Determinants of Commercial Bank Deposit Growth in Ethiopia

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Article History: Received: 29 September 2021; Revised: 28 December 2021; Accepted: 3 February 2022

Abstract

The study analysed the short and long-run impacts of endogenous and exogenous factors affecting deposit growth of the Commercial Bank of Ethiopia from 1974/75 - 2013/14. We employed the Vector Error Correction Model to establish the causal relationship among the variables of the study. Results show that exchange rate and branch expansion positively influence deposit growth contemporaneously both in the short-run and long-run while interest rate maintains positive but insignificant impact both in the long-run and short-run. Population and economic growth exhibit a positive relationship with deposit growth but significant only in the long-run. Moreover, inflation maintained a positive and significant impact in the long-run but negative in the short-run. Using the Granger causality test, it was found out a unidirectional causal flow from economic growth to deposit without any feedback while deposit growth has a bidirectional causality with branch expansion and economic growth implicating inflation affecting economic growth through investment. Finally, with error correction -0.0678, full adjustment from actual deposit to equilibrium would require about 15 years, implicating a slow speed of adjustment in every following year.

Keywords: deposit growth, VECM, short run, long run, bank
JEL Classification: G21

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1. Introduction

A sound, dynamic, and competitive financial sector is essential to promote economic growth and reduce poverty by mobilizing savings and allocating resources efficiently (Bayiley, 2013). Banks as financial intermediaries also provide savers a channel to diversify the risk of holding financial assets and permit investors to access financial resources that would otherwise be unavailable. In this process, banks most importantly in developing economies connect customers with capital deficits to customers with a capital surplus. In so doing, banks eventually facilitate the efficient use of this very scarce resource, ignite economic competition, integrate commodity markets, and above all spur economic growth (Phan et al., 2020).

Globally, the banking sector assumes the largest share of the financial system, and it plays an important role in all aspects of the national economy (Falkena et al., 2004; Phan et al., 2020). In Ethiopia, banks are the most dominant players in the country's financial system accounting for about 95% of the total financial sector assets (Babu et al., 2020; Alemu et al., 2021). More into these banks account for about 93 percent, 98 percent, and 92 percent of the total assets, deposits, and loans of the financial sector respectively in the year 2006 while microfinance companies hold 4 percent of assets, 2 of deposits, and 8 percent of loans, insurance companies hold only 3 percent of 2 total assets (Bayiley, 2013).

As of 2021, the number of commercial banks operating in the country reached 19 of which 17 are private the rest state-owned. During the year 2020/21, these banks opened 199 additional branches raising the total branch network of the country to 7096. As a result, the bank branch to population ratio becomes 1:14514.9 in 2013/14 (NBE Annual report, 2020/21). The total capital of the banking system amounted to Birr 125.1 billion, of which state-owned banks accounted for 46.4 percent and private banks 53.6 percent.

In a bid to improve the share of internal borrowing and reduce dependence on external sources in the financing of priority sector investments, the National Bank of Ethiopia, for example, has made it a requirement for private banks to buy federal government bonds amounting to 27% their loan portfolio. Accordingly, most private banks have identified deposit mobilization as the most important indicator of bank performance. In most private banks, for instance, meeting deposit targets by managers account 50% of the total branch performance. More into this, though CBE is waived from the 27% investment requirement in a federal government bond, as a state-owned bank expected of

promoting state interest it has set a meeting of deposit targets as 100% performance achievement.

Through relentless efforts are made to mobilize deposits and commendable results have been achieved, there is an unprecedented mismatch between demand and supply of financial resources in the Ethiopian banking sector. As a result, there have been many cases whereby private companies and small business firms complain about the inadequacy of credit facilities (World Bank Group, 2011) calling for efficient and coordinated deposit mobilization strategies.

Taking into consideration the fast growth of the Ethiopian economy and lower propensity to save (Fenta et al., 2017; Bekata, 2016), it has become increasingly difficult to satisfy the credit need of small businesses and the private sector. Hence, there is a need to understand the factors affecting deposit mobilization and develop an effective deposit mobilization strategy. Although, deposit mobilization strategies alone could not bring about long-term and sustainable deposit growth, deposit mobilization strategies should be complemented with quality service. Therefore, this study analyzed factors affecting deposit growth in Ethiopia for the country to sustain its growth in the foreseeable future.

There is a plethora of research output related to the current study. However, not only are the findings inconsistent but also, they are contradictory and thus, inconclusive (Jacobs, 2013). For example, a study by Almaqtari et al. (2018) by using a Panel data model from 2008 to 2017 for 69 Indian Commercial Banks found that the number of branches, bank size, and operational efficiency were the most important bank-specific determinants that affect the deposit and profitability of Indian commercial banks. A study by Muhindi and Ngaba (2018) found that the number of branches that a bank operates has a significant effect on financial performance of financial institutions because they are costly. They concluded with brick-and-mortar branches, banks must hire staff, pay for rent and provide security that increases the likelihood of loss than making a profit.

Inflation, interest rate, exchange rate, demographic composition, and branch expansion are some of the most important variables known to explain deposit growth though results are inconsistent. For example, some argued that branch expansion positively affects deposit mobilization; real interest rate has little or no impact on deposit mobilization when the spread between deposit rates and inflation is narrow; and interest rate and inflation rate do not affect deposit growth (Gemedu, 2012; Boyd et al., 2001). Others posit both branch expansion

and inflation negatively influence private saving in the short-run; and real per capita income and urbanization ratio have a positive effect (Gebeyehu, 2019; Menza, 2019). Deposit growth is positively related to bank income, loans, liability, and advance granted, and CPI (Tessema, 2019; Rashid, 2020).

Exchange rate negatively influenced bank deposits (Ngula, 2012; Hasanov et al., 2018; Tho'in and Prastiwi, 2019). A common phenomenon in developing economies where there exists a concern on currency volatility than the depreciation of the domestic currency. The rise in exchange rates might lead to lower levels of deposit as savers may withdraw their money deposited in banks to substitute domestic currency for foreign currency as a better means of saving. While inflation negatively influences deposits, interest rate has a positive but insignificant relationship with a deposit (Ngula, 2012; Bernard, 2019). On the other hand, a study by Ogbuabor and Nwosu (2017) by using Error Correction Model found that in the short-run, interest rate has no impact on deposit growth rate but it has a positive and significant impact in the long run.

The arguments presented in the previous paragraphs highlight lack of convergence in the claims of various researchers. The current research, therefore, attempted to examine the short and long-run impacts of endogenous and exogenous factors on deposit growth of Commercial Bank of Ethiopia for the period 1974/75 - 2019/20. The study also attempted to establish the causal relationships that exist between the antecedents and the consequent. In the empirical VECM model, parsimony was sought and the most commonly used control variables by various researchers including economic growth, inflation, interest rate, exchange rate, population growth, and branch expansion were used to establish the causal relationship and measure their impact on the outcome variable.

The rest of the article is structured as follows: section II reviews relevant extant theoretical and empirical literature. Section III presents the empirical approach. Section IV explains the research findings. Finally, section V summarizes the conclusions of the paper and highlights policy implications.

2. Empirical Review and Theoretical Framework

Financial systems play a central role in the capital formation endeavour of nations. Capital formation is also very much connected to economic growth through the efficient allocation of scarce resources. Banks as a crucial part of the financial system aid the mobilization of savings from saving-surplus economic

units and channel it to saving-deficit economic units. Such a process triggers capital formation and thereby economic growth.

The act of investing is usually limited to a particular class of innovative and growth-oriented entrepreneurs who have the acumen, technical skills, market-related information, and the predisposition to use them. However, saving is largely spread among the mass who lack these skills, resources, as well as attributes that make the role of financial institutions such as banks instrumental in capital formation, economic growth, and job creation.

History tells that the free market has existed in Ethiopia during the Imperial regime. Ethiopia has a market-led economic policy although the direct role of the government in the economy was not minimal. There is a general view that in Ethiopia, there exists monopolistic competition among banks in terms of price and investment opportunity although the competition in terms of price is relatively weak (Sime et al., 2013). Put in the order of their importance, Ethiopian banks compete in terms of service quality and efficiency including the use of technological advances, branch network expansions, advertising, and pricing (Tesfaye et al., 2019).

Deposits mobilization is one of the main functions of banks which they channel from those who have less economic opportunities to those who have higher economic opportunities contributing to the overall being of the economy. Deposit mobilization has a unique role for a developmental state economy as it helps to channel funds to priority sectors essential for long-term economic transformation. It has increasingly become difficult for developing economies to get adequate funds through aid and external borrowing as they are usually subjected to political conditions.

At the empirical front, research on what factors drive deposit growth is short, as most studies are researched towards explaining the determinants of savings behaviour. Whereas the microeconomic factors relate to bank-level variables, the macroeconomic level determinants reflect the overall macroeconomic fundamentals of a country. In general, the determining factors of bank deposits and savings are classified into microeconomic and macroeconomic factors.

The successful functioning of commercial banks depends on the extent of the funds they mobilize. Deposits constitute a reliable and low-cost source of funds for banks in financing their operations and asset portfolio. Financial resources of banking systems are naturally provided by public deposits (Namazi and Salehi, 2010; Bolarinawa, Obembe, and Olaniyi, 2019). Deposits play an

important role for both consumers and financial services providers (Stulz, 2019). For example, in Europe, deposits account for approximately 60% of bank funding (Global financial markets, 2012) and 87.7% in Africa (IMF Country Report 15/55).

Deposits are not only a crucial funding instruments for banks; they are one of the most important forms of investment for private individuals (Ahlswede et al., 2012). For commercial banks, they are the oldest, most stable, and significant source of funding. In the traditional banking model, deposits are the counterparts of loans. Moreover, deposit mobilization is the most important priority for developing economies whose growth performance is subject to domestic saving potential including financing of mega projects such as the Great Ethiopian Renaissance Dam (Roy, 2003; Duguma and Han, 2018; Ogechi, 2018).

Exchange rate and Total Deposit

Exchange rate plays an increasingly significant role in any economy as it directly affects domestic price level, the profitability of traded goods and services, allocation of resources, and investment decisions. These days, the stability of the exchange rate is a formidable bedrock of all economic activities. Since the adoption of the Structural Adjustment Programme (SAP) in 1996, the exchange rate regime of the Ethiopian government has been changed from fixed to a managed float. Before 1991, the Birr was pegged to the US Dollar at a fixed rate of $1= 2.07 Birr. The Ethiopian Birr was devalued by 58.6%, from 2.07 to 5.00 per dollar, by the Transitional Government of Ethiopia in 1992 (Geda, 1999; Kassie, 2015). Since a pegged exchange rate does not necessarily represent a currency's true market value, the EPRDF replaced the fixed exchange rate system with a floating exchange rate system (Amdework, 2021; Asratie, 2021; Yitayaw, 2021; Ayele, 2021).

Exchange rate negatively influenced bank deposits (Ngula, 2012; Alemayehu, 2015; Hasanov, 2018; Tho'in, 2019). Similar findings have been exhibited by Lu et al (2021), and Sitompul et al (2021). Moreover, Taiwo and Adesola (2013) found a negative relationship between the exchange rate and bank profitability. Such a relationship is a common phenomenon in developing economies where there exists a concern on currency volatility than the depreciation of the domestic currency. For instance, a poorly functioning monetary policy framework in a flexible exchange rate regime may hamper the country’s ability to maintain macroeconomic stability and insulate the real side of the economy from shocks. Following this, a rise in exchange rate might

potentially lead to lower levels of deposit as savers withdraw their money deposited in banks to substitute for foreign currency as a better means of saving. Based on these research findings, the research hypothesizes a negative relationship between exchange rate and the bank and performance.

Inflation rate and Total Deposit

The welfare cost of inflation is a longstanding concern of monetary economics, and the recent debate about raising the inflation target lends it renewed relevance (Kurlat, 2019). One reason that inflation is costly is that other thing being equal, higher inflation induces households to reduce their money balances, forgoing some of the convenience of carrying money to conduct transactions. Siegel (1981), Boyd et al (2001), Namazi and Salehi (2010), Abduh et al (2011), Asongu (2013), Chanthol (2021) found a significant, and economically important, negative relationship between inflation and both banking sector development and equity market activity. On the other hand, a study by Pasaribu and Fitrawaty (2021) found that inflation does not affect deposit growth. Also, Agarwa and Baron (2021) using a 47-country panel found that large inflation increases tend to be followed by aggregate lending contractions and reducing the bank's branch deposit. While inflation negatively influences deposits, the interest rate has a positive but insignificant relationship with deposit growth (Ngula, 2012; Bernand, 2019). On the other hand, a study by Ogbuabor et al. (2017) by using Error Correction Model found that in the short-run, interest rate has no impact on deposit growth rate but it has a positive and significant impact in the long run.

Branch expansion and Total Deposit

Unvan and Yakubu (2020) found bank-specific factors drive bank deposits in Ghana for the period 2008 to 2017 using the random effects technique. The results show that bank size is a significant determinant of bank deposit growth. The study by Yakubu and Abokor (2020) also identified branch expansion as a significant contributor to bank deposit mobilization.

Interest rate and Total Deposit

Regarding the elements of the bank's deposit policy of the Commercial Bank of Ethiopia, it should be noted that the formation of the deposit policy is closely related to the bank's interest rate policy and regulation guided by the National Bank of Ethiopia with a minimum deposit rate. Since the deposit rate is an effective tool for attracting resources (Yakubova, 2020), Andros et al. (2020), Owolabi and Fayemi (2017), Halaskova et al. (2021), and Ilugbemi (2020) examined the effect of interest rates on the profitability of Deposit Money Banks in Nigeria from 2004 to 2018 using time series data and found that interest rate was not significant to influence bank deposit growth. A study by Hossin (2020) using co-integration and error correction models proven that there was a positive effect of deposit rate of interest rate on financial depth in Bangladesh. Özen et al. (2018) based on McKinnon-Shaw's Theory, found that investors increase their deposit investments when interest rates rise.

Real GDP and Total Deposit

An increase in the real GDP can increase the money supply and hence, result in decreasing in interest rate as well as conversely decrease Commercial Bank's Total deposit (He, 2017). As predicted by theoretical models of the paradox of thrift (Ghiaie, 2018; Degorce and Monnet, 2021), found a negative relationship between RGDP and total deposit growth rate. In addition, Koroleva et al. (2021) examined the relationship between internal determinants, external determinants, and the profitability of state-owned commercial banks using pooled regression, fixed effect, and random effect models using selected top five Chinese state-owned commercial banks between 2007 and 2019 and proven that macroeconomic factor measured by the natural logarithm of GDP negatively influences banks' profitability. Puatwoe et al. (2017) in their study found that there exists a short-run negative relationship between bank deposits and economic growth equally. However, in the long-run, relationship between bank deposits and economic growth was found to be a positive and significant relationship.

3. Research Design and Methodology

The research followed a deductive approach, quantitative method and longitudinal time horizon, and used secondary data. The research also employed an explanatory research design to establish a relationship and claim causality between the explained and explanatory variables.

Data source and type

The research used secondary annual time series data published by different financial institutions. An annualized total deposit by category of ownership and type of deposit was collected from Commercial bank of Ethiopia along with lending rate, exchange rate, and the number of branches. Annualized data of population growth, inflation, and economic growth were sourced from the Central Statistical Agency of Ethiopia. Moreover, annual publication reports of the National Bank of Ethiopia and financial magazines such as Mudaye Neway and Biritu were also used as sources of secondary data.

Variable description and hypothesis

While deposit (D) was used as the explained variable interest rate on deposits (R), an exchange rate (E), economic growth (EG), inflation (I), and branch expansion (BR), and population growth (P) were used as explanatory variables of the study after a thorough review of extant literature. Moreover, the study used over 40-years annualized economic data spanning from 1974 to 2013.

Model specification

The empirical framework of this study focused on modelling the determinants of deposit of commercial banks in Ethiopia. A variant of the determinant model can be used to evaluate the determinants of deposit and the following empirical model was formulated as presented hereunder:

$$D = \mathrm{f}(\mathrm{R}, \mathrm{E}, \mathrm{I}, \mathrm{EG}, \mathrm{P}, \mathrm{BR}) \quad \textbf{(3.1)}$$

Thus, the equivalent equation in logarithmic form would be:

$$LD = \beta_0 + \beta_1 \mathrm{LR} + \beta_2 \mathrm{LE} + \beta_3 \mathrm{LI} + \beta_4 \mathrm{LGDP} + \beta_5 \mathrm{LP} + \beta_6 \mathrm{LBR} + \varepsilon \mathrm{t} \quad \textbf{(3.2)}$$

Where ε_t is the error term and β_0 is the constant term, β_1, β_2, $\beta 3$, $\beta 4$and $\beta 5$ are elasticity coefficients.

Estimation techniques

The study used recent techniques in time series econometrics to analyse the determinants of deposit growth for the selected organization including co-integration and error correction method carried out within the vector autoregression (VAR) framework. First, the unit root test was conducted using

Augmented Dickey-Fuller (ADF) test. Then, a test for co-integration among variables followed, and a vector error correction model (VECM) was constructed. Wherever there was a lack of evidence for co-integration, the analyses would be based on the first differences of the variables using a standard VAR model. In a VAR model, each variable is explained by its own lagged values and the lagged values of all other variables in the system. The variables of the form y_{t-I} indicate that variable's value *i* time periods earlier and they are known as the "i*th* lag" of y_t. Suppose that we have an n-variable VAR with lags up to order p. If the variables of the system are y_1, y_2, …, y_n, then we can write the n equations of the VAR as:

$$y_t = \beta_0 + \beta_1 y_{t-1} + \beta_2 y_{2-2} + \cdots + \beta_p y_{t-p} + e_t \qquad (\mathbf{3.3})$$

where β_0 is a $k \times 1$ vector of constants, B_i is a $k \times k$ matrix (for every $i = 0, ..., p$) and ε_t is a $k \times 1$ vector of error terms in another way a vector autoregressive process of order k or VAR (k) for a system of 'm' variables can thus, be written in the following matrix form:

$$Y = \delta + \sum_{j=1}^{k} AjYt - j + Vt \qquad \mathbf{(3.4)}$$

There are no exogenous variables in the model. In the VAR model, several endogenous variables were considered and each endogenous variable was explained by its lagged and the lagged values of all other endogenous variables in the model. In general, a VAR model expresses current values of the endogenous variables solely as a function of lagged values of all endogenous variables in the system.

VAR model is the extension of the univariate autoregressive model to dynamic multivariate time series. It has proven to be especially useful for describing the dynamic behaviour of economic and financial time series and important for forecasting. It often provides higher forecasts to those from univariate time series models as well as it elaborates theory-based simultaneous equations models. Thus, the researchers choose the VAR model by its ability to capture the intertwined dynamics of time series data, better, systematic, and flexible approach for capturing complex real-world behaviour.

Unit root tests

Many economic and financial time series exhibit trending behavior or non-stationarity in the mean. In time series analysis, the variables are expected to be stationary with a mean of zero and constant variance. Two common trend removal or de-trending procedures are first differencing and time-trend regression. First differencing is appropriate for I(1) time series and time-trend regression is appropriate for trend stationery I(0) time series. Unit root tests are used to determine if trending data should be first differenced or regressed on deterministic functions of time to render the data stationary (Kumar et al., 2020; Webb et al., 2020).

To examine the stationary nature of the variables, an ADF test was conducted. The logarithm values of the time series data were taken before Ordinary Least Square (OLS) techniques were used for estimating the model (Dickey and Fuller, 1981). Doing so is important to transform the nonlinear data into a linear form. As all variables in the system have to be stationary in the VAR model before estimation, it is necessary to test the stationary of each data series. Under the ADF test, the null hypothesis of a unit root, H0: b1 = 0 (unit root), is tested using the following specification:

$$\Delta Y = b_0 + b_1 Y t_{t-1} + \sum_{j=1}^{k} \theta j \Delta Y_{t-i} + \varepsilon t \qquad \mathbf{(3.5)}$$

Where y is the variable to be tested; Δ is the first difference operator; b_0 is a constant term; t represents the time trend; ε represents the Gaussian white noise; b and θj (for j=1, 2 …p) constant parameters; K is the optimal lag length to be chosen by the Akaike information criteria AIC or Schwartz/ Bayesian information criteria SBIC to ensure that εt is white noise.

The hypothesis to be tested is:
Ho: b_1 = 0, i.e.the variable has unit root (the series is non stationary)
H1: $b_1 \neq 0$, i.e.the variable has no unit root (the series is stationary)
The original level data and the first-differenced level data were both tested for unit roots. Where the test statistics (t-ratio) was greater than the critical values given in Fuller (1976), the null hypothesis was rejected and stationarity was claimed.

Cointegration tests

Economic theory recommends that many time series datasets will move together, fluctuating around a long-run equilibrium (Furno, 2021). In statistics and econometrics, this long-run equilibrium is measured and tested by using the concept of cointegration (Badshah and Bulut, 2020). A multivariate test for cointegration developed by Johansen (1988) and Johansen and Juselius (2009) was used in the study. The Johansen-Juselius (JJ) procedure of the co-integration test is based on the maximum likelihood estimation of the VAR model. The test was carried out through a VAR system such as follows:

$$Dt = B_1 D_{t-1} + B_2 D_{t-2} + B_1 D_{t-3} + \cdots + B_k D_{t-k} + \alpha + V_t \qquad \textbf{(3.6)}$$

t= 1, ----, T

Where D_t is an (n × 1) vector of I(1) variables; βi are (n × n) matrices of parameters; α is an (n × 1) vector of constant; υ_t is a vector of normal log distributed error with zero mean and constant variance, and k is the maximum number of lag length processing the white noise.

The trace and maximum eigenvalue statistics were calculated to test for the presence of r co-integrating vectors. The λtrace for the null hypothesis of at most r co-integrating vectors is:

$$\lambda_{trace}(r) = -T \sum_{j=r+1}^{n} \ln(1 - \lambda_j) \qquad \textbf{(3.7)}$$

The maximum eigenvalue statistic (λ_{max}) for the null hypothesis of r co-integrating vectors against the alternative of r + 1 co-integrating vectors is therefore:

$$\lambda_{max}(r, r+1) = -T\ln(1 - \lambda_{r+1}) \qquad \textbf{(3.8)}$$

Where, λ_j is the estimated values of the characteristic's roots obtained from the Π matrix and T is the number of usable observations.

The Vector Error Correction Model

This model is used to detect the presence of long-term relationships between the endogenous variables (Zhao and Palomar, 2017; Abusharbeh, 2020). Engle and Granger (1987) showed that co-integration implies, and is implied by, the existence of an error correction term. This means that changes in the

dependent variable are a function of the level of disequilibrium in the co-integrating relationship (captured by the error correction term) as well as changes in other explanatory variables. Once the variables are found to be co-integrated, a vector correction model (VECM) will be used to investigate the dynamic interactions among them in the system. The Granger representation states that for two co-integrated variables, an ECM can be found in the following form:

$$\Delta Yt = \mathrm{B}_{0+}B_1\Delta X_{\mathrm{t}} + B_2\varepsilon_{\mathrm{t}-1} + \cdots + V_{\mathrm{t}} \qquad \textbf{(3.9)}$$

Where ϵ_{t-1} represents the error correction term which captures the adjustment toward the long-run equilibrium and β_2 is the short-run adjustment coefficient.

A principal feature of co-integrated variables is that their time paths are influenced by the extent of any deviation from long-run equilibrium. ECM captures the dynamics of the system whilst incorporating the equilibrium suggested by economic theory (Newbold, 1983). The appeal of the ECM formulation is that it combines flexibility in dynamic specification with desirable long-run properties (Dolado et al., 1990).

Diagnostic tests

Diagnostic tests for multi-co-linearity, autocorrelation (serial correlation), normality, heteroscedasticity, and endogeneity test have been made. Under the ordinary least squares estimation (OLS) of regression models, the assumptions of no serial correlation of the error terms as well as a constant variance of the error terms are important. The Breusch-Godfrey test for serial correlation and the Breusch-Pagan /Cook-Weisberg were used to test for heteroskedasticity. If both tests fail, a robust estimator of the covariance shall be used to correct for the presence of serial correlation and heteroskedasticity. In this study, the diagnostic testing result for multi-co-linearity using Variance inflation factor (VIF), serial correlation test using Durbin-Watson (Durbin and Watson, 1950), normality using White-MacDonald test (White and MacDonald, 1980), and homoskedasticity using Bruesch-Pagan and Godfrey tests (Godfrey, 1978; Bruesch and Pagan, 1979) show that all are consistent to estimate the ECM mode.

4. Results and Discussion

In this section, the determinants of deposit growth in Ethiopia using annual data from 1974/75-2013/14 are thoroughly examined. Before the direct estimation of the model, the unit root was tested using ADF. After identifying the optimal lag length, the presence of the co-integrating vectors is tested using the Johansen procedure. Further, the granger causality test was employed to find the direction of causality between inflation, investment, and economic growth. The long-run and short-run relationships among variables were also captured.

The unit root test is a common practice in macro-level data analysis to accommodate non-stationary. If this behaviour of macro-variables is left uncorrected, it would lead to the problem of spurious regression when there is a need to model relationships among variables.

As explained in the methodology, formal testing for stationary and the order of integration of each variable are primarily undertaken using ADF. The tests with the ADF methods are performed with different trend assumptions (only intercept both linear trends and intercept, and no intercept and no trend). Performing the tests under all three alternatives will identify whether only the intercept or both the trend and intercept are significant. The results from the stationary test under the ADF (Table 8) demonstrate that both trend and intercept must be included in all variables (LnDeposit, LnRGDP, Lninflation, Lninterestrate, Lnexchangerate, and Lnbrexpanision) in testing for stationary, while Ln population is tested without the trend and intercept. A linear trend is found to be insignificant in all of the test equations. The results show that all of the variables included in the model are integrated of order 1, i.e., I (1) (see Tables1and 2)

The absolute values of the calculated test statistics for all variables are less than their critical value at a 5 percent level of significance. The result indicated that all variables are non-stationary at level 1. Thus, the null hypothesis that each variable has a unit root cannot be rejected by the ADF test. However, after applying the first difference, the null hypothesis was rejected, since the data appeared to be stationary at first difference. Therefore, all variables are integrated of order one I (1).

Table 1: ADF Unit Root Test at Level

Variable at Level	Test Statistic Under Different Assumptions		
	ADF test statistic	Critical Value at 5% Level of Significance	Order of Integration
LNDEPOSIT	-1.463756	-3.536601	The critical value is less than the test statistic. (In absolute terms)
LNRGDP	-0.658953	-3.529758	
LNINFLATION	-1.986868	-3.548490	
LNINTERESTRATE	-3.362962	-3.536601	
LNEXCHRATE	-2.274971	-3.533083	
BREXP	-0.451818	-3.533083	
LNPOP	-1.571379	-3.548490	

Table 2: ADF Unit Root Test at First Difference

Variable First difference	Test Statistic Under Different Assumptions		
	ADF test statistic	Critical Value at 5% Level of Significance	Order of Integration
LNDEPOSIT	-3.755235	-3.533083	I(1)
LNRGDP	-5.875910	-3.536601	I(1)
LNINFLATION	-5.339272	-3.533083	I(1)
LNINTERESTRATE	-6.617931	-3.536601	I(1)
LNEXCHRATE	-4.356993	-3.533083	I(1)
LNBREXPAN	-3.276611	-3.198312*	I(1)
LNPOP	-4.354315	-3.568379	I(1)

* Shows significance at 10%, others at 5%

Optimal lag selection

The lag length is selected according to Final Prediction Error (FPE), Akaike Information Criterion (AIC), Hannan-Quinn Information Criterion (HQIC), and Schwarz Information Criterion (SIC). The more lags we include, the more initial values we lose. If we include too few lags, the size of the test will be incorrect (Wooldridge, 2000). VAR lag exclusion test is also applied to check the suitability of the lag included for estimation techniques (Table 3).

Table 3: Optimal Lag selection

VAR Lag Order Selection Criteria
Endogenous variables: LNDEPOSIT LNRGDP LNINFLATION LNINTERESTRATE LNEXCHRATE LNBREXP
Exogenous variables: C LNPOPULATION
Sample: 1974 - 2014
Included observations: 35

Lag	Log	LR	FPE	AIC	SC	HQ
0	161.2837	NA	3.43e-14	-8.301926	-7.590910	-8.056483
1	372.0987	301.1642*	8.87e-18*	-16.69135	-13.13627*	-15.46414*
2	440.3957	66.34570	1.45e-17	-16.93690*	-10.53775	-14.72791

* Indicates lag order selected by the criterion
LR: sequential modified LR test statistic (each test at 5% level)

All FPE, SIC, and HQ results indicated one lag length to be the optimum lag length. The lag exclusion tests confirmed the first lag to be the appropriate lag. Hence, this study used the optimal lag length of one for estimation techniques.

Co-integration test result

The next step in validating the VAR model is to test for the existence of a long-run relationship among the variables. Lack of co-integration between variables suggested the existence of no long-run relationship between the explanatory and explained variables. Hence, the Johansen co-integration method is applied. The result of testing the number of co-integrating vectors is shown in Tables 4 and 5.

Table 4: Unrestricted Cointegration Rank Test (Trace)

Sample (adjusted): 1976 - 2013
Included observations: 35 after adjustments
Trend assumption: Linear deterministic trend
Series: LNDEPOSIT LNRGDP LNINF LNINTERESTRATE LNEXCHRATE LNBREXP LNPOP
Lags interval (in first differences): 1 to 1
Unrestricted Cointegration Rank Test (Trace)

Hypothesized		Trace	0.05	
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None *	0.875713	211.4466	125.6154	0.0000
At most 1 *	0.806117	138.4660	95.75366	0.0000
At most 2 *	0.589826	81.04848	69.81889	0.0049
At most 3 *	0.458305	49.85738	47.85613	0.0320
At most 4	0.388743	28.40056	29.79707	0.0718
At most 5	0.268718	11.17226	15.49471	0.2011
At most 6	0.006232	0.218788	3.841466	0.6400

Trace test indicates 4 co-integratingeon(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level

Table 5: Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.875713	72.98057	46.23142	0.0000
At most 1 *	0.806117	57.41753	40.07757	0.0002
At most 2	0.589826	31.19110	33.87687	0.1012
At most 3	0.458305	21.45682	27.58434	0.2496
At most 4	0.388743	17.22830	21.13162	0.1615
At most 5	0.268718	10.95347	14.26460	0.1566
At most 6	0.006232	0.218788	3.841466	0.6400

Max-eigenvalue test indicates 2 co-integratingeon(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level

While the unrestricted co-integration rank test (Trace) in Table 4 shows four co-integrating vectors at the 5% critical value in the system, the unrestricted co-integration rank test (Maximum Eigenvalue) result presented in Table 5

indicates there are two co-integrating vectors in the system. Thus, based on the two statistics result, it was concluded that there exists a meaningful long-run relationship between the variables under consideration. Since the long-run co-integrated relationship was found at most in four variables, the Vector Error Correction Model (VECM) thus can be estimated.

The VECM also provides important information on the short-run relationship between any co-integrated variables through the error correction term which explains the short-run deviations from the long-run equilibrium. This study, therefore, analyzed the long-run co-integrating relationship and short-run dynamics between deposit growth rate and the control variables.

Error correction model (ECM)

After the co-integrated model is estimated, an optimal lag is chosen, the ECM was estimated by making use of the Johansen co-integration test result.

Long-run relationships

As shown in Johansen co-integration test, there are at most four co-integrating relationships. This part of the study examined the impact of independent variables on deposit growth. The first normalized coefficients of deposit growth from the co-integration equation are indicated in Table 6.

Table 6: The Estimated Long Run Model for LNDEPOSIT

Dependent Variable: LNDEPOSIT
Method: Least Squares
Sample (adjusted): 1974 – 2013
Included observations: 39 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LNRGDP	0.746919	0.013898	53.74468	0.0000
LNINFLATION	0.396015	0.081562	4.855358	0.0000
LNINTERESTRATE	0.008544	0.038916	0.219559	0.8276
LNEXCHRATE	0.739377	0.062018	11.92195	0.0000
LNBREXP	0.239927	0.104156	2.303539	0.0277
LNPOP	0.374507	0.085944	4.357563	0.0001
R-squared	0.994284	Mean dependent vary		22.96867
Adjusted R-squared	0.993418	S.D. dependent vary		1.438257

The co-integrated estimated result of the long-run model of LNDEPOSIT is shown in the following equation:

LN DEPOSIT =0.75 LNRGDP+0.40 LNINFLATION+0.73 LNEXCHRATE +0.24 LNBREXP +0.37 LNPOP

The result indicated that except for interest rate, all independent variables at a 5 percent level of significance have a long-run effect on deposit growth. The result also shows that in the long-run GDP, inflation, exchange rate, branch expansion, and population growth positively affect deposit growth while interest rate has a positive but insignificant effect on the outcome variable. The results of the long-run estimations are analyzed and discussed in the following paragraphs. A 10 percent increase in GDP improves deposit growth by 7.4 percent. What this implicates is a growing economy leads to increase earnings which in turn increases saving. The result is consistent with the findings of Gebeyehu (2019) and Gebrelibanos (2012). Moreover, the Chakravarty committee study in 1985 indicated the existence of deposit growth at times where there was real growth in the Indian economy (Chakravarty, 1985).

A positive relationship was observed between inflation and deposit in the long run. A 10 percent increase in inflation results in a 3.9 percent increase in deposit growth. This seams a reality on the ground; both private and government saving has been increasing year to year. Though the result supports the finding of Gemedu (2012) and Carroll (2006), it contradicts the findings of Gebeyehu (2019) who argued that households in developing countries facing inflationary pressure and macroeconomic uncertainty have income barely enough for subsistence but not for saving. It can be posited that the result may be related to the saving motive in Ethiopia which is mainly precautionary than investment as in most of the least developed countries. To this end, Deaton (1992) found that precautionary saving increases at times of inflation. Moreover, the result may also be due to the lack of entrepreneurial skill, availability of enough alternative investments, or risk-averse behaviour of most depositors in developing economies. For this reason, the null hypothesis was not rejected

The long-run relationship between deposit and exchange rate is positive and statistically significant. A 10 percent increase in exchange rate resulted in results in 7.3 percent increase in saving deposits. The result disagrees with the finding of Ngula (2012) who conducted the study in the Nigerian context. This may be due to the difference in foreign currency management policies of the two

countries. While individuals can buy and hold foreign currency in Nigeria to make earnings, this however is an illegal act in Ethiopia. Ethiopian depositors don't have the possibility of withdrawing their deposits and buying foreign currency though we know that Ethiopian local currency consistently depreciates against major foreign currencies which might have negatively affected deposit growth. Moreover, given that remittance and export of agricultural commodities are the two major sources of foreign currency for Ethiopia that have roots with the larger population of the country, local currency depreciation will predictably increase deposit growth. Therefore, the Null hypothesis was rejected

At priori it was expected that Branch expansion positively influences deposit growth in the long run. The result also confirmed the same. A ten percent increase in the number of branches increases deposit growth by 2.3 percent. Similar results were found by Gebeyehu (2019), Gemedu (2012), Rangarajan (1982), Sandhu and Goswami (1986). As a result, the Null hypothesis was rejected

The result also revealed that Population growth has a positive and significant impact on deposit growth. 1 percent increase in population growth increases deposit growth by 0.37 percent. The result is consistent with Modigliani (1986).

The long-run relationship between deposit and interest rate was positive but statistically insignificant. This is in support of the findings of Gebeyehu (2019) and Gebrelibanos (2012). Edmister and Merriken (1989) also found that interest rates could influence little in this regard. The finding could be the result of a negative real interest rate in the Ethiopian financial system. Owing to this, the Null hypothesis was rejected.

Short-run relationships

The other objective of this estimation was to investigate the short-run relationship between dependent and independent variables. If the cointegrating relationship, in the long run could be obtained, then the Vector Error Correction Model (VECM) can be estimated. This VECM is important to show the short-run relationship between any two co-integrated variables. Table 7 shows the result of the first short-run error correction model.

Table 7: Short-Run Coefficients when the dependent variable is D (LDEPOSIT)

Dependent Variable: D(LNDEPOSIT)
Method: Least Squares
Sample (adjusted): 1975 – 2013
Included observations: 37 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.071652	0.011248	6.369938	0.0000
D(LNRGDP)	0.214730	0.151483	1.417523	0.1666
D(LNINF)	-0.026112	0.018463	-1.414253	0.1676
D(LNINTERESTRATE)	0.011926	0.014553	0.819473	0.4190
D(LNEXCHRATE)	0.241443	0.076019	3.176066	0.0034
D(LNBREXP)	0.565349	0.075256	7.512329	0.0000
D(LNPOP)	0.001957	0.076373	0.025631	0.9797
CointEq1	-0.067835	0.039664	-0.85155	0.0444
R-squared	0.762707	Mean dependent var		0.130684
Adjusted R-squared	0.715249	S.D. dependent var		0.090587

The coefficient of the error correction term for the deposit growth equation has the expected negative sign, indicating that it is error-correcting. This guaranteed that although the actual real deposit may temporarily deviate from its long-run equilibrium value, it would gradually converge to its equilibrium. The error correction term of -0.0678 showed that 6.8 percent of the deviation of the actual deposit from its equilibrium value is eliminated every year. Hence, a full adjustment would require about 15 years. This showed that the speed of adjustment is slow in each subsequent year. The relatively low pace of adjustment may be attributed to structural rigidities in Ethiopia that is common in most developing countries that slow down the adjustment processes. In estimating the error-correction model, the population is introduced exogenously to capture the effect of the population on deposit growth.

In the short run, branch expansion and the exchange rate had positive and significant impacts on deposit growth while GDP, interest rate, and the population had a positive but insignificant relationship. However, inflation had an insignificant but negative relationship with deposits. The negative relationship, though insignificant, could be attributed to the recent dramatic increase of

inflation in the Ethiopian economy. For instance, in July 2008, inflation reached 64 % (UNDP, 2014).

Granger causality test result

At the most basic level of economic theory, the belief is that certain pairs of economic variables should not diverge too far from each other, at least in the long run (Granger, 2009). As indicated in the estimated causality test result reported in Table 8, the null hypothesis that RGDP does not granger cause Deposit and branch expansion (and vice versa) was rejected at a 5% level of significance. However, the null hypothesis that inflation and interest rate do not granger cause Deposit couldn't be rejected. The causality runs one way from deposit to inflation and interest rate, not the other way. Causality is unidirectional. Quite opposite to this, the null hypothesis that exchange rate and population growth do not granger cause Deposit was rejected at 5% level of significance. The causality runs one way from the exchange rate and population growth to deposit but not vice versa (Table 8).

Table 8: Pairwise Granger Causality Tests

Sample: 1974 - 2014

Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
LNRGDP does not Granger Cause LNDEPOSIT	38	1.33789	0.2763
K2 LNDEPOSIT does not Granger Cause LNRGDP		1.43079	0.2536
LNINF does not Granger Cause LNDEPOSIT	38	10.0375	0.0004
LNDEPOSIT does not Granger Cause LNINF		2.28005	0.1182
LNINTERESTRATE does not Granger Cause LNDEPOSIT	35	3.85044	0.0325
LNDEPOSIT does not Granger Cause LNINTERESTRATE		0.86499	0.4313
LNEXCHRATE does not Granger Cause LNDEPOSIT	38	2.06550	0.1428
LNDEPOSIT does not Granger Cause LNEXCHRATE		3.43419	0.0442
LNBREXP does not Granger Cause LNDEPOSIT	38	0.33089	0.7206
LNDEPOSIT does not Granger Cause LNBREXP		2.48934	0.0984
LNPOP does not Granger Cause LNDEPOSIT	38	0.07461	0.9283
LNDEPOSIT does not Granger Cause LNPOP		0.29426	0.0470

5. Conclusion and Policy Implications

5.1 Conclusions

Based on the findings of the study both from the descriptive and econometric analysis, the following conclusions are made.

In the long run, real GDP, inflation, branch expansion, exchange rate, and population growth have a positive and significant impact on the deposit growth of CBE. As the model result showed, economic growth has a more positive impact on deposit growth than other determinant factors. Even though interest rate has a positive sign, it was insignificant. Exchange rate has the second higher impact in the long run than other variables included in the model. The rate of inflation in Ethiopia is generally low except for the years 2008 and 2012. Whenever the level of inflation is below the threshold, it has a positive impact on the overall economy. Most studies suggest that the optimal level of inflation (threshold) for Ethiopia is 10% (Altasseb, 2013). For this reason, inflation has a positive impact on deposit growth in the Ethiopian context in the long run.

There is a short-run association between deposit and its determinants. In the short-run, there is a significant positive impact of exchange rate and branch expansion on the rate of deposit growth while real GDP growth rate, interest rate, inflation, and population growth are insignificant. Moreover, the estimated result of this model indicates that the deviation of the real deposit growth rate from its long-run equilibrium would require 15 years to adjust. There is a sluggish dynamic adjustment of deposits to equilibrium.

Deposit growth can predict movements of branch expansion and RGDP and vice-versa. Moreover, exchange rate and population growth can predict movements of deposit growth in Ethiopia but not vice versa.

5.2 Policy Implications

The macroeconomic event of Ethiopia could have a strong effect on deposit mobilization, which calls for a responsive policy to increase domestic saving for the sustainable financial liberty of the country.

Based on the analysis made and the major findings obtained, the following policy recommendations are forwarded;

- Improve infrastructure and incentives for banks to open branches in both remote (central) areas and reach the unbanked society. There should be also an investment in strengthening the operational capacity of the existing branches. Particularly those which are located in remote areas with limited

human and other resources. The empirical evidence indicated that deposits would increase as the number of branches increases.

- The government should continue to manage inflation below its threshold or optimal level as the research showed it negatively affects deposit growth in banks.
- There is a well-established positive relationship between economic growth and deposit mobilization. This calls for continued policy support and investment in enhancing economic growth that would not only increase the capacity of banks to mobilize resources but also trigger the overall growth of the economy both in the long and short run.
- Results also indicated an increase in population growth positively affecting the growth of deposits. While unmanaged population growth could hinder economic growth and social development, regulated population growth would mean an increase in the functional labor force that would attract investment and create wealth which would positively affect overall economic growth. As a result, the deposit will grow. The study recommends strengthening the current family planning initiatives allows regulated population growth. And then, enhance Human Resource development in the country. And finally, creating job opportunities for the existing labor force through developing investment-friendly policy instruments.
- Under the current financial and investment policy of the country, investment in the financial sector is allowed only for people with Ethiopian citizenship. This inhibits the possibility of foreign banks operating in the country. Since competition would remain low, the interest rate would not necessarily increase the total deposit. However, experiences from other countries, particularly where there is a liberalized economy, indicated that increasing interest rate commonly increases deposit mobilization. Therefore, banks should develop long-run strategies that will align with the policy shift of the country, if any. For example, if Ethiopia decides to be a member of the World Trade Organization (WTO), foreign banks would be allowed to operate in the country.

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