

Banking Capitalization and Financial Development in Chad: The Comparative Effects of The Banking Process

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Abstract

The purpose of this article is to highlight the implications of capitalization and bank risk management on financial development in Chad before and after the banking (financial inclusion) of Chadian officials. To achieve this goal, we used Generalized Method of moment (GMM) and the Seemingly Unrelated Regression (SUR) estimators on truncate data from Chadian banks during the period 2000-2015. Results show, Chadian banks recapitalize to reduce bank risks, while risks negatively affect financial development before the start of the banking process. During the period of the mass banking and despite the risk inherent to Chadian customers, the recapitalization of the banks however improved in weak proportion the financial development in Chad.

Keywords: Banking capitalization, Financial development, Banking process, GMM, SUR

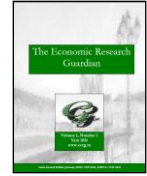
JEL classification: G32, O10, O55

1. Introduction

Chad, among other CEMAC¹ countries (Cameroon and Gabon) have a low level of financial development. Resilience between the real and financial sector remains despite the international interconnections of financial systems absent in Chad. Loan mobilized to finance the economy or the private sector has never exceeded 6% of the gross domestic product in Chad (CROSET, 2017).

Furthermore, less than 16% of adults hold an account at a formal financial institution (Demirguc-Kunt & Klapper, 2012). Therefore to increase banking capitalization, the Chadian's government in 2009 promoted financial development which included public officials to own a bank account. All Chadian civil servants or officials must receive their salaries (government payment) through banks. However in a context of low concentration banking market and therefore a competitive situation until 2004 (COBAC, 2010). Before 2009, civil servants from Chad got their salaries in cash directly from the government's treasury. The decision to fund Chadian officials from 2009, gave to banks a

¹ CEMAC: Economic Commission of Central African States uniting six countries (Cameroon, Central African Republic, Congo, Gabon, Equatorial Guinea and Chad).



new impetus in managing client risks and “bad debts”. Bad debts and riskiest character of banks clients can conduct banks to a weak motivation to promote financial inclusion and therefore constitute constraints to finance the economy. In addition to the traditional activity of providing loanable funds, the financial development promotion by the Chad government also aimed at banks profitability and attractiveness of the financial system in general through new banking products and services.

For the CEMAC micro prudential regulatory management authority, (COBAC²), the banks are required to comply with Basel's international prudential standards, to respect the holding of capital above at least 8% of their risk-weighted assets. Alongside to hold minimum regulatory capital of at least 10 billion francs, banks must accompany the proper monitoring of prudential standards prudential ratios (capital ratio, liquidity, transformation and immobilization). However, the change in capital is not without effect on the economy because it has already been judged by economists to follow economic trend or conjuncture ((Ouédraogo R., 2011); (Ouédraogo, 2014); (Djimoudjiel, 2018)). Indeed, the vast majority of banks increase the level of their capitalization based on the margins generated on their liquid assets. An improvement in the capital of banks explains a favourable economic situation for sustained growth (Demirguc-Kunt & Detragiache, 1998) and impact the process of financial development. The objective of this purpose is to highlight if Chadian banks, despite their recapitalization and capacity to reduce credit risks have follow financial development after 2009.

Therefore, we shall proceed by reviewing some relevant literature on the concepts of the study. This will be followed by econometric steps to achieve the set objectives. The last section shall focus on results, finding solutions and conclusions.

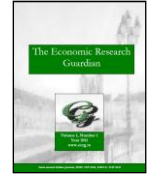
2. Literature review

Prudential regulation policy aimed to ensure a financial structure not subject to moral hazard risks and excessive risk taking that could constitute an obstacle to the functioning of the financial system in general (Lacoue-labarthe, 2003). The goal is to allow banks in a financial system, in general to ensure the allocation of funds without harming productive investments and savings. It globally attracts management of macroeconomic shocks and financial instability (BCE, 2016).

From a global and dynamic point of view, financial system restructuring must revive economic growth and thus promote financial development ((Simon, 2003); (Mishkin, 2010)). Banking regulation questions, before they became widespread at the international level, focused on the issue of exchange rates and international bank failures ((Goodhart, 2011); (Gehrig, 2013)). The current objective of the prudential regulation is more accentuated on a sustainable competition between banks ((Dewatripont & Tirole, 1993); (Lacoue-labarthe, 2003)) and financial stability (Bordes, 2013).

Berenger & Teiletche (2003), taking into account the second Basel agreement (Basle II), conclude a process of "creative destruction" due to the procyclical nature of regulatory capital ((Claessens et al.,

² Banking Commission of Central African States created in 1992's to ensure banking prudential regulation individually and to grant agreement to banks (and all other financial institutions) for exercising in the community.



2009) ; (Ouédraogo, 2014)) that banks can cope with (Allen et al., 2003). The procyclicality of bank capital arises as regulatory capital takes on a coexistent bearing on economic conjuncture. In the economic phase, whether favourable or not, banks in order to comply with banking regulations will be forced to restrict credit or to increase the supply of credit and therefore to modify financial development trend (Korkmaz, 2015). Bagehot (1873) empirically confirms the idea that the performance of British banks remains conditional on bank credits. The evolution of credit for Kaminsky & Reinhart (1999) makes it possible to implement scenery of the cyclical trend of the economic conjuncture whether it is favourable or not. Trends in financial crises are accompanied by a slowdown in financial development followed by an upsurge in financial risks. For Simon (2003), the adoption of prudential norms alone reduced the level of economic growth to 13 points during the 1990s, thus significantly reducing the proportion of loanable funds to enterprises. Indeed, in return for the significant reduction of banking risks via the cyclical variation of banks capital, the primary sector of the economy in France has deteriorated considerably. The constraints on the respect of prudential ratios (taking into account the internal and standard methods of determination of capital adequacy) modified the adjustment behaviour of 27 banks in India and adversely affect the financial contribution to growth ((Nag & Das, 2002) ; (Das, 2002)).

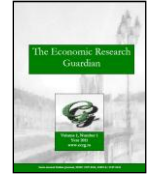
However, thanks to the estimators of the two stage least squares (2SLS). Qualified as "prophetic" standards by Nitsure (2005), thanks to the low level of financial development (around 40% of bank liquid assets finance growth), they have been able to contain trends in financial crises and their imported influences. Yellen (2011) and Reza (2011) propose for this state of affairs, a holding of the capital buffer or capital security to accompany financial development even in times of recession. Indeed, periods of recession suggest a high level of risk for economic agents. Banks, on the other hand, are likely to refinance the economy in the event of low risk or expansion period ((Goodhart C., 2005) (Garabiol, 2006)). The financial contribution to the process of economic growth or financial development is a constraint on the behavior of the authority in charge of financial stability or prudential regulation.

3. Brief overview of Chadian financial system

3.1. Chadian banking system facing prudential standards

Less than half of the banks in the sub-region are out of line with prudential standards as a whole (BEAC, 2016). In fact, out of the 52 banks operating in overall the region, the latest reports states that 25 banks approximated legal situation with prudential standards and 12 banks considered less risky against the other 40 considered at risk. The revaluation of bank capital in 2009 to 10 billion was not a significant constraint for Chadian banks.

Like other countries, the increase in capital is a function of the strong presence of international banks with a large foreign shareholding (Holdings). Also, the risky climate of the Chadian banking system leaves an increase in provisions for risk to 52% to reach 26 billion francs (COBAC, 2010). In



the same dynamic, compliance with the risk coverage ratio (capital ratio) has constantly been evolving for banks. The decline in profits or net banking income (GNP) observed (21%) by COBAC during this period, explains the reluctance of banks to raise the level of lendable funds given the risky dynamics of the banking system. Most banks in the sub region, and particularly in Chad, account for a large proportion or are generally generated receivables (credits) granted to customers (at least 57%) and other types of transactions in their GNP.

3.2. Financial development and banking market structure in Chad

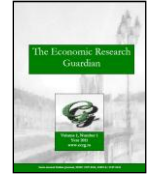
The already disturbing evolution of the Herfindhal-Hirshman index regarding credit granted by the three (3) first banks shows (Fig 1) that banking activity in Chad is facing increasing volatility regarding the quest for market share. Over the period in question, and particularly before the banking of Chadian officials or householders, the competitive situation of the banking industry has improved considerably (trend decline of the HHI on the chart). Indeed, this downward trend of this index (at 18%) has evolved since 2005, was accompanied by a 23% drop in the level of financial development and therefore the supply of credit to the economy. The year 2009 was marked by a prosperous development of macroeconomic aggregates in Chad and banking activities in general (raising banks' capital). We can easily see an upsurge of bank credit in growth and combined with an increase (from 0.15 point to 0.12 of the HHI) in the structure of the banking market (competitive market). The plausible explanation to bring outside the banking activity blast is thus related to the decision of the Chadian government to pay civil servant salaries through banks. The increase of bank capital and the customer risks (credit losses and other) during the banking period marginally improved credit conditions. By accordance with the literature mentioned, recapitalization should adopt a causal risk-capital sense and under the same conditions curb the real sector of the economy.

4. Methodology

In the context of loans make deposit and the Basel norms to create resilience in economics sectors, banks must be well capitalize to finance the economy. Shrieves & Dahl (1992) modelization, on US banks, explain a simultaneous relation between banking capital and risk (losses probability) relatively to prudential norms. To analyze the effects of civil servants inclusion in banking services, many constraints related to capital and risk management influenced Chadian banks activities. Hence, we suppose as Ouédraogo (2014) a relation between banking capital and financial development by taking account loss credence which banks are managing. The empirical model for estimating the effects of the bank capital revaluation standard on the economy can be specified as follows:

$$\Delta devf = f(\Delta CAP; Z_{it}) + \varepsilon_{1,it} \quad (1)$$

$$\Delta risk = f(\Delta CAP; Z_{it}) + \varepsilon_{2,it} \quad (2)$$



with $Devf$ the variable measuring financial development, CAP variable is the banking capital evolves in a discretionary way while under a constraint of a rule (social capital or minimum required). Therefore CAP is obtained by reporting banks capital to their assets ($Actif$) (Reza, 2011). $Z_{i,t}$ is the control group variables uniting the inflation rate ($Infl$), the Herfindhal-Hirshman concentration index (HHI), the logarithm of Gross Domestic Product (GDP), the degree of trade openness (Ouv) (Berthélemy & Varoudakis, 1998); (Aka Brou, 2010)). The openness degree is given by the average of the sum of goods and services importation and exportation reported to GDP. In the context to respond to the regulator decision to ensure their solvability, banks should demonstrate a higher ratio of funds reported to their total asset (RF). The proxy variable for financial development chosen is the ratio of gross credit to GDP (CRE/GDP) (Mohamed, 2008); (Eggoh, 2010)). $Actif$ is the logarithm of the total assets. We consider as risk proxy ($Risk$), bad debts or losses credence's of banks reported to their assets ($Actif$). We assume here that banks increase their capital in the case the risk level is not insignificant (Djimoudjiel, 2018). The model to be estimated is therefore defined:

$$\Delta devf_{it} = \alpha_0 + \alpha_1 \Delta CAP_{it} + \alpha_2 \Delta risk_{it} + \alpha_3 GDP_{it} + \alpha_4 devf_{it-1} + \alpha_5 HHI_{it} + \alpha_6 Ouv_{it} + \alpha_7 RF_{it} + \alpha_8 Infl_{it} + \varepsilon_{1,it} \quad (3)$$

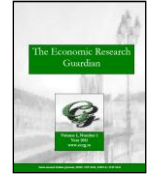
$$\Delta risk_{it} = \beta_0 + \beta_1 \Delta CAP_{it} + \beta_2 \Delta devf_{it} + \beta_3 risk_{it-1} + \beta_4 RF_{it} + \beta_5 GDP_{it} + \beta_6 Infl_{it} + \beta_7 HHI_{it} + \beta_8 Actif_{it} + \varepsilon_{2,it} \quad (4)$$

$\varepsilon_{1,it}$ and $\varepsilon_{2,it}$ are errors terms associated respectively to equations (3) et (4).

The estimation model deduced above (Equation 3 and 4) takes into account two simultaneous equations relating financial development and bank risk to choose the best estimator and to obtain robust results. Different equations depending on whether they are identified at the right level or over-identified is essential. The conditions of identification without any restriction on the coefficients bring out a over-identify model consider our specification (Table 1). The presence of autocorrelation and heteroskedasticity of the errors justified by the various tests thus leads to the use of the Generalized Moment Method (GMM) of Blundel and Bond to correct this state of affairs in the empirical model. In the same way, the identification of our model gives the possibility of the use of three or two stage least squares (3SLS/2SLS) ((Zellner & Theil, 1962) ; (Batalgi & Chang, 2000)). Nearby theses estimators, the introduction of fixed effect in the estimate model and the using of the seemingly unrelated Regression (SUR) conduct also to consistent estimators (Thiombiano, 2002). Due to the preference of GMM estimators in presence of heteroskedasticity, the choice of the SUR estimators will allow therefore to test the robustness of our results (Zellner A. , 2006) and more in the case of the effects of financial inclusion on banking risk managing in Chad.

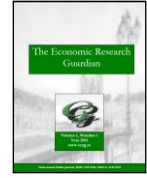
5. Results

The process of financial development in Chad has took off since 2011 (Fig 1), whereas in previous years it was at its lowest level. This fact, this descriptive result, as seen from the statistics, confirms and explains the non-significance of the bank recapitalization variable concerning financial development in the pre-banking period. Unfortunately, bank capital adjustment is not intended to boost economic activity before the pre-banking period for Chadian officials. As other banks in CEMAC, Chadian banks are indeed taking more risks, and recapitalize in the same sense as the



increase in losses likely to receivables on customers (Djimoudjiel, 2018). An increase of 1 point in risk of credit losses to be covered by bank during the relevant year range impact an increase of 0.10 point in bank capital (Table 2). The results also indicate that the riskiness of the Chadian client conditions the behaviour of banks to finance economic activity. Credence risks on customers affect therefore the financial development processes at 5% level of significance. Despite the absence of robustness of this result, the coefficient related to the losses credence risks is important. For 1 point of risk increasing, financial development decrease at 7.14 point. While the banking commission ruled on a low concentration of the Chadian banking market already from 2002, the fall in the level of risks has slightly improved financial development. The constraint of capital adequacy ratio, despite being one of the key prerogatives of the regulatory authority, adversely affects financial development. Raising equity for the sole purpose of containing risks, however, reduces the chances of economic recovery via bank financing. An increase in the ratio can be explained by a bank assets growth or by a reduction in the risks related to receivables to the private sectors, to the government or customers. While banks must hold a level of capital based on the credit risks granted to customers, the risk aversion of bankers slows down financial development. This result however not robust, has been obtained in studies as Ouédraogo S. (2014), Garba (2016), and Djimoudjiel (2018) analyzing empirically relationship between prudential standards and banking risks in developing countries and some sub-Saharan countries. While the inflationary process would favour the improvement of the bank's ability to promote financial development, the domestic product negatively affects the latter. The results are robust regarding significance, then considering the same effects on financial development obtain through the GMM and SUR estimators. As a result, the added value of the Chadian economy would be explained to a large extent by non-financial aggregates or from other sectors of the economy. A situation of oligopolistic competition due to an improvement in the Herfindhal-Hirshman Index (HHI) has a negative impact on the contribution of the banking sector to the economic growth process. In other terms, in the pre-banking period a strong hold of the market shares of some banks (top 3 or 5) can restrict the supply of credit to the economy. Would an allocation of the customer base or the officials based on the choice of the latter (to be banked for this first case) impact the level of market shares to create competition? This interrogation comes in the sense that the Chadian officials are free to choose the bank where their account will be domiciled.

The post-2009 period (Table 3), marked by a strong inclusion of Chadian households, naturally raised the level of financial development as anticipated by the expected effects. According to our two estimators, the difference in the capital variation is correspondingly and positively aligned with the economic recovery via the banking sector and therefore the supply of loanable funds at 10% of significance. This recapitalization is not inherent in the risks banks face. Unlike the previous cases, the change in capital improves the conditions for access to credit rather than reducing the harmful effects of bad debts or losses credence's. In spite of these results, the first question to which it is imperative to answer whether the choice made by officials or civil servants to choose their banks would restructure the structure of the banking market, the answer seems to be positive. The decision of the Chadian government to banking officials positively promoted financial development and improved bank shares. The inflationary process, the role of which is to boost or boost GDP, can lead to a marginally weak competition situation insofar as it is maintained. Unlike the previous conclusion, the HHI index improves in the same direction as the financial development process. After the banking period (in 2009), banking market structure followed the credit supply and financial



development process. The moderate financial inclusion level after 2009, led to a decrease in the HHI evolution (fig 1) and less market concentration (Pebereau, 2015). Given the two estimators used to obtain these results, Chadian banks are more incentivized in return for the management of the credit risks or receivables losses, to attract the customers following the policy of bankability of officials. In the same conception of banking behavior, compliance with the standard of holding capital against risks is more akin to risk taking. In the same vision, banking revival activities created a financial moderated risky environment. An increase in equity of 1%, although it does not condition the supply of credit to the financing of the economy, is explained by the upsurge in customer loan losses (by 5%).

6. Conclusion

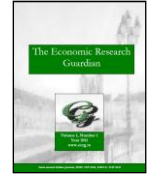
The purpose of this article is to provide an explanatory framework for the contribution of the Chadian officials (civil servants) banking process to financial development in comparison with a pre-banking period. It is focused on the assumption that the government's decision to include civil servants in the financial system promotes financial development. Indeed, using data from Chadian banks over a period from 2000 to 2015, truncated in two periods (2000-2008 and 2009-2015) allowed us to test this hypothesis. Hence, the results obtained showed an accentuation of the effects of the cyclical variation of the capital of the Chadian banks in the management of the risks before the banking period. While the post-financial inclusion period resulted in risk management reduction under the constraint of capital according to bank rents. Also, during this period, the recapitalization of banks has significantly improved financial development. Despite the risk banking environment, bank recapitalization improved financial development in Chad. The rise in bad and bad debt losses is counteracting banks' efforts to finance the Chadian economy. The low concentration of the banking system despite its low coefficient explains significantly the improvement of the level of financial development. Also, the process of banking has led to an upsurge in risks and conditioning the financing of the economy via a less concentrated banking market.

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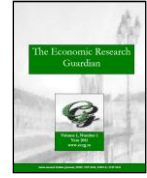
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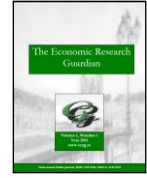
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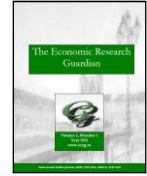
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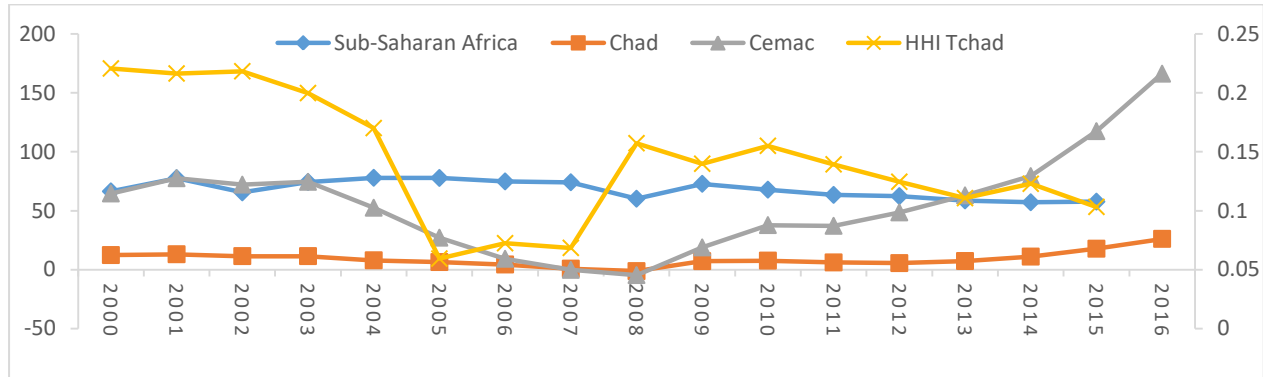
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Appendix

Figure 1 - Evolution of Chad HHI and Financial development in sub-Saharan and CEMAC



Source: author from WDI and Central Bank data.

Technical appendix: identification methods of the model and estimators

- If $(g - g') + (k - k') < g - 1$, equation is under-identify (OLS estimators)
- If $(g - g') + (k - k') = g - 1$, equation is just-identify (Two least squares)
- If $(g - g') + (k - k') > g - 1$, equation is over-identify (required Three and two least square, Seemingly unrelated regression (SUR) estimators)

With

- g : number of endogenous variables in the model (equation number)
- k : exogenous variables in the model ;
- g' : endogenous variables in the identify equation ;
- k' : exogenous variables in the equation to identify.

Table 1 - Determination of our estimation model identification

| | g | g' | k | k' | $(g - g') + (k - k')$ | $g - 1$ | Type |
|--------------|-----|------|-----|------|-----------------------|---------|----------------|
| Equation (3) | 2 | 1 | 8 | 7 | 2 | 1 | Over-identify. |
| Equation (4) | 2 | 1 | 8 | 7 | 2 | 1 | Over-identify |

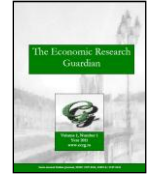


Table 2 - GMM and SUR estimation results (2000-2008)

| | GMM | | SUR | |
|--------------|------------------------|-------------------------|-------------------------|------------------------|
| | $\Delta DevF$ | $\Delta Risk$ | $\Delta DevF$ | $\Delta Risk$ |
| D.DevF | | -4.7629 (0.270) | | -7.149* (0.068) |
| D.CAP | 4.67e-06 (0.210) | 0.109983* (0.050) | 3.41e-06 (0.181) | 0.11674 (0.123) |
| D.Risk | -3.63e-06** (0.022) | | -5.46e-06 (0.202) | |
| GDP | -3.90e-06* (0.051) | -0.030119 (0.600) | -3.16e-06 ** (0.036) | -0.034160 (0.324) |
| HHI | -0.000157** (0.019) | -1.41850 (0.632) | -0.00015*** (0.006) | -1.823088 (0.261) |
| Ouv | -7.93e-08 (0.395) | | -5.89e-08 (0.680) | |
| RF | -6.62e-06* (0.074) | 0.041121 (0.845) | -4.37e-06 (0.156) | 0.01605 (0.915) |
| Infl | 2.27e-07*** (0.006) | 0.0013026 (0.482) | 2.21e-07*** (0.000) | 0.001923 (0.201) |
| Actif | | -0.00690 (0.776) | | -0.009673 (0.531) |
| L.DevF | -0.3874* (0.091) | | -0.28133 *** (0.002) | |
| L.Risk | | - 0.33665*** (0.001) | | -0.33474*** (0.000) |
| Constante | 0.0001208** (0.037) | 0.8216382 (0.599) | 0.0001022** (0.021) | 1.241072 (0.274) |
| Test AR (2) | (0.146) | (0.141) | | |
| Hansen test | (1.000) | (1.000) | | |
| Sargan test | (0.006) | (0.101) | | |
| Observations | 48 | 48 | 48 | 48 |
| Banks | 7 | 7 | 8 | 8 |
| RMSE | | | 1.53e-06 | 0.04394 |
| R-sq. | | | 0.5257 | 0.3635 |
| Chi2 | | | 55.68 | 22.67 |

Note:

(a) (...) denotes the standard error;

(b) ***, **, and * show significance at 1, 5 and 10 % level of significance, respectively.

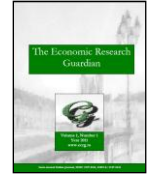


Table 3 - GMM and SUR estimation results after financial inclusion of Chadian official's (2009-2015)

| | GMM | | SUR | |
|-------------|-------------------------|------------------------|-----------------------|----------------------|
| | Δ DevF | Δ Risk | Δ DevF | Δ Risk |
| D.DevF | | -6.8291 (0.200) | | -1.0818** (0.038) |
| D.CAP | 2.10e-06* (0.093) | -0.02698 (0.444) | 2.07e-06* (0.084) | -0.019757 (0.653) |
| D.Risk | -2.11e-06 (0.572) | | -4.43e-06 (0.218) | |
| GDP | -1.42e-06 (0.307) | -0.028352 (0.356) | -1.41e-06 (0.419) | -0.05243 (0.420) |
| HHI | 0.0000372*** (0.001) | 0.13745 (0.659) | 0.0004*** (0.000) | 0.3034 (0.281) |
| Ouv | -2.17e-06 (0.366) | | -2.08e-06 (0.352) | |
| RF | -1.28e-07 (0.941) | 0.2029431** (0.028) | -1.45e-08 (0.993) | 0.20410** (0.016) |
| Infl | 1.04e-07** (0.010) | 0.0009535 (0.332) | 1.06e-1*** (0.003) | 0.0012051 (0.342) |
| Actif | | 0.0335032* (0.071) | | 0.03600** (0.035) |
| L.DevF | 0.0685621 (0.603) | | 0.07151 (0.494) | |
| L.Risk | | -0.11616 (0.578) | | -0.091885 (0.378) |
| Constante | 0.0000297 (0.331) | 0.241807 (0.738) | 0.0003 (0.456) | 0.7463091 (0.598) |
| Test AR (2) | (0.239) | (0.147) | | |
| Hansen test | (1.000) | (1.000) | | |
| Sargan test | (0.043) | (0.071) | | |
| Observation | 62 | 62 | 62 | 62 |
| Banks | 7 | 7 | 8 | 8 |
| RMSE | | | 1.39e-06 | 0.0495096 |
| R-sq. | | | 0.4721 | 0.1124 |
| Chi2 | | | 57.62 | 9.72 |

Note:

(a) (...) denotes the standard error;

(b) ***, **, and * show significance at 1, 5 and 10 % level of significance, respectively.