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Granger Causality Model of Retained Earnings and Financial Performance of Nonfinancial Firms Listed at the Nairobi Securities Exchange (NSE), Kenya

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Abstract

Non-financial firms are central to economic development of nations, producing goods and services and alleviating unemployment by creating numerous job opportunities. Despite this potential inherent in non-financial firms, evidence shows that the non-financial firms listed at the Nairobi Securities Exchange (NSE) experience challenges in their financial performance which lowers their capacity to invest. Although retained earnings have been used as a source of funding among listed non-financial firms, there is a paucity of research on the predictive power between retained earnings and financial performance of these firms. Therefore, this research addressed this paucity by modeling Granger causality between retained earnings and financial performance of non-financial firms listed at the NSE. The Wald tests revealed that financial performance of the non-financial firms Granger causes retained earnings, but retained earnings do not Granger cause financial performance. The conclusion drawn from these findings is that financial performance of non-financial firms listed at the NSE allows forecasting of future retained earnings. However, future research should leverage emerging advances like Network Granger causality to determine whether bidirectional Granger causality is viable between the two variables.

Keywords: Non-financial firms, Financial performance, Granger causality, Retained earnings, Wald test, Forecasting

Introduction

The financial well-being and performance of nonfinancial firms listed on the Nairobi Securities Exchange (NSE) in Kenya are crucial determinants that impact various stakeholders, including investors, managers, and policymakers. However, it is noted that a considerable number of non-financial firms listed on the NSE have been experiencing a decline in their financial performance and growth, which hampers investment (Shikumo et al., 2023). These scholars argue that lenders exhibit a lack of inclination to provide loans to non-financial firms. Consequently, the said firms encounter difficulties in procuring funds for their operational activities. Therefore, it is imperative to comprehend and evaluate the long-term financial health of these firms to make informed decisions regarding strategic financial management.

Retained earnings, among the principal factors determining a firm's financial well-being, play a significant role as they reflect the company's capacity to reinvest profits into its operations and sustain long-term growth. Retained earnings refer to the portion of a company's net profit after tax that is kept within the organization rather than being distributed to shareholders as dividends. These earnings are earmarked for reinvestment in the company's operations and are not distributed as dividends. They play a crucial role in enhancing stockholders' ownership of the company's net assets. According to Dahmash et al. (2023), retained profits can have a substantial impact on the overall value of the firm.

Retained earnings represent the accumulated net earnings or profits of a company after dividends have been paid out. These earnings consist of the net earnings that remain after dividends, which can be reinvested in the company or used to reduce debt. Since they signify the portion of a company's earnings that is not distributed as dividends, they are commonly referred to as retained surplus. Retained earnings serve as a highly significant financial resource for firms as they do not incur additional operational costs, thereby enhancing financial performance and mitigating risks. A ratio known as the plowback ratio, also known as the retention rate in organizational contexts, can be used to measure retained earnings. However, as emphasized by Fernando (2023), there is a conflict regarding the optimal level of earnings retention. While managers often aim for a higher plowback ratio, shareholders may have different perspectives. Elevated plowback ratios introduce greater uncertainty for shareholders regarding their influence over shares and financial matters, resulting in significant trade-offs for equity shareholders (Koussis et al., 2017).

Non-financial enterprises encompass a wide range of industries, including manufacturing, technology, consumer goods, healthcare, and

services. Academic research indicates that these non-financial corporations engage in cross-market arbitrage by substituting one form of security for another in response to changes in relative valuations. This leads to financing flows that are negatively correlated across different markets (Ma, 2019). However, similar to other firms listed at the NSE, non-financial companies are currently facing the challenging situation of publicly traded companies suffering due to the ongoing economic crisis. Additionally, there appears to be a lack of enthusiasm among investors for stocks, which can be attributed to decreased disposable incomes and the emergence of alternative investment opportunities such as real estate and private equity (Anyanzwa, 2023), warranting an evaluation of these firms as listed at the NSE.

Evaluating and assessing the financial performance of publicly traded non-financial firms entails scrutinizing their financial health, efficiency, and effectiveness (Verma, 2023). The analysis of the financial performance of these listed non-financial enterprises entails evaluating various financial metrics, ratios, and indicators to comprehend how effectively the company is utilizing its resources, generating profits, managing its debt, and delivering value to its shareholders. Key components of financial performance analysis may encompass profitability, liquidity, solvency, efficiency, growth, and shareholder returns (Ahsan, 2016; Fatihudin, 2018; Galant et al., 2017). However, contemporary research prominently features profitability measure ratios such as return on assets (ROA) and return on equity (ROE) (Asikin et al., 2020; Dianita, 2021; Nenobais et al., 2022; Panigrahi & Vachhani, 2021; Saputra, 2022).

Granger causality analysis, a statistical methodology devised by Clive Granger, is extensively employed to examine the causal relationship between two time-series variables (Amornbunchornvej et al., 2021; Cekic et al., 2018; Chvosteková et al., 2021; Hendry, 2017). Within financial research, Granger causality analysis has been utilized to comprehend the temporal precedence and direction of causality between economic variables, such as retained earnings and financial performance indicators (Jackson & Orr, 2019; Josi, 2018; Yinusa & Adedokun, 2017). By investigating whether alterations in one variable occur before changes in another, Granger causality analysis provides insights into potential causal linkages that can enrich economic theory, influence policy decisions, and inform investment strategies.

Granger causality has traditionally relied on the assumption of a linear vector autoregressive (VAR) model (Shojaie & Fox, 2022) and the examination of tests on the VAR coefficients in the bivariate context. However, when dealing with real-world systems that involve numerous time series, studying the relationship between only two series can result in misleading conclusions (Cerqueira et al., 2020). Therefore, in using Granger

causality, we took cognizance of limitations such as the assumption of (a) real-valued time series with (b) linear dynamics that depend on (c) a known number of past lagged observations, and (d) observations that are available at a fixed, discrete sampling rate matching the time scale of the causal structure of interest.

Scholarly research has demonstrated that comprehending the relationship between retained earnings and financial performance indicators, such as return on assets and return on equity, is crucial for making informed investment decisions and strategic management choices within the dynamic landscape of the Kenyan stock market (Thuranira, 2014). Nevertheless, it remains uncertain whether the association between retained earnings and financial performance among non-financial firms in capital markets can be sustained in the long term. While previous research has explored the interconnection between retained earnings and financial performance in various contexts (Adeniji, 2023; Mauwa, 2017; Oganda et al., 2022; Viet et al., 2020), there exists a gap in understanding the sustainability of such an association in the long term, particularly among non-financial firms listed on the NSE, Kenya. Additionally, existing studies (Lokwang et al., 2018; Purohit, 2024) often overlook the subtle distinctions in individual firm characteristics and temporal variations, which can significantly impact the dynamics between retained earnings and financial performance.

In this paper, we have addressed the aforementioned gaps by employing concise panel data analysis techniques to examine the Granger causality relationship between retained earnings and financial performance among nonfinancial firms that are listed on the NSE in Kenya. The utilization of panel data analysis offers a robust and comprehensive approach that takes into consideration both the time-series and cross-sectional dimensions of the data, thus providing a thorough understanding of the underlying dynamics. The central research problem at hand involved determining whether retained earnings have a causal influence on changes in financial performance indicators, or vice versa, among nonfinancial firms in the NSE in Kenya. Through the examination of the temporal precedence of changes in one variable over another, we aimed to uncover potential causal linkages that could offer valuable insights for strategic decision-making and financial management practices within these non-financial firms.

The structure of this paper is as follows: We commence by providing an overview of the pertinent literature on retained earnings, financial performance, and Granger causality analysis. Subsequently, we delineate our research methodology, encompassing data collection, panel data analysis techniques, and Granger causality tests. Following that, we present our empirical findings and engage in a comprehensive discussion on their implications for investors, managers, and policymakers. Lastly, we conclude

by summarizing the key findings and providing suggestions for future research directions.

Literature Review

Existing empirical literature has underscored the importance of Granger causality in predictive forecasting. In a study targeting quoted firms in Ghana, Li et al. (2020) examined causation between liquidity and financial performance of non-financial firms. Using return on equity (ROE) to measure financial performance, they found a negative effect of liquidity on financial performance of the firms. On the contrary, when cash flow was used as a proxy to measure ROE, the effect was positive but non-significant. Their study did not investigate whether liquidity Granger causes ROE. Therefore, this study aimed to fill this research gap by investigating whether retained earnings for non-financial firms trading at the NSE Granger cause financial performance as measured by ROE and return on assets (ROA).

In another study conducted on commercial banks drawn from 30 countries in the Sub-Saharan Africa (SSA) region, Olarewaju et al. (2018) investigated causality between dividend policy and banks' financial performance for the period 2006 to 2015. Using pairwise Granger causality and Wald tests, they established that the retention policy Granger causes performance when measured in terms of ROA. Despite employing the Granger causality approach, their study focused on financial institutions, thus warranting a replication of such research in non-financial firms trading on the NSE.

A prior study conducted by Mutua and Atheru (2020) investigated the association between capital structure and financial performance among manufacturing and allied sector firms listed on the NSE, Kenya. These scholars used the Ordinary Least Squares (OLS) regression approach to show that retained earnings had a negative effect on financial performance of the manufacturing firms. The study findings left a gap as to whether the observed effects were a result of causation given the dynamic nexus between retained earnings and financial performance justifying a study on Granger causality.

Another study conducted by Abdullah and Tursoy, T. (2021) examined the panel causality between capital structure, as measured by retained earnings among other proxies, and financial performance in non-financial sectors listed on the German Securities Exchange from 1993 to 2016. By using the panel regression approach, Abdullah and Tursoy (2021) confirmed that there was a significant homogeneous causality between capital structure and financial performance of non-financial firms trading on the German Securities Exchange. However, these scholars did not put into

context the cross sectional and time series aspects of the firms, justifying replication of the study by factoring in the potential for Granger causality.

A research paper authored by Gathara et al. (2019) delved into the determinants of financial performance among firms listed on the NSE, Kenya, including factors such as leverage, liquidity, and firm size. The study highlighted determinants of financial performance among firms listed at the NSE, but failed to show the predictive ability of retained earnings and financial performance of the firms. This research gap emphasizes the necessity for a dedicated analysis that scrutinizes the causal linkages between retained earnings and financial performance within the context of the Kenyan stock market.

Despite the valuable contributions made by existing empirical studies in various aspects of corporate finance and financial performance within the context of the NSE, Kenya, there remains a gap in understanding the specific panel causality between retained earnings and financial performance indicators. This study addressed this research gap by employing panel data analysis techniques to investigate the Granger causality between retained earnings and financial performance among non-financial firms listed at the NSE, Kenya.

Method

Data Collection

Nonfinancial firms listed on the Nairobi Securities Exchange (NSE), Kenya, were identified as the target population. This study had a structure that involved several variables that included return on assets (ROA) and return on equity (ROE) as proxies for financial performance and retained earnings (RE) measured using earning per share. Data were collected from all listed non-financial firms on the NSE for the time interval 2016 to 2022 inclusive. To get a refined sample, the criteria of data collection were made stringent. The first criterion related to selecting non-financial firms, meaning that financial firms were not considered. This decision was made due to the distinct nature of their operations and financing policies, as discussed in previous studies (Abdullah & Tursoy, 2019; Vo & Ellis, 2017). Secondly, to ensure a balanced panel dataset, companies with missing year-end financial data throughout the entire sample period were also excluded from the analysis. The secondary panel data was sourced from audited financial statements. Therefore, the final dataset included non-financial firms spread over a seven year period and distributed in 42 balanced panels, allowing for subsequent analyses.

Study variables

In this study, the independent variable employed was retained earnings, which were measured using earnings per share. Retained earnings, as described by Ball et al. (2020), represent the cumulative sum of earnings generated by the firm over its history, minus the total dividends distributed to shareholders over time. Consistent with prior research (Dahmash et al., 2023; Yemi & Seriki, 2018), earnings per share was utilized as the metric for assessing retained earnings.

Financial performance was conceptualized as the dependent variable in this study. This variable was measured through ROA and ROE. These measures were chosen due to their widespread adoption in the literature, as evidenced by previous studies (Batchimeg, 2017; Jouida, 2018; Le & Phan, 2017). Return on assets (ROA) is the ratio of net income of a particular financial year to total assets of the same year. In contrast, ROE is the ratio of the company's net income to its average shareholders' equity. Financial performance was therefore the geometric mean of ROA and ROE.

Financial Performance-Retained earning model

This model was based on the Panel Vector Auto Regression (PVAR) approach. The model was executed to examine the impact of financial performance on retained earnings. Earnings per share (EPS) served as the independent variable, representing retained earnings, while the geometric mean of the ROA and ROE served as the dependent variable in two distinct models. We hypothesized that retained earnings could either positively (H1) or negatively (H2) affect financial performance. Based on these hypotheses, the econometric causality model was of the form

$$FP_{it} = \alpha_i + \sum_{j=1}^{p} \beta_{ij} FP_{i,t-j} + \sum_{k=0}^{q} \gamma_{ik} RE_{i,t-k} + \varepsilon_{it} \quad (1)$$

In the model, FP_{it}represent financial performance for firm *i* at time *t*; α_i represents firm specific intercepts; p and q represent the lag order for financial performance and retained earnings, respectively; β_{ij} and $\gamma_{ik}$are coefficients to be estimated; and ε_{it} is the error term.

Financial performance – Retained earnings model

This model was employed to investigate the impact of financial performance on retained earnings. Therefore, we postulated that financial performance could have either a positive (H1) or negative (H2) effect on retained earnings. Based on these postulations, the causality model was as presented in equation 2.

$$RE_{it} = \mu_i + \sum_{l=1}^{r} \theta_{il} RE_{i,t-l} + \sum_{m=0}^{s} \varphi_{im} FP_{i,t-m} + \eta_{it} \quad (2)$$

Where;

RE_{it} represent retained earnings for firm i at time t; r and s represent the lag order for retained earnings and financial performance, respectively; μ_i are firm-specific intercepts; θ_{il} and φ_{im} are coefficients to be estimated; and η_{it} are error terms.

Results

Diagnostic tests

Prior to running the fixed effects regressions on lagged variables to estimate the PVAR model, declaration of to be panel data revealed a strongly balanced panel variable as required for investigating Granger causality.

Panel Unit Root Test

Panel data unit root tests were performed using the Levin-Lin-Chu (LLC) unit root test, which is suitable for strongly balanced panels, as observed in this study. Specifically, the LLC tests were conducted in this study to evaluate the stationarity properties of financial performance and retained earnings across the 42 panels. The null hypothesis (H0) proposed that all panels contained unit roots, indicating non-stationarity, while the alternative hypothesis (Ha) suggested that at least one panel was stationary. The LLC tests yielded compelling evidence against the null hypothesis for the two variables, as indicated by the statistically significant adjusted t* values (Table 1). This implies that there was at least one panel where financial performance and retained earnings were stationary.

Table 1: Levin-Lin-Chu unit-root test

H_0: Panels contain unit roots H_a: Panels are stationary		Number of panes Avg. number of periods	= 42 = 7
		Stat.	p-value
Financial Performance	Unadjusted t	-4.3e+02	
	Adjusted t*	-4.6e+02	.000
Retained Earnings	Unadjusted t	-16.8	
	Adjusted t*	-13.5	.000

Estimating Panel Vector Autocorrelation Model

The STATA software Version IC 15.0 was used to generate lagged variables for financial performance and retained earnings. This was the followed with an estimation of the PVAR model. Results presented in Table 2 revealed the following. A one-unit increase in the lagged financial performance (L1_finperf) was associated with a decrease of 0.570 units in financial performance, holding other variables constant. The coefficient was

statistically significant at the 0.05, indicating that the effect of L1_finperf on financial performance was unlikely to be due to random chance.

A one-unit increase in the lagged financial performance (L2_finperf) was associated with a decrease of 0.456 units in financial performance, holding other variables constant. The coefficient was statistically significant at the 0.05 level, indicating a significant effect of L2_finperf on financial performance. A one-unit increase in the lagged financial performance (L3_finperf) was associated with a decrease of 0.245 units in financial performance, holding other variables constant. However, the coefficient was not statistically significant at the 0.05 level, suggesting that the effect of L3_finperf on financial performance may not be robust. Regarding retained earnings, none of the lagged retained earnings had statistically significant coefficients, and indication that lagging retained earnings at whatever level did not yield significant effects.

Table 2:

Financial Performance	Coef.	Robust Std. Err	t	p>|t|
L1_finperf	-.570	.136	-4.20	0.000
L2_finperf	-.456	.216	-2.11	0.041
L3_finperf	-.245	.217	-1.13	0.264
L1_retained	-8.98	15.1	-0.59	0.555
L2_retained	.027	12.0	0.00	0.998
L3_retained	10.9	14.8	0.74	0.466
_cons	3926	1196	3.28	0.002

Wald test results

(1) L1_finperf = 0	(1) L1_retained = 0
(2) L2_finperf = 0	(2) L2_retained = 0
(3) L3_finperf = 0	(3) L3_retained = 0
F(3, 4) = 125.9	F(3, 4) = 0.29
Prob > F = 0.000	Prob > F = 0.829

Granger Causality Tests

The Wald tests were conducted to test financial performance Granger causing retained earnings on the one hand and retained earnings Granger causing financial performance on the other. The postulation made in the predictive potential of financial performance was that the lagged financial performance variables (L1_finperf, L2_finperf, and L3_finperf) had no joint significant predictive power for retained earnings. The alternative hypothesis was therefore that at least one of the lagged financial variables significantly predicted retained earnings. The Wald test provided evidence of Granger causality from lagged financial performance to retained earnings ($F_{3,\ 4}$ =

125.9, $p < 0.05$). In case of the predictive power of retained earnings, the postulation was that joint lagged retained earnings variables (L1_retained, L2_retained, and L3_retained) did not significantly predict financial performance in non-financial firms. The alternative hypothesis to this was that at least one of the lagged retained earning variables predicted financial performance in non-financial firms. The Wald test results failed to find evidence of Granger causality from lagged retained earnings to financial performance in the given model. Therefore, based on these test results, we inferred that financial performance Granger causes retained earnings and is represented by the econometric model in equation 3.

$$RE_{it} = 3925.8_i - 0.570L1\_finperf_{it} - 0.456L2\_finperf_{it} - 0.245L3\_finperf_{it} + \eta_{it} \quad (3)$$

While retained earnings represented by equation 4 does not Granger cause financial performance over time in the given model.

$$FP_{it} = -8.98L2\_retained_{it} + 0.027L2\_retained_{it} + 10.9L3\_retained_{it} + \eta_{it} \quad (4)$$

Discussions

The Wald test revealed that financial performance granger causes retained earnings. This finding has implications for non-financial firms listed at the NSE. It suggests that the financial performance of these firms has a predictive effect on their retained earnings. This means that the financial performance of a non-financial firm can be used to forecast the changes in its retained earnings over time. This finding is important for managers and investors as it provides insights into the relationship between financial performance and retained earnings, which are key indicators of a firm's financial health and profitability. By understanding this relationship, managers can make informed decisions regarding resource allocation and financial planning, while investors can use it to assess the prospects and profitability of non-financial firms (Kristi & Yanto, 2020).

Research has shown that retained earnings hold significant importance as the primary means of financing a firm's growth (Thuranira, 2014). Therefore by showing that financial performance of a non-financial firm can be used to forecast the changes in its retained earnings over time, this research provides an avenue for non-financial firms trading at the NSE to experience growth by distributing lower dividends, reinvesting a greater portion of their earnings, and allocating a higher percentage of their overall returns towards capital gains.

The existence of unidirectional Granger causality from financial performance to retained earnings suggests that changes in financial performance can lead to changes in retained earnings. This information is valuable for decision-making and strategic planning, as it allows businesses to assess the impact of their financial performance on their retained earnings.

This finding regarding unidirectional Granger causality is consistent with other previous studies.

Studies by El Ammari and Terzi (2023), Lin (2021), and Muritala et al. (2020) have shown unidirectional Granger causality involving financial performance. El Ammari and Terzi (2023) found both unidirectional and bidirectional significant causal links between ownership structure, dividend policy, and financial performance in Tunisia. Lin (2021) identified a positive relationship between R&D investment and financial performance at certain quantiles. Muritala et al. (2020) found a unidirectional causal relationship between emissions intensity and equity returns, as well as a bidirectional causal relationship between emissions intensity and market value of equity deflated by sales. These studies corroborate our findings by providing evidence of the impact of various factors on financial performance and contribute to our understanding of the causality nexus in different contexts.

Conclusions

Based on the results of the Wald tests, it can be concluded that financial performance Granger causes retained earnings, while there is no evidence of Granger causality from retained earnings to financial performance in non-financial firms listed at the NSE. This contradicts existing research which reports Granger causality from retained earnings to financial performance in other contexts. Therefore, this research reinforces the postulations that PVAR Granger causality in the temporal domain does not always reveal genuine causality. Future studies should seek to replicate this research by employing recent advances such as Network Granger causality which can address the intricate nature of real-world systems that encompass numerous time series to avoid confounding inferences.

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