Is there financial acceleration in african banking? Studies on 25 african countries

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Abstract

African countries are one of the regions consisting of many developing countries. The behavior of price-cost margins carried out by banks is an issue that needs to be looked at further because it can damage economic development. The main objective of this study was to investigate whether there was a financial accelerators behavior carried out by banks in African countries. Author found evidence of financial accelerators behavior carried out by African banks. Using a sample of 153 banks with 1415 observational data from 2005 to 2021, the author found that loan was negatively related to the amount of price-cost margin received by the bank. Furthermore, when there is a recession marked by worsening economic growth, the reduction in loans actually increases bank profits which are characterized by higher price-cost margins. Researchers also found that the worse the recession, the higher the price-cost margin that banks receive

Keywords: financial accelerators, loan, price-cost margin

INTRODUCTION

In general, developing countries have a higher rate of economic growth than developed countries. However, global economic uncertainty makes economic growth increasingly difficult for both developing and developed countries. African countries are one of the regions consisting of many developing countries. Based on statistics, in 2021 the economic growth rate measured by GDP growth of countries in Africa averaged around 4.1% (World Bank, 2022). This growth turned out to be low from the average economic growth in developed countries of the Eurozone of 5.4% and North America of 5.5% in the same year. Figure 1 shows that the average country in Africa has higher economic growth. However, it experienced a decline in in 2019/2020 in line with the weakening of the global economy.
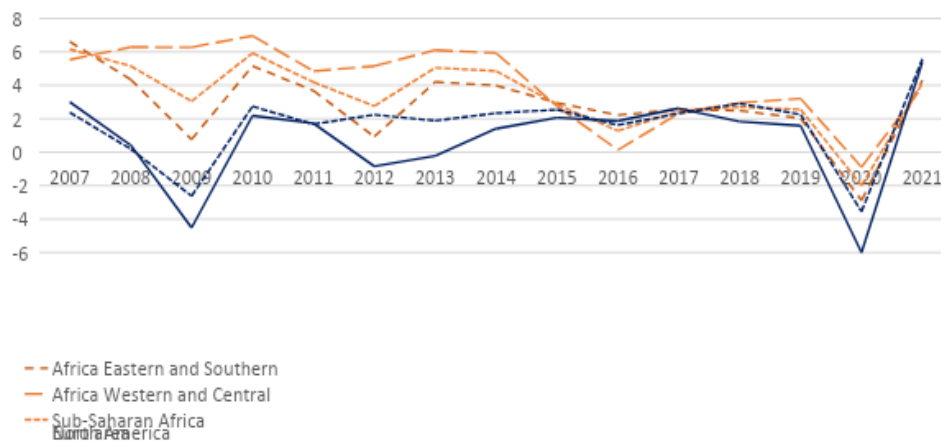
Figure 1. Average GDP growth of Africa versus EURO & North America Countries
Source: Self processed

Despite uncertainty in the global economy, economic growth in Africa is projected to accelerate moderately, due to strengthening demand, but is expected to be restrained in the long run by the slow pace of reforms. Furthermore, inflationary pressures in Africa have eased and the current account average and government deficit are projected to decline, reflecting the recovery in commodity prices since their lowest level in 2016. The average debt situation in African countries shows signs of stabilization, but there is a high risk of debt pressure in some countries due to high levels of government debt (European Investment Bank, 2020**).**

The banking sector in developing countries such as Africa has an important role to play in economic success or failure. The European Investment Bank (2020) reports that in line with improving economic conditions, in general banking in most African countries is generally in an expansive mode which is largely thanks to organic growth but also due to greenfield and brownfield investment. Nevertheless, some groups are still in consolidation mode, especially in the short term. Banking groups (2020) reported that non-performing loans (NPLs) were seen under control in most banking groups but were still rising in other groups. In addition attempts to meet Basel II and Basel III standards were also reported. Further in terms of product and service focus, African banking groups are still emphasizing investments in e-banking and mobile banking services. Some groups are also deploying or planning fintech development, with a primary focus on facilitating mobile money, electronic transfers, and back-office operations. Most groups also invest in lending-related fintechs, including data analytics and blockchain technology. The situation of African countries is also heterogeneous in terms of the development of financial markets and the rate of progress of financial inclusion (The European Investment Bank, 2020).

Bernanke et al., (1996) put forward theory called "financial accelerators". In this view, adverse shocks to the economy can be magnified by the deterioration of credit market conditions called financial accelerators. Moreover, theoretically Bernanke et al., (1996) interpret financial accelerators as a result of endogenous changes during the business cycle in agency costs of loans. The implication of this theory is that, at the beginning of a recession, borrowers face high agency cost having to receive a relatively lower share of the credit provided.

The business cycle is closely associated with the emergence of financial accelerators. Several recent empirical researchers who tested the financial accelerators hypothesis focused on the development of a bank's price-cost margin on the assumption that it was a proxy for the external financial premium that banks charge companies. The accelerator hypothesis implies that this price margin is opposite to the business cycle thus making bank credit more expensive during an economic downturn than would happen in an economy with constant bank margins.

To measure the potential existence of a financial accelerator, we can use price-cost margin. Previously, variations in the business cycle on the price-cost margin have been analyzed in various studies particulary in the manufacturing industries. However, these studies gave mixed results. Some found that price-cost margins behaved procyclically while some found evidence against countercyclical margins. Green and Porter (1984) predict procyclical behavior while Rotemberg and Saloner (1986) predict countercyclical behavior for margins. Domowitz et al. (1986a,b) examined patterns of changes in price-cost margins in 284 U.S. manufacturing industries during fluctuations in demand for their products. They found that margins behaved procyclically and stated that this was evident especially in more concentrated industries. Prince and Thurik (1992) focus on the cyclical behavior of price-cost margins and their relationship to concentrations in 66 Dutch manufacturing industries during the period 1974-1986. They found that the procyclical behavior of the margins depended on the size of the business cycle used. Machin and Van Reenen (1993) investigated the profit margin behaviour of 709 large British manufacturing companies during the period 1972-1986. Their findings indicate significant procyclical behavior. Chand and Sen (2000) analyzed mark-up behavior in 15 Indian manufacturing industries during the period 1973–1988. They found that mark-ups were countercyclical, particularly in concentrated industries.

To date, almost all research investigating the behavior of price-cost margin cycles focuses on the manufacturing industry. The empirical evidence of the bank's price-cost margin cycle behavior is still lacking.

In developed countries, Altunbas et al., (2016) conducted research on 1133 banks in 15 European countries from 1989 to 2012 showing that the price margin for European banks is countercyclical after controlling monetary policy, interest rate risk, loan size and certain banking industry and bank factors. Furthermore, Altunbas et al., (2016) states that there are financial accelerators working in the European economy where bank loans becomes more expensive in an economic downturn compared to an economy where the distribution of banks is constant or procyclical.

In the United States, Aliaga-Díaz & Oliviero (2010) provide evidence of accelerator behavior by American banks. In his research in the period 1984–2005, they showed that in difficult times, credit becomes more expensive than an economy with a constant margin, and companies may delay investment and production. This makes the recession worse.

In Turkey, Turgutlu (2010) provides evidence of countercyclical behavior from margins. In his research in the period 2002Q1–2008Q2, Turgutlu (2010) explains that due to countercyclicality margins banks can deepen contraction by limiting credit opportunities during periods of economic downturn. Furthermore, control variables, monetary policy, market structure and financial deepening of the economy show a significant influence on the bank's price-cost margin. The findings are also evidence of the financial accelerators mechanism in the Turkish economy during the sample period.

Research conducted in Indonesia by Yudaruddin (2017) on regional banks in Indonesia in the period 2001-2015 found there is a positive relationship between GDP and bank profitability. Meanwhile, another study conducted by Lesmana et al., (2016) on 94 conventional banks from 2011-2020 showed that GDP did not have a significant effect on the price margin of banks in Indonesia. They also found that loans have negative impact on banking margins in Indonesia.

To date, there are still few who discuss financial accelerators in the banking sector, especially in Africa. This study aims to determine the impact of business cycle using changes in gross domestic product and changes in the amount of banking loans on the amount of price-cost margin in the banking industry that covering 25 African countries starting from 2005 to 2021.

The key finding showed that when the economy was deteriorating, banks got higher price-cost margins. Furthermore, when the economy is struggling, banks will tend to hold back loans which on the other hand actually increase bank' price-cost margin. This findings proves the theory of Bernanke et al., (1996) which posits that financial accelerators is a deviation in banking behavior in times of crisis by withholding loans and raising the price of borrowed capital at high interest rates, thereby accelerating the price-cost margin income of banks but having a negative impact on the economy.

The rest of the study will be organized as follows: Part 2 Data & Methodology. Part 3 Empirical Results. Part 4 Conclusions & Limitations.

RESEARCH METHOD

Data Description

The main objective of this study was to investigate whether there was a financial accelerators behavior carried out by banks in African countries. The data used is annual data covering all African banks that available in Osiris. The author found that there were 153 banks spread across 25 African countries with a total number of observations of 1415 starting from 2005 to 2021. The author chose to use local curency exchanges to reduce bias on changes in the dollar rate against domestic currencies during the series of observation periods.

Model

In this study, to investigate whether there is a financial accelerators behavior, author used 2 business cycle models, namely changes in gross domestic product (GDP_G) and changes in loans (LOANS_G). Mankiw (2019) states that the business cycle can be measured through gross domestic product (GDP) reflects total income and expenditure in the economy. GDP is the best measure to look at the overall state of the economy. Cao (2022) states that the business cycle can also be measured through lines of loan conducted by banks because loan reflects investment and production in a country's economy.

The dependent variable used is price-cost margin (PCM). If bank's price-cost margin (PCM) increases when the economy deteriorates, it reflect the possibility of financial accelerators behavior from

African banking. In addition, when there is a decrease in the amount of loans (in the sense that banks withhold or reduce loans) but instead increase at the bank's cost margin price (PCM), it also means the possibility of financial accelerators behavior.

In this study, researchers used 3 measurement models to assess the magnitude of the price cost model following Turgutlu (2010), Diaz & Oliviero (2010) and Altunbas et al (2016). Table 1 below show 3 measurement models of bank's price-cost margin:

Table 1. Definition of Price-cost margin

Measurement	Definition
Price–cost margin I (PCM1)	(Interest income on loans/ total loans) − (interest expenses on deposits /total deposits)
Price–cost margin II (PCM2)	(Interest income−interest expenses) /total assets
Price–cost margin III (PCM3)	(Interest income−interest expenses) /total loans

The empirical model is formulated as follows

$$PCM\ i,t = \beta_0 + \beta_1 * \text{lag\_}PCM\ i,t - \beta_2 * GGP\_G_{i,t} - \beta_3 * LOANS\_G_{i,t} + \beta_4\ INFLATIONi,t$$

$$+ \beta_{3*}\beta\ i,t\ Bank\_Char + e,t$$

Following Turgutlu (2010), Diaz & Oliviero (2010) and Altunbas et al (2016), author used lag (PCM) data in this study. GDP_G formulated negatively, it means that when economic conditions deteriorate, the price-cost margin expected to be increase. Likewise, LOANS_G formulated negatively to show that a reduction in credit will actually expected increase the bank's price-cost margin. Researcher also used several control variables such as inflation, and bank characteristics such as log assets, current ratio and net profit margin

The regression model used is Estimated Generalized Least Squares (EGLS) to control the possibility of autocorrelation and heteroscedasticity in the model, by adopted GLS Weight (Cross Section Weight) and White Cross Section (Cluster Period) as covariance method coefficient. Then to control endogeneity, author using the Generalized Method of Moment / Dynamic Panel Data estimation model and adopted EGSL to control the possibility of autocorrelation and heteroscedasticity.

RESULTS AND DISCUSSION

Table 2 below summarizes the number of samples for each country. It can be observed that some countries have a limited number of banks. Even some countries have only 1 bank available. Researcher suspect that the source of Osiris' data presents incomplete data.

Table 2. Number of samples each country

Country	Number of banks	Country	Number of banks
Zimbabwe	5	Mauritius	6
Zambia	4	Mali	1
South Africa	13	Morocco	6
Uganda	3	Kenya	11
Tanzania	5	Gambia	1
Tunisia	12	Ghana	8
Togo	1	Egypt	23
Senegal	1	Cape Verde	2
Sudan	10	Ivory Coast	3
Nigeria	22	Botswana	5
Country	**Number of banks**	**Country**	**Number of banks**
Niger	1	Benin	1
Namibia	3	Burkina Faso	2
Malawi	4	Total	153

Table 3 summarizes a statistical descriptive overview of 3 PCM measurement units as well as 2 business cycle measurement units represented by GDP growth and loans growth. The median price value of both the PCM1 and PCM 3 models ranges from 8.12-10.52%. The value of PCM2 is smaller than PCM1 and PCM3 because PCM2 uses total assets as its unit of measurement. Median GDP growth is positive at 10.47% and median loans growth is positive at 11.41% with a total observation sample of 1415 observation data.

Table 3. Descriptive Statistics

	PCM1	PCM2	PCM3	GDP_G	LOANS_G
Mean	0.198225	0.04845	0.123858	0.166246	0.441
Median	0.105246	0.039906	0.081243	0.104734	0.114
Maximum	95.08752	0.489751	19.89186	5.174083	279.9
Minimum	-4.590482	-0.013526	-0.039036	-0.15518	-0.968
Std. Dev.	2.542405	0.035057	0.553245	0.412985	7.561
Skewness	36.80504	4.760989	32.91307	9.681831	35.83
Kurtosis	1373.355	45.9873	1159.477	106.4787	1321
Sum Sq. Dev.	9139.848	1.737789	432.7971	241.1674	80843
Observations	1415	1415	1415	1415	1415

Table 4 summarizes the matrix correlation between each PCM unit of measurement and the two business cycles namely GDP growth and loans growth using ordinary correlation. The author report that there is a positive correlation between the three PCM models. The two business cycles are also positively interconnected.

Table 4. Corelation Matrix Main Variable

Variable	PCM1	PCM2	PCM3	GDP_G	LOANS_G
PCM1	1				
PCM2	0.014573	1			
PCM3	0.975574***	0.16477***	1		
GDP_G	0.000672	0.034685	0.016583	1	
LOANS_G	0.00015	-0.034672	-0.002594	0.092792***	1

Note: the values in round brackets are the r-statistics and p-values are provided in square brackets. ***, **, * indicate the coefficients which are statistically significant at 1%, 5% & 10%

Tables 5, 6 and 7 report regression estimation using EGLS and GMM EGLS on the bank's price-cost margin. Author use EGLS to control the possibility of autocorrelation and heteroscedasticity by using GLS Weight (cross section weight) and white cross section (cluster period) as covariance method coefficient. Author also use Generalized Method of Moment estimation model (GMM) jointly with GLS weight. to control endogeneity issue, autocorrelation and heteroscedasticity.

The results in Tables 5, 6 and 7 show that there is a positive and significant effect of the change in GDP on the price-cost margin. These results were strong on both PCM1, PCM2 and PCM3 tests. This positive effect shows that the better the economy in a country, the higher the bank's price-cost margin, which means that the bank's profitability will increase.

On the other hand, loan growth has a significant negative effect, meaning that banks will actually get a high price-cost margin when the loan amount decreases. Table 4 corelation matrix shows that there is a positive and significant relationship between GDP growth and loan growth. This means that when the economy deteriorates, the amount of loans will be expected to be decrease. However the results

summarized in Tables 5, 6 and 7 show a contradiction where GDP growth and loan growth have opposite directions in influencing bank' price-cost margin. In order to prove there is financial accelerators on banking behavior, GDP growth should have a negative effect on bank'price-cost margins. It means that when the country's economy is bad, banks will find an increase in price-cost margin due to an increase in credit interest. Additional tests will be conducted further which we can see in Tables 8 and 9 below.

Table 5. EGLS & GMM EGLS estimates of the determinants of banks' price-cost margin 1

Variable	EGLS	EGLS	GMM EGLS	GMM EGLS
C	0.005235	0.052294	0.005235	0.052294
	(0.627324)	(1.117204)	(0.627324)	(1.117204)
PCM1(-1)	1.03486***	1.086613***	1.03486***	1.086613***
	(6.020274)	(5.931256)	(6.020274)	(5.931256)
GDP_G	0.253275***	0.292074***	0.253275***	0.292074***
	(4.393233)	(6.374734)	(4.393233)	(6.374734)
LOAN_G	-0.284245***	-0.330749***	-0.284245***	-0.330749***
	(-4.501939)	(-5.224699)	(-4.501939)	(-5.224699)
INFLATION		-4.983361**		-4.983361**
		(-2.217764)		(-2.217764)
LOG(ASSETS)		-0.00133		-0.00133
		(-0.770153)		(-0.770153)
CURRENT_RATIO		-0.006296		-0.006296
		(-0.399323)		(-0.399323)
PROFIT_MARGIN		0.017009		0.017009
		(1.584605)		(1.584605)
Adjusted R Square	0.813596	0.855304	0.813596	0.855304
Total Observation	1414	1399	1414	1399

Note: the values in round brackets are the t-statistics and p-values are provided in square brackets. ***, **, * indicate the coefficients which are statistically significant at 1%, 5% & 10%

Table 6. EGLS & GMM EGLS estimates of the determinants of banks' price-cost margin 2

Variable	EGLS	EGLS	GMM EGLS	GMM EGLS
C	0.004285***	0.052294	0.004285***	0.003949*
	(4.938429)	(1.117204)	(4.938429)	(1.803885)
PCM2(-1)	0.875345***	1.086613***	0.875345***	0.889163***
	(49.9428)	(5.931256)	(49.9428)	(64.56983)
GDP_G	0.006058***	0.292074***	0.006058***	0.004173**
	(4.742517)	(6.374734)	(4.742517)	(2.353147)
LOAN_G	-0.0000248*	-0.330749***	-0.0000248*	-0.0000081
Variable	**EGLS**	**EGLS**	**GMM EGLS**	**GMM EGLS**
	(-1.758143)	(-5.224699)	(-1.758143)	(-1.120468)
INFLATION		-4.983361**		0.052429
		(-2.217764)		(0.581796)
LOG(ASSETS)		-0.00133		-0.0000552
		(-0.770153)		(-0.682807)
CURRENT_RATIO		-0.006296		0.000193
		(-0.399323)		(0.278392)
PROFIT_MARGIN		0.017009		0.002612***
		(1.584605)		(3.335464)
Adjusted R Square	0.911764	0.855304	0.911764	0.898745
Total Observation	1416	1399	1416	1399

Note: the values in round brackets are the t-statistics and p-values are provided in square brackets. ***, **, * indicate the coefficients which are statistically significant at 1%, 5% & 10%

Tabel 7. EGLS & GMM EGLS estimates of the determinants of banks' price-cost margin 3

Variable	EGLS	EGLS	GMM EGLS	GMM EGLS
C	0.020633***	0.003818	0.020633***	0.003818
	(5.223111)	(0.27)	(5.223111)	(0.27)
PCM3(-1)	0.791726***	0.775615***	0.791726***	0.775615***
	(20.29647)	(16.96658)	(20.29647)	(16.96658)
GDP_G	0.03577***	0.027163***	0.03577***	0.027163***
	(3.775585)	(3.378288)	(3.775585)	(3.378288)
LOAN_G	-0.019197**	-0.016317*	-0.019197**	-0.016317*
	(-2.334612)	(-2.056528)	(-2.334612)	(-2.056528)
INFLATION		-0.092989		-0.092989
		(-0.246304)		(-0.246304)
LOG(ASSETS)		0.000569		0.000569
		(1.031769)		(1.031769)
CURRENT_RATIO		0.009093		0.009093
		(1.409672)		(1.409672)
PROFIT_MARGIN		0.00035		0.00035
		(0.144741)		(0.144741)
Adjusted R Square	0.678835	0.709746	0.678835	0.709746
Total Observation	1416	1401	1416	1401

Note: the values in round brackets are the t-statistics and p-values are provided in square brackets. ***, **, * indicate the coefficients which are statistically significant at 1%, 5% & 10%

Additional Test

In order to ensure that there is financial accelerator behavior, the author test how banks behave when the economy deteriorates. Samples are limited based on economic growth measured using gpd growth. In conditions when the country's economy is bad or declining, economic growth and loan growth are expected to be negative effect on bank's price-cost margin.

Tables 8 and 9 below report evidence of such financial acceleration using EGLS and GMM EGLS when GDP_growth<0. Negative regression coefficient showed that in a downturn economy, reduction on loan, actually results in an increase in bank price margins. Furthermore, a negative coefficient on GDP growth indicates that the worse the economy, the higher the bank's price margin.

Table 8. EGLS estimates of the determinants of banks' price-cost margin if GDP growth <0

Variable	PCM1 (EGLS)	PCM2 (EGLS)	PCM3 (EGLS)
C	0.006534***	0.006172***	0.0033*
	(387.5347)	(241.2454)	(7.251316)
PCM3(-1)	0.989638***	0.735889***	0.904278***
	(480.4859)	(1129.043)	(169.1198)
GDP_G	-0.039196***	-0.030496***	-0.285047***
	(-191.8)	(-13155.13)	(-422.3406)
LOAN_G	-0.154757***	-0.005703***	-0.271411**
	(-88.18444)	(-160.0004)	(-32.59362)
Adjusted R Square	0.99268	0.999856	0.986562
Total Observation	44	44	43

Note: the values in round brackets are the t-statistics and p-values are provided in square brackets. ***, **, * indicate the coefficients which are statistically significant at 1%, 5% & 10%

Table 9. GMM EGLS estimates of the determinants of banks' price-cost margin if GDP growth <0

Variable	PCM1 (GMM)	PCM2 (GMM)	PCM3 (GMM)
C	0.006534***	0.006172***	0.003024**
	(387.5347)	(241.2623)	(12.97577)
PCM3(-1)	0.989638***	0.735889***	0.963622***
	(480.4859)	(1129.18)	(832.074)
GDP_G	-0.039196***	-0.030496***	-0.044349**
	(-191.8)	(-13128.11)	(-44.3284)
LOAN_G	-0.154757***	-0.005703***	-0.091502**
	(-88.18444)	(-159.9812)	(-27.03896)
Adjusted R Square	0.99268	0.999856	0.999964
Total Observation	44	44	43

Note: the values in round brackets are the t-statistics and p-values are provided in square brackets. ***, **, * indicate the coefficients which are statistically significant at 1%, 5% & 10%

DISCUSSION

The financial accelerator, an economic concept, highlights how small shocks in the economy can be intensified as they move through the financial system, causing more significant impacts on real economic activity. Ben Bernanke et al. in the early 1990s contributed significantly to this idea, developing a model that incorporated the feedback loop between financial markets and the real economy.

In their 1996 work, Bernanke et al. introduced the theory of "financial accelerators," explaining that when credit market conditions worsen (referred to as financial accelerators), negative economic shocks can become more severe. They attributed the emergence of financial accelerators to natural changes in loan management costs during the business cycle. This theory suggests that during a recession's onset, borrowers face increased costs and receive a smaller share of available credit.

The implication is that when borrowing constraints are present, such as limited access to credit for firms or households, small shocks reducing income or asset values can lead to more significant reductions in spending. This is because economic actors may be compelled to cut back on consumption or investment due to their inability to smooth out the shocks' impact.

In this research, the author found that in unfavorable conditions, particularly when GDP growth is negative, the loan levels are actually limited. Based on tables 7, 8, and 9, the negative coefficients on loan growth indicate that during these challenging periods, the reduction in disbursed credit is accompanied by a significant increase in the price-cost margin. These results hold strong for all three dependent variables PCM1, PCM 2, and PCM 3, whether using the EGLS or GMM regression methods. This proves the existence of financial accelerators in banks in African countries.

The findings of financial accelerators in developing countries in Africa are consistent with other findings from research conducted in developed countries by Altunbas et al., (2016) in their study of 1133 banks in Europe for the period 1989 to 2012. Similarly, research conducted by Aliaga-Díaz & Oliviero (2010) on banks in America for the period 1984–2005. In Turkey, Turgutlu (2010) also found indications of the existence of financial accelerators.

CONCLUSION

The behavior of price-cost margins carried out by banks is an issue that needs to be looked at further because it can damage economic development. Bernanke et al., (1996) put forward the classic theory of BGG called financial accelerators where there is a "different" form of behavior where during a crisis banks will hold loans and raise the price of borrowed capital with high interest rates, thus creating a negative impact on the economy. The implication of this theory is that, at the beginning of a recession, borrowers face high agency cost having to receive a relatively lower share of the credit provided.

Africa is a region dominated by developing countries where it has a relatively higher average economic growth than developed countries. Author found evidence of financial accelerators behavior

carried out by African banks. Using a sample of 153 banks with 1415 observational data from 2005 to 2021, the author found that loan was negatively related to the amount of price-cost margin received by the bank. Furthermore, when there is a recession marked by worsening economic growth, the reduction in loans actually increases bank profits which are characterized by higher price-cost margins. Researchers also found that the worse the recession, the higher the price-cost margin that banks receive.

This study has limitations. First, in the additional test, the author was only able to find 44 observational data, when controlling negative GDP_growth. The small number of samples in the additional test is due to in the 17-year period, the economic downturn occurred in less frequent conditions than the increase in the economy. Second, the Author also has limitations in the data source. The Osiris data source has only 135 banks across Africa covering 25 countries with a total of 1415 annual data observations. Even some countries have only 1 bank available. Researcher suspect that the source of Osiris' data presents incomplete data. Third, author does not control the concentration of the market in its independent variables as reported by other researchers.

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