Bank's Ownership and Performance in Kenya and Tanzania. Does the size matter? Evidence from Cost and Profit Efficiency of Commercial Banks in Kenya and Tanzania

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ABSTRACT

This paper looks on ownership structure of the banks in Kenya and Tanzania and how it affected by the size of the banks as described big and small size depending the size of the assets banks owns. A non-parametric technique, data envelopment analysis (DEA) and General Least Square Method (GLS) for data from 1998 to 2022 were used to investigate the banks' cost and profit efficiency and examine the influence of ownership, bank profile and size. The generally results show that commercial banks in Kenya and Tanzania are relative more cost efficiency than profit efficiency though the margin is small, which is consistent with other studies. Foreign banks outsmart local banks in both cost and profit efficiency and big banks perform well compared with small banks.

Keywords: *Big and small banks, Cost efficiency, DEA, Domestic and foreign banks, GLS, Kenya and Tanzania commercial banks, Listed and Unlisted, Old and New banks, Profit efficiency.*

1. INTRODUCTION

Banking sector is in general highly regulated industry to protect small, uninformed depositors and to limit both the direct and indirect cost to them resulting from bank 's bankruptcy. The banking sector is of continuing importance to the developing countries due to overwhelmingly dominant position in developing economic financial systems and is extremely important engines of economic growth (King & Levine, 1993a, 1993b; Levine, 1997). There is a growing body of empirical studies to suggest that the overall economic success of a country is a positive function of the development of its financial sector, and of its banking system in particular (Levine, 1997; Levine & Zervos, 1998; Rajan & Zingales, 1998).

Africa continues to lag behind other regions of the world in terms of financial sector development. Only few countries like Egypt, Algeria, Morocco and Tunisia in the North and South Africa in the south have reached a relatively high level of erudition in terms of financial sector. Countries like Botswana, Cameroon, Ghana, Kenya, Mauritius, Nigeria, Senegal, Tanzania, Uganda and Zambia are witnessing a steady expansion of the financial sector, though their stage of development is still low to compare with other countries in developing economies. The banking system in Africa is dominated by a few large banks, and in most cases foreign banks. In Algeria, Egypt, Tunisia, Ghana, Rwanda, and Tanzania foreign banks accounts for more than 50 percent of banking operation. In some other countries like, Niger, Swaziland, Uganda and Zambia, foreign banks account for more than 75 percent of banking operation. While countries like Burkina Faso, Madagascar, and Mozambique foreign banks account for more than 90 percent of the banking operation.

Since the introduction of the financial liberalization process in 1980's, the African banking sector has grown hastily and transformed itself. The industry considerably improved in technology and in human capital and hence expanded, the scope of products offered. The banking sector in Africa, however, is diverse as the countries and in most of the countries is dominated either by state owned banks or by a few large foreign banks. For example, the banking system in North Africa is largely dominated by few and most of them are foreign banks. In Egypt and Algeria, for example, foreign banks account for more than 60 percent of banking operations and about two third of the banks in Egypt are either fully or majority owned by foreign banks. The situation is the same to the rest of Africa. In Ghana and Tanzania, for example foreigners own over 60 percent of banks.

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One of the common features of African banks is that, most of the domestic banks are politically affiliated either where members of the parliaments and other top government officials are members of the boards, or have closely related to banks management. Political affiliation in banks has its advantages and disadvantages. The advantage is, since politics gives access to the economy and possibility to set the rule of the game, political affiliation considered as one of the most important intangible assets of the banks. Nevertheless, political affiliations can interfere with the operation of the banks, for example, by directing banks to give out loans and other services based on politically motivated justifications rather than prudent economic assessment (Aburime, 2009).

The question whether ownership structure influences the profitability of banks is examined by a fairly large literature with rather mixed results depending on the context examined (Arun & Turner, 2004; Chen, Harford, & Li, 2007; Chol, Nthambi, & Kamau, 2020) and such studies focus largely on foreign ownership (Greenaway, Guariglia, & Yu, 2014), family ownership (De Massis, Kotlar, Campopiano, & Cassia, 2013), state ownership (Cornett, Guo, Khaksari, & Tehranian, 2010) and institutional ownership Elyasiani and Jia (2010), Ozili and Uadiale (2017), Kirimi, Kariuki, and Ocharo (2022), Chol et al. (2020), Temba, Kasoga, and Karegero (2023), Mamatzakis, Zhang, and Wang (2017), Agustin, Indrastuti, Tanjung, and Said (2018), Mkaro, Lau, and Choong (2023) and Habile and Okpanachie (2026) with little focus on whether the size of the bank matters in its performance. In this study, focus is on a different ownership structure categorization involving size of the bank.

2. LITERATURE

African banking sector experienced the introduction of several new private banks; this showed that Africa attracted more foreign banks than other parts of the world since the introduction of financial reforms. A percentage of foreign banks among total banks increased. For example, in Egypt, the percentage increased from 44 in 2006 to 52 in 2010; Tanzania from 68 in 2006 to 70 in 2010; Zimbabwe from 25 in 2006 to 35 in 2010. Bank privatizations witnessed in plentiful of African countries causes change in ownership structure to shift from state to private sector. These privatizations of banking sector, is mostly caused by failure of government owned banks to perform to the expectation (Berger, Clarke, Cull, Klapper, & Udell, 2005; Micco, Panizza, & Yanez, 2007). The government ownership poor performance argued to lead to politician has to hamper banking issues including credit allocation in political manner and disregard economic consideration. Evidence from Kenya and Tanzania documented that state owned banks performing relatively poorly in comparison with the private and foreign owned banks. In Kenya, for example, the share of assets of private domestic banks increased from 21.9% in 2000 to 31% in 2007 while that of state-owned banks decreased from 7.1% to 4.8% for the same period. The situation is the same for the share of total loan where for private domestic banks increased from 22% in 2000 to 31.5% in 2007, while that of state owned dropped to 2% in 2007 from 10% in 2000. Simpasa (2011) documents for Tanzanian banking sector that state owned banks performing relatively defectively in comparison with the foreign and private domestic banks in both market share and profitability. By 2008 foreign banks owns 69.98% of the total market share, private domestic banks own 24.12% and state-owned banks owned only 5.90%. In terms of profitability measured by return on average assets (ROAA), return on average equity (ROAE) and net interest margin (NIM), foreign banks increased its ROAA from 1.04 % in 2004 to 1.38% in 2008. For the same period, ROAE has increased from 8.45% to 16%, and NIM from 4.86% to 8.69%. The ROAA, ROAE, and NIM for state owned banks were 1.82%, 23.05% and 8.94%.

The existence of state-owned banks is argued to be necessary for stimulating economic growth and financial development (Andrianova, Demetriades, & Shortland, 2008; Boubakri, Cosset, Fischer, & Guedhami, 2005; Gerschenkron, 1962; Sappington & Stiglitz, 1987). Micco et al. (2007) found that in developing countries state owned banks have fiscal cost due to lower returns compared with privately owned banks. Nevertheless, they point out that their evidence cannot be used as an argument against the existence of state-owned banks, as this low profitability might stem from state owned banks activity on project characterized by low private sector investment and high social return. Panizza (2024) argues that state owned banks are less profitable and have higher share of non-performing loans than their private (domestic or foreign) counterparts. The World Bank African Region, 2006 report that, banking systems in Africa for the most part dominated by state and foreigners where two out of every five banks are mainly foreign owned. Driven by domestic deregulation, increased financial integration and globalization and on the other side with the pressure of privatization of financial sector imposed by the international financial institution like World Bank (WB) and International Monetary Fund (IMF), African countries experienced the rapid

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increase of foreign banks. Foreign banks have thus become a significant part of the banking systems of African countries and increased both in terms of number and in terms of their assets.

Panizza (2024) noted that between 2010 and 2020 there are up and down on ownership structure of banking sector in developing and emerging economies where state owned banks increase slightly to 15-16% over 2016-2020 and the share of foreign banks lowered around 38% over 2010-2013 and then decreased to 36% over 2013-2020 (Panizza, 2024). State owned banks have guaranteed income that makes them strongly invest in government securities with short-term maturity (Boubakri et al., 2005). Thus, reduces the bank enticement to develop the aptitude to serve small and medium enterprises, which are the vertebrae of any economy and need access to banking products as much as big businesses. Like the rest of the developing countries, Africa has undergone a series of important structural and policy reforms in their financial sector in recent years. The presence of large number of foreign banks in Africa partly contributed by the recent improvement of economic conditions that driven by the wealth of natural resources the continent has that attract many foreign investors, the highest returns on investment, and the spreading of democracy where number of leaders who are democratically elected increased compared with the past. Bourke (1989); Molyneux and Thornton (1992) found no significant relationship between the ownership status and performance of the bank. However, Micco et al. (2007) and Iannotta, Nocera, and Sironi (2007) find strong empirical evidence that ownership does affect the bank profitability.

2.1. State Ownership of Bank and Performance

Almost all countries around the world have experienced the state ownership of bank at some point in their history. For a long period, state owned banks dominate the banking sectors and play important role of developing economies in developing countries. A question which triggers the researchers in development economies is that, should government engage in banking business, or should it remain to be regulator only? State ownership of banks arguments based on assumptions that, government are well or even perfectly informed and that they try to maximize social welfare. If this argument is true, then the government ownership might be an easy and cheap way for government to correct market failure (Sappington & Stiglitz, 1987) thus reduce inequality and meet other social goals (Willner, 2001).

Gerschenkron (1962) as cited by La Porta, Lopez-de-Silanes, and Shleifer (2002) put forward another argument in favour of state ownership of bank. His argument based on the fact that, when the standards of honesty in business is so disastrously and the general distrust of the public is so great, that no bank could be ready to engage in long term credit the state-owned banks could step in. The Gerschenkron argument is influenced by the Lenin own perspective about bank that “without big banks, socialism will be impossible” (Lenin, 1917 cited by La Porta et al. (2002)). These ideas were, then adopted by many countries around the world particularly in Africa, Asia and Latin America.

The development school of view support the idea of state ownership of bank on premises that in country where the economic institutions are not well developed, the state ownership of bank is needed to foster financial and economic development. They argue that government could use state owned banks to raise capital for projects with high social, but low private returns, and provide finance to poor borrowers that are neglected by less well-informed or motivated private bankers (Clarke, Cull, & Shirley, 2005). They challenge the idea that politicians might use state owned banks and bureaucrats to secure political office, accumulate power, or seek rent. They argue that, if politicians do this, they might be especially likely to do so in weak institutional environments, where a voter has less information. Boubakri et al. (2005) under- pinned the advocacy of state ownership of bank by suggesting three arguments in justifying it; they argue that private banks are more prone to crisis; the excessive private ownership may limit access to credit to many parts of society; and that the government is more fitted to allocate capital to certain investment.

While the development view arguments seem to be well sound, and to some extent have some validity, empirical evidences document that state owned enterprises have been used to finance politically motivated projects (Baum, Caglayan, & Talavera, 2010; Cole, 2009; Dinç, 2005; Donahue, 1989; Firth, Lin, & Wong, 2008; Jones, 1985; Kikeri, Nellis, & Shirley, 1992; Micco et al., 2007; Sapienza, 2004; Vins, 2008; World Bank, 1995) have inferior performance (Cornett et al., 2010; Megginson, 2005; Megginson & Netter, 2001) and have depressing impact in growth (Körner & Schnabel, 2010). Though it is difficult to have evidence on hand, there are numerous criticisms that African banks used to finance political activities.

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2.2. Foreign Ownership of Bank and Performance

Foreign banks become an important part of the banking system in developing countries (Panizza, 2024). Foreign banks entry is associated with both decline and increases of domestic banks. For example, in countries in which the number of foreign banks increases, the growth in number of domestic banks is decreases, the opposite is the case, and this is true especially for the low-income countries (Claessens, van Horen, Gurcanlar, & Mercado Sapiain, 2008). The number of foreign banks in low-income countries increased by 90 percent in between 1995 and 2006, with the total number of domestic banks increased by only 2 percent in the same period (ibid). Categorizing banks by geographical regions, Claessens et al. (2008) show that between 1995 and 2006 a number of foreign banks increased by 66 percent in the MENA countries and 64 percent in Sub – Saharan Africa. Panizza (2024) argue that shared for foreign banks in emerging and developing countries lowered to 36% over 2013-2020 from around 38% over 2010-2013 and Habile and Okpanachie (2026) posit that foreign banks exhibit negative relationship with earning per share. Literature on foreign ownership of banks produces mix results. The most common findings for developing countries show that in average, foreign banks are more efficient comparing with the private domestic banks of the same level, and the state owned banks. Bonin, Hasan, and Wachtel (2005a) and Bonin, Hasan, and Wachtel (2005b) using data from the transition nations of the Eastern Europe finds that, foreign banks to be the most efficient, followed by the private domestic banks, and then state owned banks. However, in study of transition nations by Semih Yildirim and Philippatos (2007) they found the mixed results that foreign banks are more cost efficient, but less profit efficient than both private domestic and state owned banks. Claessens, Demirgüç-Kunt, and Huizinga (2001) evidenced that in many developing countries (with the example of Argentina, Egypt, Indonesia and Venezuela) foreign banks report significantly higher net interest margins than domestic banks, while in Asia and Latin America foreign banks achieve significantly higher net profitability than domestic banks. However, in two different studies that using the data from Argentina (prior to 2002 crisis), Delfino (2003) and Berger et al. (2005) find roughly equal efficiency for foreign and private domestic banks and that both are more efficient on average to compare with state owned banks.

Some findings on the entry of foreign banks evidence the higher competitive pressure and increase in the efficiency of domestic banks (Claessens et al., 2001; Claessens & Laeven, 2003; Denizer, 2000; Jeon, Olivero, & Wu, 2011; Lensink & Hermes, 2004; Levy Yeyati & Micco, 2003; Manlagñit, 2011). However, some studies put forward that foreign bank entry resulted in unpretentious or boundless impact on banking sector development (Detragiache, Gupta, & Tressel, 2006; Green, Murinde, & Nikolov, 2004; Schulz, 2006).

2.3. Private Domestic Banks and Performance

The World Bank and International Monetary Fund policy framework forces many African countries to change their policies from the control economy to market economy where issues of economic liberalisation and privatisation become a foremost agenda in reviving their economic growth. Whether attempts of changing policies to suit the WB and IMF policy framework are of any assistance to African countries or not, is a subject that need comprehensive research that is beyond this study. However, it is noteworthy to say that policies of economic liberalisation forced most African countries to allow foreign banks to take part in their economy. By allowing the entry of foreign banks in African financial sector, there is a need to understand the position of domestic banks in terms of performance. Understanding the competitive of domestic banks in the presence of foreign banks is essential particularly if the presence of foreign banks is assumed to create spill over or increase the competition in the domestic banking sector as posited by many scholars and researchers in this area. As most empirical literature suggests that privatisation increase the performance, it is not different for the domestic private banks. A question remain is the private domestic perform well in comparison with the foreign ones?

Sensarma (2006) compared state owned, private and foreign banks in India and finds that banks have improved their performance during the period 1986-2000 in terms of both efficiency and productivity. Surprisingly, however, he finds that foreign banks have been the worst performers throughout the period as compared with state owned and private domestic banks. Subsequent study by Lensink, Meesters, and Naaborg (2008) comes out with the almost agreed results. Examining bank efficiency and foreign ownership using stochastic frontier analysis for sample of 2095 commercial banks in 105 countries for the year 1998-2003, they find that higher quality of the institutions in the home country and higher similarity between home and host country institutional quality reduce foreign bank inefficiency. Their results also indicate that domestic bank in average more efficient than foreign banks. This result show that foreign banks may find more difficult to deal with host country regulations, banking supervision rules to

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compare with the domestic banks. Hence, especially in countries where governance is bad, the foreign ownership banks efficiency relationship is negative.

3. METHODOLOGY

The study-categorized ownership in three forms, government owned banks, domestic private owned and foreign owned banks (Nguyen, 2020). They were represented in the regression with DUMGOV for government owned banks, DUMFOR for foreign owned banks, and DUMPRI for domestic private owned banks. This study classify majority state owned banks as those banks in which public sector ownership is above 50% of total ownership; majority private domestic banks are those banks whose private domestic is over 50% of total ownership; and majority foreign banks as those banks whose foreign ownership is over 50%. This threshold of the majority ownership has been applied in number of papers (Berger, Hasan, & Zhou, 2009; Bonin et al., 2005a; Mamatzakis, Staikouras, & Koutsomanoli-Filippaki, 2008; Micco et al., 2007; Omran, 2007). Nevertheless, some papers classify the majority ownership if one group of shareholders own at least 20% of the total ownership (Anderson & Gupta, 2009; Cornett et al., 2010; Dinç, 2005). The 20% threshold argument following the corporate control literature, which suggests that 20% ownership, is often sufficient to control a company. When it appears, there is no clear notch up majority of ownership, this study assigns the majorities to the group with the highest ownership.

The standard DEA model developed by Farrell (1957) was used to compute cost and profit efficiency for the banks in Kenya and Tanzania. From the set of the available data, DEA identifies relative efficient DMUs, which are used as a reference point that define the efficiency frontier and evaluate the inefficiency of other DMUs, which lie below the frontier line. Charnes, Cooper, and Rhodes (1978) introduce CCR-Model. This model measures the efficiency of each DMU, which obtained as a maximum of a ratio of total sum of weighted outputs to total sum of weighted inputs. Consequently, the efficiency can be defined as follow.

$$Efficiency = \frac{Weighted\ sum\ of\ outputs}{Weighted\ sum\ of\ inputs}$$

The weights for the ratio are determined by the restriction that the similar ratios for every DMU have to be less than or equal to unity, thus reducing multiple inputs and outputs to a single “virtual” input and single “virtual” output without requiring pre-assigned weights. Therefore, the efficiency score is a function of the weights of the “virtual” input-output combination. Suppose that there are *n* DMUs, each with series of *m* inputs and series of *s* outputs, relative efficiency score of a given DMU0 is obtained by solving the following linear programming model.

$$\max h_0(u,v) = \frac{\sum_{r=1}^{s} v_r y_{r0}}{\sum_{i=1}^{m} u_i x_{i0}}$$

subject to

$$\frac{\sum_{r=1}^{s} v_r y_{rj}}{\sum_{i=1}^{m} u_i x_{ij}} \le 1 ; j = 1,2,.....,n$$

$$u_i \ge 0 ; i = 1,2,.....,m$$

$$v_r \ge 0 ; r = 1,2,.....,s$$

where

x_{ij} = the amount of input i utilized by the jth DMU

y_{rj} = the amount of output r produced by the jth DMU

u_i = weight given to input i

v_r = weight given to output r

Following the Charnes and Cooper (1962) one can select a representative solution (u, v) for which

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

Hence, the denominator in the efficiency score *h*0 shown above is set equal to one, the transformed linear programming model for DMU0 can be written as follow.

$$\max z_0 = \sum_{r=1}^{s} v_r y_{r0}$$

subject to

$$\sum_{r=1}^{s} v_r y_{rj} - \sum_{i=1}^{m} u_i x_{ij} \leq 0 \; ; \; j = 1,2,\ldots\ldots,n$$

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

$$u_i \geq 0 \; ; \; i = 1,2,\ldots\ldots,m$$

$$v_r \geq 0 \; ; \; r = 1,2,\ldots\ldots,s$$

The linear programming model shown above will be run *n* times in identifying the relative efficiency scores of all the DMUs. Each DMU selects input and output weights that maximize its efficiency score. Generally, a DMU is considered efficient if it obtains a score of 1.00, implying 100% efficiency; whereas a score of less than 1.00 implies that it is inefficient. Maximizing the fraction can be accomplished by minimizing the denominator of the fraction and normalizing the denominator to one (Lehmann, Warning, & Weigand, 2004).

$Min \sum_{r=1}^{m} u_{i,} x$

Subject to: $\sum_{r=1}^{s} v_r y_r = 1$

$$-\sum_{r=1}^{s} v_r \, y_{r\,j} + \sum_{r=1}^{m} u_{i,} x \geq 0, \qquad j = 1, 2\ldots n$$

$v_r \geq 0$ $\quad r = 1,2,\ldots.s$

$u_i \geq 0$ $\quad i = 1,2, \ldots m$

The duality theory from linear programming suggests that there is a dual program for each original linear program and the solution are always equal (Gale, Kuhn, & Tucker, 1951)

3.1. DEA for Profit Maximization

The profit-maximization equation of a multiple outputs, multiple inputs firm with inputs and outputs prices *w* and *p*, respectively, can be formulated as follows:

$$\text{M}\sum_{r=1}^{m} p_r y_r - \sum_{i=1}^{n} w_i x_i$$

Subject to $\sum_{j=1}^{N} \lambda_j y_{rj} \geq y_r (r = 1,2,\ldots.,m);$

$\sum_{j=1}^{N} \lambda_j x_{ij} \leq x_i (i = 1,2,\ldots.,n);$

$\sum_{j=1}^{N} \lambda_j = 1;$

$\lambda_j \geq 0; (j = 1,2,\ldots.,N).$

The profit maximizing input and output quantities x_i^**(I=1,2,…,n)* and y_r^**(r=1,2,…,m)* are obtained along with the other decision variables λ_j^* *(j =1,2,…, N)* at the optimal solution of this problem. An important point needs to be noted in this context is that, the optimal value of the objective function $\Pi^* = p'y^* - w'x^*$is the maximum profit that the firm can earn. The bounded solution of the LP problem in (4.10), allow variable returns to scale. Without the restriction $\sum_1^N \lambda_j = 1$,if (λ^*, x^*, y^*) is a feasible solution, then, for any arbitrary *t>0,* $(t\lambda^*, tx^*, ty^*)$ is also a feasible solution but in that case Π^*also gets multiplied by *t*. By making *t* arbitrarily large, it can increase the maximum profit indefinitely. Therefore, for a finite (non-zero) profit, it must assume variable returns to scale.

To ascertain the factors, which derive banking performance the cost and profit efficiency of the banks regressed on empirical proxies of bank specific factors. The generalized least square (GLS) regression model is employed. In

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determining the bank specific factors that affects cost and profit efficiency of banks, the bank efficiency score is used as the dependent variable. The independent variables for the study are loan to deposit ratio, non-interest expenses to total assets, non-interest income to total assets, loan to total assets, loan loss provisions to total loan, equity to total assets, natural logarithms of total assets, return on average assets, return on average equity, and age of the bank. Loan to deposit ratio therefore, used to measure the bank's management on deposits and thus, it is a good proxy for management efficiency in banking sector Chu and Lim (1998) pinpoint that larger banks may attract more deposits and loan and therefore command larger interest rate spread. Lim and Randhawa (2005) put forward that the smaller banks with small depositor's base might have to option to acquire funds in inter -bank market, which is more cost.

The ratio of non- interest expenses to total assets included in this study as a proxy for management quality. Thus, lower or the higher cost represents how management are good or otherwise. The higher ratio of non-interest expenses to total assets expected to affects negative to bank efficiency because efficient bank expected to operate at lower costs. The ratio of non-interest income to total assets included in this study as a proxy for non- traditional activities of the banks. It includes fee income, trading income, commission income, other operating income and non-operating income. Traditional banks rely on interest charged to the depositors to funding as their income, however in recent years, banks have generating income from trade and other off-balance sheet and fees generating business and reduce relying on interest income. The variable expected to have a positive relationship with bank efficiency. The ratio of loan to total assets this study presents the liquidity management of the commercial banks. Banks loan regarded as the main source of bank without it a bank could fail. In most case the bank liquidity, depend upon the economic condition of the country. If the economic condition of the country is good, most people can have saving and therefore the loan percentage of banks expected to increase. The opposite is true if the economy of the country is weak. This variable expected to have positive relationship with bank efficiency. However, it may take negative relationship because of the economic state of change.

Banks set their loan loss provisions to reflect expected future losses on loan in their existing portfolios. Since the future losses, cannot estimate with certainty, bank management have substantial discretion to set the provision. Loan loss provisioning is an expense creditor's budget as an allowance for bad loans. Following the 2008 global financial crisis, banks in most countries have steep rises in loan loss provision due to customer defaults. Loan loss provisioning policy is critical in assessing financial system stability, in that it is a key contributor to fluctuations in bank's profitability and capital positions, which has a bearing on bank supply of credit to the economy (Beatty & Liao, 2011). It is a measure of bank credit quality and reported on a bank's income statement. A higher ratio indicates a lower credit quality and therefore a lower profitability. In consequence, the study expects a negative effect from the loan loss provision relative to total loans on bank performance. The level of loan loss provisioning, should be able to reflect the beliefs of bank management on the quality of the loan portfolios that they have indicating that provisions should be able to cover the whole spectrum of expected credit losses if they are to think of provisions as measure of true credit risk (Dugan, 2009) Equity to total assets included in the model to look at the relationship between bank profitability and bank capitalization. Thus, the LLP to total loan is taken as a good measure of bank credit risk.

To withstand financial shocks, banks need to have strong capital structure. The expected sign for this variable however is mixed because it is a practical matter for the bank to have either too much or too little capital. Capital is considered as a bolster to cover risk of default. Having too little capital imply risk default to the bank, however, having too much capital impose higher cost to the bank and result to the poor return on equity. One of the most central questions in the literature is which bank maximizes bank efficiency in term of cost and profitability. Bank size is an important element in measuring bank efficiency as big bank may have the benefit of economies of scale in both implementation of corporate governance norms and financial operations. It is also important to include bank size as a control variable as small banks can behave differently from larger banks (Shehzad, de Haan, & Scholtens, 2010). Smirlock (1985) and Pasiouras and Kosmidou (2007) evidenced that the growing bank size is positively related to the bank profitability. This is because larger bank likely to have higher degree of product and loan diversification, which reduces, risks and raise economies of scale and thus lead to operational efficiency to compare with small bank. Bank size in this study is proxies by natural logarithm of total assets and expects to have positive effect on both cost reduction bank profitability.

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The return on assets is the most common variable used in literature to measure the bank performance. This measure has been applied in many papers among others (Athanasoglou, Brissimis, & Delis, 2008; Bonin et al., 2005a; Dietrich & Wanzenried, 2011; Haw, Ho, Hu, & Wu, 2010; Lin & Zhang, 2009; Micco et al., 2007; Pasiouras & Kosmidou, 2007; Sanda, Mikailu, & Garba, 2005). The ROAA is defined as the ratio of the net profits to average total assets expressed as a percentage. In principle, ROAA reflects the ability of the banks management to generate profits from the bank's assets. According to Rhodes (1998) cited by Lin and Zhang (2009) ROAA is biased upwards for banks that earn significant profits from off balance sheet operations such as derivative activities, as these activities generate revenue and expenses but are not recorded as assets. However, ROAA still emerges as the key ratio for the evaluation of the bank performance. Return on equity indicates the return to shareholders on their equity. It is expressed as the ratio of net profits to average equity in the percentage form. This measure has been applied by number of scholars and researchers among others (Athanasoglou et al., 2008; Berger et al., 2005; Bonin et al., 2005a; Boubakri et al., 2005; Claessens et al., 2001; Dietrich & Wanzenried, 2011; Lin & Zhang, 2009). The analysis of ROE, however, is criticised by disregarding the risk associated with high leverage and the effects of regulation on leverage. De Wet and Du Toit (2007) point out that, though ROE is a popular measure of corporate financial performance but it is flawed. Amongst the flaws of ROAE are possibility of manipulating via changes in accounting policy ROAE is calculated after cost of debt but before taking into account the cost of own capital that may resulted to increase the cost of borrowed funds, and hence share price to fall. To counter the problems of each measure, this study employed both ROAA and ROAE as the measures of profitability for the bank efficiency.

Age of the bank included in this study to test whether there is variation of cost and profit efficiency between banks with different age. The study categorized all banks with less than 30 years in operation as the new banks and those with above 30 years of operation as the old bank. If a bank merged or acquired, this study treats the resulting bank as new. Old banks expected to be more efficiency compared with new banks due to their long market experience and asset accumulation.

3.2. Macroeconomic Determinants

To investigate the effects of macroeconomic factors on bank performance, this study includes a set of key macroeconomic variables that expected to have impact in bank's cost and profit efficiency. These include includes the gross domestic product (GDP); inflation; and ratio of broad money to GDP. The investigation of macroeconomics in bank efficiency is important because banks operate in countries with difference macroeconomics environment. Hence, bank efficiency level differs across country. According to the literature on the association between economic growth and financial sector development (Athanasoglou et al., 2008; Bikker & Hu, 2002; Demirgüç-Kunt & Huizinga, 1999). GDP growth has expected to have positive effects on bank profitability. If economic condition is good banks profit, tend to go up even if it is not efficient, and if economic condition is poor, the ability of bank to maintain profitability is lower. This study use change in GDP as a proxy for economic growth. The proxy is commonly used to represent the general market condition of the country.

The relationship between consumer price index and efficiency is ambiguous. For example, it is argued that the higher rate of inflation favours the debtors (debtors gain from inflation as they repay creditors with dollars that worth less in term of purchasing power) and therefore the banks might expect an increase in bad debts. This would reduce the bank efficiency in terms of costs and profits, as banks need to incur additional costs to manage the bad debts. Nevertheless, the relationship between bank efficiency level and inflation is undeniably. Banks tend to charge higher rate in higher inflationary environment to compensate for their returns. Therefore, this study will use the inflation rate to test for the efficiency of the bank. Allen, Otchere, and Senbet (2011) use liquidity liabilities per GDP and private credit per GDP to provide a review of African financial system. This study will use the ratio of broad money to GDP to test the cost and profit efficiency of the African banks. In developed economy, banks face very stiff competition in attracting deposits and loans because borrowers and surplus fund holders have alternative of directing their funds or borrowing to other sources. The situation is slightly different in developing economy where there is limited alternative of directing funds, and banks are the major sources of finance.

3.3. Econometric Model Specification

To test the relationship between variables described above, the study estimates a linear regression model as follow:

$Eff_i = f(BANKsp, MACECONsp, INDsp)$

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Where,

Eff_{it} = efficiency score for bank in country *i* in time *t*
BANKsp = bank specific
MACECONsp = macroeconomic specific
INDsp = industry specific (ownership)

More specific, the equation can be written as follow:

$$Eff_{ijt} = \alpha_{ijt} + \beta_1 LOANDEP_{ijt} + \beta_2 NIETA_{ijt} + \beta_3 NIITA_{ijt} + \beta_4 LOANTA_{ijt} + \beta_5 LLPTL_{ijt} + \beta_6 EQUITYTA_{ijt} + \beta_7 LTA_{ijt} + \beta_8 ROAA_{ijt} + \beta_9 ROAE_{ijt} + \beta_{10} AGE_{ijt} + \beta_{11} M2/GDP_{jit} + \beta_{12} INFL_{jit} + \beta_{13} LTA_{jit} + \beta_{14} DUMGOV_{jit} + \beta_{14} DUMFOR_{jit} + \beta_{14} DUMPRI_{jit} + \varepsilon_{ijt}$$

Where;

Eff_{ijt} = efficient score of banks *i* in country *j* at time *t*
$LOANDEP_{ijt}$ = loan to deposit ratio of bank *i* in country *j* at time *t*
$NIETA_{ijt}$ = non -interest expenses to total assets of bank *i* in country *j* at time *t*
$NIITA_{ijt}$ = non -interest income to total assets of bank *i* in country *j* at time *t*
$LOANTA_{ijt}$ = loan to total assets of bank *i* at country *j* in time *t*
$LLPTL_{ijt}$ = loan loss provision to total loan of bank *i* at country *j* in time *t*
$EQUITYTA_{ijt}$ = equity to total assets of bank *i* at country *j* in time *t*
LTA_{ijt} = natural logarithm of total assets of bank *i* at country *j* in time *t*
$ROAA_{ijt}$ = return on average assets of bank *i* in country *j* at time *t*
$ROAE_{ijt}$ = return on average equity of bank *i* in country *j* at time *t*
AGE_{ijt} = age of bank *i* in country *j* at time *t*
GDP_{jit} = the yearly GDP growth in country *j* at time *t*
$INFL_{jit}$ = inflation rate (consumer price index) of country *i* in time *t*
$M2/GDP_{jit}$ = broad money to GDP ratio of country *i* in time *t*
$DUMGOV_{jit}$ = dummy of Government (=1when bank is government owned, 0 otherwise)
$DUMFOR_{jit}$ = dummy of foreign (=1 when bank is foreign owned, 0 otherwise)
$DUMPRI_{jit}$ = dummy of private (=1when bank is privately owned, 0 otherwise)

4. EMPIRICAL RESULTS

4.1. Average Efficiency for Kenya and Tanzania

Table 1. Descriptive Statistics for cost and profit efficiency (1998-2022) for Kenya and Tanzania.

Kenya and Tanzania	Cost Efficiency		Profit Efficiency			No. of Banks
	Mean	Std. Dev.	Mean	Std. Dev.	Obs.	
Panel A: All banks	0.7994	0.2190	0.7920	0.2177	518	53
Panel B: Local banks	0.7960	0.2280	0.7829	0.3006	312	28
Panel C: Foreign banks	0.8174	0.2212	0.7897	0.2818	215	25
Panel D: Old banks	0.8017	0.1971	0.8133	0.2325	200	24
Panel E: New banks	0.7757	0.2400	0.7965	0.2500	201	29
Panel F: Big banks	0.8835	0.1686	0.8536	0.2514	123	14
Panel G: Small banks	0.7704	0.2294	0.7708	0.2931	278	39
Panel H: Listed banks	0.9135	0.1543	0.8026	0.4027	88	10
Panel I: Unlisted banks	0.7806	0.2301	0.7863	0.2698	299	43

The Table 1 compares difference categories of bank efficiency scores from Kenya and Tanzania. Panel A in above table indicate the average scores for all commercial banks for the sample of Kenya and Tanzania. The scores show that Kenya and Tanzania commercial banks are relatively more cost efficient than profit efficient although the margin is very small. A cost efficiency mean score of 0.7994 compared with profit efficiency mean score of 0.7920 point out that on average banks in Kenya and Tanzania could make a profit of 79.20 percent that the best practice banks make under the same condition. The results also show that an average bank from Kenya and Tanzania waste around 20.06

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percent of their resources relative to the best practice banks waste for the same level of output. Thus, banks in Kenya and Tanzania could further improve their profits by 20.8 percent and could further reduce their costs for 20.06 percent to apprehend the efficiency level.

Results for domestic and foreign banks reported on Panel B and C in above table indicate that foreign banks are relatively more cost and profit efficiencies than domestic banks. The cost efficiency mean scores for domestic banks is 0.7960 whilst that of foreign banks is 0.8174 signifying that domestic banks waste around 20.4 percent of their costs compared with foreign that waste around 18.26 percent of their costs for the same level of output. On the profit side, mean estimates of the foreign banks is 0.7897 whilst that of domestic banks is 0.7829 suggests that on average foreign banks are much closer to the profit efficient frontiers compared with domestic banks.

A comparison of new and old banks shows that old banks are relatively more cost efficient than domestic banks. The cost mean score for old banks is 0.8017 compared with that of new banks which stand at 0.7757 indicating that on average old banks waste 19.83 percent of their costs whilst new banks waste around 22.43 of their costs for the same level of output that could be otherwise utilized to realize maximum efficiency. The profit efficiency estimates of old banks show relatively more profit efficient than new banks with profit efficiency mean score of 0.8133 compared with new banks that show efficiency mean score of 0.7965. The profit score of 0.7965 for new banks suggesting that while new banks need further improve their profits by 20.35 to meet the most profit efficient banks, old banks need further improve their profits by 18.67 percent and shown in Panel D and E of the above table.

Panel F and G estimate show that big banks are relatively more cost and profit efficient compared with small banks. The cost efficiency average score of big banks is 0.8835 compared with 0.7704 for the small banks. These results imply that big banks waste little resources compared with small banks for the same level of output. The profits efficiency mean score for big banks is 0.8536 compared with small banks profit efficiency mean score of 0.7708 suggesting that big banks are closer to the efficient frontier by 14.64 percent compared with small banks, which are far from the frontiers by 22.92 percent. This results evidence that the size of the bank matter in performance of the bank.

Distinction between listed and unlisted banks demonstrated on panel H and I in within the table and estimated score between listed and unlisted commercial banks outline that listed banks are relatively more cost efficient than unlisted banks. A mean score of 0.9135 reveal that listed banks ravage approximately 8.65 percent of their costs, whilst a mean score of 0.7806 for the unlisted banks reveal that an average unlisted bank ravage around 21.94 of its costs for the same level of output. Analysis of profit efficiency between listed and unlisted banks evidence that listed banks are more profit efficient compared with unlisted banks. Profit estimates mean score for listed banks is 0.8026 compared with 0.7863 of the unlisted banks implying that listed banks earn around 80.26 percent that most efficient profit banks earn compared with unlisted banks, which earn 78.63 percent of what most efficient profit banks earn. The result implying that for commercial listed banks to operate at efficient level they need further improve their profits by 19.74 percent whilst for the commercial unlisted banks to reach the most profit efficient banks they need further improve their profits by 21.37 percent.

4.2. GLS Regression Results on the Determinants of Efficiency Model for Kenya and Tanzania

The regression results for Kenya and Tanzania are presented in Table 2. The coefficient of the ratio of loans to deposit (LOANDEP) for Kenya and Tanzania is positive to cost and profit efficiencies but statistically not significant to both. Management quality is proxies by non-interest expenses to total assets (NIETA). Coefficient of NIETA is negative but statistically significant to cost efficiency suggesting that administration costs could contribute to commercial bank cost inefficiency. Nevertheless, the coefficient is negative and insignificant to profit efficiency. Coefficient of non-interest income to total assets proxies by (NIITA) is positive to cost and profit efficiencies and statistically significant at 1% to both, suggesting that commercial banks that obtain their income from sources other than interest sources like fees and commissions are relatively more efficient compared with banks that gain their income from interest related sources.

Bank liquidity is proxies by loans to total assets (LOANSTA). The coefficient of LOANSTA is positive to cost efficiency and statistically significant at 1% suggesting that the most liquidity commercial bank tend to reduces their costs. On the other hand, the coefficient is positive and statistically significant to profit efficiency at 5% level signifying that the most liquidity bank would also be more profit efficient compared with less liquidity banks. Credit risk is proxies by loan loss provision to total assets (LLPLOAN). The coefficient of LLPLOAN is negative and statistically not

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significant to both cost and profit efficiencies. Bank capitalization is proxies by equity to total assets (EQUITYTA). The coefficient of EQUITYTA is positive and statistically significant at 1% and 5% level to cost and profit respectively suggesting that in good health banks (well-capitalized commercial bank) might reduce costs and improve profits compared with their counterparts, hence become cost and profit efficient. Natural logarithm of
total assets (LTA) are used as a proxy for bank size. The coefficient of LTA is positive and statistically significant to both cost and profit efficiencies implying that large commercial banks are relatively more cost and profit efficient compared with their small banks. Thus, age of the bank is an important factor to consider in analysing bank efficiency. An impact of bank profitability to bank efficiency is proxies by return on average assets (ROAA) and return on average equity (ROAE). Coefficient of ROAA is positive to cost efficiency and negative to profit efficiency but, in both cases, it is statistically not significant.

The positive sign to cost efficiency suggests that more profit bank might also be more cost-efficient bank. Coefficient of ROAE is negative to cost and profit efficiencies and statistically not significant to both. Coefficient of the age of the bank (AGE) is negative to cost efficiency and positive to profit efficiency though statistically not significant to both. The positive sign to profit efficiency signify that bank age affects bank profit positively. Thus, old commercial banks could be more profit efficient compared with their counterpart.

Table 2. Results of GLS regression on the determinants of efficiency model- Kenya and Tanzania.

Variable	Cost Efficiency		Profit Efficiency	
	Model 1	**Model 2**	**Model 1**	**Model 2**
Bank Specific				
LOANDEP	0.00017(1.19) [0.00014]	0.00013(1.13) [0.00011]	0.0003(1.46) [0.0002]	0.0003(1.45) [0.0002]
NIETA	-0.0232***(-4.89) [0.0047]	-0.0278***(-6.34) [0.0043]	-0.0095(-1.31) [0.0073]	-0.0161**(-2.11) [0.0076]
NIITA	2.9333***(5.68) [0.5161]	1.2685***(2.85) [0.4445]	4.4920***(5.67) [0.7921]	2.9458***(3.80) [0.7742]
LOANTA	0.0052***(6.49) [0.0008]	-0.0018**(-2.18) [0.00083]	0.0025**(2.06) [0.0012]	-0.0036**(-2.54) [0.0014]
LLPLOAN	-0.0014(-1.27) [0.0011]	-0.0004(-0.48) [0.0009]	-0.0003(-0.21) [0.0016]	0.0003(0.22) [0.0016]
EQUITYTA	0.0036***(2.70) [0.0013]	-0.0021*(-1.73) [0.0012]	0.0051**(2.49) [0.0020]	0.0004(0.22) [0.0021]
LTA	0.0886***(10.07) [0.0088]	-0.0031(-0.33) [0.0097]	0.0750***(5.56) [0.0135]	-0.0105(-0.62) [0.0169]
ROAA	0.0014(0.23) [0.0062]	0.0037(0.72) [0.0052]	-0.0032(-0.34) [0.0095]	0.00019(0.02) [0.0091]
ROAE	-0.00018(-0.14) [0.0013]	0.0012(1.10) [0.0011]	-0.0006(-0.34) [0.0020]	0.0002(0.14) [0.0019]
AGE	-0.0004(-0.81) [0.00058]	0.0008*(1.79) [0.0004]	0.00014 (0.16) [0.0008]	0.0012(1.43) [0.0008]
DUMGOV	-	0.8132***(10.13) [0.0803]	-	0.8043***(5.75) [0.1398]
DUMFOR	-	0.9491***(14.11) [0.0672]	-	0.8980***(7.67) [0.1171]
DUMPRI	-	0.9629***(14.03) [0.0686]	-	0.8611***(7.20) [0.1195]
Macroeconomic				
M2	0.00091(1.18) [0.0007]	-	-0.0011(-1.32) [0.0009]	-
INFLATION	0.0030(0.56) [0.0053]	-	-0.00019(-0.03) [0.0063]	-

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LGDP	0.0170***(6.82) [0.0025]	-	0.0218***(7.42) [0.0029]	-
Wald (P - Value)	0.0000	0.0000	0.0000	0.0000
Obs.	481	481	481	481

Note: ***, **, and * denote significant at 1%, 5%, and 10%, respectively. Standard errors and *t* ratios are in parentheses and brackets respectively.

Coefficients ownership for state owned banks, foreign banks and domestic private banks is positive and statistically significant at 1% level to cost and profit efficiencies suggesting that all forms of ownership are significant to bank efficiency. This finding is consistent with Micco et al. (2007) findings that evidence that whether a bank is state owned or private owned does affects its performance. Broad money to GDP ratio (M2/GDP) coefficient is positive but statistically insignificant to cost efficiency and negative and statistically insignificant to profit efficiency. The positive sign of M2/GDP to cost efficiency imply that money supply in economy affect commercial bank cost efficiency. Thus, if money supply grows the commercial banks could reduce the costs. The coefficient of inflation (INFL) is positive but statistically insignificant to cost efficiency and negative and statistically insignificant to profit efficiency. Economic growth is proxies by LGDP and have positive coefficient and statistically significant to cost and profit efficiencies at 1% level suggesting that economic development affects bank efficiency positively. These results implying that when economy of the country develops the bank cost and profit efficiencies improved.

5. CONCLUSION

During the last two decades, African countries have initiated several reforms in their financial sectors including deregulations of financial market and allowing foreign banks to participate in market. Greater foreign participation coupled with timely deregulation efforts in most of African countries perhaps contributed towards their profit and cost efficiency. However, the impact of reforms seems to less benefit to countries such as Kenya and Tanzania as shown above. Foreign banks entering into developing countries appears more willing to focus on asset quality rather than generating new loans (Kim & Lee, 2004). Analysis of efficiency between big and small banks found that big banks are more cost efficient for all countries that could be due to the availability of resources to adapt latest technology. In term of profit efficiency, the study reveals that big banks in Kenya and Tanzania outperform small banks.

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