

# **Regulation and Performance of Microfinance Institutions within the West African Economic and Monetary Union\***

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# Regulation and performance of microfinance institutions within the West African Economic and Monetary Union

## Abstract

This study assesses the performance of microfinance institutions (MFIs) in the West African Economic and Monetary Union (*WAEMU*) following changes in regulation in 2007, including the adoption of prudential capital and liquidity ratios. Analyses of data for the period 2002-2015 show that the 2007 law has had a global negative impact on financial performance, presumably due to the costs and constraints of implementation and the respect of all its provisions. The marginal effect of the minimum capital and the minimum liquidity requirements on financial performance was positive. The impact of regulation on social performance was positive, with a decreasing marginal effect for capital and liquidity. Overall, the net effect of the law on social performance was weakly positive. These results call regulators to avoid a “one size fits all” policy for MFIs in the *WAEMU*.

Keywords: Microfinance, *WAEMU*, Regulation, Capital, Liquidity, Performance

## 1. Introduction

To reduce poverty, microfinance institutions (MFIs) focus on providing microcredit to people who lack access to banking services, to help them set up income-generating activities (Hermes et al., 2011). This was relatively successful. As the popularity of MFIs has grown, the list of financial products offered has also increased (Barry & Tacneng, 2014), pushing them to face various risks. Despite the progress recorded by the sector, some MFIs have been particularly hampered by both institutional and financial obstacles (Azokly & Camara, 2009). Several MFIs were forced to go bankrupt. As result, MFIs’ regulators had taken measures to respond to and to prevent similar situations. These measures generally complement those set by international regulatory bodies such as the various Basel Accords. It is in this context that, in April 2007, a law aimed at regulating the microfinance sector in the *WAEMU* was introduced (BCEAO, 2011). The new regulatory framework was intended to ensure the compliance with and the respect of rules and procedures, which include minimum capital and minimum liquidity ratios. Regulations, and in particular capital and liquidity requirements imposed by the regulator, could

be detrimental to bank performance if they turn to be binding (De Bandt et al., 2018). If the mandatory ratios are set above the optimal level as determined by market forces, the excess value may imply a negative marginal effect on performance. Giving these anticipations, what was the real net effect of the 2007 law on the performance of MFIs in the *WAEMU*?

The objective of this paper is then to assess the effect of the 2007 law on the performance of MFIs in the *WAEMU*.<sup>1</sup> Specifically, we will first examine the changes in the financial and social performance of MFIs caused by the new law, then focus on the specific impact of the minimum capital and the minimum liquidity requirements.

The study has two features that represent notable contributions to the literature. First, it covers a long period (from 2002 to 2015), which will enable us to consider the changes in the *WAEMU* regulatory framework related to MFIs. Second, it is the first study on the effect of a change in the regulatory framework and the introduction of new capital and liquidity ratios on the performance of MFIs in the *WAEMU* zone.

The results show that, overall, the 2007 law has had a negative impact on financial performance, presumably due to the costs and constraints associated with the continuous respect of all its provisions. The marginal effect of the minimum capital requirements and the minimum liquidity requirements on financial performance was positive. The impact of regulation on social performance was positive, with a decreasing marginal effect for capital and liquidity. Overall, the net effect of the law on social performance was weakly positive.

The paper continues as follows: Section 2 is devoted to the literature review. Section 3 presents the data and methodology, while Section 4 reports and discusses the results. Section 5 presents robustness checks and Section 6 concludes.

## **2. Literature Review**

### **2.1 Regulation in the financial industry**

MFIs can operate under regulation or without regulation. In some countries, they can choose between being regulated or unregulated (Hartarska & Nadolnyak, 2007). This was the case in the *WAEMU* zone in the 1990s. The law that was in force at the time (*PARMEC*) concerned only

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<sup>1</sup> The *WAEMU* comprises eight countries: Benin, Burkina Faso, Ivory Coast, Guinea-Bissau, Mali, Niger, Senegal and Togo.

mutual saving and credit institutions. In 2007, a new law replaced *PARMEC*.<sup>2</sup> This became necessary because of the evolution of the microfinance industry, as well as the failure of many MFIs. It applies to all MFIs operating in the union.<sup>3</sup>

The empirical evidence of the impact of regulation on performance in the financial services sector is mixed. Several authors have reported either a negative or no effect, especially on social performance. Mersland & Strøm (2009) found that regulation does not have a significant impact on financial or social performance. Hartarska & Nadolnyak (2007) report no impact of being regulated on financial performance and weak evidence of an impact on social performance. Hartarska (2005) found a lower return on assets (ROA) for regulated MFIs in Central and Eastern Europe and newly independent states than for non-regulated MFIs. Cull, Demirgüç-Kunt & Morduch (2011) also found a negative relationship between regulation and performance of MFIs from 67 developing countries.

Regarding the positive impact, Ndambu (2011) reports that a better general regulatory framework and effective supervision improves sustainability in Sub-Saharan Africa. Similarly, Tchakoute-Tchuigoua (2010) reports a positive relationship between financial performance measures and regulation in this region. Bassem (2009) reports the same result for 42 MFIs active in 21 countries.

Instituting regulation entails introducing prudential ratios, in particular, minimum capital and minimum liquidity ratios.

## 2.2 Minimum capital and performance

In response to bank crises, regulatory authorities have, through the Basel capital ratios, put in place measures to protect the financial system and the customers. Banking regulators believe that capital restrictions are essential to protect the public interest (Santos, 2000). Capital acts as a buffer to absorb losses when they occur (Behn, Rancoita & Rodriguez, 2020). High levels of capital encourage banks to better monitor borrowers, thereby reducing their likelihood of defaulting on payments and ensuring their own survival (Berger & Bouwman, 2013). Thus, capital regulation is expected to have a positive impact on performance. There is empirical evidence of a positive effect of capital on performance (Ben Naceur & Kandil, 2009; Doku, Kpekpena & Boateng, 2019; Njue et al., 2020).

However, excess capital can harm institutions. Capital mobilization is expensive, especially

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<sup>2</sup> *PARMEC*: Support project for the regulation of savings and credit mutual.

<sup>3</sup> A bill regulating the microfinance industry in the *WAEMU* became law following its adoption by the Council of Ministers of the *WAEMU* on April 6, 2007.

during a recession when profits are falling. Compliance with minimum capital requirements may force banks to reduce the volume of their loan portfolio (Jokipii & Milne, 2008). Such credit rationing may be reflected negatively in the bank's value. For instance, Ani et al. (2012) report a negative relationship between the level of capital and the performance of Nigerian banks.

### **2.3 Minimum Liquidity and Performance**

Recent financial crises have shown the importance of managing banks' liquidity risk. Banking institutions often have liquidity problems in certain situations (such as crises), making it difficult for them to satisfy their customers' financial needs. Regulatory authorities are thus forced to take action.

Particular attention must be paid to liquidity, since it often determines the survival of a business. In the literature, the effect of liquidity on banks' performance is mixed. Excess liquidity is said to be beneficial for institutions. According to Bordeleau & Graham (2010) holding substantial liquidity reduces the probability of bank failure and improves performance. Having little liquidity is regarded as harmful because it can lead to payment defaults *vis-à-vis* customers. This risk forces institutions to borrow funds at exorbitant costs, which in turn reduces their performance. Agbada & Osuji (2013) report a positive effect of liquidity on performance of banks in Nigeria. Conversely, excess liquidity can have a negative effect, leading to the accumulation of unproductive assets. This causes banks to incur opportunity costs, and have a negative effect on performance (Muriithi & Waweru, 2017; Adusei, 2022).

## **3. Data and Methodology**

### **3.1 Data**

The data used in this paper are extracted from the Mix Market information platform (<https://databank.worldbank.org/source/mix-market>). Mix Market ranks MFIs by assigning them diamonds numbered from 1 to 5. The greater the number of diamonds, the more structure data is available, the more transparent and reliable. We consider only MFIs with a number of diamonds at least equal to 3, and having been in operation between the years 2002 and 2015.<sup>4</sup>

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<sup>4</sup> For the choice of the study period, we first consider the years 2002 to 2006, the year of adoption of the law (2007) and the years of its progressive implementation (i.e., 2007, 2008 and 2009) as the pre-implementation period (i.e., a total of 8 years). We then choose a period of roughly equal duration 2010-2015 (7 years) for the full implementation period. We labelled *REG*. This gives us a study period running from 2002 to 2015.

Based on this inclusion criteria, the sample comprises an unbalanced panel (Ogunleye, 2017) of 17 MFIs covering six member countries of the *WAEMU* (MFIs from Mali and Togo are not included in the sample, because of application of our inclusion criteria). Bank specific data are extracted from the Mix Market database and macroeconomic data, from the World Development Indicators database.

### 3.2 Econometric specification

Similar to Hartarska & Nadolnyak (2007), Cull et al. (2011) and Gueyie et al. (2019), this study employs the following econometric specification:

$$\begin{aligned} \text{PERF}_{it} = & \beta_0 + \beta_1 \text{PERF}_{it-1} + \beta_2 \text{CAP}_{it} + \beta_3 \text{LIQ}_{it} + \beta_4 \text{RISK}_{it} + \beta_5 \text{SIZE}_{it} + \beta_6 \text{INT}_{it} \\ & + \beta_7 \text{INFL}_{it} + \beta_8 \text{REG} + \beta_9 \text{CAP} * \text{REG} + \beta_{10} \text{LIQ} * \text{REG} + \varepsilon_{it}, \end{aligned} \quad (1)$$

where *PERF* stands for performance, *CAP*: capital ratio; *LIQ*: liquidity ratio; *RISK*: portfolio at risk; *SIZE*: logarithm of total assets; *INTR*: real interest rate; *INFL*: inflation rate; *REG*: regulation, and  $\varepsilon$  is a random error term.<sup>5</sup>

Ben Naceur & Kandil (2009) have shown that empirical studies on the determinants of bank performance may suffer from endogeneity bias. Endogeneity bias can lead to inconsistent estimates and incorrect inferences (Ullah, Akhtar & Zaefarian, 2018). Sometimes, it can even lead to coefficient having the wrong sign. A second problem is unobservable heterogeneity across MFIs. Finally, the performance could be persistent across time. The Generalized Method of Moments (GMM) dynamic panel technique is used in our estimations (Chikalipah, 2017). It corrects potential problems of endogeneity, heteroscedasticity and autocorrelation (Thao Tran et al., 2016). Equation (1) is estimated using a single-step GMM (difference GMM). Blundell & Bond (1998) demonstrated that inferences based on this estimator are reliable even in the presence of non-normality or heteroscedasticity, as it also controls for unobserved heterogeneity and for the persistence of the dependent variable. As such, it yields unbiased estimations of the parameters.

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<sup>5</sup> Additional lags of the dependent variable will be added to the model when post-estimation AR1/AR2 coefficients are significantly different from zero

### 3.3 Dependent variables

MFIs generally pursue two goals: first, financial profitability, which will enable them to continue their activities in the long run; and second, providing of their services to a large number of people (social performance). Following Guidara et al. (2013) and Barry & Tacneng (2014), we use ROA (Net income/Total assets) and return on equity (Net income/Equity) as proxies of financial performance. We also used the logarithm of the number of active borrowers *-NAB-* (Makame & Murinde 2006; Bassem 2009) and the average balance of loans per borrower relative to per capita gross domestic product *-LOAN-* (Hartarska & Nadolnyak, 2007, Tchakoute-Tchuigoua, 2010) as proxies of social performance.

### 3.4 Explanatory variables

The regulatory variable *REG* represents phase of full implementation of the 2007 law (Tchakoute-Tchuigoua, 2010, Guidara et al., 2013). It takes the value 1 for the years 2010-2015 or 0 otherwise. Since laws and regulations are generally intended to ensure that financial institutions operate safely (Barth et al., 2010) and to provide protection to small investors (Arun, 2005), a positive effect on performance is expected for *REG*.

*CAP* is the ratio of equity to the total assets. It has been used by many authors, including Ben Naceur & Kandil (2009) and Ali, Gueyie & Okou (2020). Capital can have a positive effect on performance, as these funds are resources available to MFIs. However, from a regulatory perspective, capital is perceived as a buffer against unexpected losses. It may have a negative impact on performance (Barth et al., 2013). Therefore, the expected sign of *CAP* is ambiguous.

*LIQ* is the ratio of cash and cash-equivalent assets to total assets. Some level of liquidity is needed for MFIs' solvency, as it reinforces their ability to meet their financial obligations. However, excessive liquidity can have a negative impact on performance, as liquidity is an interest-free asset, or one that earns only minimal interest. A negative sign is expected for *LIQ*.

*CAP\*REG* is the interaction between the capital ratio and *REG* (Guidara et al., 2013). A positive sign is expected for this interaction term if the new regulation on capital is beneficial.

*LIQ\*REG* is the interaction between the liquidity ratio and *REG*. A negative sign is expected for this interaction term, as mandatory liquidity is perceived as a constraint.

*RISK* is the ratio of portfolio at risk for 30 days over the gross loan portfolio. The anticipated sign for *RISK* is negative.

*SIZE* is the logarithm of total assets. A large size may have a positive impact on performance because of economies of scale, diversification of products and services (Gueyie et al., 2019) and improved managerial skills (Bibi et al., 2018). A positive sign is expected for *SIZE*.

The real interest rate (*INT*) is the yield of loans granted by MFIs. It is the difference between the nominal interest rate and the inflation rate. When this rate increases, performance can increase as well. A high interest rate does not reduce people's willingness to obtain loans from MFIs.

The macroeconomic environment is considered in terms of the inflation rate (*INFL*) (Hartarska & Nadolnyak, 2007). *INFL* measures purchasing power in the country considered; high values can be detrimental to the performance of MFIs.

## 4. Results

### 4.1 Descriptive statistics

Table 1 presents the descriptive statistics. It reveals rather weak financial performance in the MFIs in the sample. The average of *ROA* is 0.345%, with an average *ROE* of -0.678%. *ROE* is highly volatile, with a standard deviation of 28.625%.

Table 1: Descriptive statistics (annual data, 2002–2015)

Variables	Observations	Mean	Standard Dev.	Minimum	Maximum
<i>ROA (%)</i>	149	0.345	3.853	-10.71	11.05
<i>ROE (%)</i>	148	-0.678	28.625	-98.07	86.66
<i>NAB</i>	159	9.058	1.666	3.73	11.489
<i>LOAN (\$)</i>	150	129.790	114.564	4.84	615.85
<i>PM (%)</i>	165	-1.319	30.967	-146.58	78.60
<i>NDEPOSITORS</i>	142	9.545	2.208	1.00	12.80
<i>CAP (%)</i>	162	26.885	20.378	-6.61	74.34
<i>LIQ (%)</i>	125	16.656	11.080	0 03	42.93
<i>RISK (%)</i>	126	6.592	5.347	0.00	22.67
<i>SIZE</i>	149	15.224	1.964	2.00	18.268
<i>INT (%)</i>	120	16.933	4.810	5.95	28.82
<i>INFL (%)</i>	238	2.199	2.441	-2.80	11.3

*ROA*: return on assets; *ROE*: return on equity; *NAB*: logarithm of the number of active borrowers; *LOAN*: loans per borrower as a ratio of the gross national income per capita; *PM*: profit margin; *NDEPOSITORS*: logarithm of the number of depositors; *CAP*: Equity/Total assets; *LIQ*: Cash and cash equivalents/Total assets; *RISK*: portfolio at risk > 30 day/Gross loan portfolio; *SIZE*: logarithm of total assets; *INT*: real interest



rate on loans and *INFL*: inflation rate.

Source: The authors.

The average *NAB* was estimated at 9.058, with a low standard deviation of 1.666. This means that the MFIs in the sample keep an average of 8,587 customers [ $(\exp(9.058) = 8,587)$ ]. The average *LOAN* is \$129.79. This means that the loan size per borrower is very small, on average, given the level of GNI per capita of countries in the sample. More poor are served by MFIs in these countries.

The average *CAP* is 26.88%. It exceeds the 15% level set by the law. This suggests that, although the law must have forced undercapitalized MFIs to adjust toward the required minimum capital ratio, many are well capitalized or even overcapitalized. MFIs' average *LIQ* is 16.66%. This value is not directly comparable with the prudential liquidity ratio set by the law, but is comparable to some international results using the same definition.<sup>6</sup> For instance, Gueyie et al. (2019) report an average liquidity ratio of 13% for Canadian chartered banks. The percentage of portfolio at risk (*RISK*) is reasonable, with a 6.592% average value. The MFIs in our sample operate in a relatively stable environment, with a low average inflation rate of 2.199%, but they charge their customers relatively high interest rates, with an average real rate on loans close to 17%.

Table 2 presents the correlation matrix between the variables.

Table 2: Correlation matrix of the variables

The variables are as defined in Table 1.

	<i>ROA</i>	<i>ROE</i>	<i>NAB</i>	<i>LOAN</i>	<i>CAP</i>	<i>LIQ</i>	<i>RISK</i>	<i>SIZE</i>	<i>INT</i>	<i>INFL</i>
<i>ROA</i>	1.000									
<i>ROE</i>	0.789	1.000								
<i>NAB</i>	0.090	-0.014	1.000							
<i>LOAN</i>	0.270	0.264	-0.324	1.000						
<i>CAP</i>	0.492	0.218	0.088	0.456	1.000					
<i>LIQ</i>	0.186	0.036	-0.350	0.458	0.176	1.000				
<i>RISK</i>	0.226	-0.246	0.068	-0.007	0.102	0.136	1.000			
<i>SIZE</i>	0.104	0.096	0.322	0.201	-0.009	0.020	0.087	1.000		
<i>INT</i>	0.112	0.179	0.255	-0.094	0.103	-0.301	-0.090	0.150	1.000	
<i>INFL</i>	0.028	-0.004	-0.073	-0.256	-0.096	-0.154	-0.239	-0.166	-0.118	1.000

Source: The authors.

*CAP* is positively correlated with the four performance measures. This result corroborates that of Flamini et al. (2009), who found a positive effect of the level of capital on banks'

<sup>6</sup> According to the law, the prudential liquidity ratio measures the capacity of an institution to meet its current liabilities—that is, to honor its short-term commitments (3 months at most) with its short-term resources (3 months at most). This prudential liquidity ratio was set at 100% for savings and credit institutions (SCIs) which are not affiliated to a network and the other MFIs that collected deposits, at 80% for affiliated SCIs, and at 60% for institutions that did not collect deposits. We could not directly compute this prudential liquidity ratio, due to insufficient data.

performance. The correlation matrix shows that the liquidity–performance relationship is stronger for social than for financial performance. However, the relationship between MFIs’ liquidity and performance is fairly weak. It is negative for *ROA* (-18.6%) and *NAB* (-35%), but positive for *ROE* (3.65%) and *LOAN* (45.76%). The highest correlation among the independent variables is 17.59% (between *CAP* and *LIQ*). The absence of high correlations reduces the possibility of multicollinearity in the regression estimations.

## 4.2 Estimations

The results of the econometric estimations are presented in Table 3.

### Table 3: Results of estimations

This table presents the results of estimations of equation (1). Estimations were obtained using the one-step Generalized Moment Method estimator. The data used are annual and cover the period 2002–2015. MFIs’ performance was measured on four variables: *ROA*: return on assets; *ROE*: return on equity; *NAB*: logarithm of the number of active borrowers and *LOAN*: loans per borrower as a ratio of the gross national income per capita. The other variables are as defined in Table 1. The values given in brackets represent robust standard deviations.

	<i>ROA</i>	<i>ROE</i>	<i>NAB</i>	<i>LOAN</i> <sup>7</sup>
<i>CONSTANT</i>	-7.888*** (2.263)	-53.626*** (9.725)	3.794 (2.969)	1217*** (301.867)
<i>CAP</i>	0.176*** (0.061)	1.424*** (0.325)	-0.011 (0.010)	-13.180*** (3.756)
<i>LIQ</i>	-0.112 (0.081)	-1.707*** (0.374)	0.061 (0.015)	-19.243*** (2.093)
<i>RISK</i>	-0.513*** (0.095)	-1.502*** (0.071)	-0.001 (0.008)	2.355** (1.148)
<i>SIZE</i>	0.109*** (0.031)	0.053 (0.058)	-0.018*** (0.005)	9.616*** (0.399)
<i>INT</i>	0.370*** (0.093)	1.711*** (0.148)	-0.015 (0.014)	10.157*** (3.667)
<i>INFL</i>	0.267*** (0.071)	0.954*** (0.251)	-0.024 (0.015)	10.239*** (3.628)
<i>REG</i>	-7.063*** (0.799)	-20.255*** (2.862)	0.572** (0.278)	-1533.636*** (342.341)
<i>CAP*REG</i>	0.0404*** (0.014)	-0.113 (0.109)	-0.002 (0.001)	18.789*** (5.066)
<i>LIQ*REG</i>	0.444*** (0.111)	2.872*** (0.420)	-0.062*** (0.019)	18.393*** (3.066)
<i>LAG(1)- Dependent Var.</i>	-0.257*** (0.120)	-0.241*** (0.127)	0.619* (0.336)	-0.540*** (0.134)
<i>LAG(2)- Dependent Var.</i>	-	0.021*** (0.059)	-	-0.699* (0.383)
Probability ( $\chi^2$ )	0.000	0.000	0.000	0.000

<sup>7</sup> For this variable, a negative and significant coefficient means more small-sized loans, i.e., a favorable social effect.

AR1	-1.588	-1.601	-1.407	-1.5982
P value AR1	0.112	0.109	0.159	0.110
AR2	1.061	1.647	-1.038	1.5982
P value AR2	0.288	0.100	0.299	0.110
Sargan	6.900	0.817	4.987	5.012
P value Sargan	0.547	0.665	0.545	0.542
Number of observations	149	149	149	149
Number of MFIs	17	17	17	17

\*\*\* 1% significance; \*\* 5% significance; \* 10% significance.

Source: The authors.

As a robustness check, we rerun the regressions with alternative measures of financial performance (profit margin, *PM*) and social performance (logarithm of the number of depositors, *NDEPOSITORS*). Due to space limitation, the results are presented in the supplementary material.

For the *ROA* regression. Table 4 shows that *CAP* has a positive and significant coefficient. MFIs with higher capital are less dependent on external financing. They tend to face lower funding costs and lower potential bankruptcy costs, which allows them to earn higher profits. This result corroborates those Kassem and Sakr (2018) and Kanga, Murinde and Soumaré (2020).

*LIQ* is negatively related to *ROA*, but is not significant. This may suggest an equilibrium between the amount of liquid assets requested for solvency purposes and an optimal investment of surpluses. But further investigation is needed with the *ROE*.

*REG* is negative and significant. This goes against our expectation but is consistent with results obtained by Hartarska (2005), Cull, Demirguç-Kunt and Morduch (2009), Pati (2012) and Kanga, Murinde & Soumaré (2020) regarding the effect of regulation on performance. The full implementation of the 2007 law resulted, on average, in a decrease in *ROA* compared to the pre-adoption phase. This may be explained by the costs and constraints associated with the respect of the numerous provisions (articles) of the law.<sup>8</sup> Although the coefficient of *REG* is negative and significant, it is important to note that the regulatory framework created by PARMEC had become restrictive for certain MFIs, in particular those having reached a certain size, and required them to make changes (Azokly & Camara, 2009).

<sup>8</sup> The provisions of the law are not limited to the regulation of capita and liquidity. They also include issues such as limitation of the risks to which an institution is exposed; coverage of medium and long-term assets with stable resources; limitation of loans to managers and staff, as well as to related persons; limitation of the risks taken on a single signature; limitation of operations other than savings and credit activities; constitution of the general reserve and limitation of equity investments.

*CAPREG* positively and significantly influences *ROA*. In other words, the adoption of capital prudential ratios had positively impacted on the *ROA*. This is not surprising, given that we found that *CAP* positively influences *ROA*. Therefore, we expect that measures-regulatory or not-that strengthen capital bases have a positive impact on *ROA*.

*LIQREG* is positively and significantly related to *ROA*. The adoption of minimum prudential liquidity ratios positively affected *ROA*. This result indicates that prior to the full implementation of the law, MFIs were not all safe (in terms of liquidity), and that the liquidity regulation has had a disciplining effect on some MFIs' liquidity management.

The model with *ROE* shows that *REG* has a negative coefficient, the same result obtained with *ROA*. This result reinforces the finding of a negative effect of the 2007 regulation on MFIs' financial performance. As for *ROA*, here also, *CAPREG* have a negative sign, but is not significant. *LIQREG* keep their positive and significant sign. Thus, the discussion presented above for *ROA* also holds for *ROE*. Regarding the control variables, as reported by Agbada & Osuji (2013) and Serwadda (2018), liquidity (*LIQ*) negatively and significantly impacts the performance measure (*ROE* here). The negative and significant effect found here suggests that before the full implementation of the 2007 law, the MFIs in the sample were facing excess liquidity, or liquidity mismanagement. Having more than an optimal target liquidity -or excess liquidity- translates into a reduction in profitability. Excess liquidity earns no, or very little, interest. The other variables are materially unchanged. Thus, *ROE* results reflects those of *ROA*, with the exception of *CAPREG*, which is not significant here.

In relation to social performance, the model with the number of active borrowers indicates that *REG* is positively related to the logarithm of the number of active borrowers (*NAB*). The relation is significant at the 5% level. Clearly, the implementation of the law has resulted into an increase in the number of active borrowers. *CAPREG* is negative but non-significant, while *LIQREG* is negative and significant at the 1% level. The negative effects of *CAPREG* and *LIQREG* on *NAB* indicate that the net effect of regulation on social performance was weak. Hartarska & Nadolnyak (2007) have also reported weak evidence of an impact of regulation on social performance. Regarding the control variables, *CAP* is negatively related to *NAB*, but is not significant. *LIQ* is positively and significantly related to *NAB*.

The last model uses the average loan per gross national income per capita (*LOAN*) as dependent variable. *REG* has a negative and significant impact on MFIs' loan size, meaning that the MFIs in the sample serve more small-sized loans, i.e., they serve more poor individuals. In other

words, after full implementation, the new regulatory framework has had a positive effect on the social performance of MFIs, as smaller loans are more accessible to the poor. *CAPREG* and *LIQREG* are positive and significant at the 1% level. The effectiveness of the minimum capital and minimum liquidity rules has translated into an increased loan size, a negative marginal effect for social performance. While the holding of liquidity (*LIQ*) is globally beneficial for social performance (*LOAN*), as highlighted by the negative and significant sign of this variable (which means smaller loans), its effect was reduced after the new law took effect (positive and significant sign of *LIQREG*).

Combining the results of *NAB* and *LOAN*, we can conclude that the net effect of the new regulation on the social performance was weakly favorable.

For a robustness check, we re-estimated the regression using two alternative performance measures: the profit margin (*PM*) for financial performance and the logarithm of the number of depositors (*NDEPOSITORS*) for social performance. The results are presented, and are discussed in the supplementary material.

Overall, they corroborate those found here above.

## **6. Conclusion**

This paper analyzes the financial and social performance of MFIs in the *WAEMU* following a 2007 change in the regulatory framework regarding the minimum capital and minimum liquidity requirements. The data examined span the period 2002–2015, in which we distinguish two phases: the pre-implementation phase of the law (2002–2009) and the full implementation phase (2010–2015).

Our results show that, overall, the 2007 law has had a negative impact on MFIs' financial performance, presumably due to the costs and constraints of implementation and the respect of all its provisions. The marginal effect of the minimum capital requirements and the minimum liquidity requirements on financial performance was positive. The impact of regulation on social performance was positive, with a decreasing marginal effect for capital and liquidity. Overall, the net effect of the law on social performance was weakly positive.

What are the practical and policy implications of our results? Unlike *PARMEC*, which was limited to the mutual entities, the 2007 law extended regulation to the entire microfinance sector. Was it necessary to revise *PARMEC*? The answer is yes. Regulations must adapt to the changing environment and to new realities. The regulatory framework of *PARMEC* had become

very restrictive and discouraged the evolution of some MFIs. These MFIs were able to change under the 2007 law, adopting new legal status allowed by the law. To facilitate the mutation, Azokly & Camara (2009) have published a manual for such institutional transformation.

It was necessary to extend regulation to other MFIs. However, in the case of the capital and liquidity regulations, the “one size fits all” does not necessarily work for all MFIs. These prudential regulation and supervision should be applied to microfinance only when MFIs collect deposits and/or raise funds from the public (Hoxhaj, 2010). The relevant MFIs must in our view include deposit-taking MFIs, as well as for-profits institutions (i.e., public and private limited companies). Capital and liquidity ratios expose NGO for instance to an unnecessary pressure. The study has some limitations. First due to data availability and the quality of available data, the sample in this paper is limited to 6 countries: Benin, Burkina Faso, Ivory Coast, Guinea-Bissau, Niger and Senegal. Mali and Togo are not included. However, the 2007 law applies to the MFIs operating in all the *WAEMU* countries. The absence of these two countries do not allow us to have a full portray of the effect of regulation in the *WAEMU* zone. Second, we do not distinguish MFIs by type of institutions: associations, cooperative and credit unions, public and private limited companies; not-for-profits (i.e., associations & cooperative and credit unions) versus for-profits (i.e., public and private limited companies); deposit-taking versus non-deposit-taking institutions, etc. The impact of the law may vary significantly, depending on the type of institutions. This is not investigated in the paper.

In term of research avenues, future studies should seek to address these limitations. Efforts should be made to enrich the data, by collecting them manually from where they may be available. The study may also be extended to other regions in Africa where similar regulations were adopted.

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