Analyzing Banks’ Efficiency as a Measurement of Performance in the Moroccan Context: Application of CAMEL Framework

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Abstract

The present research paper attempts to study the financial performance of banks in the Moroccan context. The main motive behind this study is the fact that the banking sector in Morocco is well structured and witnessing a fast evolution and little is known about its financial performance, how banks operate financially speaking, and which factors impact their performance. The main objective of the study therefore, is to explore Moroccan banks’ financial performance of an extended period from 2004 to 2014 using the CAMEL framework; an internationally valid and commonly used model in the banking sector, with efficiency proxied by efficiency ratio as the dependent variable, and the CAMEL’s five components (Capital adequacy, Assets quality, Management efficiency, Earnings performance, and Liquidity) as the independent variables. Secondary data of the six banks listed at the Casablanca Stock Exchange was collected and analyzed using the panel data analysis. The study’s findings suggest that Capital adequacy, Asset quality, Earnings performance, and liquidity have a positive impact on banks’ efficiency with capital adequacy having the most significant impact, while management efficiency is negatively related to efficiency.

Key Words: Banks’ efficiency, Moroccan context, CAMEL framework, Panel regression
1. Introduction

The evolution of the financial intermediation industry in Morocco especially the banking sector that is growing at a fast pace can be noticed by looking at figures of Bank Al Maghrib (BAM) the central bank of the kingdom of Morocco. At the end of 2015, the value of bank deposits totaled €83.6bn; an increase of 7.4% compared to 2014, and the total value of bank loans was €83bn (Bank Al Maghrib, 2015).

Given the important role played by banks in the market economy as financial intermediaries, since almost all financial transactions are being made through banks, and given the competitive market in which banks are operating, it is important to study and evaluate their performance in terms of efficiency, and determine the factors that impact the way they operate in order to maintain their profitability. This evaluation is beneficial for different parties namely; depositors, investors, researchers, regulators, and the economy as a whole.

Efficiency as a performance measurement was first initiated in Edgeworth, (1881) and Pareto, (1927) works, and was first empirically implemented in Shephard’s (1953) book. Efficiency can be defined as the ability to generate the highest amount of output out of the lowest amount of input. A bank is considered to be efficient if it has the ability to generate the maximum of revenues by using its resources efficiently. Banks’ efficiency in this study is measured using the efficiency ratio (ER); a widely used measure of banks performance. It is defined as the firm’s ability to transform its resources into revenues, and it is calculated by dividing the firm’s total expense excluding interest expenses over its total revenue; the lower the ratio, the greater the firm’s efficiency and vice versa (Hays, Stephen, Arthur, 2009).

While it is often believed that the management try to minimize overhead costs to maximize profits since the efficiency ratio depends highly on overhead expenses management, there is the expense preference theory developed by Edwards (1977) that posits that management are not always intending to lower overhead expenses, they may focus on utility such as staff expenditures trying to increase it rather that profitability. This may have a short term positive impact since it can be illustrated in a higher efficiency ratio, but no evidence about the long term benefits of such management preferences (Edwards, 1977).

There are several divergent views regarding the measurement method that best evaluates financial institutions’ performance. The CAMEL model has been chosen in this paper to evaluate banks’ efficiency in the Moroccan context for two main reasons; first, because it’s the most widely used and recommended model by well-known financial institutions; and second, because the model’s five components are covering and touching on multiple aspects of a bank, meaning it leaves no room for other variables to disturb its results. So it is believed that the CAMEL is the most appropriate performance evaluation approach (kongiri, 2012).
According to Uyen (2011), CAMEL approach is an efficient tool to assess banks’ performance in terms of efficiency, and helps avoid banks’ failure and inefficiencies by anticipating any potential risks and taking preventive actions. Even if there are different approaches for banks’ performance evaluation, the CAMEL framework is the most used one and recommended by Basle Committee on Bank Supervision and IMF (Baral, 2005). As stated earlier, the lower the efficiency ratio, the higher the banks’ efficiency; meaning that the CAMEL’s variables that are directly and indirectly related to efficiency will be negative and positive respectively.

The fast evolution that the Moroccan banking sector has been witnessing recently calls for the crucial need to direct intention towards the performance aspect. As banks’ organizational structure is growing and changing, there is an absolute need to adopt a broader approach incorporating other ratios other than the ROA and ROE only. While critically reviewing the literature, most of researchers examined the impact of the CAMEL’s five components on banks’ profitability using ROA and ROE as a proxy of performance. This study is intending to fill the research gap by measuring efficiency as a proxy for performance rather than profitability. Furthermore, the present study seeks to reduce the information asymmetry and fill the knowledge gap in a way it will provide insights into Moroccan banks’ financial performance to all stakeholders for whom it may concern. More specifically, the present study’s findings will be useful for investors to help them deeply understand their own investments and make better decisions by having the necessary information in terms of banks’ strengths and weaknesses without resorting to other agencies.

The remaining of the paper discusses theories surrounding the scope of our empirical research, and then comes up with conclusions from the findings by building linkages with the literature, then presents the research methodology explaining the approach and tools used in the analysis and the variables measurements; afterwards, the paper provides the output of the regression analysis with their interpretation and discussion, and then concludes with some recommendations and future implications.

2. Literature Review

In this section, the different theories that most of scholars based their research surrounding the banks’ financial performance field on will be discussed first; afterwards, the findings concerning the impact of the CAMEL’s five components and other measurement methods on banks’ performance will be reviewed.
2.1 Theories Surrounding Banks’ Efficiency

2.1.1 Market Power Theory

Berger (1995) states that market structure is what determines banks’ performance, called the Market Power Theory that is divided into two main hypothesis: the Structure-Conduct Performance (SCP), and the Relative Market Power (RMP).

The SCP is the relationship between a firm and the concentration level of the industry in which it is operating stating that as the cost of barriers to entry increases, firms can improve or at least maintain their profitability. In the banking sector case, banks that operate in a more concentrated market, tend to have a better performance because they have the ability to lower the deposit rates while charging a higher rates of loans as a consequence of a collusion between them, allowing themselves to make substantial profits. On the other hand, the RMP hypothesis states that a firm’s financial performance is a function of its market share and its differentiation strategy; in other words, banks with larger market share pursuing an intense differentiation strategy have the ability to set higher prices and make “non-competitive profits” unlike banks with small market share with no differentiation where competition shifts to price only (Tregenna, 2009).

However, no significant correlation between market structure and banks’ efficiency has been signaled. Previous empirical studies in this regards found a positive but weak relationship between market structure and banks’ performance; Kaufman (1966) for example found that the correlation between the two variables is not linear, Smirlock (1985) and Rhoades (1985) as well confirmed Kaufman’s (1966) findings stating that there is an insignificant relationship between market structure and banks’ financial performance.

2.1.2 The Efficient-Structure Theory

The Efficient-Structure theory simply posits that the reason why some banks make more profits is that they are more efficient than others, and to achieve this efficiency; there are two main hypothesis under the Efficient-Structure theory; the X-efficiency and Scale-efficiency. The X-efficiency hypothesis refers to the firms’ ability to generate more profit through lowering costs thanks to their management practices efficiency, which allows them to gain larger market shares (Athanasoglou et al, 2006), while the Scale-efficiency hypothesis states that some banks are more efficient than others thanks to their capacity to achieve economies of scales which allows them to have lower costs and make higher profits (Thoraneenitiyan, 2010).

In his empirical study trying to investigate the impact of bank’s level of efficiency (Structure-Conduct Performance & Relative Market Power) and market structure (X-efficiency & Scale-efficiency) on banks’ performance proxied by profitability ratios, Seelanatha’s (2010) results revealed that banks’ performance depends highly on their level of efficiency and not at all on market structure. Moreover, several researchers namely, Berger (1995), Byeongyong (2002), Shepherd (1986), Seelanatha, (2010), disagreed about using market share as an
indicator of banks’ efficiency stating that there is no relationship between the two components; rather, efficiency should be proxied by other direct ratios.

2.2 CAMEL’s Variables and their Impact on Banks’ Performance

2.2.1 Capital Adequacy

Capital adequacy is the portion of a financial institution’s equity capital expected to absorb any potential losses and risk with all its different forms such as, credit risk and market risk to ensure a sustainable balance and protect debt holders (Uyen, 2011). In general, banks are required to maintain a minimum requirement imposed by the supervising authority. It is believed that meeting a substantial capital requirement in a bank’ capital structure is a fundamental element of capital adequacy; as it is emphasized by Fama and Jensen (1983), the lack of capital structure discipline in banks causes their inefficiency because somehow owners lose control over management.

However, Beckman (2007) argues that banks with high capital generate less profit because they are not risk-inclined; they don’t consider profitable risky investments; therefore, investors require a lower rate of return for that lower level of risk. Moreover, excessive regulations regarding the minimum requirements can be harmful for bank’s profitability as it may increase intermediation costs. Previous studies on the impact of capital adequacy on banks’ performance have divergent findings. Fred, Stephen, and Arthur, (2008) in their study of community banks’ efficiency found that inefficient banks have smaller capital adequacy ratio than efficient banks do. Confirming this result, Jehovaness (2008) found in his empirical analysis of banks’ performance in Tanzania that capital adequacy is significantly negatively related to efficiency ratio; meaning that banks are getting more efficient as they increase their capital base.

Olweny and Shipho, (2011) examined banks’ performance in the Kenyan context using the CAMEL framework excluding the earning performance components because they used profitability as a measurement of performance proxied by ROA as the dependent variable, adding other independent variables which are ownership and market concentration. The study’s findings reveal that all the CAMEL’s components are statistically significant with the capital adequacy the most significant component, while the other variables have no effect on banks’ profitability.

2.2.2 Asset Quality

According to Grier (2007), “poor asset quality is the major cause of most bank failures”. Asset quality referred to as well as credit risk since the banks’ primary activity is lending money; it is usually measured by the non-performing loans to total loans ratio. The major risk that a bank may face is when a debtor does not pay-off his or her loan, most of banks that went into bankruptcy was due to the credit risk meaning that they had a poor asset quality (Hays, Lurgio, Gilbert, 2008). Obviously, the better the asset quality, the better is the bank’s performance. Since this risk has to be efficiently managed, various studies were conducted with
this regard trying to measure it and study its impact on banks’ overall performance. In his study of commercial banks’ profitability as a measure of performance proxied by ROA, and the loan loss reserve to gross loans ratio as a proxy for asset quality in Greece, Kosmidou (2008) found that credit risk has a significant negative impact on banks’ profitability, confirming the theory that as the exposure to credit risk increases, bank’s profitability decreases.

2.2.3 Management Efficiency

The management component has an overview of all the various key aspects of a bank, it is regarded as one of the factors that guide the functioning of the bank and determine its overall performance (Grier, 2007). Management quality is the subjective part of the CAMEL framework since it reflects all the qualitative aspects of a bank such as, the organizational culture, management system, compliance with the internal and external norms and policies, the risk inclination level and so on; however, it can be gauged by different ratios that measure the elements that determine the level of its quality. Scholars who have examined banks’ efficiency in their researches agreed that management quality and efficiency are directly related; in simple words, the better the quality management the better is the efficiency, but with different significance.

Ongore and Kusa (2013) found that the management is the key element that significantly determines banks’ performance, while the macroeconomic factors have no effect. In their paper that studies the performance of the commercial banks in Kenya using the CAMEL framework, Olweny and Shipho (2011) used the operational cost efficiency to measure banks’ management quality. They found that operational cost efficiency ratio and performance are significantly negatively related, as this ratio decreases, efficiency gets better; thing that was highly expected. However, Naceur (2003) found that overhead cost has a positive significant impact on performance as suggested by Flamini et al (2009) that in relatively uncompetitive market where firms enjoy a great deal of market share, there is a positive relationship between operational cost efficiency ratio and banks’ performance because costs are transferred to depositors in the form of low interest and to lenders in the form of high lending rate.

Management efficiency can be measured according to Sangmi and Nazir (2010) by the following proxies: credit to deposit ratio, expenditure to income ratio, diversification ratio, asset utilization ratio, and earning per employee ratio. Scholars who have studied the impact of management efficiency on banks performance using the diversification ratio as a proxy of management efficiency found different results. Albertazzi and Gambacorta (2006) for example found that banks’ profitability and diversification are significantly positively related stating that diversification follows the portfolio theory; a portfolio is considered less risky if it’s fully diversified. Therefore, through diversification, the bank reduces its risk by spreading the overall risk on different entities, and hence, providing stability of income. The opposite view about diversification being beneficial to banks’ performance is that it leads to managerial complexity.
Choi and Kotrozo (2006) argue that diversification leads to complexity; therefore, management may lose control over the bank’s activities stating that banks with a high diversification tend to have a poor performance than those who are more focused on a specific activity.

2.2.4 Earnings Performance

The first and major concern of banks is to increase their capital base to absorb any potential losses due to the nature of their activity, and here earnings come as an efficient defense tool against these risks allowing banks to maintain their competitive position, improve their management strategic initiatives, and finance their expansion strategy. Banks can seize profitable opportunities as they occur through a good earnings management, adopting a new technology or penetrating a new market for instance thanks to their large capital base. Further, through the help of constantly healthy earnings, banks can adopt good dividend policies in order to satisfy their shareholders and protect their interests, so banks are required to generate sufficient earnings. Both the quality and quantity of a bank’s earnings are significantly affected by the credit risk management quality and the level of market risk in terms of interest rates volatility; this said, banks’ management is required to efficiently manage, control, and anticipate the factors that may affect the future trend of earnings (Uniform Financial Institutions Rating System, 1997).

Based on the CAMEL framework, a bank’s earnings performance can be evaluated according to the following criteria: historical earnings trend, income quality and composition elements, the ability to absorb financial shocks, and peer group comparisons (Sundarajan and Errico, 2002). There are several ratios to proxy for banks’ earnings quality, but most of scholars like (Sundarajan and Errico, 2002), and Sarker (2005), agreed that return on assets (ROA) complemented by return on equity (ROE) are the widely used and best indicators to judge the performance. Apostolos et al, (2011) found that when efficiency ratio is regressed against ROA as a proxy for earnings performance, there is a significant negative relationship, stating that a healthy earnings policy along with considerable profits contribute to banks’ efficiency. In their study trying to investigate the impact of Islamic banks’ financial performance on their profit distribution policy, Lahrech, Lahrech, and Boulaksil (2014) found a positive straightforward relationship between return on equity as a proxy for earnings performance and profit distribution ratio implying that as Islamic banks are generating more returns, they are more likely to distribute and share their profits; however, they found the opposite when using return on assets as a proxy for earnings performance explained by the fact that unlike conventional banks, Islamic banks do not make profit through charging a loan rate that it higher than the deposit one.

2.2.5 Liquidity

Liquidity refers to the ability of banks to generate more cash and the possession of assets that could be easily converted to cash to meet their financial obligations and to face any
potential fluctuations, and liquidity shocks such as, withdrawals of deposits or any unanticipated demand for cash (Uniform Financial Institutions Rating System, 1997). As stated by Shiftability Theory, a bank is considered to be liquid if it possesses assets that could be easily exchanged for cash called marketable assets (Sunny, 2013). Since liquidity creation is the reason why banks do exist as stated by the financial intermediation theory, it has to be efficiently managed, and indeed, it is receiving serious attention nowadays. Bank regulators impose on banks to maintain a minimum requirement in terms of liquidity that differs from one country to another.

Previous research surrounding banks’ performance using the different performance measurement approaches argued about the ideal level of liquidity holdings and the fact that having excess liquidity may not be always beneficial for banks. Holding a high level of liquidity indicates an opportunity cost of some major investments that would’ve generated high returns and contributed to the bank’s overall performance; thus, a highly liquid bank means it is a less risky one, thing that impacts negatively its profitability, therefore; the management has to deal with the dilemma of liquidity holdings VS profitability to achieve the optimal trade-off. (Hempel et al, 1994). The research of Al-Tamimi (2010) using the CAMEL rating model to investigate the determinants of conventional and Islamic banks’ performance in UAE revealed that liquidity is a major determinant of conventional banks’ performance.

Kamau (2009) as well in his research in the Kenyan context using the nonparametric approach (DEA) found that excess liquidity and efficiency ratio are significantly positively related, meaning that excess liquidity leads to inefficiency. In a study of the impact of liquidity on banks’ profitability in the Canadian and American context for a time frame extending from 1997 to 2009, Bordeleau and Graham (2010) noticed that the profitability of banks in subject was increasing as their level of liquidity holdings was increasing as well to reach an inflection point where profitability started increasing but at a decreasing a rate, and afterwards, it decreased. In line with previous findings, this research confirms that reaching a certain level of liquidity holdings diminishes banks’ profitability because it’s an opportunity cost of profitable investments.

The CAMEL framework can be used as a rating system to obtain a ranking for banks based on the five dimensions. In the Moroccan context, there is the work of Ferrouhi (2014) who followed a different methodology using the CAMEL framework aiming at analyzing banks’ financial performance for the period of 2001 to 2011 by computing the five components using debt to equity as a proxy for capital adequacy, loan loss provisions to total loss for asset quality, return on equity for management efficiency, return on asset for earnings performance, and deposits to total assets for liquidity, including six of the biggest Moroccan banks. Afterwards, a scale of 1 (best) to 5 (worst) is used to rank each of the five components averages of each
bank, allowing the study to obtain a ranking of banks in terms of their financial performance. This methodology is different from the present one in a way it uses the CAMEL to rank banks and find out which one is more efficient based on the five components, while the one we used relies on the CAMEL to examine the impact of its components on banks’ efficiency, which means we cannot compare the results of the two studies since they have different purposes and follow two different methodologies.

3. Research Methodology

3.1 Research Design and sampling

In the present study, panel data analysis will be adopted to test for the study’s hypothesis and fulfill its objective, with efficiency as the dependent variable and CAMEL’s five components as the independent variables. The study will include all banks that are listed in the Casablanca Stock Exchange for the sampling period 2004-2014. The concerned banks are: Attijariwafa Bank, Banque Populaire, Banque Marocaine du Commerce Exterieur (BMCE), Banque Marocaine pour le Commerce et l’Industrie (BMCI), Crédit immobilier et hôtelier (CIH bank), and Crédit du Maroc (CDM). The total number of observations is 60. The present study will use secondary data needed for the CAMEL framework drawn from banks’ financial statements namely, balance sheets and income statements available in annual reports of the 10-year period from 2004 to 2014.

3.2 Data Analysis

To look into various aspects of banks’ efficiency, the present study makes use of the CAMEL framework trying to explore the impact of its five components on banks’ efficiency as a proxy of performance; the study employs the most appropriate instrument in this case that is the panel data analysis using the 2 techniques, the fixed effect to control for the time-invariant variables to remove their effect on the dependent variable, and the random effect to eliminate the effect of variables that change among entities, and then runs a Hausman test to decide between the two.

3.3 Operationalization of the Study’s Variables

3.3.1 Dependent Variable

Efficiency: refers to how a bank is being efficient in terms of utilizing its resources to achieve the maximum of output. Often measured by the efficiency ratio that can be obtained by dividing non-interest expenses over net income, it reflects the extent to which a bank is able to generate revenues through the efficient use of its overhead expenses. A lower efficiency ratio often indicates that a bank is efficiently operating while a higher ratio reflects the bank’s inefficiency (Hays, Lurgio, Gilbert, 2008).
3.3.2 Independent Variables

**Capital adequacy:** it’s the internal strength of a bank that reflects its capacity to face difficulties during the downturns. This component can be measured through different ratios namely, the capital adequacy ratio obtained by adding up Tier-1 capital and Tier-2 capital, all divided by risk-weighted assets; Tier-1 represents the primary capital, and Tier-2 is the supplementary capital (Sangmi & Nazir, 2010). Capital adequacy ratio reflects the bank’s ability to compensate for the loss of its assets in terms of value and it’s the most widely used one; the higher the ratio, the stronger is the bank’s efficiency (Hasbian & Haruman, 2001). Another ratio to proxy for capital adequacy is equity to asset ratio, it measures the bank’s ability to generate sufficient equity capital to face deposits withdrawals; the higher the ratio, the better is the bank’s efficiency (Zülfiyye, 2006).

**Asset quality:** one major task of banks’ management is to closely control and monitor risk, and seeing that banks’ risk comes mainly from their loan portfolio, banks’ management is required to constantly evaluate the health and quality of their assets (loans) by keeping track of the financial health of their borrowers and the trend in non-performing loans to gross loans ratio as a proxy of asset quality (Baral, 2005). However, according to Koch (1995), the loan loss reserve to gross loans is the best indicator for asset quality since it takes into account the forecasting and the management expectations concerning the bank’s asset quality. The higher the loan loss reserve ratio the better is the bank’s efficiency.

**Management efficiency:** since the bank’s management quality includes all key components that are in a straightforward relationship with performance, it can be gauged using different ratios of different areas (Mathuva, 2009). According to Sangmi & Nazir (2010), a bank’s management efficiency can be assessed with the help of the following ratios. Profit per employee ratio indicates the profit earned by each employee, obtained by dividing the profit after tax by total employees. Operating expense ratio, a commonly used ratio that reflects the management efficiency, it quantifies the expense incurred by an item compared to the profit generated by that same item arrived at by dividing operating expenses by gross operating income. Management should intervene immediately whenever this ratio starts increasing. Assets utilization ratio also is being widely used to proxy for banks’ management efficiency, it is obtained by dividing total revenue by the average total assets. This ratio indicates the extent to which a bank is efficient in terms of using its available assets to make profits (Sangmi & Nazir, 2010).

**Earnings performance:** According to some scholars such as, Ayadi & Pujals (2005); Athanasoglou, Brissimis & Delis (2005), return on assets (ROA) is the best measurement that evaluate the earning performance of a bank; obtained by dividing net income by total assets, it reflects the extent to which a bank is able to generate profits from its own assets. Return on equity (ROE) arrived at by dividing net income by total equity is another earning performance.

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measurement, it indicates the bank’s ability to make profit through the use of its shareholders' equity. However, ROA is considered the indicator that best proxies for the earnings performance because ROE doesn’t take into consideration the financial leverage (Athanasoglou, Brissimis & Delis, 2005).

**Liquidity:** While going through the literature, the most commonly used ratio by scholars in their empirical studies to proxy for liquidity are as follow. Net loans to deposits ratio (LTD) arrived at by dividing total loans by total deposits, it measures the extent to which a bank relies only on its loan portfolio to repay depositors when required (Routledge & Gadenne, 2000). Another measure of liquidity is liquid assets to total deposits ratio; it reflects the bank’s ability to meet its obligation in terms of unanticipated withdrawals of deposits using its liquid assets (Calomiris & Mason, 1997; Gonzalez, 1999). Total loans to total assets ratio is another proxy of banks’ liquidity, it quantifies the amount of the bank’s assets that are illiquid and may expose the banks to the default risk (Arena, 2005).

The study’s multiple regression model is as follow:

\[
ER_i = \alpha + \beta_1 DE_{it} + \beta_2 LLR_{it} + \beta_3 OE_{it} + \beta_4 ROA_{it} + \beta_5 LTD_i + \epsilon_i
\]

Where:

- \( ER_i \) = Efficiency ratio of bank \( i \) at time \( t \)
- \( \alpha \) = Constant
- \( \beta_1...\beta_5 \) = Coefficients of regression
- \( DE_{it} \) = Total debt to total equity ratio of bank \( i \) at time \( t \)
- \( LLR_{it} \) = Loan loss reserve ratio of bank \( i \) at time \( t \)
- \( OE_{it} \) = Operating expense ratio of bank \( i \) at time \( t \)
- \( ROA_{it} \) = Return on assets of bank \( i \) at time \( t \)
- \( LTD_i \) = Loan to deposit ratio of bank \( i \) at time \( t \)
- \( \epsilon_i \) = Error term

### 3.5 Statement of hypothesis

- **H1:** Capital adequacy has a positive/negative impact on banks’ efficiency
- **H2:** Asset quality has a positive/negative impact on banks’ efficiency
- **H3:** Management efficiency has a positive/negative impact on banks’ efficiency
- **H4:** Earnings performance has a positive/negative impact on banks’ efficiency
- **H5:** Liquidity has a positive/negative impact on banks’ efficiency

### 4. Data Analysis Results and Findings

#### 4.1 Descriptive statistics

Table 4.1 below shows the mean efficiency ratio of the concerned banks of a period extended over 10 years, from 2004 to 2014. Results report that banks’ efficiency ratio has a decreasing trend, it was at its highest in 2005 with a value of 68.74% and at its lowest in 2014 with a value...
of 58.75%. According to Hays, Lurgio, and Gilbert, (2008), a bank is considered to be efficient when it has an efficiency ratio that is equal or below 50%; accordingly, banks in the present study can be considered to be moderately efficient, they haven’t reached the maximum yet, but the trend over the years shows that efficiency is getting improved to reach eventually the optimum.

Table 4.1: Annual Efficiency Ratio (ER) mean from 2004 to 2014

<table>
<thead>
<tr>
<th>Years</th>
<th>Mean</th>
<th>Std.Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>2004</td>
<td>0.6722</td>
<td>0.6798</td>
</tr>
<tr>
<td>2005</td>
<td>0.6874</td>
<td>0.595</td>
</tr>
<tr>
<td>2006</td>
<td>0.6677</td>
<td>0.5003</td>
</tr>
<tr>
<td>2007</td>
<td>0.6305</td>
<td>0.5425</td>
</tr>
<tr>
<td>2008</td>
<td>0.6281</td>
<td>0.6185</td>
</tr>
<tr>
<td>2009</td>
<td>0.6152</td>
<td>0.5123</td>
</tr>
<tr>
<td>2010</td>
<td>0.6025</td>
<td>0.4965</td>
</tr>
<tr>
<td>2011</td>
<td>0.5984</td>
<td>0.5048</td>
</tr>
<tr>
<td>2012</td>
<td>0.5936</td>
<td>0.4235</td>
</tr>
<tr>
<td>2013</td>
<td>0.5968</td>
<td>0.1425</td>
</tr>
<tr>
<td>2014</td>
<td>0.5875</td>
<td>0.2045</td>
</tr>
</tbody>
</table>

4.2 Regression analysis

After running the fixed and the random effect, we made use of the Hausman test to conclude between the two techniques. The Hausman test concluded that using the fixed effect is more efficient since it provides consistent results (Prob<0.005). Summary statistic of the fixed effect analysis of the impact of CAMEL’s variables on efficiency in table 4.2.1 below reveals and strongly confirms results previously reported.

Table 4.2.1: Fixed effect of the panel data analysis

| Efficiency ratio          | Coef.     | Std. Err | T     | P>|t| | Level of significance |
|---------------------------|-----------|----------|-------|-----|----------------------|
| Debt to equity            | -22.6275  | 8.798169 | -2.57 | 0.013 | **                   |
| Loan loss reserve         | -4.517196 | 4.108588 | -1.10 | 0.076 | *                    |
| Operating expense         | 0.053347  | 0.1328181| -0.40 | 0.089 | *                    |
| Return on assets          | -1.343065 | 7.631819 | 0.18  | 0.861 | NS                   |
| Loan to deposit           | -1.1895487| .1922885 | -0.99 | 0.029 | **                   |
| Constant                  | 4.895317  | .698407  | 7.01  | 0.000 | ***                  |

Debt to equity ratio as a proxy for capital adequacy is negatively (-22.62) related to efficiency ratio, and with the most significant impact among the five variables on the dependent variable at 5% level of significance. In simple words, banks are getting more efficient as they...
increase their capital base to absorb potential risk, which joins to previous research’ findings. Loans loss reserve as a measurement of asset quality is found to be negatively (-4.51) related to efficiency ratio and statistically significant at 1% significance level, and also with the second significant impact among the five variables. This result means that an increase of 1% in the loan loss reserve ratio leads to a decrease of 4.51% in efficiency ratio. This results in line with the previous studies’ findings indicate that as banks effectively monitor risks and put in place efficient strategies and policies enabling them to do so, their efficiency gets better as they become able to effectively manage their assets portfolio. Management efficiency proxied by operating expense ratio as expected is found to be positively (0.05) related to efficiency ratio and statistically significant at 10% level of significance. The intuition here is that a bank could be considered to be efficient if it has the ability not only to generate maximum profit, but also the ability to control its expenses by keeping expense ratios low. Return on assets as well found to have a negative (-1.34) impact on efficiency ratio but statistically insignificant. Lastly, the regression analysis showed a negative (-0.189) impact of liquidity gauged by loan to deposit ratio on efficiency ratio at 5% level of significance, which implies that efficient banks are highly liquid through their ability to quickly respond to unanticipated demand for cash. Confirming the major concern of banks that is holding sufficient liquidity in terms of cash and liquid assets to absorb potential shocks. The study’s finding concerning liquidity doesn’t not support Aikeli (2008) and Kamau’s (2009) one that considerable liquidity holding is an opportunity cost of some profitable investments that leads to inefficiency. However, it is important to keep in mind the existence of a point beyond which liquidity starts having the inverse effect on efficiency.

5. Conclusion and recommendations

The banking sector plays an important role as a financial intermediary between money seekers and money providers. Financial intermediation reduces the total amount of transaction costs and information caused by information asymmetry because borrowers are more knowledgeable than lenders about their investments. In order to have an efficient market, information transfer must be ensured; lenders should have a clear idea about projects’ quality that exist in the market.

For a bank to be efficient, it is necessary to keep the efficiency ratio low as it is expressed as expenses as a percentage of revenues, meaning that banks have to generate higher revenues with lower expenses. The objective of study was to investigate the impact of the CAMEL’ five component on banks efficiency in the Moroccan context. The most remarkable finding of this study is that the performance of banks in Morocco in terms of efficiency is fairly good, based on the panel data from 2004 to 2014. The descriptive statistics showed that Moroccan banks are moderately efficient as there is a remarkable decreasing trend in terms of efficiency ratio from 2004 to 2014, meaning that the banking sector in Morocco is more or less on the right
track to reach the optimal efficiency that is 50% or below. The study joined other studies’ finding identifying the most significant factors influencing banks’ financial performance that the CAMEL framework is an efficient tool for this research area in terms of analyzing performance and predicting any financial distress. Similar to previous studies, capital adequacy, assets quality, management efficiency, and liquidity bear a significant positive impact on banks’ efficiency with capital adequacy having the greatest effect, while earnings performance measured by return on assets bears a positive but a weak impact on efficiency.

In the light of the study’s findings, we can recommend that banks’ management should work in a tight collaboration with regulatory authorities and policymakers to implement efficient strategies and policies that could strengthen the important role played by capital adequacy, enhance assets quality, improve management efficiency, help generate sufficient earnings, and hold the optimal amount of liquidity to support banks’ business as efficient financial intermediaries. As capital adequacy has been found to have the most significant impact on efficiency, it is important to study this component in more depth trying to find the optimal holding in terms of capital portion dedicated to face any financial distress making of a given bank an efficient one.

There is a substantial need to carry out more empirical studies regarding banks efficiency in Morocco. Despite the fact that our study’s findings are in line with most of previous empirical research, there is a need to explore more and dig deeper to have a clearer and more generalized findings. Although the CAMEL framework is considered to be the most efficient model to evaluate banks’ performance, it has to be supported and complemented by other measurement models in order to provide more accurate findings, one such model is the non-parametric model the Data Envelopment Analysis (DEA), The DEA approach would help identify the optimal points beyond which the CAMEL’s two variables (liquidity & capital adequacy) would lead to banks’ inefficiency. As already stated by Beckman (2007), a high ratio of capital adequacy means that a banks is not fully exploiting its resources and ignoring risky profitable investment which results in a lower rate of return for a lower level of risk. The same goes for liquidity, it might be considered as “what is blood in human body” in a bank to ensure its normal functioning, but as argued by (Hempel et al, 1994) that holding excess liquidity is considered to be an opportunity cost foregone for some profitable investments, so further studies have to take this issue into consideration since no previous studies have explored the excess liquidity-bank’s efficiency relationship. This said, it is necessary to conduct research investigating banks’ financial performance using the Data Envelopment Analysis to determine the liquidity and capital adequacy optimal points to support the CAMEL framework and to assist regulatory authorities to impose the right minimum requirement on banks without putting their efficiency into jeopardy. Finally, the sixth component of the CAMEL that is sensitivity to the market...
should be taken into consideration to see whether there is an impact of the market conditions on banks efficiency.

The major limitation of our study is data unavailability concerning the sixth component of the CAMEL model, and for the other five variables. Due to data unavailability, we were unable to proxy for each CAMEL ‘five components using different ratios that would have confirmed the study’s results. The other limitation is the study’s sample, only listed banks were included in the study; as a result, the findings cannot be generalized.

Reference


