The Determinants of Bank Profitability in Haiti

by

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Abstract

Banks' profits in Haiti have been healthy despite the country's poor record in terms of economic growth. This paper looks at the data from the country's nine banks from the 1st quarter of 2001 to the last quarter of 2015 in order to find the determinants of their profitability. We do this by regressing the Return on Asset Ratio (ROA) on a set of bank-specific indicators, market structure factors as well as macroeconomic variables. Our main conclusion regarding bank specific factors is that past profitability and credit risk are positively associated with ROA, while operating expenses shows a negative relationship with it. With respect to market structure, banking system concentration has a relatively small impact on ROA. On the macroeconomic side, factors positively associated with ROA are the growth in commercial activity and the main monetary policy rate.

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Contents

I. Introduction

Banks' profits in Haiti have been relatively healthy despite the country's poor record in terms of economic growth, with returns on assets averaging 1.37% between 2001 and 2015. Various explanations are usually provided to explain this state of affairs. For many, it is a result of a relatively low level of competition in the banking sector, others point at monetary policy which uses central bank bonds (BRH Bonds) [1] as one of its main instruments. These "risk free" bonds, which are mainly bought by commercial banks, have been remunerated at an average of 10.92%[2] between 2001 and 2015 and accounted for more than 11% of banks assets at some point.

Market concentration in the banking sector and the market power it may allow can keep returns high. Indeed, concentration in the Haitian banking system is considered high, with a Herfindahl-Hirschman index that has stayed over the 2000 benchmark since the third quarter of 2002 while the share of assets of the four biggest banks has averaged 79.73 % over the same period.

This paper looks at the determinants of bank profitability in Haiti as measured by the Return on Assets ratio (ROA). Data of the country's nine banks are used from the 1st quarter of 2001 to the last quarter of 2015. We investigate the impact of bank specific factors such as size, capital, credit portfolio, operating expenses, and interest revenue relative to other income, market structure factors as well as macroeconomic factors such as

[1]The central bank bonds are known as BRH bonds with BRH standing for Banque de la République d'Haïti, the official French designation of the Central Bank of Haiti.

[2] This is the average nominal interest rate on the BRH bond with a maturity of 91 days. There are other BRH Bonds with a 7 days and 28 days maturity with lower interest rates. However, the rate on the 91 days bond is usually considered as the main monetary policy rate.

economic activity, inflation, exchange rate depreciation and monetary policy instruments. Our main conclusion regarding bank specific factors; is that past returns continue to moderately affect current bank profitability, while the amount of credit risk taken by banks is positively associated with higher ROA. Furthermore, the control of operating expenses plays a major role in determining bank profitability. With respect to market structure, banking sector concentration has a small positive impact on bank profitability. On the macroeconomic side, factors positively associated with higher ROA are the growth in commercial activity and the main monetary policy.

Section 2 reviews the literature on the determinants of bank profits. Section 3 introduces the data and methodology. We discuss the results in Section 4 and provide our concluding remarks in Section 5.

II. Literature review

Studies of the determinants of bank profitability have usually look at how some measure of relative profitability such as return on assets (ROA) and return on equity (ROE) are affected by bank specific factors, market structure factors and macroeconomic factors.

Haslem (1968, 1969), in one of the first studies of this kind found that financial indicators such as capital ratios, interest paid and received as well as salaries and wages of US banks were significantly related to profitability. Wall (1985) also found that asset-liability management, as well as the management of funding and non interest costs had all a significant impact on profitability.

Bourke (1989) looks at the determinants of international bank profitability while using pooled time series data and estimates a linear relationship between internal factors (wages and salaries, liquidity, capital ratios), market structure, macroeconomic factors and profitability. He finds a positive but moderate relationship between concentration and profitability as well as some indication of risk avoidance by banks with a high degree of market power (Edwards-Heggestad-Mingo hypothesis).

Molyneux (1992) applies Bourke's methodology to a set of banks across eighteen European countries from 1986 to 1989. The results are similar to Bourke's regarding the impact of market concentration while no evidence is found for the Edwards-Heggestad-Mingo hypothesis.

Demirgüç-Kunt and Huizinga (1998) investigate the determinants of interest margins and bank profitability for 80 countries between 1998 and 1995 while using bank level data. They find that a greater ratio of bank assets to GDP and a smaller market concentration ratio are associated with lower interest margins and profits. Bank ownership also plays a significant role as foreign banks exhibit higher margins and profits than domestic banks in developing countries while the opposite situation is observed in developed economies. Furthermore, the tax burden faced by banks ultimately falls on customers whereas it is not the case for increases in reserve requirements.

In a study of south eastern European banks profitability over the period of 1998-2002, Athanasoglou et al.(2006) found that market concentration has a positive impact on bank returns on assets (ROA) while liquidity risk has no significant effect. In respect to

macroeconomic determinants, they find that inflation affects both ROA and ROE positively while growth in GDP per capita has no significant effect. Athanasoglou et al. (2006b) also find that profits tend to persist over time when they use a dynamic panel data model to study the performance of Greek banks between 1985 and 2001. This has been interpreted as indicative of a non-competitive market structure.

More recently the literature has looked at profitability determinants in less developed financial markets and lower income countries. For instance, Flamini et al. (2009) study the determinants of profitability for a sample of 389 banks in 41 African countries. They find that bank size, activity diversification, credit risk and private ownership have a positive relationship with ROA while market concentration seems to have no direct effect on bank profitability. The results also indicate that inflation and output growth are positively associated with bank profits while GDP per capita does not affect bank returns significantly. They also investigate the causation from ROA to equity using a Granger test and find that returns are not immediately used by shareholders to increase equity.

Ally (2014) looks at how bank specific and macroeconomic factors affect banks' profitability in Tanzania using data from 23 banks between 2009 and 2013. Using a fixed effects regression model he finds a significant impact of bank internal factors while no significant effect is found for macroeconomic factors. Amoah and Gyamerah (2015) look at a similar question for Ghana between 1999 and 2010. They find a negative relationship between cost management and profitability while bank size and credit risk are positively associated with it.

III. Data and methodology

This paper uses a panel of quarterly data for the nine Haitian commercial banks between 2001 and 2015. Individual banks data are taken from the quarterly report published by the Banking Supervision Department at the Central Bank of Haiti. The exchange and interest rate data come from the Central Bank's database while inflation and the commercial activity index are taken from the National Statistical Agency (IHSI).

The profitability indicators traditionally used in the literature are the return on equity (ROE), which divides the net profit by equity and the return on assets (ROA), the ratio of net profit to total assets. In addition to being a profitability measure, ROA is considered as an indicator of management efficiency. Indeed, given that a major purpose of assets is to generate revenue and profit for the firm, the ROA shows how investments in assets can be turned into profits. Furthermore, relative to ROE, ROA takes into account the risks associated with leverage and is therefore the key bank profitability ratio (Athanasoglou et al., 2005). While the existence of off-balance-sheet assets complicates its interpretation, this type of assets are relatively rare in the Haitian financial system and do not represent a major source of bank revenue as it is the case in more developed financial systems. Some studies have also used composite index of profitability (see for instance Amoah and Gyamerah, 2015), however we have chosen to use the ROA given that it is straightforward and widely used.

Studies have usually split the determinants of bank profitability between bank specific variables, market structure factors and macroeconomic determinants. According to this description, a general linear model would take the following form:

$$ROA_{it} = \varphi + \beta_1 SPEC_{it} + \beta_2 MKT_{it} + \beta_3 MACRO_{it} + \varepsilon_{it} \quad (1)$$

Where ROA stands for the return on assets for bank i in period t, φ is a constant term, $SPEC_{it}$ a vector of bank specific determinants, MKT_{it} a vector of industry (market structure) factors and$MACRO_{it}$a vector of macroeconomic determinants. $\varepsilon_{it}$is the error term where *i* is cross sectional and *t* time identifier.

Table 1 and 2 present the main descriptive statistics and the correlation matrix for the variables used in our estimation respectively. It is worth noting the substantial dispersion in the *Mix* variable as shown by its relatively large standard deviation.

Bank-specific determinants

Among internal factors affecting profitability, cost management has usually been pointed as a primary driver. In particular, conventional wisdom sees the total of staff wages and salaries as having a negative relationship the "bottom line" and other relative profitability measures. However, while some studies such as Bourke (1989) seem to find that staff expenses affect banks' ROA negatively, others such as Molyneux (1992) have highlighted a positive link between staff outlays and total profits; which the author interprets as higher profits enabling banks to spend more on payroll. More generally, high overhead expenses should have a negative impact on profitability if banks are unable to pass on their costs to customers. Furthermore, high operating costs, as it is the case in Haiti are usually a signal of weak competitive pressures. We proxy cost management by using the logarithm of operating expenses (*OpExp*).

Haitian banks operate in a relatively risky environment. The weaknesses of the judicial system as well as the lack of information on borrowers with the absence of a credit bureau[3] create additional risks for banks whenever they provide a loan. Following Flamini et al. (2009), credit risk is measured as the ratio of loans to deposits in each bank (*CrRisk*). According to the Capital Asset Pricing Model, we should expect a positive relationship between credit risk and profitability.

The finance literature usually takes the total assets of banks as the proxy for size. According to financial intermediation theories, increases in bank size should lead to efficiency gains up to a certain point, thanks to economies of scale leading to higher profits. Past this point, diseconomies of scale start to show and the relationship between profits and size turns negative. This has been stressed notably by Athanasoglou et al. (2005). In order to allow for diseconomies of scale and a non linear relationship between the two variables, we use the logarithm of total assets (S*ize*) as well as its squared value (*Size2*).

Another important internal factor is bank capital. A well-capitalized bank is in a better position to absorb losses and will require relatively less external funding. It is also subject to a lower cost of funding given that it faces lower prospective costs of going bankrupt. Furthermore, as mentioned by Athanasoglou et al. (2005), a well-capitalized bank can venture more effectively into new businesses opportunities. Moreover, according to Athanasoglou et al. (2005) and Berger (1995), stronger capitalization can more credibly signal the expectation of better performance in the presence of asymmetrical information.

[3] A credit bureau has been recently set up by the Central Bank in cooperation with the Commercial Banks Association (APB). However it is in its initial phase and we cannot argue that it has already had a significant impact on the most recent data.

We use the standard ratio of equity to total assets in order to measure banks capital adequacy (*Equity*).

Similarly to Flamini et al. (2009) we include the share of net interest revenues to other operating income (*Mix*) as a bank specific determinant. This is in line with the work of Demirgüç-Kunt and Huizinga (1998) which find that banks with relatively high non-interest earning assets are less profitable. It is worth noting that they tend to find a weaker negative impact of non-interest earning assets in poorer countries. Therefore it will be interesting to see if the Haitian case is closer to the standard theory that riskier interest earning activities are rewarded by higher returns or whether it exhibits the particular trend found for poorer countries in Demirgüç-Kunt and Huizinga (1998).

Market structure factors

Regarding the relationship between market structure and bank performance, standard theory in Industrial Organization posits a positive link between profitability and concentration in a given industry. For instance, the Structure-Conduct-Performance (SCP) hypothesis states that concentrated markets enable banks to obtain monopolistic rents by allowing them to offer relatively low deposit rates while charging relatively higher rates on loans. Also, banks with large market shares and well differentiated services can use their market power while pricing these products and earn “higher than normal” profits as highlighted by the Relative-Market-Power hypothesis (RMP).

We measure the level of concentration in the banking system with the Herfindahl-Hirschman index, defined as the sum of the squares of the market shares of each bank (*Herf*). Given the SCP and RMP hypotheses, we expect its coefficient to be positive.

We also include two dummies for publicly owned as well as foreign owned banks. Given that public banks often have larger goals than strict profitability, we expect the coefficient on this variable (*Public*) to be negative. In the case of foreign banks, given that they are subsidiaries of large multinational banks with access to the latest technology and management techniques, we expect their coefficient (*Foreign*) to be positive.

Macroeconomic determinants

To measure the impact of the macroeconomic environment on bank profitability we use an index of economic activity, the inflation rate, the variation in the exchange rate, the main monetary policy interest rate as well as the required reserve ratio. Usually it is expected that an economic slowdown will lead to the deterioration in credit portfolio quality, an increase in debtors' defaults and ultimately a decrease in bank returns. The reverse would happen during an expansion period. Indeed, Demirgüç-Kunt and Huizinga (1998),as well as Bikker and Hu (2002) find a positive relationship between bank profitability and the business cycle. In the case of Greek banks, Athanasoglou, et al. (2006) find a positive but asymmetric relationship between cyclical output and profitability with cyclical output having an impact only during the cycle upswing. To account for the effect of economic activity a standard measure would have been GDP growth. However this wouldn't be possible as quarterly data on Haitian GDP are unavailable. We therefore use the quarterly

Index of Commercial Activity (*Icom)* published by the Haitian Statistical Agency (IHSI) as a proxy for economic activity. The choice of this index is also fitting as more than half of the Haitian banks credit portfolio went to the commercial sector over the period.

Regarding inflation, its impact on bank profitability has been reported by the literature to be positive or negative depending on whether it is anticipated or not. When banks properly anticipate the inflation rate, they can raise their profits by adjusting their interest rates in order to increase revenues. When they fail to anticipate it, inflation would lead to an increase in costs and a decrease in profitability. For instance, Bourke (1989), Molyneux and Thornton (1992), Demirgüç-Kunt and Huizinga (1998), Flaminiet al. (2009) have all found a positive relationship between inflation and profitability. Moreover, if we assume that the Fisher equation holds, one can easily find mathematical evidence of this relationship. Withr_L and $r_D$the real interest rate on loans and deposits, respectively, and π the inflation rate, bank spreads can be written in nominal terms as follows:

$$(1 + r_L)(1 + \pi) - (1 + r_D)(1 + \pi)$$

This can be rearranged as:

$$(r_L - r_D)(1 + \pi)$$

If we assume that net interest margins are a major component of bank profits, we therefore have a positive effect of inflation on bank profitability even when there is no attempt by banks to adjust interest rates in order to counter the impact of inflation shocks. Our inflation variable (*Inf*) corresponds to the quarterly CPI growth rate.

The Haitian economy is partially dollarized with credit in US dollars representing on average 47.31% of the total bank credit portfolio over the period and US dollar deposits amounting to an average of 53.85% over the same period. Due to the dollarization of the credit portfolio, Haitian banks face significant foreign currency risks given that most of their customers' incomes are in the national currency. Thus, when the national currency depreciates against the US dollar we could expect a deterioration in the quality of the credit portfolio with adverse consequences on profitability. Also, banks have tended to collect a greater share of their revenues from foreign exchange operations over the years, which may have a positive impact on profits. It will therefore be interesting to see which one of these effects dominate. Our exchange rate variation measure is the quarterly rate of variation of the end of period exchange rate (*Exch*).

To assess the impact of monetary policy on bank profitability we use the main policy rate. As mentioned above, this is the nominal rate on BRH Bonds with a maturity of 91 days. Given that BRH Bonds are a "risk free" security we assume a positive relationship between the policy rate (*Rate91*) and bank profitability.

Given the negative impact of required reserves rates on bank liquidity we assume that there will be a negative relationship between the former and bank profitability. While there are different reserve rates for deposits in local currency and deposits in US dollars, we only use the reserve rate on local currency deposits (*ReqRes*), given that there is a high correlation between these two instruments (84% over the study period).

Finally, we include a dummy variable for the year 2010, given that the earthquake caused major losses for the banking system. We therefore expect the sign of its coefficient (*Quake*) to be negative.

IV. Empirical results

To test the relationship between bank profitability and the determinants described above, we estimate the following model expressed earlier in equation (1):

$$ROA_{it} = \varphi + \beta_1 SPEC_{it} + \beta_2 MKT_{it} + \beta_3 MACRO_{it} + \varepsilon_{it}$$

Due to the relatively high level of concentration in the Haitian banking sector and the possibility of high sensitivity to macroeconomic factors we have chosen the dynamic version of the model which includes lagged values of the dependent variable as regressors. If the coefficients of the lagged ROA are between 0 and 1 we can infer that profits are persistent with nevertheless a tendency to return to their equilibrium level. Furthermore, if they are close to zero, this demonstrates a high speed of adjustment which is a signal of a relatively competitive market structure. Conversely, if the coefficients are closer to one, there is slower mean reversion in profitability and the banking sector is therefore less competitive. This yields the following model specification:

$$ROA_{it} = \varphi + \gamma ROA_{it-1} + \theta ROA_{it-2} + \beta_1 SPEC_{it} + \beta_2 MKT_{it} + \beta_3 MACRO_{it} + \varepsilon_{it} \quad (2)$$

With the dynamic specification, we are unable to use the standard Ordinary Least Squares (OLS) method. Indeed, the resulting estimators would have been biased and inconsistent due to correlation between the unobserved panel-level effects and the lagged dependent

variable. We could have used the Arellano-Bond (1991) approach to address this issue. However, the Arellano-Bond estimator shows its own weaknesses when there are large autoregressive parameters or when we have a large ratio of the variance of the panel-effect to the variance of the idiosyncratic error. We therefore use the Arellano-Bover/Blundell-Bond (1995, 1998) generalized method of moments (GMM) which includes additional moment conditions. This method assumes the absence of autocorrelation in the idiosyncratic errors while the no correlation condition between the panel-level effects and the first difference of the first observation of the dependent variable is a prerequisite.

Table 4 reports the results of our main specification. The Wald test statistic rejects the null hypothesis of joint insignificance of parameters while the Sargan test shows that the underlying overidentifying restrictions are valid. We also test for serial autocorrelation, in the first-differenced residuals and find no indication of model misspecification. Furthermore, it indicates second order autocorrelation in the data, which is a signal that the moment conditions of the model are valid.

The coefficients on the one-period and two-period lagged ROA confirm the dynamic nature of the model and a mildly persistent relationship between quarterly returns over time. The 0.12 coefficient for the one-period lagged ROA is lower than the 0.21 coefficient that has been observed in Sub Saharan Africa (Flamini et al., 2009) but is only significant at the ten percent level. This would tend to indicate a smaller departure from a competitive market in Haiti than in African countries. The coefficient for the two-period lagged ROA has a similar size (0.13) and is significant at the 5% level.

The relationship between equity and ROA is positive and significant at the 1% level with a relatively large coefficient (0.15). This is a strong indication that well capitalized banks achieve greater profitability. However, as stressed by Flamini et al. (2009), increases in returns can help boost capital if part of the profits are retained and not distributed as dividends. To investigate this possible reverse relationship from profitability to capital, we conduct Granger causality tests that look at how ROA affects changes in equity and vice versa. Table 6 shows the result of a Granger test where each variable is regressed on a constant and three lags of itself and the other variable. The main takeout from the tests is that in the case of equity as the dependent variable, the coefficients on lagged ROA are not significant. Therefore, we could argue that there is no causation in the Granger sense from ROA to capital. Another possible interpretation is that profits are not systematically reinvested in the banking system.

The credit risk coefficient is positive and significant at the 10% level. This is in line with financial models where risk-averse banks require larger earnings to compensate for higher credit risk.

There is also sign of a strong negative effect of operating expenses on profitability. Indeed, the coefficient sign is negative, relatively large and significant at the 1% level. This could be interpreted as a sign that banks are relatively unable to completely pass on their costs to their customers. The size of the coefficient also points to potentially large gains in profitability if banks manage to better reduce their operating expenses.

The ratio of net interest income to other operating income has a negative relationship with profitability. Its coefficient is negative, highly significant and small. Therefore we can say that diversifying away from standard credit activities has a positive impact on profitability albeit a small one. This might be due to the fact that fees for other services are a less risky and a potentially more stable source of income than interest generated by loans.

The coefficient of the size variable is significant at the 5% level and has the expected sign according to the economies of scale/market-power hypothesis. The size of the coefficient of the squared size variable, which is significant at the 10% level, seems to confirm the existence of managerial inefficiencies when a bank becomes “too large”, leading to diseconomies of scale.

The coefficient of the Herfindahl-Hirschman index is significant and has a positive impact on bank profitability, albeit a small one. This tend to confirm the SCP and RMP hypotheses.

As expected, public ownership seem to affect profitability in a negative way. However, its coefficients is not significant. Against our expectations, foreign ownership has a negative relationship with the ROA. This could be due to the fact that foreign banks operating in Haiti are prevented by their parent companies to take as much risk as domestic banks, given that the country is usually perceived as highly risky by foreign investors. For instance, the Scotiabank and Citibank subsidiaries are not allowed to acquire government securities and Citibank only serve corporate and institutional. This clearly puts foreign banks at a disadvantage compared to their domestic peers and restricts their profit opportunities.

As expected, inflation shows a positive relationship with bank profitability; however the coefficient is not significant. This lack of significance may be due to the fact that sometimes banks fail to forecast inflation adequately to adjust their interest rates or also because inflation is capturing other effects of macroeconomic instability that are not well taken into account by the other macroeconomic variables. The coefficient on exchange rate variation is positive and small but not significant.

In line with our expectations, the growth in the index of commercial activity shows a positive relationship with profitability and the coefficient is significant at the one percent level.

Not surprisingly, the coefficient for the January 2010 earthquake dummy is highly significant at one percent. It is also the largest coefficient in our estimation. This confirms the devastating effect the earthquake had on Haiti's banking system.

V. Concluding remarks and some implications for policymakers

This work is a first attempt to study the profitability of the banking sector in Haiti and it might be premature to draw strong policy conclusions from it. Further research is definitely needed on the topic. In particular, it would be interesting to look at the determinants of profitability in sub-groups such as: the largest banks, the private banks and so on.

Nevertheless, the small value of the Herfindahl-Hirschman index coefficient tend to show that while there is a high level of market concentration in Haiti, it has a lesser impact on bank profitability than it is generally believed. It also seems that banks have been able to gain in profitability by assuming more credit risk in the form of a greater loan to deposit

ratio. This may be the sign of a potential win-win situation for banks and the larger economy if financial tools are developed to allow banks to provide more credit and take more risks. Such tools could be considered for the agricultural sector in the form of insurance schemes. Finally, the size of the coefficient for operating expenses could be pointing to potentially important gains for banks if they manage to better control their costs. Therefore, recent development such as agency banking, by minimizing fixed costs, may play an important role in determining future profits in the sector.

Table 1. Descriptive Statistics

Variable	Mean	Std. Dev.	Min	Max
ROA	1.37	1.80	-11.75	8.06
opexp	1.44	0.60	0.42	3.28
size	6.74	0.50	5.85	7.86
size2	45.62	6.94	34.24	61.85
equity	5.97	2.94	-7.07	12.63
exch	1.40	5.24	-10.74	28.02
inf	2.68	2.59	-5.38	14.25
icom	4.60	13.60	-45.45	66.03
rate91	10.92	8.19	0.00	27.80
reqres	31.47	2.95	29.00	44.00
mix	224.12	379.06	-7196.28	1368.59
crrisk	42.72	16.09	5.96	106.34
herf	2222.79	972.96	86.83	2395.97

Table 2. Correlation Matrix

	roa	opexp	size	size2	equity	exch	inf	icom	rate91	reqres	mix	crrisk	herf
roa	1												
opexp	-0.203	1											
size	0.024	-0.455	1										
size2	0.024	-0.458	0.999	1									
equity	0.340	-0.401	0.192	0.194	1								
exch	0.077	0.049	-0.072	-0.070	-0.001	1							
inf	0.122	0.113	-0.167	-0.166	0.008	0.340	1						
icom	0.075	-0.005	0.004	0.004	-0.018	-0.023	-0.135	1					
rate91	0.165	0.249	-0.352	-0.348	0.046	0.107	0.413	-0.001	1				
reqres	0.027	-0.151	0.194	0.194	0.106	0.104	0.022	-0.071	0.031	1			
mix	-0.089	-0.088	-0.144	-0.146	0.109	0.017	0.003	-0.006	0.032	-0.040	1		
crrisk	0.127	-0.019	-0.386	-0.387	0.145	0.044	-0.020	-0.040	0.023	0.082	0.036	1	
herf	-0.072	-0.216	0.396	0.389	0.016	-0.186	-0.422	0.056	-0.639	0.072	-0.058	0.022	1

Table 3. Variable definition and notation

		Variable	Measure	Notation	Expected effect
Determinants	Dependant variable	Profitability	Net profits / Assets	ROA	
	Bank Specific	Capital	Equity / Assets	Equity	Positive
		Credit risk	Loans / Deposits	CrRisk	Positive
		Activity mix	Net interest revenues / other operating income	Mix	Positive
		Operating expenses	Ln(operating expenses)	OpExp	Negative
		Size	Ln(total Assets)	Size	Positive
			Ln(total Assets)2	Size2	Negative
		Ownership	Dummy variable equal to one for public banks	Public	Negative
	Industry-Specific		Dummy variable equal to one for foreign banks	Foreign	Positive
		Concentration	Herfindahl-Hirschman index, defined as the sum of the squares of the market shares of each bank	Herf	Positive
		Inflation	CPI growth rate	Inf	Positive
	Macroeconomic	Currency depreciation	Exchange rate growth rate	Exch	?
		2010 Earthquake	Dummy variable equal to one for year 2010	Quake	Negative
		Economic activity	Growth rate of index of Commercial Activity	Icom	Positive
		Required reserves rate	Required reserve rate local currency deposits	ResReq	Negative
		Monetary policy main interest rate	Interest rate on BRH Bonds with a maturity of 91 days	Rate91	Positive

Table 4. Estimation Results

	Coef.	Robust Std. Err.	z	P>z
ROA(-1)	0.1282	0.074	1.740	0.081
ROA(-2)	0.1325	0.045	2.980	0.003
CrRisk	0.0133	0.007	1.880	0.060
Equity	0.1540	0.060	2.580	0.010
OpExp	-1.0847	0.460	-2.360	0.018
Size	1.7441	0.845	2.060	0.039
Size2	-0.2174	0.120	-1.810	0.071
Herf	0.0002	0.000	2.070	0.038
Exch	0.0060	0.012	0.500	0.616
Inf	0.0521	0.043	1.210	0.228
Icom	0.0161	0.003	6.400	0.000
rate91	0.0290	0.014	2.070	0.038
reqres	-0.0237	0.021	-1.120	0.261
Mix	-0.0007	0.000	-4.900	0.000
quake	-1.8891	0.778	-2.430	0.015
public	-0.1302	0.412	-0.320	0.752
foreign	-0.5783	0.278	-2.080	0.037
Wald test				
chi2(8)	=	293.58		
Prob>chi2	=	0.000		
Arellano-Bond test for zero autocorrelation in first-differenced errors				
Order	z	Prob>z		
1	-2.380	0.02		
2	0.779	0.44		
H0: no autocorrelation				
Sargan test of over identifying restrictions				
chi2(518)	=	549.7168		
Prob>chi2	=	0.3426		
H0: over identifying restrictions are valid				

Table 5. Granger- Causality Test between ROA and Capital

	Equity				ROA			
	Coef.	Robust Std.Err.	z	P>z	Coef.	Robust Std.Err.	z	P>z
ROA(-1)	0.054	0.038	1.430	0.152	0.182	0.045	4.030	0.000
ROA(-2)	0.055	0.026	2.150	0.032	0.134	0.039	3.480	0.001
ROA(-3)	-0.002	0.022	-0.080	0.940	-0.009	0.052	-0.170	0.866
Equity(-1)	0.758	0.132	5.740	0.000	0.186	0.089	2.080	0.037
Equity(-2)	0.057	0.088	0.650	0.514	-0.195	0.059	-3.300	0.001
Equity(-3)	0.019	0.040	0.470	0.639	0.111	0.091	1.220	0.222
_cons	0.870	0.280	3.100	0.002	0.341	0.201	1.700	0.089
Wald test								
chi2(6)	=	8791.93			chi2(6)	=	119.84	
Prob> chi2	=	0.000			Prob> chi2	=	0.000	
Arellano-Bond test for zero autocorrelation in first-differenced errors								
Order	z	Prob>z			Order	z	Prob>z	
1	-2.385	0.0171			1	-2.3024	0.0213	
2	-1.5223	0.1279			2	-0.92427	0.3553	
H0: no autocorrelation								

References

Ally Z. (2014). "Determinants of Banks' Profitability in a Developing Economy: Empirical Evidence from Tanzania," European Journal of Business and Management 6, 363-375.

Amoah B. and I. Gyamerah (2015). "Determinants of Bank Profitability in Ghana," International Journal of Accounting and Financial Reporting 5, 173-187.

Arellano, M., Bond, S.(1991). "Some tests of specification for panel data: Monte Carlo evidence and an application to employment equations," Review of Economic Studies 58, 277-97.

Arellano, M., Bover, O. (1995). "Another look at the instrumental variable estimation of error components models," Journal of Econometrics 68, 29-51.

Athanasoglou P., Delis M. and C. Staikouras (2006). "Determinants of Banking. Profitability in the South Eastern European Region," Bank of Greece Working Paper 06/47

Banque de la République d'Haïti (2013), Rapport Annuel.

Bikker J, Hu H. (2002). "Cyclical Patterns in Profits, Provisioning and Lending of Banks and Procyclicality of the New Basel Capital Requirements," BNL Q. Rev. 221:143-175.

Blundell, R., Bond, S. (1998). "Initial conditions and moment restrictions in dynamic panel data models," Journal of Econometrics 87, 115-43.

Bourke, P. (1989). "Concentration and Other Determinants of Bank Profitability in Europe, North America and Australia," Journal of Banking and Finance 13, 65-79.

Demirgüç-Kunt, A. and A. Huizinga (1998). “Determinants of Commercial Bank Interest Margins and Profitability: Some International Evidence,” World Bank Economic Review 13, 379-408.

Flamini, V. McDonald, C. A., and Schumacher, L B. (2009) “The determinants of commercial bank profitability in Sub-Saharan Africa” IMF Working Papers (9), pp.1-30.

HaslemJohn A. (1968), A Statistical Analysis of the Relative Profitability of Commercial Banks (July 6, 2015). Journal of Finance, Vol. 23, No. 1, pp. 167-176.

Haslem, John A. (1969), A Statistical Estimation of Commercial Bank Profitability (July 10, 2015). Journal of Business, Vol. 42, No. 1, pp. 22-35.

Molyneux, P. and J. Thornton (1992). “Determinants of European Bank Profitability: A Note,” Journal of Banking and Finance 16, 1173-1178.

Wall, L.D. (1985). “Why are some banks more profitable than others?” Journal of Bank Research 15 (4): 240-256.