



Examining the Causal Relationship between Financial Intermediation and Poverty in Selected Developing Countries

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ABSTRACT

Formal financial intermediation and the financial dimensions which include financial efficiency, financial access and financial stability can be tools that can be useful in providing the much needed finance for households and businesses. The objective of this article is to examine the causal relationship between financial dimension in the financial intermediation setting and poverty. This study used annual data from 2004 to 2018 for a panel of selected developing countries. The pooled mean group estimator in a panel ARDL framework was employed to examine the causal relationship between financial dimensions and poverty. Results revealed a long run causal relationship between the financial dimensions and poverty with no significant short run causal relationships. Furthermore, the study highlights the great importance of multidimensionality of poverty and that how poverty is measured is significant to the nature of the causal links with financial dimensions. The findings are expected to encourage developing countries to particularly pay attention to how poverty is measured and how different financial dimensions are important for an inclusive financial system.

Keywords: Poverty, Financial Intermediation, Financial Access, Pooled Mean Group Approach

JEL Classifications: G0, G2, O12

1. INTRODUCTION

Despite technological advances and significant developments in the financial markets and systems, poverty remains one of the ravaging challenges in developing countries. In examining the role of the financial sector in poverty and inequality challenges most studies with the exception of Rewilak (2017) and, Zhang and Naceur (2019) focused on the size of the financial sector than the other financial dimensions such as financial efficiency, financial access and financial stability. There is no conclusive consensus theoretically on the impact of financial development and income distribution (Demirguc-Kunt and Levine, 2009). Therefore, empirical studies on the link between finance and poverty are an ongoing research. Moreover, the causal relationship between financial intermediation and the dimensions of finance in the financial intermediation space is under researched. De Haan and Sturm (2017) recommended that the empirical studies should examine other characteristics of finance rather than only the size of the financial sector.

The debate on the role of financial intermediaries, especially banks, dates back to the 18th century noting banks as greatest engines ever invented to drive the economy Hamilton (1781) in Hammond (1991, p. 36). However, Adams (1819) in Hammond (1991, p. 36) argues that banks harm the “morality, tranquillity, and even wealth” of nations. Since then relationship between finance and poverty reduction has remained an on-going debate (Nanziri, 2016). Financial sector development does not necessarily mean increased intermediation and poverty reduction rather, the effect of finance to poverty reduction is dependent on the transmission channel (Jeanneney and Kpodar, 2011). Beck et al. (2005) stated that financial development of the Nigerian economy in the 1980s resulted in financial disintermediation. In this regard, the role of financial intermediation on poverty is not a one size fits all. The study on linkages between the formal finance and the poor in developing countries remains incomplete.

This article contributes to the board of knowledge in three ways. Firstly, the article included the other dimension of finance

(financial access, financial efficiency and financial instability) in the examination of financial intermediation and poverty in developing countries. Secondly, different poverty proxies were used to examine the causal relationship between financial intermediation and poverty. This causal analysis between poverty and financial dimensions where examined in the financial intermediation space. Thirdly, the article further examined the causal relationships between the financial dimensions themselves. Literature on the study of the other financial dimensions besides financial development on either poverty or inequality is very scant (De Haan and Sturm, 2017; Zhang and Naceur 2019).

Therefore, the aim of this study is to examine the causality between financial dimensions in the financial intermediation setting and poverty in selected developing countries. The results confirm that the effect of financial dimension on poverty varied and depends on how poverty is measured. Furthermore, the results suggest that there are feedback loops of the financial variables that affect the causal relationship on each of the financial dimension to poverty in the selected countries of the study. The results further suggest that the causal effect of financial intermediation is conditioned to financial access, financial efficiency and financial stability.

The rest of the paper is organised as follows: Section 2 discusses the literature review. Section 3 presents data and describes the methodological approach. Section 4 presents and discusses the empirical results. Section 5 concludes the study.

2. LITERATURE REVIEW

The study is guided by the theory of imperfect market which includes information asymmetry, transaction costs and delegated monitoring in explaining the non-accessibility of formal financial services by the poor (see Stiglitz and Weiss, 1981). In most developing economies formal financial services have not been easily accessible to the poor (Demirguc-Kunt et al., 2008). The existence of financial intermediation and the market frictions can create poverty traps as other economic agents fail to adequately benefit from the existence of financial intermediaries due to non-accessibility of formal financial services (Karnani, 2009; Buera, Kaboski 2017). The financial intermediation process by financial intermediaries overcomes the market frictions and is able to channel financial resources from surplus to deficit units in the economy (Levine, 1997, Zhang and Naceur, 2019). Furthermore, the imperfect financial markets determine the extent to which the poor can borrow or save for investment in capital or education (Levine, 1997).

Behavioural finance theory which combines psychology and cognitive science further explains the nexus between finance and poverty. People's decisions are irrational and illogical on spending, borrowing, saving and investing money (Belsky and Gilovich, 1999). Low income earners are typically faced with limited scope for financial blunders, resource scarcity and risk aversion (Loibl, 2018. p. 431). Self-stereotyping and the habits of the mind affects the adoption and/acceptance of services in which people previously feel discriminated (Hoff and Walsh, 2018). There are challenges in the financial environment which influence behaviours and financial

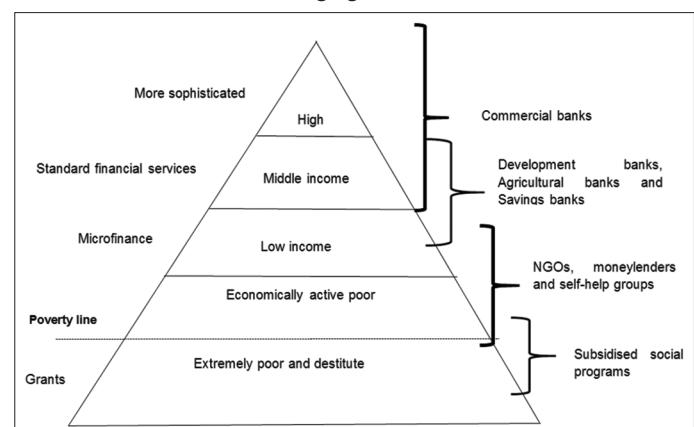
choices of low-income individuals and their families (Mani et al., 2013; Haushofer and Fehr, 2014; Mullainathan & Shafir, 2013). Low-income neighbourhoods have a larger number of alternative financial services which are mainly informal such as payday lenders, and pawnshops (Barr, 2012; Mani et al., 2013). This means the poor usually borrow at higher interest rates which restricts the amount of money that can be borrowed (Barr, 2012). Eventually low-income households have liquidity constraints compared to those households above the poverty threshold (Haushofer and Fehr, 2014).

The provision of formal financial products and services is usually based on business models of the intermediaries rather than the financial needs of the larger population (Consultative Group to Assist the Poor (CGAP, 2019)). Most formal financial products and services are designed and distributed under the perception that poor households cannot afford these products. Non-participation of low income earners in formal finance can be rational decisions that the trivial available savings are not worth the cost of a savings account with a formal financial institution (Karlan et al., 2014). Hence behavioural traits by financial intermediaries and consumers explain the provision, adoption and use of financial services. There is a common affirmation among behavioural theorists that it is difficult to make good financial decisions when you are poor (Haushofer and Fehr, 2014; Mani et al., 2013; Loibl, 2018). Information asymmetry limits the capability of the poor as lack of financial capability prohibits effective risk management and consumption smoothing. Low income earners have highly opaque information with high costs of delegated monitoring. More often, individuals' financial needs are misunderstood because less information of their characteristics is available.

2.1. Empirical Literature Review

Financial intermediaries are able to reduce poverty and inequality through the functions of financial intermediation such as transaction, credit, payments, savings and risk management (Swinnen and Kuijpers, 2020; Honohan, 2008). Access and use of formal financial services offers more benefits in terms of savings, investments, payments and risk management than the non-formal sector (Aguera, 2015). In most developing economies the provision of financial services to poor households is rarely by the formal

Figure 1: Financial intermediation landscape in developing and emerging markets



Source: Adapted from (Rabobank, 2005)

financial intermediaries. Figure 1 summarises the provision of financial services and products in developing countries. The poor in developing countries are mainly served by Alternative Financial Institutions (AFI) as illustrated in Figure 1.

The financial providers at the bottom of the pyramid (BoP hereafter) seek mainly financial and social returns, rather than profit maximisation, which is the main goal of formal financial intermediaries (Mohammed et al., 2017; Rabobank, 2005). According to the CGAP (2019) the financial services and products provided at the BoP are comparatively costly or rigid. Susceptibilities such as low or variable incomes, lower levels of financial literacy and capability, and limited access to or experience with formal financial services characterises the consumer profile at the BoP (Chandwani and Kulkarni, 2018). Illiteracy, minority racial or ethnic status, and longer distances from main population centres correlates with the lack of access and use of formal finance by BoP consumer profile (Chapman and Mazer, 2013). the contribution of formal finance to poverty reduction should not be based in the number of financial assets held by the poor but on whether they have access to the financial products and services (Honohan, 2008)

Figure 1 illustrates the nonexistence of formal bank financial intermediation at the bottom of the pyramid. The BoP is characterised by large numbers of vulnerable customers with limited financial resources and frequent small transactions (Hannig and Jansen, 2010). Formal financial intermediaries regard BOP consumers as high risk leading to involuntary exclusion (Rabobank, 2005; Demirguc-Kunt et al., 2008).

The financial markets also determine how the poor people raise external capital to initiate projects (King and Levine, 1993). The poor are limited on the knowhow to use the financial instruments that are available and in some cases these limitations affects intergenerational poverty (Behrman et al., 2017; Demirguc-Kunt et al., 2008). Besides the allocative efficiency of resources finance, also influences the opportunities that are available to individuals (CGAP, 2019). Most formal financial institutions cater mainly affluent areas with large enterprise and wealthy individuals (CGAP, 2019; Claessens, 2006). The distribution of formal financial services has been largely skewed without providing the welfare benefits of equitable distribution of income (Adcock et al., 2015). Claessens (2006) found that credit facilities in formal financial services in developing countries are mainly based on political relationships and connections. Morduch (1999) argues that the financial services should be reliable (available when needed); convenient (easy access); continuity (can finance be accessed repeatedly) and flexible (is the product tailored to individual). These formal financial dimensions are usually lacking for the poor households (Zhang and Naceur, 2019). Claessens and Perrotti (2007) study found that the depth of the financial sector do not equal access to the formal financial services.

Prahalaad (2010) study found that inclusive formal finance is not only beneficial for poverty reduction, but the banks can also benefit profitably in treating the poor as a consumer market. The major drawback of the formal financial intermediaries in servicing

the poor is to enter the poor's market with non-centric consumer products (CGAP, 2019). Mainly the BoP market has low margins and high volumes which most formal financial intermediaries aren't capturing as it is argued that the smaller transactions are expensive. Not only innovations in products and processes of servicing the poor is essential but the distribution systems that enhances the outreach to this market is equally essential (Prahalaad, 2010; Kavya and Shijin, 2020).

Earlier studies on the role of financial intermediation in poverty reduction focused mainly on the aspect of financial depth without looking at the other dimensions of financial intermediation (see Odhiambo, 2009; Jauch and Watzka, 2016). Demirguc-Kunt et al. (2008) opined that it is possible to have deep financial markets without delivering access for all. Aslan et al. (2017) found a significantly strong association between inequality in financial access and income inequality in developing countries. Access to financial services in most previous studies was not regarded as a different dimension mostly because of lack of data. This has been captured as a different dimension in this study as there are improvements in the available data on access. Efficient financial management includes both deposits and loans and access to such paths of formal financial services are said to lower poverty and inequality (see Honohan, 2008; Allen et al., 2016).

3. DATA AND METHODOLOGY

Annual data for a panel of 35 developing countries mainly in Africa from 2004 to 2018 was used. The data was obtained from the World Bank, the International Monetary Fund (IMF) and the Standardized World Income Inequality Database (SWIID) databases. The time frame was limited by the data availability of the financial access variable as the data for this variable is not available prior to 2004. The choice of the countries in the panel was determined by the availability of the data for all the control variables. The results of the study were generated using EVIEWS 9.0 and STATA 15.0 software. All the diagnostic tests for time series data were performed prior to data analysis to avoid spurious regression results. The variables used in the study as dependent variables are poverty, measured by the headcount ratio and poverty gap and inequality as measured by the Gini coefficient. The ratio of private credit to gross domestic product (GDP) was used as a measure of financial intermediation. Financial efficiency was measured using the interest rate spread, financial access was measured by the branches of commercial banks per 1,000km² whilst the z-score was used to measure financial stability. These were used as the independent variables of the study. The Pesaran et al. (1999) approach which introduced the pooled mean group (PMG) approach in a panel Autoregressive Distributed Lag (ARDL) framework was followed for this study. The PMG has the advantage that it permits country heterogeneity in error variances, the short-run coefficients, together with the intercepts, the speed of adjustment to the long run equilibrium values with a proposal of homogenous long run slope coefficients across countries (N) (Pesaran et al., 1999, Loayza and Rancière, 2006). The PMG can also be used irrespective of whether the series is I(1) or I(0) and inference of long- and short-run causalities can be drawn using the same method. For the purpose of this study poverty is hypothesised

to be a function of financial intermediation (including other dimensions of financial intermediation such as access, efficiency and stability). The unrestricted panel ARDL system of equations to be estimated is generalised as in equation 3.1.

$$POV_{it} = \phi_0 + \sum_{k=1}^p \delta_{ik} POV_{i,t-1} + \sum_{i=1}^q \delta_{2i} X_{i,t-1} + \mu_i + \varepsilon_{it} \quad (3.1)$$

Where Y_{it} is the dependent variable and $X_{i,t-1}$ is the $(k \times 1)$ vector of the explanatory variables for group i and μ_i is the fixed effect, k is the studied country with p and q as the lag length (Pesaran et al., 1999).

Equation 3.2-3.10 can be reparameterised to the specifics of this study to a system of equations in which the dependent variable (poverty) is proxied by headcount ratio, povgap and Gini and the following system of equations illustrates the proposed model specifications for this study¹.

$$\begin{aligned} HCR_{it} = & \beta_0 + \beta_{1i} HCR_{i,t-1} + \beta_{2i} FI_{i,t-1} + \beta_{4i} FE_{i,t-1} \\ & + \sum_{i=0}^n \delta \Delta HCR_{i,t-1} + \sum_{i=0}^n \delta_{2t} \Delta FI_{i,t-1} \\ & + \sum_{i=0}^n \delta_{4t} \Delta FE_{i,t-1} + \varepsilon_{it} \end{aligned} \quad (3.2)$$

$$\begin{aligned} HCR_{it} = & \beta_0 + \beta_{1i} HCR_{i,t-1} + \beta_{2i} FI_{i,t-1} + \beta_{4i} FA_{i,t-1} \\ & + \sum_{i=0}^n \delta \Delta HCR_{i,t-1} + \sum_{i=0}^n \delta_{2t} \Delta FI_{i,t-1} + \\ & \sum_{i=0}^n \delta_{4t} \Delta FA_{i,t-1} + \varepsilon_{it} \end{aligned} \quad (3.3)$$

$$\begin{aligned} HCR_{it} = & \beta_0 + \beta_{1i} HCR_{i,t-1} + \beta_{2i} FI_{i,t-1} + \beta_{4i} FS_{i,t-1} \\ & + \sum_{i=0}^n \delta \Delta HCR_{i,t-1} + \sum_{i=0}^n \delta_{2t} \Delta FI_{i,t-1} + \\ & \sum_{i=0}^n \delta_{4t} \Delta FS_{i,t-1} + \varepsilon_{it} \end{aligned} \quad (3.4)$$

Equation 3.5-3.7 is the system of equation using poverty gap as the dependent variable.

$$\begin{aligned} POVGAP_{it} = & \beta_0 + \beta_{1i} POVGAP_{i,t-1} + \beta_{2i} FI_{i,t-1} + \beta_{4i} FE_{i,t-1} \\ & + \sum_{i=0}^n \psi_{2t} \Delta POVAP_{i,t-1} + \sum_{i=0}^n \psi_{2t} \Delta FI_{i,t-1} \\ & + \sum_{i=0}^n \psi_{2t} \Delta FE_{i,t-1} + \varepsilon_{it} \end{aligned} \quad (3.5)$$

$$\begin{aligned} POVGAP_{it} = & \beta_0 + \beta_{1i} POVGAP_{i,t-1} + \beta_{2i} FI_{i,t-1} + \beta_{4i} FA_{i,t-1} \\ & + \sum_{i=0}^n \psi_{2t} \Delta POVAP_{i,t-1} + \sum_{i=0}^n \psi_{2t} \Delta FI_{i,t-1} \\ & + \sum_{i=0}^n \psi_{2t} \Delta FA_{i,t-1} + \varepsilon_{it} \end{aligned} \quad (3.6)$$

$$\begin{aligned} POVGAP_{it} = & \beta_0 + \beta_{1i} POVGAP_{i,t-1} + \beta_{2i} FI_{i,t-1} + \beta_{4i} FS_{i,t-1} \\ & + \sum_{i=0}^n \psi_{2t} \Delta POVAP_{i,t-1} + \sum_{i=0}^n \psi_{2t} \Delta FI_{i,t-1} \\ & + \sum_{i=0}^n \psi_{2t} \Delta FS_{i,t-1} + \varepsilon_{it} \end{aligned} \quad (3.7)$$

¹ All the system of equations were not included for space considerations but are available upon requests

Equation 3.8-3.10 is the system of equation using Gini index as the dependent variable

$$\begin{aligned} GINI_{it} = & \beta_0 + \beta_{1i} GINI_{i,t-1} + \beta_{2i} FI_{i,t-1} + \beta_{4i} FE_{i,t-1} \\ & + \sum_{i=0}^n \phi_{1t} \Delta GINI_{i,t-1} + \sum_{i=0}^n \phi_{1t} \Delta FI_{i,t-1} \\ & + \sum_{i=0}^n \phi_{1t} \Delta FE_{i,t-1} + \varepsilon_{it} \end{aligned} \quad (3.8)$$

$$\begin{aligned} GINI_{it} = & \beta_0 + \beta_{1i} GINI_{i,t-1} + \beta_{2i} FI_{i,t-1} + \beta_{4i} FE_{i,t-1} \\ & + \sum_{i=0}^n \phi_{1t} \Delta GINI_{i,t-1} + \sum_{i=0}^n \phi_{1t} \Delta FI_{i,t-1} \\ & + \sum_{i=0}^n \phi_{1t} \Delta FA_{i,t-1} + \varepsilon_{it} \end{aligned} \quad (3.9)$$

$$\begin{aligned} GINI_{it} = & \beta_0 + \beta_{1i} GINI_{i,t-1} + \beta_{2i} FI_{i,t-1} + \beta_{4i} FE_{i,t-1} \\ & + \sum_{i=0}^n \phi_{1t} \Delta GINI_{i,t-1} + \sum_{i=0}^n \phi_{1t} \Delta FI_{i,t-1} \\ & + \sum_{i=0}^n \phi_{1t} \Delta FS_{i,t-1} + \varepsilon_{it} \end{aligned} \quad (3.10)$$

Where HCR is headcount ratio, POVGAP is the poverty gap and Gini is the Gini index all as proxies of poverty.

FI is financial intermediation

FA is financial access

FE is financial efficiency

FS is financial stability

β are the long run coefficients of the independent variables δ , ϕ , λ , Θ , γ are the short run coefficients ε_{it} is error term with the i and t representing the country and time period respectively.

The lag order (p, q) is selected using the AIC. The lagged variables and the differences variables of the ARDL respectively test for the long run and the short run relationships of the variables.

4. RESULTS

The causality links that this study inferred are in three categories namely long run causality, short run causality and strong causality/joint causality and the results are summarised in Tables 1-6, for each of the poverty proxies². Intuitively, reduction in poverty increases demand of financial products and services exerting a poverty effect of the financial sector. Increased intermediation through increased access and use of the products and services reduces poverty (Mohammed et al., 2017). The causality between the variables is determined by the statistical significance of the coefficients while the statistical significance of the respective error terms shows joint causality of the variables for the panel.

Each of the variables selected for examining the causal relationship were taken in turns as a dependent variable in the tri-variate analysis of the relationships. Although the aim in the causal links was between poverty and the financial variable of interest the study included the causal links between the financial variables themselves. The study

² The correlation analysis, descriptive statistics unit root test results and the Hausman test results are not reported due to space considerations, but are available upon request.

Table 1: Panel-ECM

Dependent variable	Source of Causation (independent variables)						ECT
	Long run coefficients			Short run coefficients			
her	FI	FE	Δher	ΔFA	ΔFE		
Δhcr	-0.0000591*	0.0108***		-0.00179	-0.00523	-0.437***	
	(-2.51)	(125.30)		(-1.11)	(-1.14)	(-6.43)	
ΔFI	-34.93***	2.940***	22.90		-0.0363	-0.200***	
	(-53.87)	(21.72)	(0.71)		(-0.03)	(-3.10)	
ΔFE	7.778***	0.180***	12.42	-0.0416		-0.495***	
	(18.33)	(17.39)	(1.32)	(-0.30)		(-4.98)	
her	FI	FA	Δher	ΔFI	ΔFA	ECT	
Δhcr	0.000316***	-0.054***		-0.000716	-0.0618	-0.454***	
	(4.02)	(-41.33)		(-0.41)	(-0.49)	(-5.12)	
ΔFI	-22.53***	-2.003***	18.38		27.56	-0.401***	
	(-10.41)	(-6.90)	(0.68)		(0.83)	(-5.06)	
ΔFA	-0.0760	0.0419***	2.186	-0.00436		-0.261***	
	(-0.67)	(20.20)	(0.66)	(-0.44)		(-4.20)	
Δher	ΔFI	FS	Δher	ΔFI	ΔFS	ECT	
Δhcr	0.00131***	0.0103***		-0.000321	-0.00140	-0.258***	
	(3.18)	(11.82)		(-0.16)	(-0.90)	(-4.17)	
ΔFI	19.47***	1.842***	-2.651		-0.407	-0.155**	
	(3.44)	(20.47)	(-0.09)		(-1.67)	(-2.35)	
ΔFS	0.905***	-0.00765***	-1.244	-0.00309		-0.381***	
	(7.70)	(-11.38)	(-0.81)	(-1.37)		(-4.35)	

Source: Author's own computation. t statistics in parentheses *P<0.10, ** P<0.05, *** P<0.01. hcr (headcount ratio), FI is financial intermediation and FE measures financial efficiency, FA measures financial access FS is the bank z score measuring financial stability. Δ is the difference operator

Table 2: Panel ECM. Dependent variable- Headcount ratio

Dependent variable	Source of Causation (independent variables)						ECT
	Long run Causality			Short run Causality			
her	FI	FE	Δher	ΔFI	ΔFE		
Δhcr	Causality*	Causality***		No causality	No causality	Causality***	
	(-2.51)	(125.30)		(-1.11)	(-1.14)	(-6.43)	
ΔFI	Causality***	Causality***	No Causality		No Causality	Causality***	
	(-53.87)	(21.72)	(0.71)		(-0.03)	(-3.10)	
ΔFE	Causality***	Causality***	No Causality	No Causality		Causality***	
	(18.33)	(17.39)	(1.32)	(-0.30)		(-4.98)	
her	FI	FA	Δher	ΔFI	ΔFA	ECT	
Δhcr	Causality***	Causality***		No causality	No causality	Causality***	
	(4.02)	(-41.33)		(-0.41)	(-0.49)	(-5.12)	
ΔFI	Causality***	Causality***	No Causality		No Causality	Causality ***	
	(-10.41)	(-6.90)	(0.68)		(0.83)	(-5.06)	
ΔFA	No Causality	Causality***	No Causality	No Causality		Causality***	
	(-0.67)	(20.20)	(0.66)	(-0.44)		(-4.20)	
Δher	ΔFI	ΔFS	Δher	ΔFI	ΔFS	ECT	
Δhcr	Causality***	Causality***		No Causality	No Causality	Causality***	
	(3.18)	(11.82)		(-0.16)	(-0.90)	(-4.17)	
ΔFI	Causality***	Causality***	No Causality		No Causality	Causality**	
	(3.44)	(20.47)	(-0.09)		(-1.67)	(-2.35)	
ΔFS	Causality***	Causality***	No Causality 0.81	No Causality		Causality***	
	(7.70)	(-11.38)		(-1.37)		(-4.35)	

Source: Author's own computation. *, **, *** represent 10, 5 and 1% level of significance respectively, t statistics in parentheses, her (headcount ratio), FI is financial intermediation and is measures financial efficiency, FA measures financial access, FS is the bank z-score measuring bank stability. Δ is the difference operator

found that the feedback loops within the financial sector affects the performance of the other variables with relation to poverty. Increased access to finance enhances financial stability by increasing risk diversity through an increase in the funding base of bank deposits (Han and Melecky, 2013; Morgan and Pontines, 2014).

The causal links that are presented in Table 1 where the headcount ratio was used as the proxy for poverty are further elaborated and summarized in Table 2.

Furthermore, the analysis allows us to examine the causal analysis and the behavior of the variables within the financial intermediation setting by substituting financial efficiency, financial access and financial stability. Table 2 is the summary of Table 1 and it shows the causal relationships between the variables.

The study found bidirectional causality between headcount ratio and financial intermediation in the long run. The causal links are in

Table 3: Panel ECM. Dependent variable- Poverty Gap

Dependent variable	Sources of Causation (independent variables)						ECT
	Long run coefficients			Short run coefficients			
povgap	FI	FE	Δpovgap	ΔFI	ΔFE		
Δpovgap	-0.00163*** (-19.62)	0.00193*** (8.11)		-0.00152 (-1.18)	-0.00433 (-1.27)	-0.493*** (-4.64)	
ΔFI	-76.70*** (-16.01)	4.941*** (16.37)	170.6 (1.21)		1.269 (0.84)	-0.192** (-2.27)	
ΔFE	14.37*** (15.76)	0.187*** (19.83)	53.99** (2.08)	-0.0101 (-0.08)		-0.481*** (-4.93)	
povgap	FI	FA	Δpovgap	ΔFI	ΔFA	ECT	
Δpovgap	-0.00107*** (-6.54)	-0.00804*** (-4.67)		-0.000609 (-0.31)	-0.112 (-1.10)	-0.579*** (-5.57)	
ΔFI	-31.56*** (-8.45)	-0.109*** (-3.69)	-3.476 (-0.03)		21.12 (0.74)	-0.423*** (-5.43)	
ΔFA	-1.216*** (-9.30)	0.0000190 (0.03)	16.38 (0.95)	-0.0000474 (-0.00)		-0.202*** (-2.68)	
povgap	FI	FS	Δpovgap	ΔFI	ΔFS	ECT	
Δpovgap	0.000406** (2.76)	0.00412*** (10.89)		-0.000353 (-0.26)	-0.00218* (-1.86)	-0.433*** (-5.16)	
ΔFI	36.66*** (3.90)	1.884*** (21.52)	94.01 (0.71)		-0.668*** (-2.78)	-0.225*** (-2.83)	
ΔFS	15.56*** (6.01)	-0.0748*** (-3.75)	315.9 (1.27)	-0.0470 (-0.63)		-0.673*** (-5.84)	

Source: Author's own computation. t statistics in parentheses *P<0.10, **P<0.05, ***P<0.01. povgap (poverty gap) as poverty proxy FI is financial intermediation and is measures financial efficiency, FA measures financial access measured by the number of commercial banks per 1000 km², FS is the bank z score measuring financial stability. Δ is the difference operator

Table 4: Causal links among the variables with poverty gap as the poverty measure

Dependent variable	Sources of Causation (independent variables)						ECT
	Long run coefficients			Short run coefficients			
povgap	FI	is	Δpovgap	ΔFI	Δis		
Δpovgap	Causality*** (-19.62)	Causality*** (8.11)		No Causality (-1.18)	No Causality (-1.27)	Causality*** (-4.64)	
ΔFI	Causality*** (-16.01)	Causality*** (16.37)	No Causality (1.21)		No Causality (0.84)	Causality** (-2.27)	
Δis	Causality*** (15.76)	Causality*** (19.83)	Causality** (2.08)	No Causality (-0.08)		Causality*** (-4.93)	
povgap	FI	FA	Δpovgap	ΔFI	ΔFA	ECT	
Δpovgap	Causality*** (-6.54)	Causality*** (-4.67)		No Causality (-0.31)	No Causality (-1.10)	Causality*** (-5.57)	
ΔFI	Causality*** (-8.45)	Causality*** (-3.69)	No Causality (-0.03)		No Causality (0.74)	Causality*** (-5.43)	
ΔFA	Causality*** (-9.30)	No Causality (0.03)	No Causality (0.95)	No Causality (-0.00)		Causality*** (-2.68)	
povgap	FI	FS	Δpovgap	ΔFI	ΔFS	ECT	
Δpovgap	Causality** (2.76)	Causality*** (10.89)		No Causality (-0.26)	Causality* (-1.86)	Causality*** (-5.16)	
ΔFI	Causality*** (3.90)	Causality*** (21.52)	No Causality (0.71)		Causality*** (-2.78)	Causality*** (-2.83)	
ΔFS	Causality*** (6.01)	Causality*** (-3.75)	No Causality (1.27)	No Causality (-0.63)		Causality*** (-5.84)	

Source: Author's own computations. t statistics in parentheses *P<0.10, **P<0.05, ***P<0.01. hcr (headcount ratio), povgap (poverty gap) and gini (gini index) as poverty proxies, FI is financial intermediation and is measures financial efficiency, FA measures financial access FS is the bank z score measuring bank stability. Δ is the difference operator

both directions where financial intermediation causes poverty and poverty causes financial intermediation. This finding contradicts that of Perez-Moreno (2011), who did not find any causality between private credit and poverty for a sample of developing countries. The Perez-Moreno (2011) study did not include the other financial dimensions in the regression analysis. The study further tested the causal links jointly with other financial dimension and found that financial intermediation jointly causes

poverty with financial efficiency, financial access and financial stability. The relationship between financial efficiency and the headcount ratio is bidirectional where the financial efficiency causes poverty and vice versa. Efficient provision of financial services reduces poverty which in turn increases the demand of financial services providing an explanation of the causal links between poverty and financial intermediation and financial efficiency (Beck et al. 2007).

Table 5: Panel ECM. Dependent variable- Gini index

Dependent variable	Source of Causation (independent variables)						ECT
	Long run coefficients			Short run coefficients			
gini	FI	is	Δgini	ΔFI	Δis		
Δgini		0.00733*** (2.75)	0.0198*** (8.03)		-0.000871 (-0.23)	0.000679 (0.02)	-0.208*** (-6.16)
ΔFI	0.805 (1.15)		-0.477*** (-5.32)	1.514 (0.48)		0.328 (1.12)	-0.227*** (-4.47)
Δis	-0.206** (-2.27)	0.0977*** (9.06)		3.211** (2.23)	-0.131 (-1.49)		-0.443*** (-8.26)
gini	FI	FA	Δgini	ΔFI	ΔFA	ECT	
Δgini		-0.106*** (-15.92)	0.0910 (1.53)		0.0226 (0.86)	-0.208 (-0.27)	-0.144*** (-2.87)
ΔFI	1.956* (1.82)		1.134* (1.93)	2.620 (0.93)		-1.516 (-0.15)	-0.175*** (-2.83)
ΔFA	-0.0969*** (-11.96)	0.0279*** (19.84)		0.0492 (0.40)	0.000326 (0.07)		0.000326 (0.07)
gini	FI	FS	Δgini	ΔFI	ΔFS	ECT	
Δgini		0.00134 (0.65)	-0.00333 (-0.73)		0.00478 (0.48)	0.0119 (1.18)	-0.272*** (-6.21)
ΔFI	2.871*** (3.73)		1.523*** (9.86)	2.836 (0.64)		-0.211 (-1.66)	-0.198*** (-3.52)
ΔFS	-0.340 (-1.80)	0.0751*** (5.48)		1.052 (0.71)	-0.0889* (-2.04)		-0.504*** (-8.10)

Source: Author's own computation. t statistics in parentheses *P<0.10, **P<0.05, ***P<0.01. gini (Gini index) as poverty proxies, FI is financial intermediation and is measures financial efficiency, FA measures financial access FS is the bank Z-score measuring bank stability. Δ is the difference operator

Table 6: Causal links among the variables with Gini index as the poverty measure

Dependent variable	Source of Causation (independent variables)						ECT
	Long run coefficients			Short run coefficients			
gini	FI	FE	Δgini	ΔFI	ΔFE		
Δgini		Causality*** (2.75)	Causality*** (8.03)		No Causality (-0.23)	No Causality (0.02)	Causality*** (-6.16)
ΔFI	No Causality (1.15)		Causality*** (-5.32)	No Causality (0.48)		No Causality (1.12)	Causality*** (-4.47)
ΔFE	Causality** (-2.27)	Causality*** (9.06)		Causality** (2.23)	No Causality (-1.49)		Causality*** (-8.26)
gini	FI	FA	Δgini	ΔFI	ΔFA	ECT	
Δgini		Causality*** (-15.92)	No Causality (1.53)		No Causality (0.86)	No Causality (-0.27)	-0.144*** (-2.87)
ΔFI	Causality* (1.82)		Causality* (1.93)	No Causality (0.93)		No Causality (-0.15)	Causality*** (-2.83)
ΔFA	No Causality*** (-11.96)	Causality*** (19.84)		No Causality (0.40)	No causality (0.07)		No Causality (0.07)
Gini	FI	FS	ΔGini	ΔFI	ΔFS	ECT	
Δgini		No Causality (0.65)	No Causality (-0.73)		No Causality (0.48)	No Causality (1.18)	Causality*** (-6.21)
ΔFI	Causality*** (3.73)		Causality*** (9.86)	No Causality (0.64)		No Causality (-1.66)	Causality*** (-3.52)
ΔFS	No Causality (-1.80)	Causality*** (5.48)		No Causality (0.71)	Causality* (-2.04)		Causality*** (-8.10)

Source: Author's own computation. t statistics in parentheses *P<0.10, **P<0.05, ***P<0.01. Gini (Gini index) as poverty proxies, FI is financial intermediation and is measures financial efficiency, FA measures financial access FS is the bank z score measuring bank stability. Δ is the difference operator

The causal link between poverty and financial access is unidirectional in that financial access causes poverty in the long run but the study failed to observe the same links in the direction of poverty to financial access. Empirical studies available focused on the role of financial access in reducing poverty than the causal relationship between financial access and poverty (see Burgess and Pande, 2005; Zhang and Naceur, 2019). There is bidirectional long run relationship between financial stability (Z-Score) and the headcount ratio. As earlier noted that the study also allows

for an inference of the causal links between the financial variable in the study, there is bidirectional relationship between financial efficiency and financial intermediation. In the long run financial efficiency causes financial intermediation and the vice versa in the long run. Beck (2007) argued that lower interest spread facilitates the increased access of credit. Hence improved financial efficiency causes financial intermediation as the credit extension increases as credit becomes cheaper and more accessible. A bidirectional causal link between financial access and financial intermediation

was observed in that financial intermediation causes financial access and vice versa.

The results show a bidirectional causal links between financial intermediation and financial stability. Financial intermediation causes financial stability and vice versa. Loayza and Rancière (2006) opined the monetary aggregates such as domestic credit are the best predictors of financial fragility in any economy. Unsustainable intermediation of financial services cause instability in the banking sector (Beck and Feyen, 2013). The error correction term is significant for all the relationships at 1% significance level. Any short run deviation from the equilibrium is corrected at a speed of adjustments of 25.8% form financial stability to headcount ratio and 38.1% from headcount ratio to financial stability.

Table 3 presents the results of the analysis on the causal links between poverty gap and the financial variables selected for this study.

Table 4 summarises the causal links between the selected financial dimensions and poverty gap. The summary is of the results depicted in Table 3 and it further elaborates the relationship between the financial dimensions and poverty.

Using poverty gap as a measure of poverty the results shows a long run and joint causal link than in the short run. The relationship of financial intermediation and poverty was estimated jointly with financial efficiency, financial access and financial stability respectively. In all the scenarios financial intermediation has bidirectional causality with poverty.

The empirical finding on the causality between financial efficiency and poverty gap is bidirectional causality in the long run with unidirectional causality in the short run from poverty to financial efficiency. The study observed bidirectional causality between poverty gap and financial access in the long run with no short run causal links. The causal links of financial efficiency and poverty gap in the long run is bidirectional whilst the short run has a unidirectional causality from financial stability to poverty.

There is bidirectional causality between financial efficiency and financial intermediation with no short run causality. In the long run causality between financial intermediation and financial access is unidirectional from financial access to financial intermediation. The stability of the financial sector causes better financial intermediation and better financial efficiency which in turn reduce poverty (Uddin et al., 2014; Omar and Inaba, 2020). In the short run there is no causality between financial access and financial intermediation. The study further found bidirectional causality between financial stability and financial intermediation in the long run. In the short run the causality is unidirectional from financial stability to financial intermediation. The study observed a causal relationship between z-score and poverty gap in the short run. The z-score has short run causality to poverty gap at and causal effect is unidirectional as the poverty gap does not cause financial stability in the short run (Tables 3 and 4).

Tables 5 and 6 reports the results of the analysis using the Gini index as the dependent variable and the financial variable of interest that were selected for this study.

Table 6 is a summary of the results presented in Table 5. Gini index and inequality are used interchangeably in the discussion.

Tables 5 and 6 summarises the causal links of Gini and the financial intermediation, financial efficiency, financial access and financial stability. Theories do not explicitly provide a framework on the causal relationship between financial dimensions and inequality. The relationships that are theoretically available show the association between the variables than the causal effects (see Demirguc-Kunt and Levine, 2009). Finance can determine the gap between the rich and the poor, consequently finance shapes the persistence of the inequality across generations (Demirguc-Kunt and Levine, 2009). There is unidirectional causality between financial intermediation and inequality (Gini index) as financial intermediation causes inequality while, inequality do not cause financial intermediation.

The results show a bidirectional causal relationship between income inequality and financial efficiency in the long run. In the short run the causal relationship is unidirectional in that income inequality causes financial efficiency since only the coefficients of the Gini index are significant. Theoretically, financial intermediation and financial efficiency can reduce intergenerational persistence in relative income by expanding economic opportunities to the small business and the poor (Becker and Tomes 1986; Greenwood and Jovanovic 1990). Zhang and Naceur (2019) found that enhancing financial efficiency reduces inequality the study was short of examining the causal relationship between financial efficiency and inequality. The study mostly found causality in the long run and joint causality with only unidirectional short run between financial efficiency and Gini index. In the short run inequality causes financial efficiency but the reverse does not hold for our study in the short run.

In the presence of financial efficiency the study found a unidirectional relationship between Gini and financial intermediation in that financial intermediation causes poverty and poverty do not cause financial intermediation in the long run. Higher fixed costs associated with small transaction hinders the intermediation of financial services to the poor and small businesses and together with financial efficiency, financial intermediation can cause poverty (Claessens and Perotti, 2007). When financial efficiency was introduced in the model the study found that financial intermediation and efficiency jointly causes poverty. The study fails to observe short run causal links between financial intermediation and financial efficiency. But in the short run there were causal links with a short run unidirectional causality where financial efficiency causes poverty but poverty do not cause financial efficiency. Inequality in accessing financial services hurts the poor more than the rich, political influence protects the established rents for a few individuals at the expense of the poor and small business causing inequality in income (Rajan and Zingales, 2003; Acemoglu and Robinson, 2005). Empirical studies that looked at the causal relationship between access to finance

and poverty are scant as previously there due to non-availability of data on financial access.

When the study included financial stability dimension to financial intermediation the study found out that there were no causal links between financial intermediation and the Gini index in the presence of financial stability. The study fails to observe the causal links both in the long and the short run between financial stability and inequality. The results show a long run a bidirectional causal links between financial efficiency and Gini index with a unidirectional link where inequality causes financial efficiency. There is no causal relationship between Gini and financial access both in the long run and short run.

The financial stability does not have any causal links with the Gini index both in the long run and short run, there was joint causal links together with financial intermediation. Dabla-Norris et al. (2015) opines that for developed countries prolonged periods of persistent inequality can cause financial instability as the influence of the rich affects the economic decisions. The results show causal links between the financial dimensions themselves as there is bidirectional causality between financial efficiency and financial intermediation in the long run. In the short run financial intermediation and financial efficiency do not have any causal links. Financial access has a bidirectional causal links with the financial intermediation. Increased intermediation of financial products and services has causal links with the access of financial product in the long run. In the short run the study fail to observe any causal links between financial access and financial intermediation. In the long run financial stability and financial intermediation have a bidirectional causal links where financial intermediation causes financial stability and vice versa. In the short run the causal links are unidirectional where financial intermediation causes financial stability. As with the other poverty proxies the coefficient of the ECT for all the estimations is significant meaning there is a long run association that exists for the variables in the panel. Short run causality was only observed unidirectional from Gini to financial efficiency.

Ignoring the interlinkages between these financial dimensions can result in suboptimal policy outcomes. In improving financial access it is equally essential for the policy makers to be mindful of the effects of other financial dimensions which can overally affect the poor if access to formal finance is not responsibly bankrolled to poor households. Hence the policy makers should understand the trade-offs and the synergies among the financial dimension for effective accessibility, stability and efficiency of the formal financial sector in poverty reduction. Additionally, poverty measurement and definition should be understood and clear to all policymakers as different poverty measure yields different results.

5. CONCLUSIONS

The study included the other financial dimensions of financial efficiency, financial access and financial stability in examining the causal relationships between financial intermediation and poverty. The causal analysis for the panel of the developing countries in this study is unique in that it did not only allow us to

examine the relationship between poverty and financial variables, but also among the financial variable used in this study. Policy makers should not only be concerned with one dimension of financial intermediation of financial services to the poor and the small businesses. Literature on the causal effect of the financial dimension (financial access, financial stability and financial efficiency) on poverty is very scant. Previous studies who examine the causal effects of finance on poverty mainly used the trickle down approach where it was conditional on economic growth (see Jalilian and Kirkpatrick, 2002; Jeanneney and Kpodar, 2011; Naceur et al., 2017).

There is dearth of empirical literature that examines the causal relationship between the financial dimensions and poverty in which this study is contributing to this literature. This denotes more attention ought to be put on all financial indicators to inspire inclusion of a larger populace in the formal financial sector and reduce the level of poverty. Understanding the multidimensionality of poverty and how it is measured helps in developing the right strategies for an inclusive financial system. If poverty is wrongly measured, wrong strategies to tackle poverty are adopted by policy makers with no effect in reducing poverty. Also, understanding the efficacy of financial intermediation within the context of the three financial dimensions (access, stability and efficiency) was insightful as the results revealed important linkages amongst these variables. Therefore, financial intermediation should be empirically tested and analysed within the confinements of the other financial dimensions.

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