Regulatory Framework and Microfinance Institutions' Performance within the West African Monetary Union

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Regulatory Framework and Microfinance Institutions' Performance within the West African Monetary Union

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Abstract

This study assessed the performance of microfinance institutions (MFIs) in the West African Monetary Union (*UMOA*) following a change in regulations and prudential ratios (capital and liquidity). Results of econometric estimations based on data covering the period 2002-2015 showed that the application of the 2007 law did not bring any benefit to the performance of the MFIs. This is because the opportunity cost of holding liquidity when the new law was adopted and the period during which it was effectively enacted was high enough to have a negative effect on return on assets, on the return on equity and on the proportion of loans per capita. During the same period, the minimum capital requirements were of great importance for financial performance, since they led to an accumulation of funds for investment purposes. The relationship between minimum capital and performance remained positive even when different performance indicators and estimation methods were used. However, the effect of liquidity and regulation varied with the estimation method used.

Key Words: Microfinance, UMOA (WAMU), Performance, Regulation, Capital, Liquidity

1.0 Introduction

To reduce poverty, microfinance institutions (MFIs) focus on providing credit to the poor who do not have access to commercial banks, to help them set up their own income-generating activities (Hermes et al., 2011). But the MFIs' services also require that the beneficiaries take out a micro-insurance to protect their businesses against potential disasters. Over time, microfinance has become a popular and global scheme in terms of financial products and targeting the poor populations (Van Rooyen et al., 2012; Barry and Tacneng, 2014), but it also faces various risks (just as banks do).

Indeed, the global banking system has gone through episodes of crisis for several years as a result of which bank regulators have been forced to take measures to prevent and respond to such situations. These measures generally complement those set by international regulatory bodies such as the various Basel Accords. It is in this context that the Central Bank of West African States (BCEAO) in 2007 introduced a law aimed at regulating the microfinance sector in its member States. That was because despite the progress it had recorded, the expansion of the microfinance sector, manifested in the increase and diversification of MFIs, had been, for some decentralized financial systems (DFSs), particularly hampered by both institutional and financial obstacles (Azokly and Camara, 2009). Some of the MFIs had also ceased their operations. The purpose of the new regulatory framework was to ensure compliance with and respect for procedures and regulations. The latter include the minimum capital and minimum liquidity ratios.

According to Christen et al. (2003), the main reason for changing regulations is to encourage the formation of new microfinance institutions and/or improve the performance of existing ones. This study's main objective is to analyse the effect of regulation on the microfinance institutions' activities in the West African Monetary Union (UMOA). Specifically, the study will first examine the changes in performance of the MFIs concerned that were caused by the new law, performance being understood here as the MFIs' ability to cover their own costs and also to reach a large number of customers. Then it will analyse the relationship between the minimum capital requirements and performance. This will be deemed positive if the MFIs have leverage (Hartarska and Nadolnyak, 2007) and have accumulated enough funds during periods of their expansion to enable them cater for their future investment opportunities. Finally, the study will assess the impact of liquidity on the performance of MFIs in the UMOA zone. Liquidity benefits institutions if the opportunity cost of holding it is lower than the costs of other assets.

The study will address the following research questions: Is the performance of the MFIs sensitive to changes in regulations? Does the minimum capital requirement influence this performance? And is this affected by the minimum liquidity requirement?

This study is particular in several respects. First, it starts from the abundant literature on the effect of regulation on banks' performance. It is important to draw upon this literature in analyzing the performance of the microfinance sector. Second, it covers a fairly long period (from 2002 to 2015), which will enable it to consider the changes that were required by two regulatory frameworks. Finally, it is the first study on the effect of a change in regulatory framework and the introduction of new capital and liquidity ratios on the performance of MFIs in the UMOA zone. Therefore, it is expected to be a significant contribution to the literature.

Research findings have revealed that microfinance structures have been disadvantaged by the law of 2007; its implementation has had a negative impact on them. While microfinance institutions have accumulated capital, which has enabled them to take advantage of investment opportunities, their holding of liquid assets has had a negative impact on their performance. The opportunity cost related to the observance of the minimum liquidity ratio has been quite high, compared to the costs of holding other assets, which has meant a negative effect.

In terms of economic policy recommendation, this study proposes an adjustment of the minimum capital ratio. This indicator should not be a rigid requirement; it should be re-adjusted according to the annual situation of the MFI concerned. This re-adjustment should be carried out in two stages: the first stage should be an analysis of the MFI's risk history (quality of its credit portfolio, type of its clientele, and sources of its operating funds), while the second should consist in describing the economic environment of the area where the MFI is located (inflation, rainfall, and the dynamics of the local market). A good of health of the MFI, coupled with economic growth in the region, will lead to a decline in its capital adequacy ratio, as its total reserves diminish. The MFI will thus be able to take advantage of investment opportunities. When the microfinance institution and/or the UMOA zone sends out distress signals, its capital ratio will be maintained at the 15% required by the 2007 law.

The remainder of this paper is divided into 5 sections: section 2 presents the theoretical and conceptual framework, section 3 the methodology and the data, section 4 the results and descriptive statistics, and section 6 the robustness tests for the results and econometric estimations. Section 7 is the conclusion.

2.0 Theoretical and Conceptual Framework

There is abundant literature on issues of regulatory change in the banking system, but only little on microfinance. This study is mainly based on the banking literature.

2.1 Regulation and Performance

Microfinance institutions can operate under or without regulation or, in some countries, they can choose between being regulated and being unregulated (Hartarska and Nadolnyak, 2007). This was the case for microfinance structures in the UMOA zone in the 1990s. The PARMEC[1] law in force at the time concerned only mutual societies. In 2007, the PARMEC law was replaced by a new law that was necessitated not only by the cessation of activities by several microfinance structures but also by evolution of the microfinance sector. The status of some of the microfinance structures no longer suited the types of services they offered. Institutionalists have suggested that the governance system of non-profit organizations is less efficient than that of regulated MFIs (Tchakoute-Tchuigoua, 2010). Unlike the PARMEC law, the new one concerns all the institutions that operate in the microfinance sector, and there are four types of them: mutual institutions or savings and credit cooperatives (Institutions mutualistes ou les coopératives d'épargne et de crédit, IMCEC), associations (ASS), public limited companies (Sociétés anonymes, SA), and private limited companies (Sociétés à responsabilité limitée, SARL). Business corporations (both public and private limited companies) aim to make profits to satisfy their shareholders. Associations are composed of their founders and aim to offer services to their members. As for the IMCECs, they collect savings and grant loans.

The main objective of regulating institutions is to prevent and manage the risks they face. The latter can come from asymmetric information in the sector, which could create agency problems such as the depositors' inability to control the institution's decisions (Arun, 2005). Thus, the regulatory authority acts as an arbiter between the two parties. Laws and regulations are generally intended to ensure that banks operate in a safe manner (Barth et al., 1997). A prudential regulation policy is necessary to forestall risks and to provide protection for small investors (Arun, 2005). By having such

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1 PARMEC: Project to support the regulation of savings and credit mutual societies.

a policy, the government seeks to limit the contagion resulting from possible crises, to ensure continuity in the functioning of markets, and to deal with the moral hazard arising from deposit insurance and implicit government guarantees (Cecchetti, 2016).

The effect of regulation on performance remains ambiguous. From a private point of view, laws are only made to satisfy a few individuals. Banking regulation, therefore, has no active role in improving performance but forces banks to channel their resources for the satisfaction of a particular group, such as politicians (Barth et al., 2010). From a public point of view, regulation is intended to improve bank efficiency and prevent market instability. According to Hartarska and Nadolnyak (2007), since market failure results from asymmetric information, the power of the market is more relevant to microfinance. Regulating microfinance activities is thus motivated by the uncertainty that clients may face, and deficiencies in the microfinance sector could spread to banks, which finance the MFIs, and affect public confidence (Arun, 2005). Instituting regulation also entails introducing prudential ratios, in particular the minimum capital and minimum liquidity ratios.

2.2 Minimum Capital and Performance

In response to the financial and banking crises of the recent years, the regulatory authority has, through the Basel ratios, put in place measures to protect the financial system and customers. Banking supervisors believe that additional capital restrictions are essential to protect the public interest in the financial system (Santomero and Watson, 1977). Indeed, banking supervision reduces the adverse selection problem, allows the regulatory authority to take corrective measures when the law is broken, thus reducing the probability of banks going bankrupt (Buck and Schliephake, 2013; Vollmer and Wiese, 2013), and thereby protecting customer savings. Regulatory authorities should be able to respond when an institution does not comply with pre-established good management practices.

These measures are taken to offset bankruptcy costs and the negative externalities associated with the intermediation activity (including systemic risks) and agency costs within the financial system (Barrios and Blanco, 2003; Berger et al., 1995) and to take advantage of future investment opportunities (Jokipii and Milne, 2008). Capital will then act as a buffer to absorb those anomalies. Other theories suggest that high levels of capital encourage banks to better monitor borrowers, thereby reducing their likelihood of defaulting on payments and ensuring their own survival (Berger and Bouwman, 2013).

However, excess capital can harm institutions. According to Calem and Rob ())1999), an underfunded bank can take a great risk in its effort to improve its level of capital, even if a risky asset gives a lower performance than a risk-free asset. In addition, restricting banking activities increases fragility in the banking system. Fewer regulatory restrictions can increase the value of banks' franchises and thus increase the incentives for more prudent behaviour (Barth et al., 2008). Compliance with the minimum capital requirement also forces banks to reduce the volume of their loan

portfolio. This type of credit rationing gets reflected in the bank's value. Since capital mobilization is expensive, especially during a recession when profits are falling, banks are forced to reduce their loan portfolio to meet the minimum capital requirement (Jokipii and Milne, 2008). This reduces long-term production and productivity in the economy (Santomero and Watson, 1977).

2.3 Minimum Liquidity and Performance

The financial crises of the recent years have also shown the importance of managing banks' liquidity risk. In the language of finance and financial institutions, liquidity can be defined as a bank's ability to have immediate access to available funds, at reasonable costs, without causing unacceptable losses (Agbada and Osuji, 2013; Lalon, 2015). Banking institutions often have, in certain situations (such as crises), liquidity problems, making it difficult for them to satisfy their customers' financial needs. Regulatory authorities are thus forced to take prudential measures. For Rochet (2011), there are two main reasons for this regulation: the protection of small investors and the stability of the banking system.

Particular attention must be paid to liquidity, since it often determines the survival of any business (Mebounou et al., 2015). In the literature, the effect of liquidity on performance is mixed. Excess liquidity is said to be beneficial for institutions. Bordeleau and Graham (2010) note that holding a large amount of liquidity reduces the probability of bank failure. In such a situation, the costs of financial intermediation are low, which improves performance. Secondly, having excess liquidity can have a negative impact on banking activities; excess liquidity could lead to an accumulation of unused resources, that is unproductive assets, which cause the banks to incur opportunity costs given their low return compared to other assets. Thus, it can have a negative effect on performance (Bordeleau and Graham, 2010; Mebounou et al., 2015). However, having little liquidity can also be harmful to financial institutions because that can lead to payment defaults vis-à-vis their customers. This forces the institutions to borrow funds at exorbitant costs, which in turn reduces their performance.

The following sections deal with the case of microfinance institutions in the UMOA zone.

3.0 Data and Methodology

3.1 Econometric Specification

To analyse the effect of regulation on bank performance, Hartarska (2005), Hartarska and Nadolnyak (2007), Tchakoute-Tchuigoua (2010), Cull et al. (2011), and Barry and Tacneng (2014) used models of the following type:
where P is the performance variable, X is a set of variables inherent in microfinance institutions, R represents the regulation variables, M is composed of macroeconomic variables, and e is the error term. This study will follow a similar modelling by choosing variables that are suitable to the case of microfinance in the UMOA zone. It will use four (4) performance variables, whose models are specified as follows:

$$ROA_{i,t} = f_1(ROA_{i,t-1}, CAP_{i,t}, LIQ_{i,t}, RISK_{i,t}, INFL_{i,t}, TAILLE_{i,t}, INT_{i,t}, REG_{i,t}, CAP_{i,t}*REG_{i,t}, LIQ_{i,t}*REG_{i,t}) \quad (1)$$

$$ROE_{i,t} = f_2(ROE_{i,t-1}, CAP_{i,t}, LIQ_{i,t}, RISK_{i,t}, INFL_{i,t}, TAILLE_{i,t}, INT_{i,t}, REG_{i,t}, CAP_{i,t}*REG_{i,t}, LIQ_{i,t}*REG_{i,t}) \quad (2)$$

$$EMP_{i,t} = f_3(EMP_{i,t-1}, CAP_{i,t}, LIQ_{i,t}, RISK_{i,t}, INFL_{i,t}, TAILLE_{i,t}, INT_{i,t}, REG_{i,t}, CAP_{i,t}*REG_{i,t}, LIQ_{i,t}*REG_{i,t}) \quad (3)$$

$$PRÊT_{i,t} = f_4(PRÊT_{i,t-1}, CAP_{i,t}, LIQ_{i,t}, RISK_{i,t}, INFL_{i,t}, TAILLE_{i,t}, INT_{i,t}, REG_{i,t}, CAP_{i,t}*REG_{i,t}, LIQ_{i,t}*REG_{i,t}) \quad (4)$$

$ROA_{i,t}$ is the return on assets, $ROE_{i,t}$ the return on equity, $EMP_{i,t}$ the logarithm of the number of active borrowers, and $PRÊT_{i,t}$ the loan per borrower as a ratio of the gross national income (GNI) per capita of MFI i at period t. These four variables are indicators of performance. Additional information on them and on the explanatory variables will be given further below.

Naceur and Kandil (2009) have shown that empirical studies on the determinants of bank performance can potentially suffer from the endogeneity bias. The Generalized Method of Moments (GMM) dynamic panel technique corrects potential problems of endogeneity, heteroskedasticity and autocorrelation (Thao Tran et al., 2016). That is why this study will use the GMM estimator in one step.[2] Blundell and Bond (1998) have demonstrated that inferences based on the one-step GMM estimator are more reliable in the presence of non-normality or heteroskedasticity. A heteroskedasticity test will also be done on the data.

2The robust Arellano-Bond estimator is used to estimate the study's models.

3.2 Variables

3.2.1 The dependent variables

Very few publications are available that deal with the issue of regulation on the performance of MFIs, and which are consistent with this study's research questions. Thus the study will rely on the literature on the banking system for its choice of dependent and independent variables.

Table 1 presents the dependent and independent variables of the study's econometric model. Microfinance institutions generally pursue two goals: financial capacity, which will enable them to continue their activities (financial performance), and provision of their services to a large number of people (social performance). The term operational self-sufficiency (OSS) is usually used to measure financial performance.

Table 1: The variables of the econometric model

Variables	Definitions	Expected Sign
ROA	Return on assets= Net income/average total assets	
ROE	Return on equity= Net income/shareholders' equity	
EMP	Logarithm of the number of active borrowers	
PRÊT	Loans per borrower, as a ratio of the GNI per capita = [3] Loan average per borrower/GNI per capita	
CAP	Minimum capital ratio= Equity/total assets	+
LIQ	Minimum liquidity ratio= Available liquidity/assets	-
RISK	Portfolio risk= 30-day portfolio risk/total portfolio	-
INFL	Inflation rate = Consumer price index	-
TAILLE	Size of the institution= Log of the total assets	+
INT	Interest rate= Portfolio income/(1-inflation)	+
REG1	Regulation= 1 between 2002 and 2009 and 0 another period	+
REG2	Regulation= 1 between 2010 and 2015 and 0 another period	+
REG1*CAP	Interaction between REG1 and CAP	+
REG2*CAP	Interaction between REG2 and CAP	+
REG1*LIQ	Interaction between REG1 and LIQ	-
REG2*LIQ	Interaction between REG1 and LIQ	-

However, the OSS does not consider the grants received by microfinance structures (Hartarska and Nadolnyak, 2007). Credit unions (C-UC), for example, incorporate this type of resources in their activities. Following Hartarska (2005), Makame and Murinde (2006), Tchakoute-Tchuigoua (2010), Cull et al. (2011), Guidara et al. (2013), Barry and Tacneng (2014), and Pereira and Saito (2015), this study will use the return on assets (ROA) and the return on equity (ROE). ROA reflects the management's ability

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3 GNI Gross National income

to generate profit from the institution's assets. It is a better measure in this context because it can be considered as a performance indicator common to all types of MFIs. This study's sample consists of different types of institutions. ROE enables the income from shareholders' investments to be taken into account. It is usually used to assess the performance of private institutions (the NBFIs).

Social performance indicators measure the MFIs' ability to serve a large number of clients. The first variable is the log of the number of individuals or entities with an active loan or who are likely to repay any portion of this loan (EMP). This measure was also used by Makame and Murinde (2006). The main goal of microfinance structures is to provide loans to populations so that they can engage in income-generating activities. The more borrowers an MFI has, the more it will have achieved its social performance, hence the relevance of the EMP variable as a measure. The second variable (PRÊT) represents the average loan balance per borrower as a ratio of the gross national income per capita (Hartarska, 2005; Hartarska and Nadolnyak, 2007; Tchakoute-Tchuigoua, 2010). A low level of this ratio indicates that the MFIs serve the poorest populations.

3.2.2   The explanatory variables

Two variables will be used to measure regulation (Tchakoute-Tchuigoua, 2010, Guidara et al., 2013). The REG variable consists of two indicator variables: REG1 and REG2. REG1 relates to the adoption period of the new law of 2007; it takes the value 1 for the period from 2007 to 2009, and 0 for another period. REG2 represents the period during which the law was effectively enforced. It takes 1 for the period from 2010 to 2015, and 0 for another period. In this study, as in those by Guidara et al. (2013), Naceur and Kandil (2009), the effect of regulation will be complemented by prudential ratios. CAP measures the capital requirements imposed by the regulator on MFIs, and LIQ the cash availability with the MFIs as a ratio of the total assets. The variable represents the regulator's liquidity requirements, and there are other variables that take into account the interaction between regulation and prudential ratios (Guidara et al., 2013). CAP*REG1 and CAP* REG2 measure the interaction between the required capital ratio and the regulation variables. LIQ*REG1 and LIQ*REG2 are used to control for the interaction between the liquidity ratio and the regulation variables.

The control variables include the portfolio risk (RISK). When the amount of arrears is large, an MFI's performance can be affected. The size of an institution (TAILLE) represents all its asset accounts. A large size of an MFI has a positive impact on its performance (Aladwan, 2015; Athanasoglou et al., 2005). The real interest rate (INT) is the return on loans granted by microfinance institutions. When this rate increases, performance can also increase. It has been demonstrated in the literature that a high interest rate does not deter people from wanting to take out loans from these institutions. The macroeconomic environment is represented by the inflation rate (INFL) (Hartarska, 2005; Hartarska and Nadolnyak, 2007). It measures the purchasing

power in the country where an MFI is based; a high inflation rate can be detrimental to the MFI's performance.

3.3   Source of Data and the Sample

Macroeconomic information was obtained from the International Monetary Fund (IMF) database, while the financial data about the MFIs came from the Mix Market database. Mix Market is a non-governmental organization that collects information on MFIs around the world, and on their partners. It uses more than 100 indicators to provide an understanding of the trends and developments in the financial markets all over the world. Mix Market classifies the MFIs by assigning them diamonds numbered from 1 to 5. The greater the number of diamonds, the more data about an MFI is available and the more transparent and reliable this data is. This study uses the MFIs with at least 3 diamonds.

Non-governmental organizations (NGOs) were not included in the sample because they do not collect savings, unlike non-bank financial institutions (NBFIs) and cooperatives/credit unions (C-UCs). The sample is therefore composed only of the NBFIs and the C-UCs. The former operate like banks but are classified differently. They are also regulated differently from banks. As for cooperatives and credit unions, they offer savings and credit services to their customers. They are usually regulated by a national or sub-regional regulatory agency. In total, 82 MFIs have been registered, and of these structures, only those that were in operation before and after the adoption of the 2007 law were selected into the sample. In the end, a sample of an unbalanced panel of 19 MFIs covering the period 2002-2015 is used in this study.

4.0 Results and Descriptive Statistics

4.1 Descriptive Statistics

A first summary analysis of the data shows the existence of outliers. Estimations that include outliers can create bias in the results. Grubbs' test for outliers will be used to deal with this bias. In tests for outliers, the outlier is included in the calculation of the numerical value (a statistic) of a sample criterion, which is then compared to a critical value based on the theory of random sampling to determine whether the outlier should be maintained or rejected (Grubbs, 1969). The value of the Grubb test is calculated from the difference between the datum and the mean, taking into account the sample standard deviation.

Table 2 reveals a fairly weak financial performance. The mean return on assets is 0.34% and the return on equity -0.678%. Such a situation results in a fairly weak financial leverage on the part of the MFIs, which entails a limitation on their expansion capability (through debt, for example).

Table 2: Descriptive statistics for the variables (annual data for 2002 to 2015)

Variables	Definitions	Obs	Mean	Std. Dev.	Min	Max
ROA	Net income/average total assets	149	0.345	3.853	-10.71	11.05
ROE	Net income/shareholders' equity	148	-0.678	28.625	-98.07	86.66
EMP	Log of the number of active borrowers	159	9.058	1.666	3.737	11.489
PRÊT	Loan average per borrower/GNI per capita[4]	150	129.790	114.564	4.84	615.85
CAP	Equity/total assets	162	26.885	20.378	-6.61	74.34
LIQ	Available liquidity/assets	125	16.656	11.080	0.03	42.93
RISK	30-day portfolio risk/total portfolio	126	6.592	5.347	0	22.67
INFL	Consumer price index	238	2.199	2.441	-2.8	11.3
TAILLE	Log the total assets	149	15.224	1.964	2.003	18.268
INT	Portfolio income-inflation/ (1-inflation)	120	16.933	4.810	5.95	28.82
REG1	Binary variable= 1 for between 2002 and 2009 and 0 for another period	238	0.214	0.411	0	1
REG2	Binary variable= 1 for between 2010 and 2015 and 0 for another period	238	0.428	0.495	0	1

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4 GNI per capita. Gross National Income per Capita

The average number of active borrowers was estimated at 8,603. Loans per borrower relative to the gross national income per capita represented 129.79%. The average capital ratio was 6.87%. This exceeds the 15% level set by the BCEAO, which suggests that the MFIs studied had accumulated more funds than was required by the regulatory authority, funds that could have constituted financial leverage (Conning, 1999; Hartarska and Nadolnyak, 2007), especially that this leverage was already relatively weak. The MFIs' average liquidity represented 16.66%, which was below the norm fixed by the BCEAO5. From the BCEAO's perspective, in the event of default on the part of the MFIs in the sample, the clients would lose their savings.

Table 3 presents the results of the t-test carried out to compare the performance of the MFIs in the sample before and after the 2007 law. The performance variables are ROA, ROE, EMP and PRÊT. The data are divided into two (2) groups: the first group concerns the data for before the application of the 2007 law (2002 to 2006), and the second the data for the period after the law came into effect (2011 to 2015). The 2007-2010 period was excluded because it might have been contaminated, since the adoption of the new regulatory framework might have pushed some MFIs to make changes in the way they functioned even before the new regulation came into force.

Table 3: The t-test for the performance variables

	T	P-VALUE	ALPHA
ROA	1.417	0.162	5%
ROE	0.445	0.657	5%
EMP	-0.923	0.358	5%
PRÊT	1.780	0.079	5%

Assuming an alpha decision level of 5%, it can be observed that there was no difference between the MFIs' performance before the application of the new law and after. In other words, the 2007 regulations had no effect on the performance of those MFIs.

Table 4 presents the correlation matrix between the variables of the models. The variable "capital" is positively correlated with the four performance variables. This result corroborates that obtained by Flamini et al. (2009), who found a positive effect of the level of capital on banks' performance. The correlation matrix shows that the liquidity-performance relationship is stronger for social performance than for financial performance. However, the relationship is fairly weak between the MFIs' liquidity and performance; : it is negative in relation to ROA (-18.6%) and EMP (-35%), but positive in relation to ROE (3.65%) and PRÊT (45.76%).

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5 The liquidity ratio was set at 100% for the non-affiliated Savings and Credit Institutions (SCIs) and the other MFIs that collected deposits, at 80% for the affiliated SCIs, and at 60% for the structures that did not collect deposits. The liquidity ratio was a minimum of 80% for the SCIs under the PARMEC Law law and concerned only this type of MFI.

Table 4: Correlation matrix for the variables

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-----------------------------------------------------------------------
        ROA     ROE    PRÊT    CAP    LIQ     RISK    INFL   TAILLE   INT
 ROA    1.0000
ROE     0.7886  1.0000
EMP     0.0902 -0.0141  1.0000
PRÊT    0.2702  0.2638 -0.3244  1.0000
CAP     0.4920  0.2181  0.0879  0.4564  1.0000
LIQ    -0.1863  0.0365 -0.3500  0.4576  0.1759  1.0000
RISK   -0.2260 -0.2459  0.0678 -0.0072  0.1023  0.1360  1.0000
INFL   -0.0284 -0.0039 -0.0728 -0.2557 -0.0960 -0.1540 -0.2386  1.0000
TAILLE  0.1045  0.0957  0.3219  0.2009 -0.0087  0.0199  0.0870 -0.1659  1.0000
INT 0.1199  0.1789  0.2550 -0.0941  0.1017 -0.3013 -0.0900 -0.1181  0.1504  1.000
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4.2 Results of the Estimations

To answer the research questions, this e present study considered the activities of the MFIs under study over the period 2002-2015. Within this period, two phases are distinguished in relation to the regulation of the microfinance sector: phase 1 (before 2009) corresponds to the end of the period during which the PARMEC law was in force and the adoption of a new law that took into account all the legal aspects of the microfinance sector.

The minimum capital requirement was set at 15% while the liquidity ratio was at 100% for the non-affiliated savings and credit institutions, 80% for those affiliated and 60% for the MFIs that did not collect savings. Phase 2 is the period (2010-2015) during which the law was effectively in force. These regulatory mutations were assessed by the binary variables REG1 and REG2.

The results of the econometric estimations are presented in Table 5. The regulation variables are not included in Model 1 (columns 1 to 4), but they are in Model 2 (columns 5 to 8) for REG1 and in Model 3 (columns 9 to 12) for REG2. In Model 4 (columns 13 to 16), all the variables were estimated.

To determine the MFIs' reaction to the changes in the regulations, the study analysed the effect of the REG1 and REG2 variables on the performance of those MFIs. It should be remembered that the regulatory changes were controlled for with the indicator variables; : REG1 for the period of the adoption of the new law (see the results in Table 5, columns 5 to 8) and REG2 for the period of the effective application of the law (columns 9 to 12). In columns 13 to 16, the two variables used to assess the application of the law were all incorporated into the model.

Table 5: Results of the estimations

The table presents the results of the estimations of the equations for the changes in regulations and in prudential ratios (capital, liquidity) on the performance of microfinance institutions. The estimations were done using the Generalized Moment Method (GMM) estimator in one step. The data used are annual and cover the period from 2002 to 2015. The financial data came from the Mix Market database while the macroeconomic ones came from the International Monetary Fund (IMF) database. The MFIs' performance was measured on 4 variables, namely the return on assets (ROA), the return on equity (ROE), the number of active borrowers (EMP), and the loans per borrower as a ratio of the gross national income per capita (PRÊT). The other variables are defined in Table 1. The values given between brackets represent the robust standard deviations. Model 1 is presented in columns 1 to 4, Model 2 columns 5 to 8, Model 3 in columns 9 to 12, and Model 4 in columns 13 to 16.
*: 10% significance, **: 5% significance, ***: 1% significance

In the model that tested the ROA variable (columns 1, 5, 9, 13), the variable was found to be significant and positive when tested against REG1 but was negative when tested against REG2. WAnd when both REG1 and REG2 were included in the model, a negative effect of the regulation on performance was observed. This result disproves the study's research hypothesis, but is consistent with those obtained by Hartarska and Nadolnyak (2007) and Tchakoute-Tchuigoua (2010) on the effect of regulation on performance. The legal status of microfinance structures is not a favourable environment for their performance (Mersland and Strom, 2008; , 2009), which may imply that the change in regulatory framework only benefited some of the MFIs, but not all. According to Azokly and Camara (2009), the expansion of the microfinance sector, through an increase in and a diversification of institutions, has been, despite the progress made , for some decentralized financial systems (DFSs), hampered in particular by both institutional and financial obstacles, among other factors. These institutions are generally the largest in terms of volume of activity. Their status no longer allows them to carry out activities in the microfinance sector. A change of regulatory framework is therefore essential. The minimum capital variable (CAP) was found not to be significant in the model without regulation. The existence of a regulatory framework was found to improve performance. This result confirms both the study's expectations and the observation made by Ahokpossi ((2013)), Ben Naceur and Kandil (2009), and Flamini et al. (2009). Financial leverage played an important role in the functioning of the MFIs in the study sample, in view of the dependence of some of them on donor funding. Hartarska and Nadolnyak (2007) have pointed out that the MFIs with financial leverage are more efficient because they do not need to adjust their goals in order to gain access to additional funding.

On the other hand, the relationship between capital and the return on assets when the new law (CAP*REG1) was adopted was found to be negative (column 13), b. But the result was the same for even when the regulation became effective (CAP*REG2). However, the sign of the relationship is not the one that was expected. Liquidity (LIQ) had no effect on ROA in the absence of regulation (column 1). The setting-up of a

regulatory framework (column 13) is associated with a negative relationship between the 2 two variables. This result is in line with the study's expectations and corroborates the results obtained by Agbada and Osuji (2013) and Ibe (2013) on the relationship between regulation and MFI performance. The microfinance institutions in the UMOA zone appear to be under the same effect of the liquidity restriction on the banks in the zone. Indeed, the banking crisis of the 1980s led to the disappearance of most of development banks in the UMOA zone, which brought the Central Bank of West African States (BCEAO) to impose regulatory requirements on liquidity, the implementation of which generated excess liquidity for those banks. At the same time, and paradoxically, the economy in general and businesses in particular had difficulty finding financing for their investment, their functioning and their sustainability (Mebounou et al., 2015).

The loan portfolio risk (RISK) was found to affect the return on assets of the MFIs in the sample. The large size (TAILLE) of the MFIs was found to promote their financial performance (ROA) because it enabled them to have more flexibility in terms of both operational and financial capacity. According to Dietrich and Wanzenried (2011), large banks are more likely to have a higher degree of production and diversification of loans than small ones, because they are expected to benefit from economies of scale. An increase in the interest rate (INT) was found to increase the performance of the MFIs. Their managers must have been able to anticipate the interest rate, which must have made it possible to increase their income faster than their cost and thus make significant profits (Athanasoglou et al., 2005). The relationship between the inflation rate and the return on assets was found to be positive (columns 1, 5, 9, 13). This result corroborates that reported by Hartarska (2005) who attributed the positive relationship to the MFIs' ability to adapt and be able to operate in an inflationary environment.

The model that tested the ROE variable shows that regulation had a negative effect on the return on equity, which is the same result obtained with the model that tested the ROA variable. But this result does not confirm the hypothesis of a positive relationship between regulation and the performance of financial institutions, contrary to the arguments presented by the proponents of MFI regulation (see Hartarska and Nadolnyak, 2007). The capital accumulated by the MFIs enabled them to meet the shareholders/owners' requirements. This result is in line with thise present study's expectations and confirms the hypothesis that structures with financial leverage perform better. The effect of liquidity on the return on equity was found to be negative for both when the 2007 regulatory framework was adopted and when it was effectively enforced. As in the case of the ROA model, the opportunity cost of holding liquidity was too high to enable the MFI to achieve performance. This result confirms the this present study's expectations of a negative effect of liquidity on financial performance (ROA and ROE). Unpaid portfolio loans (RISK) were found to affect the return on equity. As was expected, the large MFIs were more likely to achieve financial performance (ROE) than the small ones. The results show that the interest rate enabled the MFIs to increase their return on equity. The inflation rate (INFL) had a positive impact on ROE. In general, this variable influenced the financial

performance of the MFIs in the study sample.

In relation to social performance model (EMP) (Table 4, column 15), regulation was found to have a negative effect on the logarithm of the number of borrowers. The enforcement of the new law of 2007 negatively affected the performance of the MFIs in the sample, which suggests that regulation does not improve the performance of microfinance structures. This result is contrary to the study's expectations, but . But it is consistent with that obtained by Makame and Murinde (2006) on the relationship between the regulatory framework and MFI performance. The minimum capital requirements did not allow the MFIs to grant loans to a large number of borrowers. This result disproves the study's hypothesis but is in line with the observations made by Ani et al. (2012) concerning the effect of capital on performance. For its part, the minimum liquidity requirements enabled the MFIs to lend money to a large number of borrowers, irrespective of whether there was no regulatory framework (column 3) or there was one (columns 7, 11). WOn the other hand, when the variables REG1 and REG2 were introduced into the model at the same time, the coefficient became statistically insignificant. This result is consistent with the study's expectations. The opportunity cost of holding liquidity is large enough to cause a negative effect on the performance of the MFIs (Bordeleau and Graham, 2010). Contrary to the thispresent study's expectations, the results showed that the large MFIs had fewer borrowers than the small ones. This can be attributed to the relationship between small MFIs and their customers. According to Barry and Tacneng (2014), small MFIs may grant more loans (than large ones) because of the particular relationship they have with their clients and may charge higher interest rates for the services they render to microenterprises or households, hence the observed relationship between the variables EMP and the interest rate (INT). The results show that a high interest rate reduced the number of borrowers. Inflation (INFL) affected the number of borrowers, a result which confirms the study's expectations and is consistent with that obtained by Cull et al. (2011).

Regarding the model that tested the PRÊT variable, the adoption of the 2007 regulations had a positive impact on the MFIs' granting of loans as a ratio of the GNI per capita. However, But when the law became effective (REG2), the relationship became the opposite. In other words, the new regulatory framework had a negative effect on the MFIs' social performance. The accumulated capital (CAP) proved to be beneficial to the MFIs in the sample. It is more expensive to reach the poor populations than the other segments of the market, even if there are no fixed loan costs, and this leverage effect can be much more difficult to achieve for the MFIs that target the "bottom-of-the market" clients (Conning, 1999). AOn the other hand, a positive impact of capital was observed when the new law became effective;: the variable was significant at the 1% level. This result may mean that perhaps the MFIs acquired new funding through the donor channel (Hartarska and Nadolnyak, 2007) during that period. The holding of liquidity (LIQ) was not beneficial for the social performance (PRÊT) of the MFIs. The relationship was significantly negative (columns 4, 12, 16) whether there was a regulatory framework or not. This result is in line with the this study's expectations and is similar to the results obtained for the models for ROA, ROE, and EMP.

As expected, the large size of an MFI was found to enable it to increase its granting of loans as a ratio of the GNI per capita. This ratio increased as a result of an increase in the real interest rate (columns 8,12,16). The inflationary environment was also found to improve the social performance (PRÊT) of the MFIs.

6.0 Robustness tests Tests

Robustness tests were carried out on the this present study's results: alternative measures of performance and two other methods of estimating the equations (1), (2), (3), (4) were used.

6.1 Alternative Mmeasures of Pperformance

The sensitivity of the study's results (Model 4) was tested using two alternative performance measures: the profit margin (PM) and the logarithm of the loans per borrower (PRÊTC). The results presented in Table 6 (column 1) show that the adoption and the effective enforcement of the 2007 regulations did not enable the MFIs to improve their profit margin. This confirms the negative effect of the law on the financial performance of the MFIs. WOn the other hand, when the PRÊTC indicator was considered, the effect of the 2 two variables REG1 and REG2 was significant and positive. This result suggests that the effect of regulation on social performance depends on the choice of the performance indicator.

The minimum capital requirements had a positive effect on the variables PM and PRÊTC. This e present study's results were thus confirmed. As in the case of the study's previous conclusions, the liquidity ratio had a negative impact on performance (PM).

6.2 Alternative Eestimation Mmethods

Two alternative estimation methods were used to test the robustness of thise present study's results. The first is the within-group estimator (Model 2, columns 3 to 6). Performance was measured by the return on assets (ROA), the return on equity (ROE), the log of the number of active borrowers (EMP), and the loan per borrower as a ratio of the GNI per capita (PRÊT). In line with the Hausman test, the random-effects model was used for the variables ROA and ROE and the fixed-effects model for the variables EMP and PRÊT. The presence of heteroskedasticity was also catered for. As in the study's previous results, the capital ratio had a positive impact on the financial performance variables (ROA and ROE), but a negative one on the variable EMP.

The results show that the regulatory framework enabled the MFIs to improve their performance. The use of a different estimation method changed the direction of the relationship between the variables. Minimum capital had a positive impact on financial performance, which confirmed the study's previous results. However,But the results about the relationship between the liquidity and performance variables were mixed.

Table 6: Results of the robustness tests

Variables	Model 1		Model 2 (WITHIN)						Model 3 (DLS)			
(1)	PW (2)	PRETC (3)	ROA (4)	ROE (5)	EMP (6)	PRET (7)		ROA	ROE	EMP	PRET

The table presents the results of the estimations of the equations for the changes in regulations and in prudential ratios (capital, liquidity) on the performance of microfinance institutions. Model 1 is presented in columns 1 to 2; , Model 2 in columns 3 to 6; , and Model 3 in columns 7 to 10. Model 1 is estimated using the Generalized Method of Moments (GMM) in one step, Model 2 by the WITHIN estimator, and Model 3 by the Oordinary Lleast Ssquares (OLS) estimator. The data used are annual and cover the period from 2002 to 2015. The financial data came from the Mix Market database while the macroeconomic ones came from the International Monetary Fund (IMF) database. The MFIs' performance was measured on 2 two variables: profit margin (PM) and number of active borrowers (PRÊTC). The performance in models 2 and 3 was assessed by the return on assets (ROA), the return on equity (ROE), the number of active borrowers (EMP), and the loan by borrowers as a ratio of the GNI per capita (PRÊT). The other variables are defined in Table 1. The values in parentheses represent robust standard deviations.

*: 10% significance, **: 5% significance, ***: 1% significance.

The OLS estimator was also used as a robustness test, and . And it too showed that the regulatory law improved the performance of the MFIs, a result which contradicts the previous one on the same issue. TOn the other hand, the relationship between capital and financial performance remained positive, despite the use of different estimation methods. Liquidity was found to havehad a positive impact on the return on equity. The other variables were not found to be significant, . This meansing that regardless of the estimator used, the impact of minimum capital remained the same. However, for the other indicators (LIQ, REG1, REG2), the effects depended on the method used.

7.0 Conclusion

The present is study analysed the performance of microfinance institutions following a change in the regulatory framework regarding the minimum capital and minimum liquidity requirements. The starting point for the study was the literature on regulations in the banking system, notably those contained in the different Basel Accords. It is indeed on the inspiration of these accords that the microfinance sector introduced its own prudential laws and ratios. The study spanned the period from 2002 to 2015, which enabled it to focus on 3 three essential periods: a) 2002-2006 (the phase before the adoption of the 2007 law); , b) 2007-2009 (phase of the adoption of the new law);, c) 2010-2015 (phase of the effective implementation of the law). The study is the first of its kind in the microfinance sector in the UMOA zone, hence its important contribution to the literature on the changes in regulations concerning the performance of the MFIs.

The study addressed the following research questions: did the 2007 law affect the performance of the MFIs in the UMOA zone? Did the minimum capital requirements affect this performance? And did the minimum liquidity requirements affect it? It transpires from this study that the application of the 2007 law did not positively affect the performance of the MFIs studied. However, these MFIs benefited from the investment opportunities provided by the minimum capital requirements. TOn the other hand, the study's results showed no effect of the liquidity ratio on the return on assets, on the return on equity, and on the number of loans per borrower as a ratio of the gross national income per capita. The relationship between the minimum capital and performance remained positive, even when alternative performance indicators and estimation methods were used. However, the effect of liquidity and regulation varied with the method used.

Based on its findings, this e present study makes the following recommendation regarding to the minimum capital ratio;: this ratio should not be a rigid requirement but should rather be re-adjusted according to the annual situation of the MFI concerned. Such a re-adjustment should follow two stages: the first should be an analysis of the MFI's risk history (quality of its credit portfolio, type of its clientele, and sources of its operating funds); and the . The second stage should consist in describing the economic environment of the area where the MFI is located (inflation, rainfall, and the dynamics of the local market). A good of health of the MFI, coupled with economic growth in the region, will lead to a decline in its capital ratio, as its total reserves diminish. The MFI will thus be able to take advantage of investment opportunities. When the microfinance institution and/or the UMOA zone sends out distress signals, its capital ratio will be maintained at the 15% required by the 2007 law.

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