"Internal determinants of bank deposit flows under different market conditions in Ghana"

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INTERNAL DETERMINANTS OF BANK DEPOSIT FLOWS UNDER DIFFERENT MARKET CONDITIONS IN GHANA

Abstract

This study analyzes the effect of internal factors of bank performance on deposit flows, considering the changes in the stock market conditions in Ghana. A panel dataset covering 2007 to 2021 of 18 banks in Ghana is applied in a dynamic panel model for the analysis. The results show that the lagged deposit growth exerts an impressive influence of 0.68 percent on the future deposit flows of banks, thus positing a favorable implication for their trading momentum. Also, liquidity was found to have a negative relationship of –0.64 percent with deposit growth. This implies that the holding of excess liquidity diminishes investors' confidence in a bank's ability to generate more revenue to enhance the value of their funds, as high liquidity ratios reduce the bank's capacity to grant more loans for profit. Furthermore, the analysis revealed a positive effect of 1.93 percent by expenditure on deposit growth, which suggests that depositors recognize a rise in operational costs as an indication of a bank's potential for growth and rapid expansion. Moreover, the analysis found the existence of a negative effect of –0.88 percent by the stock market conditions on deposit growth, which implies that bullish market conditions reduce bank deposits. This verifies that the determinants of deposit flows adapt to the changes in market conditions. Policy strategies should include non-performance metrics such as an increase in the interest paid on customers' deposits, product promotions, and targeted advertisements to sustain the inflow of depositors' funds under changing market conditions.

Keywords	deposit growth, return on average assets, credit risk, liquidity, expenditure, bank size, bank performance, market condition
JEL Classification	G10, G21

INTRODUCTION

The effective functioning of an economy's financial system depends largely on the efficiency of its banking sub-sector. This is because banks facilitate the mobilization and transfer of financial resources across different sectors of the economy to fund infrastructural development, business expansion, and individual livelihood support requirements (Berger et al., 2020; Derbali, 2021). In this context, depositors' cash represents a major source of funding for banks operational activities and the granting of loans, as the cost involved in mobilizing deposits is minimal compared to the issuance of equity and bonds (Schelling & Towbin, 2020; Afzal et al., 2023). Scholars explain that depositors' funds constitute more than 70 percent of banks' total assets, which supports the trading momentum of the banks (Hanson et al., 2015; Chen et al., 2022).

Accordingly, banks are expected to exhibit superior management and operational efficiency to sustain the inflow of customer deposits as operational efficiency remains a critical metric of bank performance (Ali & Puah, 2019). The percentage change in depositors' funds growth of

banks in Ghana was 26.77 in 2020, 13.79 in 2021, and 82.09 at the end of quarter four in 2022 (BoG, 2021, 2023). However, a recent industry survey suggests a marginal rate of decline in banks' cost-to-income ratio. The average cost-to-income ratio of the industry was 51 percent, 47 percent in 2021, and declined by 1 percent to 46 percent in 2022, which is disproportionate to the frequency of increase in depositors' funds flow during the period analyzed (PwC, 2023). The convex deposit flow and performance relationships destabilize the efficiency of the financial system regarding the fair pricing of assets (Fama, 1970) and suggest that the dynamics of their interaction adjust to the changes in stock market conditions as posited under adaptive explanations of finance, which calls for an investigation.

1. LITERATURE REVIEW AND HYPOTHESIS

The direction of depositors' fund flows is an important indicator of bank profitability, operational soundness, and financial stability. This is because customers' deposits constitute a significant proportion of the bank's operating assets from which operational and investment activities are financed (Chen et al., 2022). While customer depositors are generally, captured as a liability in the books of the banks, the accruing revenue from their effective utilization can offset the cost involved in its mobilization and the risk associated with its application as loans to borrowers. Employing a time-series regression approach, Lin (2020) assessed the impact of market index performance on bank deposit flows. The results show that the rate of individual depositors' fund allocation to banks declines during bullish periods of the stock market, where there is a general rise in equity returns.

Consequently, the capacity of banks to grant more loans is adversely affected, which drives a deteriorating trend in the stability of businesses that depend on bank credits to finance their operations. Also, the study established that banks with a high concentration of shareholders' equity tend to experience significant reductions in deposit allocations during market upturns where the returns on stock increase. This is because depositors move their funds from the banks to exchange-traded investments during market upturns in pursuit of higher returns. In this context, the asymmetric asset flow-performance dynamics of banks can be explained by the changes in market returns and other economic fundamentals such as real gross domestic product (real GDP) growth rate, interest rate as well and inflation. As a result, conditional modeling is suited to generate accurate inferences about the deposit flow-performance interactions, while this is lacking in the bank performance literature in Ghana.

Egan et al. (2017) apply a structural model to examine the relationship between deposit competition and fragility. The findings of the study suggest that depositors' decisions on the banks are affected by the financial stability of the bank, where depositors allocate funds differently across the banks based on the level of risk associated with a bank's portfolios. As a result, insured depositors are motivated to allocate more funds to banks with highly risky assets, whereas their uninsured and risk-averse counterparts limit funds allocations to banks with symptoms of financial instability. While the industry competition drives banks to implement different strategies to attract depositors' funds, cash owners become more skeptical about the viability during market downturns and thus minimize cash allocations to banks where there are no insurance policies to safeguard the value of depositors' funds under conditions of uncertainty. The reduction in depositors' funds posits adverse implications for the capitalization of banks to financial operational activities to withstand the dynamic shocks under changing market conditions.

In a related study regarding the drivers of deposit outflows and inflows, Martin et al. (2018) find that the attachment of government guarantees to deposits and insurance boosts investors' confidence to allocate more cash to a bank regardless of the direction of its current performance. This evidence supports the prior findings of Egan et al. (2017) that depositors are sensitive to the long-run stability of bank performance vis-à-vis changing market conditions where they increase cash allocations during bullish states of

the market. Furthermore, bank managers' ability to minimize credit losses and operational overheads posits important implications for the direction of the flow of depositors' funds across the banks. This is because depositors represent the primary and less costly source of funds for the banks to finance the loan arrangement with customers for profit. In this way, any impairments to the loans, as well as operational inefficiencies, pose a threat to the value of the depositors' funds when the bank runs into liquidity and insolvency challenges.

In an analysis of the key determinants of deposits, Al-Najjar and Assous (2021) employ capital adequacy, asset quality, management, earnings, and liquidity (CAMEL) rating system, and a stepwise regression model. The results show that capital adequacy ratio (CAR), efficiency, earnings, and liquidity have positive effects on banks' total deposits. This implies that increased shareholder funds, management efficiency in terms of a reduction in operational cost, and a bank's capacity to finance its current liabilities positively affect the confidence of depositors to allocate more cash to a bank. The direction of these bank-specific dynamics implies the managerial expertise of the bank to guarantee the cash owners' expectations of value addition to their underlying investments to warrant the allocation of additional funds. However, the prior analysis of Unvan and Yakubu (2020) posits contrary evidence regarding the relationship between CAR and deposit flows. The study documents an insignificant coefficient of CAR under deposits, which indicates that increasing bank capital adequacy does not effectively cause a change in deposit flows.

Using a fixed effect model, Alemu (2021) examines the determinants of deposits with a broader focus beyond internal bank dynamics. The analysis found government expenditure, interest rate, return on assets, and inflation as variables with predictive influences over the deposit flows of banks, where the impact of government expenditure, interest rate, and return on assets on deposit flows is positive, while inflation was found to have a negative relationship with customer deposits. This implies that increased capital expenditure by the government leads to the generation of more business opportunities and

an enhanced standard of living to support the saving of money in bank accounts to boost the level of customer deposits with banks. However, the negative relationship between inflation and deposits indicates that an inflationary economic environment suppresses the growth of business and individual incomes and hence, reduces the amount of money customers allocate to the banks as deposits. Prior evidence by Unvan and Yakubu (2020) verifies the finding of Alemu (2021) relative to the impact of inflation on deposit flows, which implies an adverse influence of inflation on depositors' funds.

The findings of the extant studies on bank deposit flow reveal important dimensions of its relationship with the key internal performance factors. However, the analyses do not account for the effect of the stock market fluctuations on the relationship between the deposit flows and its determinants, which is expected to change under varying conditions of the market based on the explanations of the Adaptive Market Hypothesis (AMH) (Lo, 2012). As a result, a conditional test is suited to generate accurate conclusions about the relationship between deposits and their determinants, which emphasizes the relevance of this study. In terms of contributions, this study represents a novel attempt to test the impact of bank-specific factors on deposit flow vis-à-vis the alteration in the condition of the stock market. Also, the findings of the conditional analysis of deposit flow dynamics in this study will help to drive optimal portfolio management by banking professionals to ensure an enhanced value addition to depositors' funds. Furthermore, this study represents a means of testing the adaptive principles of finance in the context of deposit flows under changing conditions of the stock market. In general, the dynamics of bank performance are linked to the direction of the stock market conditions, while the extant studies on the drivers of deposit flows in Ghana do not account for the effect of the market conditions changes in the analysis, which calls for an investigation.

Thus, this study is aimed at examining the effect of internal factors of bank performance on deposit flows under time-varying conditions of the stock market.

Based on the aim, this study hypothesizes the following:

H_0: *Deposit flow is more sensitive to the internal factors of bank performance under bullish market conditions than bearish conditions.*

H_1: *Deposit flow is more sensitive to the internal factors under bearish market conditions than bullish conditions.*

2. DATA AND METHODOLOGY

The study utilizes a yearly panel dataset of eighteen (18) banks in Ghana with licenses for universal banking operations. The sampling period spans from 2007 to 2021. Market return data were obtained from the website of the Ghana Stock Exchange, while the bank-level data were sourced from the websites of the individual banks included in the sample. The sample is selected from a population of twenty-three (23) banks based on data availability of a bank for a minimum period of six (6) years.

Following Chowdhury et al. (2017), this study estimates a dynamic panel model below for the analysis:

$$DGRTH_{i,t} = \alpha DGRTH_{i,t-1} + \beta BS_{i,t} + \gamma STKCON_{t-1} + \varepsilon_{i,t}, \qquad (1)$$

where $DGRTH_{i,t}$ is the growth rate of a bank *i's* deposit in time *t*. Mathematically, the deposit growth rate is computed as $(D_{i,t} - D_{i,t-1} / D_{i,t-1})$, where $D_{i,t}$ denotes a deposit at time *t*, and $D_{i,t-1}$ is a deposit in time *t* – 1. $DGRTH_{i,t-1}$ represents the lagged deposit growth rate of the bank at time *t* – 1. $BS_{i,t}$ denotes bank-specific variables such as return on average assets (ROAA), liquidity (LIQ), expenditure (EXP), credit risk (CRISK), and bank size (SIZE). ROAA is employed as a proxy for profitability and is generated as the bank's annual net income to average total assets ratio. The value of the ROAA indicates a bank's capability to utilize its assets under management to generate net income, which can affect depositors' decisions on the bank (Petria et al., 2015; Bongini et al., 2019). LIQ is the ratio of total loans and advances to total assets, and a bank's liquidity position has implications for deposit

flows as it implies the solvency of a bank regarding its capacity to cater to short-term debt commitments based on its current assets (Paul et al., 2021; Al-Matari, 2023). EXP is a bank's operating expense to operating revenue ratio. It is included in the equation to account for managerial efficiency regarding the bank's ability to minimize the overheads to ensure operational and financial stability (Derbali, 2021; Syafrizal et al., 2023). CRISK is calculated as the ratio of non-performing loans to total loans and advances. A high credit risk ratio has implications for the financial stability of a bank and affects depositors' decisions on the bank (Zaidanin & Zaidanin, 2021).

SIZE is the natural logarithm of a bank's total assets and is incorporated into the equation to control for the influence of asset growth on deposit flow as the pace of growth of larger banks is generally slower than smaller banks, which can drive the depositors' decisions on the banks (Bertay et al, 2013; Lee & Ngo, 2020). $STKCON_{i,t}$ is the lagged stock market condition, which captures the effect of the bullish and bearish conditions of the stock market return on deposit growth. The bullish condition of the market is denoted by a period of general rise and low volatility in the return of the market index, whereas the period of a continuous decline and high volatility in the return of the index denotes a bearish condition (Lee et al., 2011; Naifer, 2023). The dummy variable *STKCON* takes the value 1 in the bullish period (i.e., market return in time t-1 ≥ 1) and 0 for the bearish period (i.e., market return t-1 ≤ 0). It is known in the literature that a significant portion of banks' investments are posited in portfolios traded on the stock market and hence, the performance of banks is affected by the fluctuations in the stock market return (Fang et al., 2019; Lin, 2020). In this analysis, a positive significant coefficient of the stock market condition variable implies that the impact of the internal bank factors on deposit flow is more evident under the bullish condition than the bearish condition of the market. On the other hand, a negative significant coefficient of the market condition indicator implies the bank-level dynamics on deposit flow are evident more under bearish conditions of the stock market compared to bullish conditions. The market return is proxied by the Ghana Stock Exchange All Share (GSE All-Share Index) and Composite Indices. Before 2011,

the GSE All-Share Index was used by the Ghana Stock Exchange as the market benchmark and was subsequently replaced with the Ghana Stock Exchange Composite Index (GSECI) by the exchange in 2011. $\varepsilon_{i,t}$ denotes the model's error term, which captures the impact of latent dynamics on deposit flows.

The analytical technique employed, the system generalized method of moments (system GMM) model, is based on the dynamic panel dataset utilized in this study, which allows for the estimation of the effect of the past deposit growth on the current deposits. Ordinarily, the difference GMM would be suited for the analysis based on the formulation of the model as it can eliminate endogeneity problems relative to unobservable heterogeneity and simultaneity (Bundell et al., 2001; Roodman, 2009). The reliability of the difference GMM estimates, however, tends to diminish for a small sample size and scope based on the explanation by Blundell and Bond (1998). Given the size and scope of the sample data employed in this study, the system GMM estimator is more suited to address the limitations associated with the different GMM techniques. The system GMM is a more efficient estimator as it involves a two-step technique where inaccurately specified assumptions on the constant variables cannot affect the estimation coefficients of the time-variant variables. In this way, the unit-specific heterogeneity is addressed because the system allows the estimators to utilize transformations in the generation of the estimates (Arellano & Bond, 1991; Hakimi & Inglesi-Lotz, 2020).

3. RESULTS AND DISCUSSION

Table 1 reports the descriptive statistics of variables used for the analysis in this study. DGRTH, ROAA, LIQ, EXP, CRISK, and SIZE denote the deposit growth rate, return on average assets, li-

quidity, expenditure management, credit risk, and bank size, respectively. As can be observed from the table, a large difference exists between the maximum and minimum statistics of the management efficiency and bank size, bank size variables while the deposit growth rate, profitability, liquidity, and credit risk vary between 2.29 percent, and –0.24 percent, 0.10 percent, and 0.00 percent, 1.17 percent, and 0.06 percent, 1.17 percent and 0.00 percent, respectively.

Table 2 reports the correlations between the variables used for the analysis. Correlation analysis is conducted mainly to check if there exist any problems of multicollinearity between the explanatory variables, as high intercorrelation among the explanatory variables can lead to spurious estimation results (Senthilnathan, 2019). Also, through correlation analysis, the relationship between variables is determined to ascertain how a change in one variable directly affects the other. Considering the literature, a correlation of 0.7 and below is suitable as suggests the non-existence of a multicollinearity problem among the independent variables (Ahmed et al., 2018). From Table 2, the highest correlation among the explanatory variables reported between credit risk (CRISK) and return on average assets (ROAA) is –0.21 and is within the acceptable level of 0.7. Likewise, the value of the highest variance inflation factor (VIF) among the explanatory variables (reported for credit risk – CRISK), (1.12) is within the acceptable level of 10. This further indicates the non-existence of any multicollinearity issues between the regressors.

Table 3 reports the estimation results of the empirical model for the effect of internal bank factors on deposit flows under varying conditions of the stock market. As shown in Table 3, the lagged deposit growth generates a significant positive coefficient under current deposit growth. This suggests that past increases in deposits exert an impressive influence on the growth of depositors' funds of the

Table 1. Descriptive statistics

Descriptive statistics	DGRTH	ROAA	LIQ	EXP	CRISK	SIZE
Mean	0.3307	0.0286	0.5764	0.6177	0.0638	18.4359
Maximum	2.2995	0.1023	1.1661	6.6283	1.1688	24.1888
Minimum	−0.2365	0.0005	0.0605	0.0126	0.0002	11.0676
Std. dev.	0.3401	0.0183	0.2407	0.5116	0.1407	3.3455
Observations	222	222	222	222	222	222

Table 2. Correlation matrix

Variable	DGRTH	ROAA	LIQ	EXP	CRISK	SIZE	VIF
DGRTH	1.0000	–	–	–	–	–	1.0224
ROAA	0.0288	1.0000	–	–	–	–	1.1099
LIQ	0.0235	0.0117	1.0000	–	–	–	1.0536
EXP	0.0041	−0.1461**	0.1719***	1.0000	–	–	1.1038
CRISK	0.0869	−0.2070***	0.0485	−0.0348	1.0000	–	1.1187
SIZE	−0.1058	0.0431	0.0791	0.1573**	−0.1786***	1.0000	1.0858

Note: 10 percent, 5 percent, and 1 percent significant levels are denoted by *, **, and ***, respectively.

bank in the future. This evidence is consistent with the findings of Anastasiou and Katsafados (2021) and Nguyen (2022) who posit that a rise in depositors' funds allocation helps to boost the trading momentum and profitability of banks. In this way, the confidence of current and prospective customers is bolstered to allocate more funds to the outperforming banks, which leads a substantial growth. As well, growth in depositor funds implies an increase in the financial capacity of a bank to extend more credit facilities to borrowers to improve interest revenue and ensure trading stability.

From Table 3, the variable for return on average assets (ROAA) reports an insignificant relationship with deposit growth, which suggests that the direction of a bank's performance in terms of the return on assets does not exert a predictive effect on the inflow of depositor funds to the bank. This result contradicts the position of the literature that investors' cash allocation decision on banks is affected by the past performance of the bank (Bongini et al., 2019; Alemu, 2021). This is because the bank's past performance posits an important signal about its efficiency to generate substantial returns on new investments, and to protect funds of the depositors. In this context, recent outperformers and underperformers are expected to attract proportionate fund allocations from customers in the subsequent period. This is because universal banking, much like other financial enterprises, is premised on the ability to outperform the market. Otherwise, the efficiency of the financial system will be distorted to allow arbitrageurs to achieve extraordinary returns while assuming minimal risks.

The variable for liquidity (LIQ) reports a negative significant relationship with deposit growth. This evidence indicates that an enhancement in a bank's liquidity level exerts a deteriorating effect on the flow of depositors' funds to the banks. This find-ing supports the findings of Fungacova et al. (2021) that an increase in liquidity diminishes profitability over time. This is because the accumulation of more cash and cash equivalent assets by a bank limits its capacity to grant more credits to borrowers to enhance interest income, although sufficient liquidity posits positive implications for the solvency of the bank. In this way, the performance of banks in terms of earnings from interest income is reduced, which influences investors to allocate minimal funds to the underperforming banks.

In Table 3, the variable for expenditure management reports a positive significant relationship with deposit growth. This suggests that an increase in expenditure drives a positive trend in the flow of depositors' funds to the bank. This result departs from the position of the literature that an increase in operational overheads affects a bank's stability and expansion drive (Derbali, 2021; Syafrizal et al., 2023). However, an increase in expenditure can lead to a growth in depositors' funds where the expenditure is channeled towards the marketing of a bank's products and services through activities such as advertisement and special promotions to attract customers to deposit more funds with the bank.

From Table 3 it can be observed that the variable for credit risk reports an insignificant relationship with deposit growth. This implies that credit risk does not affect the depositors' decisions on banks, which is contrary to the explanation posited in the literature regarding the effect of credit risk on bank performance. Scholars explain that credit risk adversely impacts bank profitability and thus can influence depositors' fund allocation decisions on banks (Saleh & Abu Afifa, 2020; Alfadli & Rjoub, 2020). While credit risk can lead to liquidity challenges and the eventual collapse of a bank, effective management of the bank's risk exposures

relative to the granting of loans posits positive implications for rapid expansion and solvency.

Scholars (Bertay et al, 2013; Lee & Ngo, 2020) explain that customers' fund allocation decisions are affected by bank size as small banks grow faster than their larger counterparts. As a result, customers are more likely to allot more funds to smaller banks than larger ones, thus implying that growth in bank size drives the direction of deposit flows. However, in Table 3, the variable for bank size (*SIZE*) reports an insignificant relationship with deposit growth, which suggests that customers' fund allocation to the banks is insensitivity to the size of assets being managed by the bank at a particular time, which contradicts the established position of literature explained above.

Lastly, the variable for stock market conditions (*SKTCON*) reports a significant negative relationship with deposit growth in Table 3. This result indicates that an increase in the return of the market index impedes the flow of depositors' funds to the banks, which implies an adverse implication for their profitability under bullish market conditions. This finding confirms the position of a prior study (Lin, 2020) that market booms exert a deteriorating influence on the retail deposits of banks and verifies that the dynamics of bank performance, such as deposit flows, are linked to the direction of the stock market conditions.

Table 3. Drivers of bank deposits under changing market conditions

Independent variables	Dependent Variable: *DGRTH*		
	Coefficients	Standard Errors	P-values
DGRTH$_{t-1}$	0.6805***	0.2408	0.005
ROAA	1.0568	0.7902	0.014
LIQ	−0.6387**	0.2888	0.027
EXP	1.9311***	0.7334	0.008
CRISK	1.8545	4.0477	0.647
SIZE	2.2197	3.5995	0.537
SKTCON	−0.8887**	0.3709	0.017
No. of observations			198
No. of groups/instruments			18/16
AR (1) test (p-value)			0.059
AR (2) test (p-value).			0.154
Hansen test of over-identification (p-value)			0.429
Diff-in-Hansen test of Exogeneity (p-value)			0.783

Note: 10%, 5%, and 1% significant levels are denoted by *, ** and ***, respectively.

Based on the estimates of the empirical model reported in Table 3, the stock market condition variable reports a significant negative coefficient. This evidence indicates that bank deposit flow is more sensitive to the changes in the internal factors of bank performance under bearish market conditions than bullish conditions, based on interpretative assumptions explained in section 2. Therefore, the null hypothesis is rejected in favor of the alternative hypothesis.

CONCLUSION AND POLICY IMPLICATIONS

This study aimed to assess the effect of internal bank factors on deposit flows considering the periodic changeover in the conditions of the stock market. The analysis found the prevalence of a positive relationship between past deposits and current deposits, which implies that past growth in deposits drives an impressive influence on the direction of future deposit flows. This prompts the need for the banks to consolidate their asset base to boost investors' confidence to allocate more funds to them. In addition, it was found that liquidity has a negative relationship with deposit growth. This implies that banks that strategize in maximum liquidity creation run the risk of experiencing a significant reduction in deposit inflows in the future. This is because the holding of high liquidity positions reduces a bank's capacity to grant more loans to enhance profitability.

Furthermore, the results indicate a positive influence of expenditure over deposit growth. This relationship implies that the increase in operational cost signals the potential for a bank's expansion and growth, which drives the depositors to allocate more funds to the bank. However, bank managers must maintain operational overheads within the financial capacity of the bank as excessive expenditure could expose the bank to operational instability and insolvency crises. Moreover, the changes in the stock market conditions were found to have an impact on the deposit growth of banks, which implies an in-

crease in the return of the market drives the depositors' funds to exchange-traded assets. This reduces the flow of investors' funds to the banks, thus diminishing their profitability. This shows that bullish market conditions exert a deteriorating impact on deposit flows, thus implying that the dynamics of deposit flows adapt to changes in the stock market conditions.

Policy implications are offered based on the results. To begin with, banks should invest in strategies that help to maintain an increasing moment of deposit mobilization as the level of current deposit growth has implications for the direction of future deposit flows. Also, banks need to have minimum levels of liquidity as the creation of excessive liquidity signals profit deterioration to the depositors. Consequently, the investors are demotivated to allot additional funds to these banks based on the expectation of stagnated growth and profitability in the future. In addition, banks need to have strategic cost management practices to avoid the accumulation of excessive trading overheads that emanate because of rapid growth. The accumulation of excess cost adversely affects the financial capacity of a bank to support future expansion drives and hence, demotivates the depositors to invest in the banks. Furthermore, banks should implement sustainable deposit mobilizing strategies to ensure operational stability during the bullish periods of the market because a substantial proportion of bank investments are divested into exchange-traded portfolios under this condition of the market. The limitation of this study is recognized in the frequency (yearly observations) of the dataset employed for the analysis owing to high-frequency data availability across the sample. Other researchers can utilize monthly and quarterly data to improve the results and test the conditional effect of macroeconomic indicators that may drive deposit flows.

AUTHOR CONTRIBUTIONS

Conceptualization: Mulatu Fekadu Zerihun.
Data curation: Mulatu Fekadu Zerihun.
Formal analysis: Mulatu Fekadu Zerihun.
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Writing – original draft: Mulatu Fekadu Zerihun.
Writing – reviewing & editing: Mulatu Fekadu Zerihun.§

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