Research on Relationship between Financial Inclusion and Economic Growth of Rwanda: Evidence from Commercial Banks with ARDL Approach

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Abstract: This study examines the relationship between financial inclusion and economic growth of Rwanda using annual data from 2004 to 2016. We used ARDL as it is a new approach to the problem of testing the existence of a level relationship between a dependent variable and a set of regressors, when it is not known with certainty whether the underlying regressors are trend- or first-difference stationary as developed by Pesaran. The results of our study revealed that there is long-run relationship between financial inclusion and economic growth of Rwanda.

Keywords: Financial inclusion, Economic growth, Commercial bank, ARDL

1. Introduction

The government of Rwanda has got rapid growth since 2000 and has set vision 2020 where service industry was given more emphasis to boost economic growth. It is in this line that they have set a target of having 90% of Rwandans financially included by the year 2020. Different strategies were put in place to increase financial inclusion in Rwanda. Among these strategies, we can mention licensing different foreign commercial banks and creating SACCOs for each sector among 416 sectors in Rwanda. It is of great importance for researchers to know whether the efforts that the government of Rwanda has put in yielded results. It is in this context that we have conducted this research about financial inclusion and economic growth of Rwanda. Although financial inclusion has become topical on the global policy agenda for sustainable development, economic literature on financial inclusion is still in its infancy (Park & Mercado, 2015).

When measuring access and use of financial services two indicators were used by Beck et al (2007) i.e the number of branches and ATMs per capita and per square kilometer for 89 countries (Beck, Demirguc-Kunt, & Martinez Peria, 2007). This poses a problem as the size of countries vary. A small country may show a good number of ATMs per kilometer just because it is small. The number of branches may be big for a big country and still more people do not have access. This research considers only one country to facilitate use of more indicators and show the real impact of financial institutions on financial inclusion and the relationship between financial inclusion and economic growth in Rwanda.

2. Literature Review

Different authors have defined financial inclusion as being able to get access to formal financial institutions or using financial services. See (Bayero, 2015; Naceur et al., 2015; Zins & Weill, 2016; Diniz, Birochi, & Pozzebon, 2012).

On this basis, the role played by commercial banks is worthy to discuss. Research has shown that banks increase growth (Chakraborty & Ray, 2006). Financial intermediation promotes growth (Bencivenga & Smith, 1991). What is amazing is that some researches show that tighter bank competition enhances the occurrence of bank failures. Thus, measures that increase bank competition could undermine financial stability (Fungáčová & Weill, 2013). Again, microfinance loans reduce poverty and foster economic growth (Berhane & Gardebroek, 2011), micro-loans increase employment (Baldi, Guido and Sipilova, 2014). (Liang & Reichert, 2012) concluded that that growth in NBFIs has a statistically significant negative impact on economic growth. Vaithilingam, Guru, & Shanmugam (2003) found that an increase in commercial bank loans to the private sector has a direct effect on real income. According to (Mandel & Seydl, 2016) loan supply exerts a notable drag on economic activity. Not only ordinary banks contribute to economic growth but also Islamic banks Daly & Frikha (2016). Most recently, Kim, Yu, & Hassan (2018) found that financial inclusion has a positive effect on economic growth. It is evidenced by many authors that financial inclusion is of paramount importance. Demirgüç-Kant & Klapper (2012) said that inclusive financial systems benefit poor people and other disadvantaged groups. Mandel & Seydl (2016) showed that financial inclusion contributes positively to financial stability.

It is important to highlight what literature says about financial inclusion and economic growth. Most researchers have focused on role financial development on economic growth rather than financial inclusion and economic growth. For example, (Claessens & Laeven, 2003) show that financial development contributes to economic growth. They share the view with many authors who agreed that financial development causes economic growth, see (Shahbaz, Rehman, & Muzaffar, 2015; Sehrawat & Giri, 2012; Shahbaz & Mafizur Rahman, 2014; Anwar & Sun, 2011).

Masoud & Hardaker (2012) emphasized that stock market development (as part of financial development) has a significant effect on economic growth. Valickova, Havranek, & Horvath (2015) also showed that stock markets support faster economic growth than other financial intermediaries. Durusu-Ciftci, Ispir, & Yetkiner (2016) showed that debt from credit markets and equity from stock markets are two long-run determinants of GDP per capita. According to R. King & Levine (1993), at the cross-country level, evidence indicates that various measures of financial development (including assets of the financial intermediaries, liquid liabilities of financial institutions, domestic credit to private sector, stock and bond market capitalization) are robustly and positively related to economic growth. Shan, Morris, & Sun (2001) also said that there is little support for the hypothesis that finance "leads" growth, and caution must be exercised in making general conclusions about this relationship. Rousseau & D'Onofrio (2013) found unidirectional links from financial development to measures of real activity for about two-thirds of Sub Saharan African countries.

According to Sehrawat & Giri (2016) financial development and economic growth cause rural-urban income inequality. Financial inclusion is complementary to economic growth as the two contribute toward poverty alleviation (Onalapo, 2015). Literature shows that access to finance is associated with faster growth (Beck, Demirgüç-Kunt, & Maksimovic, 2005). These differences in findings and need for focus on financial inclusion motivated us to conduct a research on financial inclusion and economic growth.

3. Methodology

The study takes into consideration 13 years from 2004 to 2016. Three dimensions of financial inclusion were used to measure financial inclusion. These are access, penetration and usage as they are recommended by many authors as indicators of financial inclusion. This refers to Global financial inclusion database (Demirguc-Kunt, Klapper, Singer, & Van Oudheusden, 2015) as

these dimensions are used. Also, Kodan & Chhikara (2013), show specific measurements of financial inclusion, where depth or penetration was measured by bank accounts per 1,000 population; availability has been measured by the number of bank branches and number of ATMs per 100,000 people; and usage is measured by volumes of credit plus deposit related to the gross domestic product (GDP). The same dimensions were used by Sharma (2016) in Nexus between financial inclusion and economic growth: evidence from the emerging Indian economy and Sarma (2008) in index of financial inclusion. In this research, Automated teller machines per 100,000 adults people and % of branches of commercial banks per 1,000 km² were used as proxies of Access. % of deposit accounts with commercial banks per 1,000 adults were used as proxy of penetration and Outstanding deposits with commercial banks (% of GDP) along with Outstanding loans with commercial banks (% of GDP) were used as proxies of usage. GDP was used as a proxy of economic growth. The described dimensions are relation to commercial banks as part of financial inclusion. These dimensions are used to study the relationship between financial inclusion and economic growth.

3.1 Econometric Model

$$\text{LogGDP} = \mu + \mu_1 \text{LogATMKM} + \mu_2 \text{LogATMAD} + \mu_3 \text{LogBRAKM} + \mu_4 \text{LogBRAD} + \mu_5 \text{LogDEPAD} + \mu_6 \text{LogLACAD} + \mu_7 \text{LogOTDP} + \mu_8 \text{LogOTL} + \epsilon$$

Where:

ATMK stands for Automated Teller Machines per 1,000 km²

ATMAD : Automated Teller Machines per 100,000 adults

BRAKM : Branches of commercial banks per 1,000 km²

BRAD : Branches of commercial banks per 100,000 adults

DPAD : Deposit accounts with commercial banks per 1,000 adults

LACAD : Loan accounts with commercial banks per 1,000 adult

OTDP : Outstanding deposits with commercial banks (% of GDP)

OTL : Outstanding loans with commercial banks (% of GDP)

GDP : Gross Domestic Products

μ, α, β are constants

ϵ : Error term

4. Results and Discussion

Unit root test shows that all the variables were stationary at the level or first difference (at 5% and 10%). The pre-condition of running co-integration the unit root of variables must be checked. Following this prerequisite condition, it is necessary that data should be stationary. The variables which are not stationary at level are made stationary after taking 1st difference as they are expected to be stationary of first order. But it is not necessary that all series for which null hypothesis of unit root is accepted may be integrated of first order. The lag length was selected by Akaike Information Criteria (AIC). The variables analyzed for stationarity are Gross Domestic Product (GDP), Automated Teller Machines per 1,000 km² (ATMKM), Automated Teller Machines per 100,000 adults (ATMD), Branches of commercial banks per 1,000 km² (BRAKM), Branches of commercial banks per 100,000 adults (BRAD), Deposit accounts with commercial banks (DPAD), Deposit accounts with commercial banks per 1,000 adults, Loan accounts with commercial banks per 1,000 adults (LACD), Outstanding deposits with commercial banks (% of GDP) (OTDP), Outstanding loans with commercial banks (% of GDP) (OTL). The null hypothesis of all the unit root tests performed state the existence of unit root, the alternative hypothesis state the absence of it. The results are derived by using Eviews 9. Following detailed performed tests are given further: Unit roots tests are performed with ADF tests.

Because of mixture of first and second difference, we are allowed to use ARDL. This technique was selected for two main reasons: First, it is effective in executing the short- and long-term relationships between the different variables that do not have the same order of integration,

provided that such variables are stationary in level; I (0), and/or they are stationary in the first difference; I (1). Second, the ARDL approach can remove the problems associated with omitted variables and auto-correlation. Third, it can be useful for a small sample size application. The same reason is shared by other researchers such as Adel & Imen (2018) and Shahzad, Jan, Ali, & Ullah (2018).

We used ARDL as it is a new approach to the problem of testing the existence of a level relationship between a dependent variable and a set of regressors, when it is not known with certainty whether the underlying regressors are the trend- or first-difference stationary (Pesaran, Shin, & Smith, 2001). This has been used widely by different as it is the best and new approach (Goh, Sam, & Mcnown, 2017; Tursoy & Faisal, 2017; Bildirici & Ozaksoy, 2017; Murthy & Okunade, 2016).

The results of ARDL, the bound test for co-integration test reveals that there is long run relationship between Gross Domestic Product, Automated teller Machines per adult people, Automated teller Machines per square km, Bank branches per adult people, Branches per square km, deposits accounts per adults people, loan accounts per adults people, Outstanding loans, and Outstanding deposits per adults people at 5 percent level of significance. F-statistic of 6.100343 is bigger than the upper bound critical value of 3.97; therefore the null hypothesis of no co-integration is rejected at 1% level of significance which testifies the presence of the long-run relationship between GDP and all the explanatory variables.

Based on the results of ARDL bounds test, all the variables jointly affect the dependent variable at 1% in long-run. Note that in the short-run the following variables are significant: deposit accounts per adults people, branch per square km, branches per adults people, loan accounts per adults people, outstanding deposits per adults people and outstanding loans. Automated teller machines per square km and branches per square km are not significant but, we hope that they can be adjusted quarterly as error correction term has the negative sign.

Table 1: ARDL Bounds Test

Date: 01/11/18 Time: 19:04		
Sample: 2004Q2 2016Q4		
Included observations: 48		
Null Hypothesis: No long-run relationships exist		
Test Statistic	Value	K
F-statistic	6.100343	9
Critical Value Bounds		
Significance	I0 Bound	I1 Bound
10%	1.88	2.99
5%	2.14	3.3
2.5%	2.37	3.6
1%	2.65	3.97

Table 2: ARDL Cointegrating short and Long Run Form

Dependent Variable: LGDP1		
Selected Model: ARDL(1, 1, 1, 1, 0, 0, 1, 1, 1)		

Date: 10/31/17 Time: 16:09				
Sample: 2004Q1 2016Q4				
Included observations: 49				
Cointegrating Form/short run				
Variable	Coefficient	Std. Error	t-Statistic	Prob
D(LDPAD1)	0.731015	0.119795	6.102214	0.0000
D(LBRAKM1)	-23.674638	5.001460	-4.733545	0.0000
D(LBRAD1)	22.245989	4.968371	4.477522	0.0001
D(LATMKM1)	-3.166591	2.032566	-1.557928	0.1288
D(LATMD1)	3.025058	2.042550	1.481020	0.1481
D(LLACD1)	0.761805	0.103269	7.376910	0.0000
D(LOTDP1)	0.258018	0.079300	3.253694	0.0026
D(LOTL1)	2.816872	0.354145	7.954011	0.0000
CointEq(-1)	-0.087853	0.065349	-1.344359	0.1880
Long Run Coefficients				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
LDPAD1	2.252500	1.733795	1.299173	0.2029
LBRAKM1	-6.383135	20.661505	-0.308939	0.7593
LBRAD1	2.150652	20.722928	0.103781	0.9180
LATMKM1	-36.044160	31.704339	-1.136884	0.2638
LATMD1	34.433133	31.050382	1.108944	0.2755
LLACD1	4.119077	2.832496	1.454222	0.1553
LOTDP1	1.754153	1.462681	1.199272	0.2390
LOTL1	4.842998	2.619126	1.849089	0.0734
C	11.929335	8.707051	1.370078	0.1799

ARDL results generated the following equation:

$$LGDP_t = 11.9293 + 2.2525 * LDPAD_t - 6.3831 * LBRAKM_t + 2.1507 * LBRAD_t - 36.0442 * LATMKM_t + 34.4331 * LATMD_t + 4.1191 * LLACD_t + 1.7542 * LOTDP_t + 4.8430 * LOTL_t$$

4.1 Results of Pair Wise Granger Causality Test

The significance level is at 5% and 10% and we are only interested in knowing the causality between dependent and independent variables. To investigate the causal relationship between two variables with the help of Granger causality test, the above table shows the following: Granger causality test showed the following results: Loan Accounts per Adults People (LACAD) does not Granger cause Gross domestic Product(GDP) versus GDP does not Granger cause LACAD. Since P-value (.0029) is less than .05 we conclude that causality runs from GDP to LACAD. Meaning that direction of causality runs from GDP to LACAD. But LACAD does not Granger cause GDP in Rwanda as associated P-value is not significant.

Outstanding loans does not Granger cause Gross Domestic product versus Gross Domestic product does not Granger cause Outstanding loans showed unidirectional causality where Outstanding loans Granger cause Gross Domestic Products. The above findings are in line with what theories show that loans positively affect economic growth. For example, Du (2011) found that the increase in the supply of long-term loans can promote the economic growth. On the other hand, Donou-Adonsou & Sylwester (2017) found no relationship between commercial banks loans and raise in economic growth.

Our study reveals that Loan Accounts per Adult People granger causes outstanding deposits and that deposit does not Granger cause loan accounts. The results of our study are contrary to

findings of Boukhatem & Ben Moussa (2018) which revealed that deposits are likely to increase the scale of loans in MENA countries.

Our study reveals that there is bidirectional causality between deposits accounts and branches per square km. Note that nonsignificant values are omitted.

Table 3: Pairwise Granger Causality Tests

Date: 10/31/17 Time: 16:36			
Sample: 2004Q1 2016Q4			
Lags: 2			
Null Hypothesis:	Obs	F-Statistic	Probability
LDPAD1 does not Granger Cause LGDP1	47	1.77562	0.1819
LGDP1 does not Granger Cause LDPAD1		1.29369	0.2850
LBRAKM1 does not Granger Cause LGDP1	50	1.70226	0.1938
LGDP1 does not Granger Cause LBRAKM1		0.47261	0.6264
LBRAD1 does not Granger Cause LGDP1	50	1.58930	0.2153
LGDP1 does not Granger Cause LBRAD1		0.47810	0.6231
LATMKM1 does not Granger Cause LGDP1	49	2.09187	0.1356
LGDP1 does not Granger Cause LATMKM1		0.08713	0.9167
LATMD1 does not Granger Cause LGDP1	49	2.04299	0.1418
LGDP1 does not Granger Cause LATMD1		0.08890	0.9151
LLACD1 does not Granger Cause LGDP1	50	1.95496	0.1534
LGDP1 does not Granger Cause LLACD1		6.68661	0.0029
LOTDP1 does not Granger Cause LGDP1	50	1.28310	0.2871
LGDP1 does not Granger Cause LOTDP1		0.14794	0.8629
LOTL1 does not Granger Cause LGDP1	50	2.60966	0.0847
LGDP1 does not Granger Cause LOTL1		1.97264	0.1509
LBRAKM1 does not Granger Cause LDPAD1	47	1.34218	0.2722
LDPAD1 does not Granger Cause LBRAKM1		3.79739	0.0305
LBRAD1 does not Granger Cause LDPAD1	47	1.96811	0.1524
LDPAD1 does not Granger Cause LBRAD1		4.96020	0.0116
LATMKM1 does not Granger Cause LDPAD1	46	0.09955	0.9055
LDPAD1 does not Granger Cause LATMKM1		14.1622	2.E-05
LATMD1 does not Granger Cause LDPAD1	46	0.10916	0.8968
LDPAD1 does not Granger Cause LATMD1		14.0563	2.E-05
LLACD1 does not Granger Cause LDPAD1	47	0.28679	0.7521
LDPAD1 does not Granger Cause LLACD1		5.35341	0.0085
LOTDP1 does not Granger Cause LDPAD1	47	1.79317	0.1789
LDPAD1 does not Granger Cause LOTDP1		2.86480	0.0682
LOTL1 does not Granger Cause LDPAD1	47	2.29670	0.1131
LDPAD1 does not Granger Cause LOTL1		0.38424	0.6833
LBRAD1 does not Granger Cause LBRAKM1	50	1.72716	0.1894
LBRAKM1 does not Granger Cause LBRAD1		1.64146	0.2051
LATMKM1 does not Granger Cause LBRAKM1	49	0.08087	0.9224
LBRAKM1 does not Granger Cause LATMKM1		10.6890	0.0002
LATMD1 does not Granger Cause LBRAKM1	49	0.07015	0.9324
LBRAKM1 does not Granger Cause LATMD1		10.3105	0.0002
LLACD1 does not Granger Cause LBRAKM1	50	0.13981	0.8699
LBRAKM1 does not Granger Cause LLACD1		4.28129	0.0199
LOTDP1 does not Granger Cause LBRAKM1	50	3.22388	0.0492
LBRAKM1 does not Granger Cause LOTDP1		2.44020	0.0986
LOTL1 does not Granger Cause LBRAKM1	50	0.11683	0.8900
LBRAKM1 does not Granger Cause LOTL1		0.01653	0.9836
LATMKM1 does not Granger Cause LBRAD1	49	0.05998	0.9419
LBRAD1 does not Granger Cause LATMKM1		11.2261	0.0001
LATMD1 does not Granger Cause LBRAD1	49	0.05224	0.9492

LBRAD1 does not Granger Cause LATMD1		10.9240	0.0001
LLACD1 does not Granger Cause LBRAD1	50	0.09494	0.9096
LBRAD1 does not Granger Cause LLACD1		4.27167	0.0200
LOTDP1 does not Granger Cause LBRAD1	50	2.93081	0.0636
LBRAD1 does not Granger Cause LOTDP1		2.22517	0.1198
LOTL1 does not Granger Cause LBRAD1	50	0.07187	0.9308
LBRAD1 does not Granger Cause LOTL1		0.00158	0.9984
LATMD1 does not Granger Cause LATMKM1	49	4.59461	0.0154
LATMKM1 does not Granger Cause LATMD1		4.46010	0.0172
LLACD1 does not Granger Cause LATMKM1	49	1.27014	0.2909
LATMKM1 does not Granger Cause LLACD1		3.05354	0.0573
LOTDP1 does not Granger Cause LATMKM1	49	2.94759	0.0629
LATMKM1 does not Granger Cause LOTDP1		3.60674	0.0354
LOTL1 does not Granger Cause LATMKM1	49	0.30334	0.7399
LATMKM1 does not Granger Cause LOTL1		1.84394	0.1702
LLACD1 does not Granger Cause LATMD1	49	1.26936	0.2911
LATMD1 does not Granger Cause LLACD1		2.86424	0.0677
LOTDP1 does not Granger Cause LATMD1	49	2.75521	0.0746
LATMD1 does not Granger Cause LOTDP1		3.58046	0.0363
LOTL1 does not Granger Cause LATMD1	49	0.31533	0.7312
LATMD1 does not Granger Cause LOTL1		1.76704	0.1827
LOTDP1 does not Granger Cause LLACD1	50	2.39624	0.1026
LLACD1 does not Granger Cause LOTDP1		2.74491	0.0750
LOTL1 does not Granger Cause LLACD1	50	0.87565	0.4236
LLACD1 does not Granger Cause LOTL1		2.60951	0.0847
LOTL1 does not Granger Cause LOTDP1	50	1.90321	0.1609
LOTDP1 does not Granger Cause LOTL1		3.13334	0.0532

4.2 Results of the diagnostic test

Figure 1: Jarque-bera test (Normality test)

The assumptions of this test are as follows: H_0 (null hypothesis): The residuals are normally distributed.

H_1 : The residuals are not normally distributed.

The null hypothesis is rejected when the probability is less than 10%. The null hypothesis is not rejected i.e. residuals are normally distributed because the probability of 54.56 % is greater than the significant level of 10%.

4.3 Results of serial correlation

Table 4: Breusch-Godfrey Serial Correlation LM Test

F-statistic	0.780291	Prob. F(2,31)		0.4671
Obs*R-squared	2.348499	Prob. Chi-Square(2)		0.3091
Test Equation:				
Dependent Variable: RESID				
Method: ARDL				
Date: 10/31/17 Time: 16:13				
Sample: 2004Q2 2016Q4				
Included observations: 49				
Presample and missing interior, value lagged residuals set to zero.				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
LGDP1(-1)	0.012455	0.070210	0.177396	0.8604
LDPAD1	0.054712	0.131079	0.417400	0.6793
LDPAD1(-1)	-0.013486	0.083724	-0.161082	0.8731
LBRAKM1	-1.360114	5.483027	-0.248059	0.8057
LBRAKM1(-1)	1.717404	6.605104	0.260012	0.7966
LBRAD1	1.264520	5.433210	0.232739	0.8175
LBRAD1(-1)	-1.696657	6.615917	-0.256451	0.7993
LATMKM1	-0.178016	2.069493	-0.086019	0.9320
LATMD1	0.168332	2.079167	0.080961	0.9360
LLACD1	0.007417	0.107759	0.068829	0.9456
LLACD1(-1)	-0.002046	0.130915	-0.015627	0.9876
LOTDP1	-0.028067	0.085493	-0.328301	0.7449
LOTDP1(-1)	0.018755	0.085038	0.220546	0.8269
LOTL1	-0.045441	0.368694	-0.123247	0.9027
LOTL1(-1)	0.050982	0.367571	0.138700	0.8906
C	-0.272883	0.532421	-0.512533	0.6119
RESID(-1)	-0.012728	0.205955	-0.061800	0.9511
RESID(-2)	-0.267225	0.214165	-1.247752	0.2215
R-squared	0.047929	Mean dependent var		2.67E-14
Adjusted R-squared	-0.474175	S.D. dependent var		0.035719
S.E. of regression	0.043369	Akaike info criterion		-3.161303
Sum squared residuals	0.058306	Schwarz criterion		-2.466348
Log-likelihood	95.45192	Hannan-Quinn criter.		-2.897638
F-statistic	0.091799	Durbin-Watson stat		2.062464
Probability(F-statistic)	0.999998			

Ho: No serial correlation (errors are not correlated).

H1: There is a serial correlation.

The results show that there is no serial correlation up to the 16th lag because all probabilities are more than 10% level of significance under correlogram of residuals squared and correlogram -q-statistics. Our results show that error terms are not serially correlated.

Figure 2: Stability test

Figure 2 shows that the CUSUM plot cross the 5% critical lines. Therefore, we can safely conclude that the estimated parameters for the short-dynamics and long-run of the gross domestic products in Rwanda are stable.

5. Conclusion and Recommendations

The objective of this research is to study the relationship between financial inclusion and economic growth of Rwanda. We used different financial inclusion indicators taking into account only commercial banks. Our research covers 13 years from 2004 to 2016. We applied ARDL approach and Granger causality tests in this research.

The results of ARDL, the bound test for co-integration test reveal that there is long-run relationship between Gross Domestic Product, Automated teller Machines per adult people, Automated teller Machines per square km, Bank branches per adult people, Branches per square km, deposits accounts per adults people, loan accounts per adults people, Outstanding loans, and Outstanding deposits per adults people at 5 percent level of significance. The calculated F-statistic of 6.100343 is bigger than the upper bound critical value of 3.97; therefore the null hypothesis of no co-integration is rejected even below at 1% level of significance which testifies the presence of a long-run relationship between GDP and all explanatory variables.

Based on the results of ARDL bounds test, all the variables jointly affect the dependent variable at 1% in the long-run. Note that in the short-run the following variables are significant: deposit accounts per adults people, branch per square km, branches per adults people, loan accounts per adults people, outstanding deposits per adults people and outstanding loans. Automated teller machines per square km and branches per square km are not significant, but we hope that they can be adjusted quarterly as error correction term has the negative sign.

Granger causality test showed the following results: Loan Accounts per Adults People (LACAD) does not Granger cause Gross domestic Product (GDP) versus GDP does not Granger cause LACAD. Since P-value (.0029) is less than .05 we conclude that causality runs from GDP to LACAD, meaning that direction of causality runs from GDP to LACAD. But LACAD does not Granger cause GDP in Rwanda as associated P-value is not significant. Outstanding loans does not Granger cause Gross Domestic product versus Gross Domestic product does not Granger cause Outstanding loans showed unidirectional causality where Outstanding loans Granger cause Gross Domestic Products. This is in line with what theories show that loans cause

economic growth. We found that there is bidirectional causality between deposits accounts and branches per square km.

ARDL results showed that all the dependent variables explain independent variable. On the basis of ARDL and Granger causality test, we find that financial inclusion cause economic growth in Rwanda. As the results of our study revealed that commercial banks loans contributes to economic growth of Rwanda, the government of Rwanda should set policies that ease loan access for more people to take loans. This would boost financial inclusion as well as economic growth.

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