic banks have been observed to have a higher proportion of their portfolios in loans compared to foreign banks which have a higher proportion of their portfolios in government securities.

Another source of efficiency difference between foreign and domestic banks is bank size. In general, large banks are more inefficient compared small banks as evident by a significant negative relationship at 99% confidence level. This can be explained from the Kenyan banking sector perspective, where small banks focus more on corporate clients and scarcely indulge in retail business. Only large banks have branches spread throughout rural areas. All banks nevertheless, are heavily concentrated in major cities; a region which is the only target market for small banks. This increased competition forces small banks to be more efficient. Large banks do not have heightened competition in their expanded market. Another explanation for the efficiency difference between large and small banks is the high costs of operating numerous branches in rural areas.

In the period 2004 – 2010, many banks have been increasing their asset base; shifting from small banks to large banks. Fast growth in assets was expected to lead to increased inefficiencies as manager find difficult to control costs. Growth in assets however, did not have an influence on efficiency.

An interesting observation was made when banking efficiency difference between domestic and foreign banks was done in categories of large, medium and small banks. In contrast with other studies in developing nations (e.g., Hauner and Peiris, 2008; Kamau, 2010), large domestic banks outperformed foreign banks in all efficiency scores. Large domestic banks had a technical efficiency score, allocative efficiency score and cost efficiency score of 0.78, 0.79 and 0.63 respectively, compared to 0.76, 0.71 and 0.57 for foreign banks. The superiority can be attributed innovativeness of large domestic banks, which have been quick at implementing innovative strategies including mobile banking and agency banking. Another possibility of poor performance by large foreign banks could be due to the long periods that large foreign banks have been operational in Kenya; as evident by (Sturm and Williams, 2008), increased domestic market incumbency negatively affects foreign bank efficiency

After the 2008 global financial crisis, the Kenyan financial sector was largely unaffected. This research however, noted a decline in efficiency levels for foreign banks, relative to domestic banks, after 2008. The evidence was even more pronounced in the analysis of medium sized banks, where medium sized domestic outperformed medium sized foreign banks after 2008.

Nevertheless, small foreign banks outperformed small domestic banks over the whole period under analysis.

Banks that were listed in the Nairobi Stock Exchange were found to have a significant positive effect on technical efficiency, allocative efficiency and cost efficiency. Implied that market discipline is instilled upon those banks whose shares are publicly traded, influencing them to be more efficient. Banks that had a direct or indirect government influence, had a significant positive impact on technical and allocative efficiency, albeit an insignificant impact on cost efficiency. This is in line with a study assessing Indian banks (Bhattacharyya et al., 1997). This is however surprising and differs from other recent studies on banking efficiency (Isik and Hassan, 2002; Sensarma, 2006). State owned banks are expected to be inefficient since instead of necessarily prioritising profit optimization objective they may instead endeavor to satisfy political intents (Boycko et al., 1996). Indeed in the Kenyan banking sector state influenced banks were under a threat failing before major restructuring that saw the turnaround. Improved efficiency could be an indicator of reduced political influence, improved political good will and effects of performance based contracts that are compulsory for parastatal heads.

Loan loss provisions, negatively impacted technical efficiency and cost efficiency significantly, an indication that banks with riskier loan portfolios displayed low efficiency. Variance of return on assets had a negative influence on efficiency but was only significant for allocative efficiency. It appears that aggressive managers who undertake riskier decisions tend to incur higher input costs.

5.4 Limited global advantage hypothesis

The limited global advantage hypothesis, introduced by Berger et al., (2000), argues that only ~~foreign institutions from a few countries are able to overcome cross-border disadvantages, and~~ operate more efficiently compared to domestic owned institutions. The advantage emanates from favourable regulatory and market conditions. The research tested this hypothesis by investigating whether the country of origin of foreign banks, had an impact on efficiency.

Banks from India were found to be significantly technical, allocative and cost efficient. Additionally, banks from Mali were also found to be significantly allocative efficient. The limited global advantage hypothesis documented institutions from the US as part of the limited

number of nations with superior regulatory and market conditions. Since only Indian banks appear to be significantly efficient whereas US institutions do not exhibit significant impact, this study does not find evidence in support for the limited global hypothesis. Sturm and Williams, (2008) also documented no evidence of the limited global hypothesis for Australian banks and attributed it to increased foreign banks' incumbency that leads the overuse of inputs; a scenario that is identical to Kenyan foreign banks.

5.5 Chapter Summary

The chapter discussed the findings of the research. In general foreign banks were found to be more efficient compared to domestic banks. However after categorizing banks by sizes of large banks, medium banks and small banks, large domestic banks were observed to outperform foreign banks.

Additionally foreign banks were affected by the global economic crisis in 2008 and had a decline in efficiency levels. Surprising observations included a positive influence on efficiency by government influenced banks, foreign banks having more government securities in their loan portfolios compared to loans, with a contrasting portfolio composition for domestic banks. The study found no evidence of the limited global advantage hypothesis.

CHAPTER SIX

6 CONCLUSIONS AND RECOMMENDATIONS

6.1 Conclusions

This study analyses banking efficiency in Kenya within the period 2004 to 2010 and compares efficiency of domestic banks to foreign banks. The study applies a non-parametric, linear programming DEA methodology to generate cost efficiency, technical efficiency and allocative efficiency of Kenyan banks. Total Factor Productivity (TFP) change, based on Malmquist Index is also estimated to establish periodic improvements in efficiency. Thereafter, the study conducts non-parametric tests to establish whether efficiencies of foreign banks and domestic banks have independent distributions. Sources of banking efficiency are determined based on an econometric model of heterogeneous characteristics of banks. Finally, perceptions of bank managers collected from questionnaires are used to complement empirical findings.

Foreign banks were found to be more efficient compared to domestic banks with average efficiency scores of 0.66 and to 0.60 respectively. However the efficiency gap between domestic and foreign banks narrowed with time as domestic banks constantly improved their efficiency. Indeed, domestic banks reported higher TFP scores compared to foreign banks. When analysis of efficiency was based on bank size, large domestic banks exhibited better efficiency compared to large foreign banks. The results suggest that focus on; branchless banking, SMEs and households are sources of efficiency.

Foreign banks efficiency, especially allocative efficiency, exacerbated from 2008 to 2010. Indeed after 2008, medium sized domestic banks became more efficient compared to medium sized foreign banks. The decline in efficiency could be attributed to political instability: post election violence, which affected Kenya's economy. However, the effects of post election violence are systemic and should have affected all banks uniformly. Therefore, a more plausible explanation for the decline in efficiency of foreign banks after 2008 is the global financial crisis of 2008. The results suggest that foreign banks imported systemic inefficiency to domestic financial systems.

The results of the econometric model supported the postulation that public listing of banks in stock exchanges enhances bank efficiency. The postulation argues that market discipline compels listed banks to be more efficient. No evidence was found in support of the notion that foreign incorporated banks are more inefficient. The rate of loan default and increased bank size were observed to negatively impact efficiency.

In line with Berger et al., (2000), the study tested *limited global advantage hypothesis* in the econometric model. The hypothesis was tested by factoring dummies representing, country of origin for foreign banks. Banks from India were found to be significantly more efficient, whereas banks from Mali were found to be more allocative efficient. According to *limited global advantage hypothesis*, banks that originate from financially sophisticated nations are more efficient than other banks. There was no significant evidence to support the argument that banks from US and UK are efficient than other banks.

6.2 Recommendations

Efficient banking institutions ensure that allocation of funds is prioritized to viable investments and thus spur economic growth. This study reveal sources of efficiency that banking institutions can employ to improve efficiency. For example, public listing; adoption of innovative strategies; focus on SMEs; and technological advancement have been observed to lead to increased efficiency. Regulatory policies therefore should be geared towards strengthening these factors.

6.3 Areas for further research

Some of the findings in this research contravened expectations and would require further research to evaluate consistency. One such finding is the positive government influence on efficiency. Government influenced institutions normally have political interference thus would be expected to utilize resources inefficiently. Another contrasting observation, unlike Havrylchyk, (2006), observed foreign banks to hold more government securities in their portfolios compared loans whereas domestic banks hold more loans in their portfolios compared to government securities. Further investigation is necessary to establish the motivation by foreign banks towards government securities.

The limited global advantage hypothesis has been evidenced in some studies (Including, Berger et al., 2000; Havrylchyk, 2006; Sufian, 2011) but other studies Sturm and Williams, (2008), including this study, found no evidence of the hypothesis thus making it an interesting subject for further research.

6.4 Limitations of the study

The study measured the input and output variables based on publically available financial accounting reports, thus subjecting the study to known weaknesses financial accounting information. Financial accounting reports assume that a snap shot position in a bank's financials is representative whole year's operations, a supposition that is highly unlikely. Additionally, accounting entries are subject to human errors.

The other weakness of the study is in the linear programming methodology used: DEA. DEA is particularly sensitive to inaccurate data; for example, outliers are considered to be (in)efficiencies in a DEA analysis. The other weakness of DEA is the assumption that efficient decision making units (DMU) are only as efficient as other DMUs within the sample, whereas it is possible that a more efficient DMU that could have redefined the efficient frontier was not selected, thus underestimating relative efficiency scores (Miller and Noulas, 1996). This study has however followed the same structure as used by many other researchers (Miller and Noulas, 1996; Sathye, 2001; Havrylchyk, 2006; Hauner and Peiris, 2008).

Finally, the study had difficulties in collecting data on perceptions of bank managers. Bank managers considered the information sensitive and were unwilling to divulge it.

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8 APPENDICES

Appendix 1: A list of Kenyan Banks as at 2010

		Country or Origin	Ownership	incorporation	Government	Listed	Branches 2010
1	Bank of Africa	Mali	F	FI			18
2	Bank of Baroda	India	F	L			11
3	Bank of India	India	F	FI			5
4	Barclays Bank of Kenya	UK	F	L		PL	118
5	Citibank	US	F	FI			4
6	Diamond Trust	Switzerland	F	L		PL	36
7	Ecobank	Togo	F	L			20
8	First Community Bank		F	L			18
9	Gulf African Bank		F	L			15
10	Habib A.G. Zurich	Switzerland	F	FI			5
11	Habib Bank Ltd	Pakistan	F	F			4
12	K-Rep Bank	US	F	L			31
13	Standard Chartered Bank	UK	F	L		PL	33
14	UBA Kenya Ltd		F	L			4
15	ABC Bank		D				10
16	CFC Stanbic Bank		D		G	PL	20
17	Chase Bank		D				14
18	Commercial Bank of Africa		D				20
19	Consolidated Bank		D		G		13
20	Co-operative Bank of Kenya		D			PL	87
21	Credit Bank		D				6
22	Development Bank of Kenya		D		G		3
23	Dubai Bank		D				5
24	Equatorial Commercial Bank		D				12
25	Equity Bank		D			PL	123
26	Family Bank		D				52
27	Fidelity Commercial Bank		D				8
28	Fina Bank		D				15
29	Giro Commercial Bank		D				7
30	Guardian Bank		D				7
31	HFCK		D		G	PL	11

F- Foreign banks, D – Domestic banks, L- Locally Incorporated Banks, FI- Foreign Incorporated banks, PL- Publicly listed banks, G – Banks with direct or indirect Government Influence

Source: Central Bank of Kenya website and Individual Banks' Websites

	Country or Origin	Ownership	incorporation	Government	Listed	Branches 2010
32	I&M	D				15
33	Imperial Bank	D				16
34	Jamii Bora Bank Ltd	D				1
35	Kenya Commercial Bank	D		G	PL	165
36	Middle East Bank	D				3
37	National Bank of Kenya	D		G	PL	53
38	NIC Bank	D			PL	21
39	Oriental Commercial Bank	D				6
40	Paramount Universal Bank	D				6
41	Prime Bank	D				14
42	Trans-National Bank	D				18
43	Victoria Commercial Bank	D				2

F- Foreign banks, D – Domestic banks, L- Locally Incorporated Banks, FI- Foreign Incorporated banks, PL- Publicly listed banks, G – Banks with direct or indirect Government Influence

Source: Central Bank of Kenya website and Individual Banks' Websites

Appendix 2: Regression model diagnostics that check for reliability

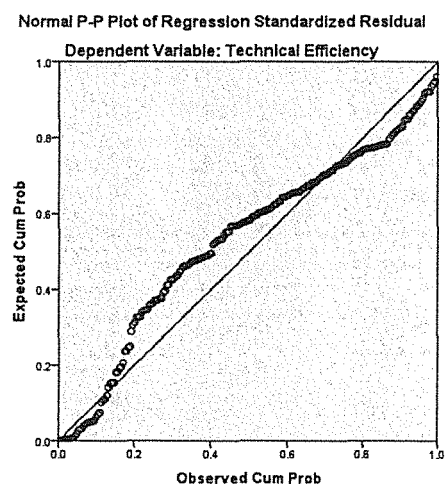
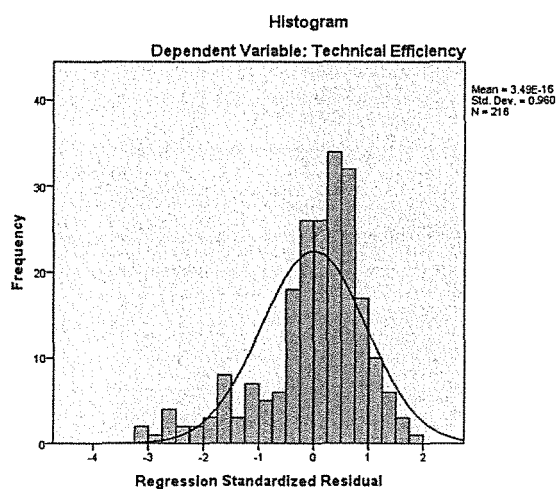
A summary of Adjusted R-square, Durbin-Watson Statistic and F-Value				
Adjusted R-square	.230	.233	.298	.082
F- Value	4.773***	4.851***	6.357***	2.126***
Durbin-Watson	1.349	1.465	1.444	1.650

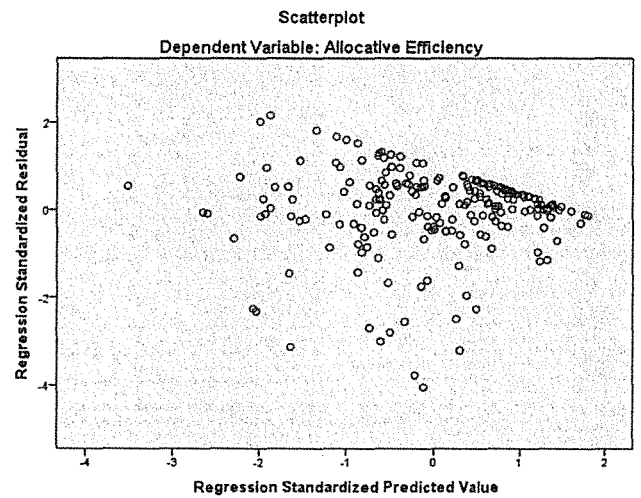
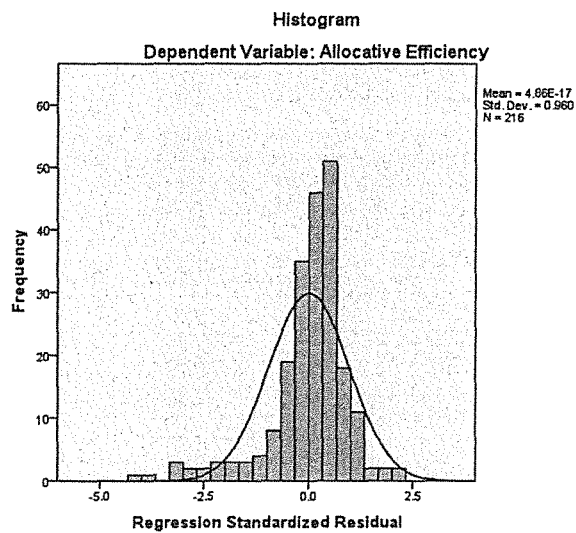
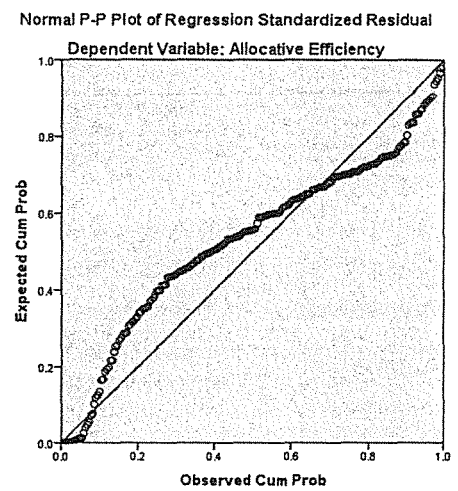
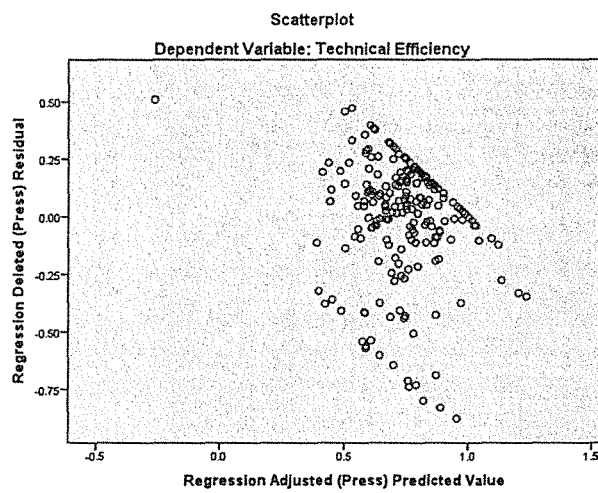
The p-value of the regression model has to be significant for a model to be reliable. The Durbin-Watson statistic check for auto-correlation of the residual. The Durbin-Watson statistic has to fall between 1 and 3 for a reliable regression model. R-square adjusted measures the explanatory power of a regression model.

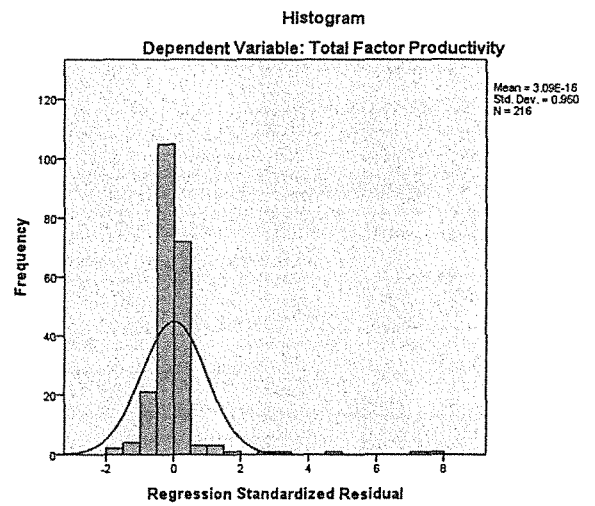
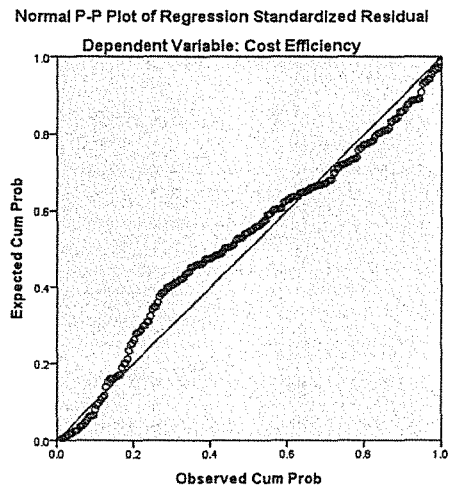
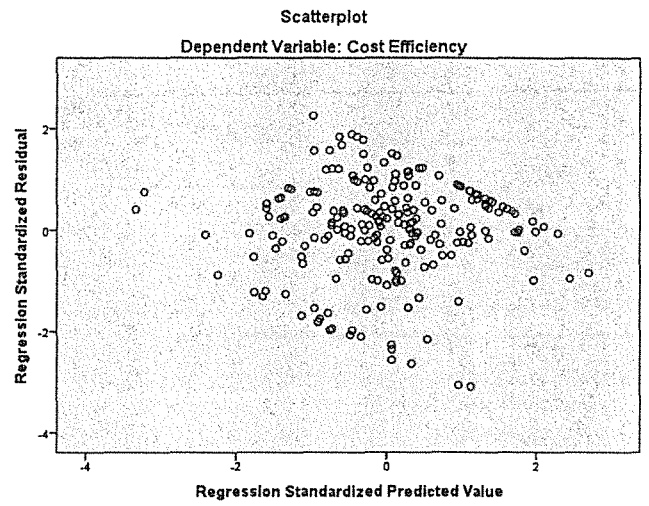
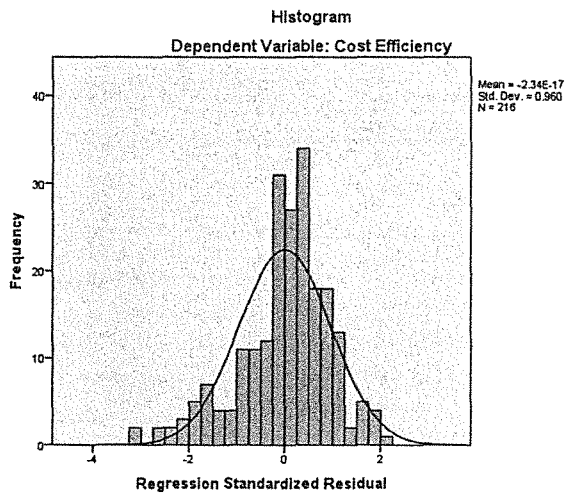
***1% significance

Summary of Figures that check for Normality and Homoscedasticity of residuals

Regression models assume that residuals are normally distributed and the variance of residuals is assumed to be constant at all levels the estimates. The diagrams below show that the models for Technical Efficiency, Allocative Efficiency, Cost Efficiency and Total Factor Productivity all meet this assumptions.

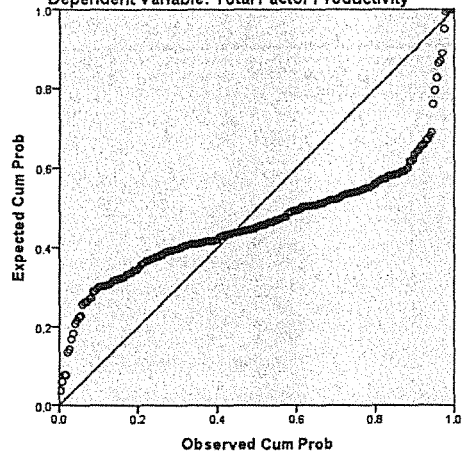






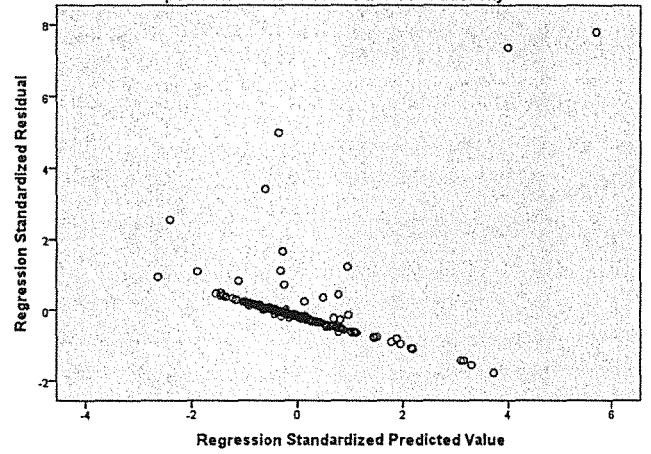
Normal P-P Plot of Regression Standardized Residual

Dependent Variable: Total Factor Productivity



Scatterplot

Dependent Variable: Total Factor Productivity



Appendix 3: Kenyan Banking Efficiency Questionnaire

Questionnaire

This questionnaire is part of an academic study which seeks to understand Banking efficiency in Kenya. The questionnaire is expected to take you approximately 10-25 minutes to complete. All information gathered here will be treated as confidential. Note that the questionnaire requests for your opinion and will thus not be treated as your banks' official position. Paul Maloba is a master of commerce student at Strathmore University.

Question 1 What is the name of the bank you work for?

What is your position?

Question 2 In your opinion, are foreign banks more efficient than domestic banks, in Kenya?

- ☐ Yes
- ☐ No
- ☐ No difference

Question 3 In your opinion, are large banks more efficient than small banks in Kenya?

- ☐ Yes
- ☐ No
- ☐ No difference

Question 4 In your opinion, what are the sources of efficiency for Kenyan foreign banks, over domestic banks?

	Not really	Somewhat a Source	A source	A Good source	Greatest Source
Expertise	☐	☐	☐	☐	☐
Cheap source of funds	☐	☐	☐	☐	☐
Focus on fees and commissions as a revenue source	☐	☐	☐	☐	☐
Focus on SMEs	☐	☐	☐	☐	☐
Mobile banking	☐	☐	☐	☐	☐
Faster decision making	☐	☐	☐	☐	☐
Focus on corporate clients	☐	☐	☐	☐	☐

	Not really	Somewhat a Source	A source	A Good source	Greatest Source
Advanced technology	☐	☐	☐	☐	☐
Numerous branches	☐	☐	☐	☐	☐
labour cost	☐	☐	☐	☐	☐
Focus on loans and advances	☐	☐	☐	☐	☐
Focus on government securities	☐	☐	☐	☐	☐
Better understand the Kenyan market	☐	☐	☐	☐	☐

Question 5 In your opinion, what are the sources of efficiency for Kenyan domestic banks, over foreign banks?

	Not really	somewhat a Source	A source	A Good source	Greatest Source
Expertise	☐	☐	☐	☐	☐
Cheap source of funds	☐	☐	☐	☐	☐
Focus on fees and commissions as a revenue source	☐	☐	☐	☐	☐
Focus on SMEs	☐	☐	☐	☐	☐
Mobile banking	☐	☐	☐	☐	☐
Faster decision making	☐	☐	☐	☐	☐
Focus on corporate clients	☐	☐	☐	☐	☐
Advanced technology	☐	☐	☐	☐	☐
Numerous branches	☐	☐	☐	☐	☐
labour cost	☐	☐	☐	☐	☐
Focus on loans and advances	☐	☐	☐	☐	☐
Focus on government securities	☐	☐	☐	☐	☐
Better understand the Kenyan market	☐	☐	☐	☐	☐

Question 6 What are the main sources of earnings for Kenyan foreign banks?

	Not really	somewhat a Source	A source	A Good source	Greatest Source
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	Not really	somewhat a Source	A source	A Good source	Greatest Source
Loans and advances to customers	☐	☐	☐	☐	☐
Fees and commissions	☐	☐	☐	☐	☐
Foreign exchange trading	☐	☐	☐	☐	☐
government securities	☐	☐	☐	☐	☐
Investments	☐	☐	☐	☐	☐

Question 7 What are the main sources of earnings for Kenyan domestic banks?

	Not really	somewhat a Source	A source	A Good source	Greatest Source
Loans and advances to customers	☐	☐	☐	☐	☐
Fees and commissions	☐	☐	☐	☐	☐
Foreign exchange trading	☐	☐	☐	☐	☐
government securities	☐	☐	☐	☐	☐
Investments	☐	☐	☐	☐	☐

Question 8 In your opinion, how efficient were Kenyan banks, in general, over the period 2004-2011

	Very inefficient	Inefficient	Indifferent	Efficient	Very efficient
2004	☐	☐	☐	☐	☐
2005	☐	☐	☐	☐	☐
2006	☐	☐	☐	☐	☐
2007	☐	☐	☐	☐	☐
2008	☐	☐	☐	☐	☐
2009	☐	☐	☐	☐	☐
2010	☒	☐	☐	☐	☐
2011	☒	☐	☐	☐	☐

Please indicate what might have contributed to the (in)efficiencies listed above. Only include factors (and) for years with greatest effects.

--

Question 9 Which years, in your opinion, were most profitable for Kenyan banks and why?

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Question 10 Which years, in your opinion, were worst performing for Kenyan banks and why?

--

Question 11 How can Kenya banks improve efficiency?

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Question 12 What are the limitations to bank efficiency in Kenya?

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Question 13 What are the limitations of Kenyan foreign banks

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Question 14 What are the limitations of Kenyan Domestic banks

--

Question 15 What advantages do Kenyan large banks have over small banks?

--

Question 16 What advantages do Kenyan small banks have over large banks?

--

THANK YOU!

Appendix 4: Letter requesting to gather research information

Strathmore University



17 March 2012

To whom it may concern

RE: Maloba, Paul Eserea - Reg. No.: 053151

Paul Maloba is a postgraduate student in our Master of Commerce (MCom) programme. In partial fulfilment of the MCom degree, students are required to carry out a research project and write a thesis on a contemporary subject within their field of specialisation. Among other activities, the project involves data collection and analysis.

Mr. Maloba is requesting to gather information to be used in his research. The information he will obtain from your organization will be used for academic purpose only and will be kept confidential. The results of the survey will be in summary form and will not disclose any individual, organization name or organization information in any way.

The research study is entitled: *"Banking Efficiency in Kenya: are Foreign Banks more Efficient than Domestic Banks?"*

We hope that your organization can assist by providing information to the above named student.

Yours faithfully,

David Mathuva,
MCom Administrator,
School of Management and Commerce.

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