# EXPLORING THE POTENTIAL BARRIERS TO APPLYING GREEN BANKING PRACTICES IN COMMERCIAL BANKS OF PAKISTAN

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#### ABSTRACT

The study analyzed the interactions between, credit to GDP ratio, Money supply to GDP ratio, Debt to GDP ratio, Inflation rate, and Economic Growth in optimal stabilization outcome for financial variables while the interaction of these financial variables affects the normal stability of the economy as a whole. We employed PVAR modeling to show the interaction between financial instability in 12 East African countries from 1995 to 2019. The study shows how financial variables should respond together with financial instability by estimating Impulse Response Functions (IRFs) and how the shock of one affect the growth of another variable by using Variance Decompositions Factor (VDCs). The main hypothesis of this paper tests whether changes in one of them may lead to a considerable impact on financial instability and economic growth. It constructed models of CRGDP ratio, CRGDP ratio, Debt to GDP ratio, Money supply ratio, Inflation rate, and Economic growth and estimated these as a system with interaction variables using a VEC (variance decomposition) and impulse response function for interpreting the results. Of all these channels, the money supply is probably the most important way the host country's economic growth is influenced by the CRGDP ratio. This happens to be the case because the CRGDP ratio influences inflation rate and financial instability more directly through this mechanism than through other channels.

Keywords: Economic Growth, Financial Instability, Impulse Response Function, Panel VAR.

### **INTRODUCTION**

The assessment of the relationship between financial sustainability and indicators of socio-economic development of countries showed that in developed countries the growth of financial sustainability contributes to increasing the volume of GDP, money supply, interest rates on deposits, and decreasing inflation. While in developing countries, the growth of financial sustainability leads to an increase in IMF lending, high-tech exports, foreign direct investment, and a decrease in the financial sector lending to the economy. In both groups of countries, the growth of financial stability provides a reduction in the unemployment rate of the economically active population.

Economic growth and inflation are often used to characterize economic stability and monetary or price stability. Price stability and financial stability are mutually reinforcing goals. Central bankers and other policymakers need to always keep in mind that pursuing price stability requires the pursuit of financial stability and vice versa. Pursuing one goal without the other can, unfortunately, be highly disastrous (Riley, 2019; Bezooijen & Bikker, 2017).

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Money supply, credit to the private sector, the ratio of credit to the private sector on Gross Domestic Product and other non-quantitative indicators like the ratio of persons to banking services, access to money transmission channels as well as financial literacy levels; have been presented at miscellaneous times as indicators of the level of financial deepening. It can be seen that the high level of stress anticipates a significant slowdown in economic activity that lasts up to 5 quarters (Heil, 2017; Heshmati, 2018; Hnatkovska, 2004; Iheanacho, 2019; Frydl, 1999; Babecky et al., 2012; Fidrmuc & Kostagianni, 2015; Terazi & Senel, 2011). Minsky's theory states that financial markets can generate their own (endogenous) forces causing self-sustained waves of credit expansion and asset price inflation, which are necessarily followed by waves of credit contraction and asset price deflation. It can be seen that the growth rate in 2001 decreased to 1% as compared with 4% in 2000. In 2009, due to the financial crisis of 2008, there was a deep recession, when the growth rate fell to almost -3%. However, in 2010, due to the massive injection of liquidity into the banking sector and broad stimulation of investment expansion, the GDP growth rate exceeded 2.5% and remained at 2% per year on average up to 2017, which marked the beginning of stable growth, reaching 3% in early 2019. According to Minsky's theory of financial instability, the economic dynamics are determined to a large degree by how firms finance their investment in fixed capital.

While policymakers continue to seek ideas from researchers to use financial regulation more efficiently and effectively to promote financial inclusion, research in this area is scarce. Nonetheless, for emerging and developing economies' policymakers, gaining insight into the impact of financial regulation on financial inclusion is a prerequisite for putting their economies on the path to speedy growth (Anarfo et al., 2020).

Therefore, it is important to study the relationship between the Financial Stress Index and measures of real economic activity and to calibrate the thresholds for the FSI at which negative economic outcomes have occurred in the past. One way to do this will be to study the nexus between financial instability and economic growth in East Africa will substantiate to fulfill the study gap (Mamonov et al., 2018; Hatzius et al., 2010; Kouki et al., 2017; Mlachila et al., 2016; Mundell, 2003). To examine the nexus between financial instability variables and Economic growth in East Africa, the credit-to-GDP gap was used as a proxy of financial instability performance (Drehmann & Tsatsaronis, 2014). Nevertheless, others suggest an alternative approach to the problem of trend stability.



Source: compiled from different literature

## FIGURE 1 CONCEPTUAL FRAME WORK OF RELATIONSHIP OF FINANCIAL INSTABILITY VARIABLES

In recording equivalence hypothesis theory, source of financing can be from government/private borrowing which crowd out private investment hence decreases economic growth, foreign borrowing will create debt burden while printing money leads inflation.

The study used the panel VAR approach that explores the endogenous interaction between labor costs and FDI. We opt for the new approach panel vector autoregressive (P-VAR) (George et al, 2016). Next, introduce an augmented model of five variables including a measure of government deficit (deficit/surplus, DEF) and a measure of the real estate markets (house prices, HP): GDP $\rightarrow$ DEF $\rightarrow$ HP $\rightarrow$ CPI $\rightarrow$ FSI. (Furi, 2021)

The data used for this study were retrieved from The Worldwide Governance Indicators (WGI) WGI project constructs aggregate indicators 12 of six broad aspects of governance. It can cautiously be claimed that this study is the first of its kind in applying these methods to study the relationship between FSI (FSIgap), inflation rate, CRGDPgap, M2GDPgap, and GDP and total population (Ijaz et al., 2020; Cairo & Sim, 2020; Belay, 2020; Claessens et al., 2013; Terhi et al., 2021; Ajello et al., 2016).

#### **Descriptive Statistics**

A descriptive presentation of the results heavily relies on the principal component analysis (Aiello, 2002; Akosah et al., 2018; Geda, 2019a;2019b; Ponomarenko, 2018; Aninat, 2003; Ijaz, et al., 2020; Admassu & Asayehgn, 2014). The first principal component is strongly correlated with four of the original variables. The first principal component decrease with GDP and inflation rate by 0.35 and 0.26 percent respectively. It increases with credit to GDP ratio and money supply to GDP by 0.6 percent and 0.63 percent respectively. This component captures the positive co-movement between credit to GDP, money supply to GDP, and debt ratio (Argitis, 2019; Ashraf, 2018; Bangake & Eggoh, 2012; Bauer & Granziera, 2016; Wanjala & Gogo, 2020; Lang & Welz, 2017).

The second component loads heavily positively on debt to GDP ratio and negatively on GDP growth rate by 0.53 and 0.62 percent respectively. The third principal component increases with an increase in the inflation rate and decreases with the debt to GDP ratio more Table 1.

Table 1     PRESENTATION OF SAMPLE AND VARIABLES IN INTERACTION VARIABLES							
		Eigenvectors (	loadings)				
Variable	PC 1	PC 2	PC 3	PC 4	PC 5		
GDPG	-0.3533	-0.5342	-0.2283	0.72266	0.12424		
CRGDP	0.60251	-0.1859	0.35911	0.15532	0.67033		
INF	-0.2625	0.52228	0.65147	0.47718	-0.0788		
LNEXTED	0.21214	0.62766	-0.628	0.32735	0.24397		
M2GDP	0.63111	-0.1153	0.01139	0.34465	-0.6852		

Here a correlation value above 0.3 is considered to be important. Only those numbers that exceed 0.3 in absolute value are retained and those that are below it are dropped Table 2.

Table 2   CORRELATION OF VARIABLES IN THE MODEL									
	1	Ordinary	correlations	5					
	GDPG CRGDP INF LNEXTED M2GDP								
GDPG	1								
CRGDP	-0.2639	1							
INF	-0.0436	-0.1726	1						
LNEXTED -0.2372 -0.0122 0.01908 1									
M2GDP	-0.207	0.67253	-0.2528	0.199424	1				

The selected sample encompasses 12 countries in Eastern African countries for the period from 1995 to 2019. To apply the PVAR approach we selected five variables. The first variable refers to the prediction of the credit to GDP ratio. The credit to GDP ratio is considered among the most threatening risks to the stability of financial systems it determines 60 percent of component one and 67 percent of the fifth component determine positively. In another case, the money supply determines 63 and 68 percent of components one and fifth positively and negatively. This risk is mainly reflected in the emergence of the inflation rate (Ascarya, 2017; Bandara, 2010; Batuo Enowbi & Kupukile, 2012; Bhattaraia, 2014; Bhaumik, 2020; Blanchard & Watson, 1982).

#### **Impulse Response Function (IRF)**

The impulse response functions give us information about the short-run dynamics of those impacts. Most shocks start to have a noticeable influence on the economy after 1 to 1.5 years and are absorbed within 10 years. We also find that right and center-wing governments cut on money supply in reaction to shocks, while left-wing governments do not (Atems & Jones, 2015). The IRFs are meant to elucidate the dynamic reaction of one variable to the innovations in another variable in the system while keeping all other shocks equal to zero (Gyebi & Boafo, 2013; Acemoglu, 2007; Afonso & Jalles, 2013; Aghion et al., 2004).

However, since the actual variance-covariance matrix of the errors is unlikely to be diagonal, to isolate shocks to one of the variables in the system it is necessary to decompose the residuals in such a way that they become orthogonal. See appendix 1 Table 3.

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	Table 3									
IMPULSE RESPONSE FUNCTION OF GDP GROWTH RATE										
		Response of GDPO	L L							
Period	GDPG	CRGDP	INF	LNEXTED	M2GDP					
1	3.756261	0.000000	0.000000	0.000000	0.000000					
2	2.404307	-1.05435	0.320314	0.042604	-0.141051					
3	1.756807	-0.7264	0.943739	0.062076	-0.130832					
4	1.958115	-0.55051	0.701727	0.079001	-0.219073					
5	1.964356	-0.6896	0.655546	-0.041424	-0.227497					
6	1.830407	-0.744236	0.956291	-0.042328	-0.250929					
7	1.777486	-0.712298	0.975936	-0.020636	-0.288424					
8	1.780340	-0.718974	0.905874	-0.058686	-0.312803					
9	1.756342	-0.734644	0.984802	-0.076626	-0.318309					
10	1.729198	-0.738076	1.035799	-0.068784	-0.332069					

Economic growth more response to inflation positively and credit over time. A one standard deviation shock (innovation) to the inflation rate, debt ratio, money supply, and credit growth initially has no noticeable impact on economic growth in period 1, the response gradually declined after 2<sup>nd</sup> period until money supply and credit growth hit the steady-state value that reveals the negative impact of them on economic growth while inflation rises after 2<sup>nd</sup> period. A shock or an innovation to the inflation rate produces a positive effect on the actual GDP in East African countries (Hayek & Keynes, 2015; Kaminsky & Reinhart, 1999; Donath & Cismas, 2008). In the same way, increase a one standard deviation shock (innovation) to inflation rate and debt ratio increase GDP growth rate by 0.7 and 0.079 percent in 4<sup>th</sup> period respectively. After 5<sup>th</sup> year a one standard deviation shock (innovation) to debt ratio becomes negative for economic growth while increasing positively for the inflation rate. This finding was consistent with the findings of (Carbo-Valverde & Sánchez, 2013). As the shock of credit increase by one standard deviation in the 2<sup>nd</sup> period, the shocking decrease economic growth by 1.5 percent and impact of shock decrease in the future to 0.7 percent (Adrian et al., 2019; Liew et al., 2018; Dudley, 2011). This analysis shows that an expansionary monetary policy, which is characterized by a lowering of the interest rate or increasing of the money supply and credit, is associated with a decline in economic growth Table 4.

	Table 4								
Period GDPG CRGDP INF LNEXTED M2GDP									
1	-1.1434	5.431371	0.000000	0.000000	0.000000				
2	-0.3417	5.759300	-0.01261	-0.325218	1.428392				
3	-0.0675	4.117765	0.218234	-0.526113	1.182379				
4	-0.6507	4.332642	0.368042	-0.499656	1.318114				
5	-0.5505	4.591762	0.141857	-0.470999	1.309223				
6	-0.429	4.564929	0.076813	-0.5165	1.396326				
7	-0.4584	4.481210	0.186526	-0.500803	1.400300				
8	-0.4824	4.513337	0.163085	-0.4784	1.408711				
9	-0.4539	4.526453	0.094279	-0.486434	1.412054				
10	-0.4449	4.522023	0.110598	-0.489219	1.425205				

#### Credit growth

Credit to GDP ratio more response positively to money supply followed by negatively to a shock of economic growth through a long period of time. As the table above reveals, as the shock of credit increase by one standard deviation at the 2<sup>nd</sup> period, the shock increase on itself in 1<sup>st</sup> and 2<sup>nd</sup> period by 5.43 and 5.74 percent while its impact gradually decreases in 10th period. Moreover, one standard deviation increases in credit to GDP growth increase, on itself by 4.5 percent others things remain constant. An increase in a one standard deviation shock (innovation) to economic growth and debt ratio increase credit to GDP ratio is 2<sup>nd</sup> period by 0.34 and 0.32 percent others remain constant. Nevertheless, the Debt ratio initially has no noticeable impact on credit growth in period 1, the response gradually increases after 2<sup>nd</sup> period and prolong in near future (Lim et al., 2011; Caverzasi, 2018; Howell, 2011; Kanu, 2019; Crozier, 1977; Dalyop, 2019).

This reveals the negative impact of the Debt ratio and Economic growth on the credit to GDP ratio by 0.4 percent in the  $10^{th}$  period. An increase in a one standard deviation shock to

Table 5										
	<b>RESPONSE FUNCTION OF INFLATION RATE</b>									
Period	GDPG	CRGDP	INF	LNEXTED	M2GDP					
1	-0.289528	-0.12675	5.625462	0.000000	0.000000					
2	0.584879	0.119472	2.576598	0.443845	-0.80747					
3	1.387552	0.140518	0.457329	-0.398224	-0.83394					
4	1.369774	0.144593	2.186631	-0.275367	-0.59821					
5	1.355542	0.217841	2.204804	0.121559	-0.67423					
6	1.571937	0.235041	1.206698	-0.017416	-0.71939					
7	1.643726	0.237080	1.411420	-0.093271	-0.62055					
8	1.622419	0.255241	1.668272	0.037458	-0.59118					
9	1.670083	0.266606	1.395919	0.053548	-0.60585					
10	1.715355	0.268707	1.316321	0.012140	-0.5806					

inflation rate decreases credit while a shock to money supply increases credit in the 2<sup>nd</sup> period, gradually both responded positively to credit growth until reaches its steady state Table 5.

**Inflation:** Impulse response function for inflation rate on its own self is positive throughout the year even though decreasing and disappears later (Alshubiri, 2017; Dingela & Khobai, 2017; Dlugoszek, 2018; Vo et al., 2019; Durak & Eroglu, 2019; Dyrberg, 2001; Geda, 2017). The impact of GDP growth rate and credit growth on inflation rate is negative in the first period then become positively increased to 1.7 and 0.26 percent at 10<sup>th</sup> period respectively reveals permanent effect in the future too. Sichula consider inflation as a major problem for many countries Table 6 (Veiga, 2014).

	Table 6									
	RESPON	SE FUNCTIO	<u>N OF DEBT T</u>	<u>O GDP RATIO</u>						
Period	GDPG	CRGDP	INF	LNEXTED	M2GDP					
1	-0.0554	0.006132	-0.02577	0.243828	0.000000					
2	-0.0596	0.022401	-0.057551	0.285404	0.000398					
3	-0.0669	0.029380	-0.052435	0.303275	0.011348					
4	-0.0642	0.028683	-0.051406	0.312405	0.013930					
5	-0.0619	0.029329	-0.062474	0.314499	0.016139					
6	-0.0598	0.030025	-0.065175	0.314756	0.018339					
7	-0.0585	0.030803	-0.064238	0.316390	0.020185					
8	-0.0571	0.031042	-0.06726	0.317309	0.020957					
9	-0.056	0.031289	-0.069507	0.317359	0.021810					
10	-0.0552	0.031524	-0.069621	0.317768	0.022540					

The public Debt ratio does not respond to an increase in money supply in the first period but becomes positively increased with money supply after the second period while an increase with credit growth from period to period implies that both have permanently increased debt ratio in East African countries. In other words, public debt responded negatively with GDP and the inflation rate reveals that an increase in GDP and inflation rate permanently reduces debt ratio which is consistent with the economic theory of debt (Mollaahmetoğlu & Akçalı, 2019; Dabla-Norris & Srivisal, 2013; Erb et al., 1996; Falaschetti, 2020). The steep increase in public debt negatively affects economic growth Table 7.

Table 7									
THE TABLE RESPONSE FUNCTION OF THE MONEY SUPPLY TO GDP RATIO									
Period	GDPG	CRGDP	INF	LNEXTED	M2GDP				
1	-3.2136	10.30171	-0.3433	-0.018588	5.641422				
2	-1.7529	8.588260	-0.3323	-0.379899	8.020338				
3	-2.011	6.702536	-0.0809	-0.55167	9.020857				
4	-2.5515	7.061441	-0.53	-0.351831	9.431614				
5	-2.2001	7.578973	-1.1815	-0.291822	9.914287				
6	-1.8718	7.467777	-1.3623	-0.245558	10.19647				
7	-1.8182	7.425475	-1.4233	-0.141476	10.37037				
8	-1.7169	7.500443	-1.6738	-0.071156	10.47208				
9	-1.5879	7.545651	-1.8558	-0.046631	10.56946				
10	-1.5096	7.553124	-1.9069	-0.008838	10.64138				
	Cholesky	Ordering: GDPC	G CRGDP INI	F LNEXTED M2C	GDP				

**Money supply growth:** Money supply more response positively to Credit to GDP ratio followed by negatively to a shock of economic growth through a long period of time, which reveals interdependence between money supply and Credit growth. A credit shock has a positive impact on the growth rate of East African countries that persists into the future. A one standard deviation increase in Credit growth increases the money supply by 10.3 in the first period and 7.5 percent in the 10<sup>th</sup> year. Whereas the impact of a shock to the Credit to GDP ratio on the money supply is positive and persists into the future, the current shock to Money supply has a persistently positive and increasing impact on the future money supply growth rate. Money supply responded negatively at the time of the increase in GDP growth, inflation rate, and debt growth rate while positively on its own self. Money supply response for the negative shock on GDP was highest in the first period and decrease later (Riley, 2019; Hanson et al., 2020; Roodman, 2009; Capolupo, 2005; Babar et al., 2019; Sahay et al., 2015; Dhal et al., 2011; Schumpeter & Backhaus, 2003).

#### Economic Growth, Credit to GDP ratio, Money supply, and Debt to GDP ratio

Impulse response function indicates economic growth negatively responded to for itself, impulse response function of GDP growth to itself become stable in the long run. While the response of GDP growth is negatively related to credit ratio, it becomes stable and disappears in the long run. The impulse response function for the increase in money supply and debt is negative in the short run and disappears in the long run. GDP less likely responded with debt shock Just as the velocity of money has slowed over time so has the velocity of debt which is a similar finding with that of (Chauhan & Ramesha, 2019).

First, the impulse response functions (Figure 1) indicate that the CRGDP ratio of the previous period has a positive significant. This confirms the results found by (Ksantini, 2014). Study result indicates a negative effect of the credit shock on GDP growth rate. This relationship implies that the CRGDP shock generates increased inflation rate. This finding is also consistent with (Ksantini, 2014) study Table 8.

	Table 8								
VAR	VARIANCE DECOMPOSITION FACTOR OF GDP GROWTH RATE								
Period	S.E.	GDPG	CRGDP	INF	LNEXTED	M2GDP			
1	3.631604	100.0000	0.000000	0.000000	0.000000	0.000000			
2	4.225677	93.97787	5.547489	0.051851	0.114717	0.308072			
3	4.443475	91.09144	7.014249	0.946325	0.225745	0.722244			
4	4.543504	89.73085	7.474608	1.685602	0.325541	0.783395			
5	4.600553	88.72802	7.914807	2.160492	0.421118	0.775566			
6	4.635262	87.97391	8.320141	2.434456	0.505557	0.765939			
7	4.656713	87.44939	8.632443	2.581284	0.577896	0.758983			
8	4.670591	87.07773	8.870219	2.656123	0.638334	0.757591			
9	4.679925	86.80762	9.050903	2.692293	0.687111	0.762074			
10	4.686325	86.61072	9.184164	2.708304	0.725293	0.771519			

The variance decomposition Table 9 indicates the contribution percentage of each variable to the explanation of the other variable. The study is primarily interested in the contribution of each variable in the evolution of the inflation rate. In the short run impulse or innovation shock to GDP and credit growth account for 91 and 7 percent variation to fluctuation in GDP respectively in period three. Shock to a credit account for 9 percent in the fluctuation of GDP and GDP contributes about 86 percent of fluctuation in GDP (its own) in the long run. Nevertheless, innovation or shock to debt ratio, inflation rate, and money supply less account for fluctuations of GDP both in the short run and long run (Mesagan et al., 2019; Pietak, 2014; Porcellacchia, 2020; Rahman et al., 2019; Sahay et al., 2015; Boubtane et al., 2013). However, innovation or shock of inflation rate shows positive and increased fluctuation in GDP growth rate in east African countries that show inflation rate stimulate economic growth.

	Table 9								
VA	RIANCE DE	COMPOSITIO	ON FACTOR	OF CREDIT TO	<b>GDP GROWTI</b>	H RATE			
Period	S.E.	GDPG	CRGDP	INF	LNEXTED	M2GDP			
1	5.235893	4.477740	95.52226	0.000000	0.000000	0.000000			
2	7.393004	2.324722	92.46707	0.216221	0.081977	4.910012			
3	8.212943	1.957393	90.51960	0.488242	0.177378	6.857390			
4	8.694227	1.855122	89.76260	0.742087	0.245103	7.395088			
5	9.044927	1.790415	89.17203	0.960563	0.302075	7.774915			
6	9.285800	1.755416	88.64180	1.131646	0.353195	8.117944			
7	9.449602	1.742601	88.21912	1.262286	0.395948	8.380045			
8	9.564473	1.739666	87.88551	1.362080	0.430427	8.582322			
9	9.646164	1.740884	87.61656	1.438308	0.457980	8.746269			
10	9.704562	1.744138	87.39901	1.496596	0.479733	8.880527			

We found that the credit to GDP ratio variable should be explained by itself (credit to GDP ratio) 87 percent fluctuations of credit in the long run and 95 percent in the short run. Past observations help to explain future observations to about 87 percent. In this respect, our VDCs show that Money supply and GDP growth rate explain approximately 6.8 and 2 percent of the variation in real credit to GDP ratio in the short run, while the effect of GDP decrease to 1.7 while that of money supply increase to 8.8 percent in the long run in countries analyzed (Krishnamurti & Lee, 2014; Fidanoski, 2017; Ejigayehu, 2013; Detzer & Herr, 2014).

Therefore, money supplies more related to credit next to GDP while other variables less account to credit fluctuations both in the short run and long run Table 10.

	Table 10     VARIANCE DECOMPOSITION FACTOR OF INFLATION RATE								
Period	SE	GDPG	CRGDP	INF	LNEXTED	M2GDP			
1	6.021718	1.626727	0.401973	97.97130	0.000000	0.000000			
2	6.735732	1.331395	0.396442	95.44501	0.512836	2.314320			
3	6.927787	1.923012	0.378125	94.39125	0.681120	2.626493			
4	7.022488	2.465174	0.694315	93.38827	0.710850	2.741392			
5	7.083012	2.770681	1.135964	92.47427	0.712934	2.906157			
6	7.119837	2.956733	1.457407	91.84611	0.709381	3.030365			
7	7.143775	3.070423	1.710836	91.40469	0.705265	3.108780			
8	7.160441	3.136478	1.916993	91.07916	0.702009	3.165358			
9	7.172202	3.175099	2.075886	90.84092	0.699747	3.208353			
10	7.180593	3.198416	2.195664	90.66676	0.698263	3.240901			

Therefore, the author suggests that this mechanism should be taken into consideration when determining monetary policy. On the other hand, there can also be interactions among financial markets and goods markets in the countries under investigation, since we find that deviations in credit to GDP ratio account for nearly 51% of the variation in broad money and 41 percent of its own in the short run (Joya, 2011; He et al., 2003; Deco et al., 2019; Aliber & Kindleberger, 2015; Ehigiamusoe & Lean, 2020; Konstantakis et al., 2016). Furthermore, the Shock in credit to GDP ratio accounts for a 38 percent fluctuation of money supply in the long run. Accordingly, we suggest that the central banks of all 11 countries should incorporate the role of financial markets in their monetary policy formulation and credit ratio. The VDCs also imply that the inflation rate increases the fluctuation of money supply in these countries in the long run which reveals interaction between money and goods market Table 11.

	Table 11								
	VARIANO	CE DECOMP	OSITION FA	CTOR OF D	EBT TO GDP I	RATIO			
Period	S.E.	GDPG	CRGDP	INF	LNEXTED	M2GDP			
1	0.237694	5.453708	0.153103	1.697552	92.69564	0.000000			
2	0.358270	5.209457	0.897657	3.741775	90.11326	0.037851			
3	0.437101	5.975100	1.673742	4.243422	87.84186	0.265881			
4	0.492993	6.877117	2.480879	4.400349	85.71536	0.526298			
5	0.534970	7.639249	3.379086	4.524221	83.64334	0.814102			
6	0.567499	8.231913	4.285272	4.661387	81.68681	1.134619			
7	0.593207	8.690723	5.139974	4.808268	79.89174	1.469294			
8	0.613844	9.046709	5.928427	4.956056	78.26394	1.804866			
9	0.630616	9.323039	6.645746	5.098115	76.79800	2.135100			
10	0.644373	9.538147	7.289472	5.230517	75.48634	2.455524			

From Table 12 it becomes apparent that the Debt growth rate is influenced by its own past dynamics since it accounts for nearly 80% of the variation per se up to the ensuing 3rd quarter. If follows that we can assert that inflation rate shocks, economic shocks, and credit growth are critically important when analyzing fluctuations in debt dynamics in all countries in the study. Our VDC analysis also supports this assertion by indicating that money supply explains nearly 50% of the variation in credit and we can infer the importance of money supply in the countries under. Therefore, the central banks of these countries should incorporate the financial sector and financial frictions in their general equilibrium frameworks (Nzioka et al., 2017; Nagy, 2017; Apergis & Rezitis, 2003; Ozili, 2018; Creel et al., 2015).

	Table 12									
VARIA	VARIANCE DECOMPOSITION FACTOR OF MONEY SUPPLY TO GDP GROWTH RATE									
Period	S.E.	GDPG	CRGDP	INF	LNEXTED	M2GDP				
1	11.73963	6.676713	68.88629	0.416956	0.001673	24.01837				
2	16.29002	4.381759	57.77279	1.061266	0.007332	36.77686				
3	18.63757	4.263656	51.82077	2.085843	0.007583	41.82215				
4	20.43750	4.384306	48.46261	3.050312	0.006478	44.09629				
5	21.96784	4.485893	45.92953	3.849696	0.005613	45.72927				
6	23.24166	4.616731	43.85593	4.494731	0.005161	47.02744				
7	24.31513	4.766886	42.17911	5.020524	0.005660	48.02782				
8	25.23895	4.914428	40.80350	5.452874	0.007510	48.82168				
9	26.04259	5.052729	39.65161	5.811614	0.010849	49.47320				
10	26.74667	5.180649	38.67552	6.112343	0.015678	50.01581				
Cholesky	y Ordering: GI	OPG CRGDP IN	IF LNEXTED	M2GDP						

On the other hand, GDP explains 12 percent of the variations in foreign aid whereas CRGDP RATIO and per capita GDP explain only 0.84 and 0.12 percent of the variations in foreign aid respectively. When it comes to CRGDP RATIO, around 73.98 percent of its variations are explained by shocks to itself. Some 20.92 percent of the variations in CRGDP RATIO are explained by changes in foreign aid while domestic investments and the growth rate of per capita GDP contribute only 2.54 percent each to variations in CRGDP RATIO. Regarding domestic investments, the lion's share of the variability is attributed to unexpected changes to itself. Specifically, about 92.46 percent of the variations in domestic investments are accounted for by the unanticipated shocks on their own. Of the remaining 7.54 percent variations in domestic investments, 5.43 percent go to CRGDP ratio whereas foreign aid and the growth rate of per capita GDP account for 1.1 and 0.99 percent respectively. Finally, nearly 63 percent (62.65 to be exact) of the variations in the growth of per capita GDP are explained by sudden shocks that occur to itself which is followed by CRGDP RATIO that explains 26.88 percent of the variations in per capita GDP's growth rate. Domestic investments account for 6.89 percent of the variations and foreign aid's share is a mere 3.56 percent in explaining the variability in the growth rate of per capita GDP (Kotlikoff, 1984; Lapteacru, 2016; Liu, 2017; Manu et al., 2011; Magweva & Sibanda, 2020; Bardoscia et al., 2017; Mian, 2017; Bordo & Meissner, 2015).

In the interaction between financial instability variables credit to GDP ratio followed by inflation rate account more percent in variation of GDP growth, Money supply ratio followed by GDP growth in the variation of credit to GDP ratio while credit to GDP ratio followed by GDP growth rate t to variation of money supply ratio (Fazli & Abbasi, 2018; Fidrmuc, 2015; Franklin & Isaac, 2011; Gersbach, 2014; Bezemer, 2011; Gulay, 2019; Hart, 1999; Orlik, 2015). Moreover, the money supply ratio followed by the GDP growth rate accounts for more percentage in a variation of the inflation rate, while GDP growth is followed by a credit to GDP ratio GDP ratio in a variation to each variable and more response to their previous values.

#### CONCLUSION

This chapter investigated various dimensions of the relationship between CRGDP ratio, Debt to GDP ratio, Money supply ratio, Inflation rate, and Economic growth in East African countries. It focused on analyzing whether CRGDP ratio response Debt to GDP ratio, Money supply ratio, Inflation rate, and Economic growth in East African countries. Besides, it also studied the impact of shock of CRGDP ratio, Debt to GDP ratio, Money supply ratio, Inflation rate, and Economic growth on each other's or its on in East African countries by using impulse response function models to mitigate the limitations of traditional panel data estimators.



#### **Appendix 1 Impulse Response**

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