



THE IMPACT OF FINANCIAL VARIABLES ON STOCK PRICE DETERMINANTS OF LISTED COMPANIES IN GHANA

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Abstract

The study examined the impact of financial variables on stock price determinants of listed companies in Ghana from 2006 to 2021. Twenty-eight (28) companies were sampled through convenience sampling technique, and stock price (price earnings ratios), core liquid asset to short-term liabilities, core liquid asset to total assets, and non-performing loans. Data is obtained from the bank of Ghana database spanning 2006 to 2021, with vector error correction model as the statistical technique to determine the short and long run effects. The study found that, there are both short and long run effects between the dependent and independent variables and further recommended that policy makers should focus attention designing and implementing the necessary measures to improve stock prices.

Keywords: Stock Price, Liquid Assets, Shares, Non-Performing Loans, Liabilities

INTRODUCTION

The stock market has faced many challenges in recent years (Shi, Feng, Zhang, Shuai, & Niu, 2023). Some of the most significant challenges that exchanges around the world have faced include globalization and the decline of economic and financial barriers at the regional and international levels, the continuous emergence of innovative technology, new regulatory reforms, and the evolution of investment decisions. These features foster competitiveness, which have a major bearing on economic conditions. As a result of the current economic climate, an increasing number of stock exchanges have opted to alter their previous approaches



(Agyeman & Lin, 2023). In most cases, they go public after demutualizing their operations. However, companies have taken steps to improve cooperation by signing memorandums of understanding with other financial markets. There has been a recent wave of consolidation across stock markets in the United States and Europe as stock exchanges have merged with one another and with markets in other parts of the world. For instance, OMX is the result of the merger of the Baltic and Nordic exchanges (Dmuchowski, Dmuchowski, Baczewska-Dąbrowska, & Gworek, 2023; Araújo & Dias, 2022). When the stock exchanges in Paris, Amsterdam, Brussels, and Lisbon merged in 2001, they became Euronext, Europe's largest stock exchange. A short time later, both OMX and NASDAQ merged with the NASDAQ, creating what is now known as Euronext (Nuhiu, Aliu, & Peci, 2022; Duterme, 2022).

Many African markets are relatively modest in size, creating substantial economies of scale. The majority of African stock exchanges face the difficulty of increasing liquidity, expanding access, and decreasing capital costs (Twesigye, 2023; Zhang, Tang, Liu, Jin, & Zhou, 2023). The expansion of Africa's financial instruments has made great strides in recent years, but there is still much work to be done. Financial market activities are constrained by a lack of money and low liquidity in the capital markets. Most financial products still cluster around the shortest maturities. That's why lending rates have stayed so high, and spreads are so wide (Jeng, Pathak, & Chandani, 2023). A further issue is the lack of involvement from domestic investors. The stock markets in the Southern African Development Community are, with a few notable exceptions, quite comparable to one another. The integration and consolidation of SADC financial markets, the facilitation of access to and free flow of information, the harmonization of regulatory and legislative frameworks for stock market and listing of securities operations, and the accelerated implementation and monitoring of the Financial and Investment Protocol are all recognized as necessary to promote financial market development.

Information, both public and private can affect stock prices. This includes news about acquisitions, mergers, and takeovers as well as profits and dividend announcements. According to proponents of the efficient market theory, share prices should adjust in response to any newly available information (Firlej, 2023; Dickinson, et al., 2022). Prices tend to rise on the day that news is disclosed, a response that is completely unplanned. At that point, the stock price does not change any further until the next announcement is made (Elshandidy & Zeng, 2022). The aforementioned hypothesis states that there are three variations of the efficient market hypothesis, with the weak form holding that stock prices reflect only public information, the semi-strong form holding that stock prices reflect both private and public information, and the strong form holding that stock prices reflect private, public, and insider information. The idea that asset prices change in response to unexpected fundamental information has been

confirmed by the earliest financial literature. This well-informed forecast has been borne out by numerous studies, including those conducted by Kim, Fahlenbrach, and Low (2023) on merger announcements, on dividend revisions, and issuing of common stock. To the contrary, as (Abouelfarag & Qutb, 2022) empirically shown, news has a negligible effect on stock prices. However, new findings have offered a novel approach to critique. Huynh (2022) employed textual analysis to discover which news impacts stock prices. They found that the association between news and stock prices is substantially greater when news can be defined and its tone can be assessed. The study also found that on days with identified news, the variance ratio of returns is nearly double that of days with no news or unidentified news, and that, subject to significant moves, stock price reversals occur on days with no news or unidentified news but exhibit continuation on days with identified news. In order to ascertain the impact of news and no-news drift and reversal after headlines, Prasad and Kadariya (2022) performed research. He discovered that companies that saw negative returns around the time that a news article broke continued to underperform their counterparts that were similar to them in terms of size, book-to-market ratio, and event return. The market's reaction to good news is typically more volatile. When comparing extreme return equities with and without news headlines for a given month Huang and Zhang (2022) found that the latter had a reversal the following month and then showed no anomalous performance thereafter. Negative news is the primary trigger for the after-event drift, and it is very sturdy. The conclusion of an overreaction is slightly undercut by the possibility that liquidity issues are behind the reversal of gains. However, the reversal holds true when one waits a week to implement a no-news long-short strategy. These results reaffirm the idea that one must be able to comprehend the news and quickly evaluate whether or not it would affect his stocks and, if so, to what extent.

Among the most important forms of capital for any business is common stock primarily tier one capital. This implies that the capital structure of a firm will be affected by its stock pricing strategy. Regulation has both good and negative effects on stock values Sadiq, Alajlani, Hussain, Ahmad, Bashir, and Chupradit (2022) according to the academic literature on finance. To find out how strict packaging restrictions will affect the stock prices of pharmaceutical businesses Shashi (2022) undertook a study. They discovered that businesses saw negative anomalous returns that were greater than the costs analysts had predicted would result from packaging legislation. This research shows that investors dislike rules and regulations even more than we already knew. Stock prices, as found in a Ellis, Sharma, and Brzeszczyński (2022) reflect the likelihood of bank failure and the impact of leverage on unsystematic risks. The share prices of banks are therefore a rich source of information for bank regulators.

Markets, such as a country's stock market or a city's real estate market can have a significant impact on stock market prices by facilitating the acquisition and sale of assets at stable, transparent prices. Generally speaking, the bid price and ask price will be relatively similar if an exchange has a high volume of trade that is not dominated by selling. As a result, investors won't have to sell their investments too soon and give up on their unrealized gains. The market is more liquid when the difference between the bid and ask prices is small; the opposite is true when the spread grows larger. Compared to stock markets, real estate markets tend to be much more illiquid. There is a correlation between the size and accessibility of markets for various assets such as derivatives, contracts, currencies, and commodities and the ease with which they can be traded.

The Price Earnings Ratio measures how expensive a company's stock is in comparison to its earnings per share (EPS). It's a standard metric used to assess a firm's worth to potential backers. The price-to-earnings ratio (P/E ratio) is a measure of a company's valuation relative to its expected earnings or future earnings, as the case may be. Earnings are critical in determining the value of a company's stock because they tell us how successful a company is and how profitable it will be in the future. Furthermore, the P/E can be interpreted as the number of years required for the company to return the price paid for each share if the company does not develop and the current level of earnings remains constant.

Financial liberalization, competitive exchange rates, liberalization of inward foreign exchange, privatization of state enterprises, and abolition of regulations that hindered market entry or restricted competition and legal security for property rights all formed part of Washington Consensus framework. Following the IMF's lead, many other donors provided financial and technical assistance to help set up stock exchanges after realizing that many structural adjustment initiatives could be supplemented by the introduction of institutional capital markets (Omar, Ali, Mouneer, Kouser, & Al-Faryan, 2022).

Wei and Zhang (2023) study the correlation between stock price growth and company size in the market. Twenty-one stocks traded on the Budapest Stock Exchange were analysed for this study. Moments of distribution and normalized moments, such as skewness and kurtosis, are calculated after companies are ordered by market capitalization. We examine the outcomes through graphs and rank correlation. The distribution of profits has a strong relationship to total market value. The relationships between the capitalization rate of the Nigerian stock market and the interest rate were studied by Nurmakhanova, Elheddad, Alfar, Egbulonuan, and Abedin (2023). The present interest rate was found to have a positive effect on the capitalization rate of the stock market using the Ordinary Least Square (OLS) regression approach. They also found that the existing interest rate has a negative effect on the

government development stock rate, and that the reverse is true for the stock market capitalization rate.

In their research, Al-Shattarat (2023) looks into how a company's share market capitalization impacts its success. To analyse data, they use the Ordinary Least Squares (OLS) technique. According to an analysis of the confectionery firm's annual reports during the past two decades, the firm's performance and market capitalization would benefit from a growth in profit after tax, dividends, and turnover Nguyen and Mogaji (2023) Investigate how interest rates affected the market value of companies listed on the Amman Stock Exchange. Time series study based on multiple linear regressions and a simple regression showed a positive and robust relationship between the federal funds rate (R) and the pace of stock market capitalization growth.

Albitar, Al-Shaer, and Liu (2023) analyses a number of micro and macro variables and finds that market capitalization is positively correlated with stock price both in the short and long term. Long-term analysis of the connection is performed using Johansen Co-integration tests. The study concluded that interest rates have a long-term association with the stock market's capitalization rate. Despite extant literature on the subject matter, the impact of financial variables on stock price determinants of financial institutions is still a mystery to scholars. Few studies have examined how economic factors influence the stock prices of publicly traded companies in Ghana. In order to bridge the vacuum in knowledge, this study will use a vector error correction model with time series data to examine the effect of financial variables on price determinants of listed enterprises in Ghana. There are a total of five parts to the article, not counting the introduction. The literature review is discussed in more depth in the second section. Method and results are discussed in Section 3. The results and analyses of the empirical research are presented in Section 4. The policy consequences are discussed in Section 5.

LITERATURE REVIEW

One of the most fundamental issues that top-level management must consider is the capital structure of the organization (Riggio & Newstead, 2023; Kragulj, 2023). The field of finance known as corporate finance examines the methods, tools, and analyses that companies employ when making financial choices. The main objective is to maximize corporate value while minimizing the firm's financial risks and the discipline can be broken down into long-term decisions and short-term actions. Financial decisions should be made strategically in order to increase the value of the firm, so that the appropriate capital structure could be adjusted. It is recommended by Simo, Tchuigoua, and Nzongang (2023)

that financial management take into account capital structure. A company's stock price, return on equity and total value to shareholders are all influenced by the capital structure choice, which involves managing the proportion of debt and equity in the company's assets. However, in the 1963 two professors named Modigliani and Miller (1963) researched capital structure theory and produced capital structure theories, which reached different and contrary findings to what the optimal capital structure theory stated. The prevailing theory holds that a combination of debt and equity financing forms the ideal capital structure for a company. The company's market value will increase because its capital structure will reduce its weighted average cost of capital. Companies of all sizes benefit from a certain level of gearing; consequently, a business that has never used debt financing before would do well to start doing so. Debt is a more cost-effective long-term financing option than equity, hence this is feasible. Management faces a difficult choice when deciding how much debt is appropriate for the company; beyond a certain point, any cost reductions realized through the use of debt capital would be eaten up by the higher required rate of return on equity. The market value of the company would fall as its weighted average cost of capital increased in this case. The Modigliani and Miller (1963) hypothesis assumes that the market for trading a company's shares is efficient. Managers can't increase or decrease the company's value by adjusting its gearing in such a market. In an ideal capital market, the share price of a firm would have nothing to do with its capital structure; rather, it would be based solely on the company's expected future cash flows and the rate of return necessary for equity investors. Predicted future cash flows are multiplied by the required rate of return by equity investors to arrive at a company's market value in such a market. In this type of market, the market value of a firm is based on the present value of its cash flows rather than the proportion of those cash flows that go to shareholders and holders of long-term debt capital. There were two major claims on which Modigliani and Miller (1963) built their case. The first was the idea that an individual could always substitute personal gearing for corporate gearing by borrowing money for investment purposes (Braun & Koddenbrock, 2022). The second was that in a perfect market, investors would never see a profit because of the financial principle of arbitrage. When a security or a security with similar features trades at different prices on different exchanges, this is known in the financial world as an arbitrage opportunity. By buying an asset at a lower price in one market and selling it at a higher price in another, an investor might earn an arbitrage profit. A perfect market would have arbitrageurs ensure that the share prices of two companies with identical operating earnings but different capital structures were equivalent. It was mathematically proven by Modigliani and Miller that if investors engaged in what they called gearing and arbitrage, the

end result would be the same price for both companies' shares (Palan & Phillips, 2022). However, the problem that financial managers and investors face is the imperfect nature of capital markets.

This paper is however based on the theory of Modigliani and Miller to examine the impact of financial variables on stock price determinants in Ghana using data from the bank of Ghana (Johansson & Filip, 2022). Theories of capital structure advanced in the 1950s, with seminal works appearing from authors including. The relevance theory proposed by (Durand, 1952) states that the weighted average cost of capital is affected by capital structure due to the cost differential between debt and equity (WACC).

Capital structure research has flourished since 1958, with three distinct lines of inquiry emerging as a result. The first is the use of standard financial methods to analyse the capital structure. The trade-off theory evolved from this approach, which was based on Modigliani and Miller's theory by assessing various imperfect market situations. As the theory goes, in non-ideal markets, companies select their optimal capital structure by weighing the benefits and drawbacks of debt. Capital structure is examined through the lens of this theory, which considers the impact of corporate taxation (Cowen, 2021). While Modigliani and Miller's theory ignored the effect of information asymmetry on capital structure, signalling models took it into account. Liu and Lyu, (2022) developed the ranking concept, which they believed sent a message to markets through the use of debt versus equity financing. The hypothesis states that firms often finance investments via retained earnings, debt, and lastly equity due to the existence of informational asymmetry between the three forms of financial financing. A second important research path in capital structure is the corporate governance strategy.

Capital structure research has recently shifted its focus to incorporate a fourth avenue of inquiry: company strategy. It is the goal of capital structure models of business strategy to show how a firm's strategy might be reflected in its capital structure (Awan, Gölgeci, Makhmadshoev, & Mishra, 2022). These methods stress the importance of matching company strategy with financial decisions (Nicolas, 2022; Åström, Reim, & Parida, 2022; Lin & Su, 2022). The two most common theoretical frameworks for studies adopting this strategy are product diversification and transaction cost economics. Transaction cost economics was used by David, Dharwadkar, and Duru (2022) to examine how different types of loan and equity transaction costs affected capital structure in light of asset specificity. New, significant empirical research has been performed to apply these theories in the context of developing and transitioning economies.

Dividends, net profit, operating earnings, and book value were identified by Azmeh and Hamada (2022) as the most significant factors affecting stock prices. There has been a lot of research, both theoretical and empirical, into what factors affect the market price of shares since then. Using a statistical model Wong and Zhang (2022) analysed the factors that led to changes in share prices. Using cross-sectional weighted least square regression, Authors examined the relationships between dividend yield, pay-out ratio, size, asset growth, leverage, and earnings volatility, along with a further six parameters.

METHODOLOGY

A vector error correction model is utilized for the analysis of the data collected from the Bank of Ghana database between 2006 and 2021. The rationale for the selection of this dataset is due to the type of research questions and objectives preferred to answer, and the availability of the data series. Time series data is a succession of data points that occur over time, whereas cross-sectional data is merely a snapshot in time (Dogariu, Ştefan, Boteanu, Lamba, Kim, & Ionescu, 2022). A time series is a series of measurements taken at regular intervals that tracks a group of variables, such as the price of an asset, across time. In other words, the data may be collected in any manner to provide the most value to the investor or analyst analysing the activity, with no minimum or maximum time period. In contrast, VECM is not restricted to explaining the dynamic behaviour of the relationship between exogenous and endogenous components; it may also describe the behavior between endogenous variables. The time series econometric procedures were used to investigate the relationship between the price earnings ratio (stock price), the ratio of core liquid asset assets to short-term liabilities, the ratio of core liquid asset assets to total assets, and whether stock price influences the independent variables. Four phases are required to estimate the relationship between stock price (price earnings ratio), ratio of core liquid assets to short-term liabilities, and the ratio of core liquid assets to total assets. The initial step is to test the stationarity or order of integration of the series, as the series must be integrated in the same order as specified by Equation (1). The second step is to determine the long-term relationship between all variables in the equation. In contrast, the long run coefficients are derived using the corresponding co-integration model, as shown in Equations (2) and (3) from (Johansen, 1988). In the third phase, residuals from the equilibrium regression can be used to estimate the error-correction model once co-integration has been confirmed. Multiple diagnostic tests, including normality, autocorrelation, and heteroskedasticity in the error term, were conducted to examine the validity and dependability of the models.

Table 1. Variable Measurement and Definition

Variable	Definition and measurement	Notation
Price Earnings Ratio	Share Price/Earnings Per Share	PER
Share of Fixed Asset to Total Asset	Fixed Asset/Total Asset	Tassets
Current Liquid Ratio	Current Assets/Current Liabilities	Classes
Non-performing loans	Gross value of loans/total value of loan portfolio	Nploans

RESULTS AND DISCUSSION

Stationarity Test

Deering-Rice, et al., (2012) recommended the co-integration test, which requires stationary pre-testing, for analysing the long-term relationship between groups of variables. Co-integration of time series requires that the time series be integrated in the same order. In other words, each series must be differentiated d times to restore stationarity if two series are co-integrated in order d ($I(d)$). For $d=0$, each series would be level-stationary, however for $d=1$ initial differentiation is required to achieve level-stationarity. A series is non-stationary if its mean, variance, and auto-covariance are not constant across time (Dixit & Jain, 2023). It is essential to include nonstationary variables in stationary processes. Otherwise, they do not drift toward equilibrium over the long run. There are two major methods for determining stationarity (Bhuiyan, Kahouli, Hamaguchi, & Zhang, 2022). These tests are referred to as unit-root tests because they examine the series for the presence of unit roots. By incorporating lagged changes of the residual into the regression, these tests correct any serial correlation that might exist in the series. Utilizing the ADF test for stationarity, this study determines the time series features of the GDP growth rate, namely its stationarity. The equation estimated for the ADF test is as follows:

$$\Delta Y_t = \nu_1 + \nu_2 t + \alpha Y_{t-1} + \delta_3 \sum \Delta Y_{t-1} + \varepsilon_t \quad (1)$$

Where ε_t is an error term, ν_1 is a drift term and $\nu_2 t$ is the time trend and Δ is the differencing operator, thus if Y_t follows equation (1), and ΔY_t follows a random walk, so $\Delta Y_t - \Delta Y_{t-1}$ is stationary. On the other hand, α and δ are coefficient of one period lagged value ΔY_{t-1} respectively. Where $\Delta Y_{t-1} = (Y_{t-1} - Y_{t-2})$, and $\Delta Y_{t-2} = (Y_{t-2} - Y_{t-3})$. Frequently, the number of lagged difference terms to include is set empirically, with the goal being to include sufficient terms so that the error term in equation(1) is serially correlated (Fingleton & Arbia, 2008). Kurum and Oktar (2023) proposed utilizing the Schwarz Information Criterion (SIC) to determine the optimal number of delays. In the ADF test, it is determined if $\alpha=0$.

Table 2. Unit Root Test

Variable	At level		Variable	At first Difference	
	ADF Statistics	Phillip Peron Statistics		ADF Statistics	Phillip Peron Statistics
PER	-2.198527 (0.2076)	-2.227350 (0.1974)	PER	-13.82045 (0.0000)	-13.85817 (0.0000)
Classets	-2.834075 (0.0554)	-3.192025 (0.5220)	Classets	-7.168853 (0.0000)	-13.16564 (0.0000)
Nploans	-2.979571 (0.2786)	-3.098535 (0.2283)	Nploans	-13.90229 (0.0000)	-13.90234 (0.0000)
Tassets	-2.107954 (0.2419)	-3.356596 (0.4138)	Tassets	-7.962218 (0.0000)	-14.35289 (0.0000)

From table 2, it can be seen that, the unit root test for all the variables at level are not stationary for both the Augmented Dickey Fuller and Phillip Perron test, however the variables became stationary after first difference for both the ADF and the Phillip Perron test. Consequently we proceed to determine the optimal lag length for the variables.

Table 3. Determination of optimal lag length

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-1507.507	NA	32300.19	16.05858	16.09301	16.07253
1	-1017.816	963.7536	184.1789	10.89166	10.99495*	10.93351*
2	-1015.578	4.356509	187.6680	10.91040	11.08255	10.98015
3	-1009.402	11.89179*	183.3819*	10.88726*	11.12827	10.98491
4	-1008.674	1.386330	189.8923	10.92206	11.23194	11.04761

Vector Autoregressive (VAR) is utilized for the analysis of time series data including several variables. Each variable is composed of a linear function of its own lag and other variables' past lags. When the data is steady and cointegrated, the model VAR is merged with the error correction model to form VECM. To establish the ideal lag length for a model, it is sometimes recommended to utilize the Akaike Information Criterion (AIC) to choose the lag length that favours the most parsimonious models. In general, however, the information criterion with the lowest value is selected. The rule of thumb is to select the criterion with the lowest value, which doubles as the AIC value at 10.88726, because the smaller the value, the superior the model. We may conclude that the optimal lag duration for the model is three and that the best criterion to use is AIC.

Johansen Cointegration Test

Co-integration requires non-stationary levels in time series systems. An integrated series of order d is one that requires d differentiations to become stationary, denoted by I (d), where d is the order of integration (Tiwari, Bolat, & Koçbulut, 2015). Cointegration can be studied when both series are integrated in the same direction. The number of cointegrating vectors is determined by the Johansen and Julius test, which use the maximum likelihood methods of the VAR model. Denano and Sibera (2022) tests can be used to rule out the possibility of no causation between two variables if they are co-integrated. Unidirectional or bidirectional causality must exist if the two variables are trending or co-integrated. Granger-causality can be shown through co-integration, but the direction of causality between variables is not shown. This Granger (or temporal) causality direction can be determined by using the vector error correction model (VECM) built from long-run co-integrating vectors. In this investigation, we used the Trace test statistic and the Max Eigen value statistic to identify the co-integrating vector r.

$$\Delta \ln Y_t = \pi_0 + \sum \vartheta_i \Delta \ln Y_t + \sum \theta_i \Delta \ln X_t + \varepsilon_t \text{-----} (2)$$

$$\Delta \ln X_t = \beta_0 + \sum \delta_i \Delta \ln X_t + \sum \tau_j \Delta \ln Y_t + \varepsilon_t \text{-----} (3)$$

Where (Y_t, X_t) are stock price and the dependent respectively; Δ is a difference operator, ε_t is a random error with constance variance π_0 and β_0 are the drift terms, $\vartheta_i, \theta_i, \delta_i$, and τ_j are the coefficient estimates for the independent variables. As there is cointegration between the variables, we have formulated the null hypothesis for the cointegration test. The trace statistics or maximum Eigen values in table 4 exceeded the critical value, indicating that there is cointegration between the variables; hence, we reject the null hypothesis.

Table 4. Table Cointegration Test

Unrestricted Cointegration Rank Test (Trace)				
Hypothesized		Trace		0.05
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None *	0.122959	58.09597	47.85613	0.0041
At most 1 *	0.081143	33.56121	29.79707	0.0176
At most 2 *	0.061834	17.73634	15.49471	0.0226
At most 3 *	0.030542	5.800353	3.841466	0.0160

Vector Error Correction Model

If the series are co-integrated, then the dynamic relationship can be described by an error correction model (ECM), according to Granger's representation theorem. The VECM

was designed as a restricted VAR for use with non-stationary series whose cointegration was previously established. Long-run behavior of endogenous variables is constrained to converge to their co-integrating relationships whereas short-run adjustment dynamics are allowed for in the VECM specification via co-integration relations. Given that the co-integration term is also known as the error correction term because it corrects the deviation from long-run equilibrium by a series of partial short-run adjustments. The advantage of the ECM model is that it can capture the long-run equilibrium relation between two series as well as the short-run dynamics. When it is known that the dependent variable shows short-run variations in response to changes in the independent variables, the error correction model can be useful. The following VAR equation is differenced to obtain VECM equations for each of the variables:

$$\Delta Y_t = \gamma + \sum_{i=1}^{k-1} \phi_i \Delta Y_{t-i} + \sum_{i=1}^{k-1} \eta_i \Delta X_{t-i} + \sum_{m=1}^{k-1} \delta_m \Delta R_{t-m} + \lambda ECT_{t-1} + \mu_t \text{-----} (4)$$

$$\Delta \ln Per_t = \alpha + \sum_{i=1}^{k-1} \beta_i \Delta per_{t-i} + \sum_{j=1}^{k-1} \phi_j \Delta Classet_{t-j} + \sum_{m=1}^{k-1} \partial_m \Delta \ln Nploans_{t-m} + \sum_{m=1}^{k-1} \sigma_m \Delta Tassets_{t-m} + \lambda_1 ECT_{t-1} + \mu_{it} \text{-----} (5)$$

$$\Delta \ln Classet_t = \alpha + \sum_{i=1}^{k-1} \beta_i \Delta Classet_{t-i} + \sum_{j=1}^{k-1} \phi_j \Delta Per_{t-j} + \sum_{m=1}^{k-1} \partial_m \Delta \ln Nploans_{t-m} + \sum_{m=1}^{k-1} \sigma_m \Delta Tassets_{t-m} + \lambda_1 ECT_{t-1} + \mu_{it} \text{-----} (6)$$

$$\Delta \ln Nploans_t = \alpha + \sum_{i=1}^{k-1} \beta_i \Delta Nploans_{t-i} + \sum_{j=1}^{k-1} \phi_j \Delta Classet_{t-j} + \sum_{m=1}^{k-1} \partial_m \Delta \ln Per_{t-m} + \sum_{m=1}^{k-1} \sigma_m \Delta Tassets_{t-m} + \lambda_1 ECT_{t-1} + \mu_{it} \text{-----} (7)$$

$$\Delta \ln Tassets_t = \alpha + \sum_{i=1}^{k-1} \beta_i \Delta Tassets_{t-i} + \sum_{j=1}^{k-1} \phi_j \Delta Classet_{t-j} + \sum_{m=1}^{k-1} \partial_m \Delta \ln Nploans_{t-m} + \sum_{m=1}^{k-1} \sigma_m \Delta Per_{t-m} + \lambda_1 ECT_{t-1} + \mu_{it} \text{-----} (8)$$

Table 5. Vector Error Correction Estimates

Cointegrating Eq:	CointEq1
PER(-1)	1.000000
CLASSETS(-1)	-0.571078 (0.17791) [3.20987]
NPLOANS(-1)	1.171319 (0.25617) [-4.57251]
TASSETS(-1)	-1.235037 (0.41888) [2.94840]
C	-16.76602

	Coefficient	Std. Error	t-Statistic	Prob.
CoIntEq1	-0.116111	0.025487	-4.555667	0.0000
D(PER(-1))	0.140019	0.069194	2.023584	0.0000
D(PER(-2))	0.223517	0.068909	3.243653	0.0014
D(CLASSETS(-1))	-0.065763	0.059031	-1.114042	0.2668
D(CLASSETS(-2))	-0.043601	0.059476	-0.733086	0.4645
D(NPLOANS(-1))	-0.059361	0.152678	-0.388798	0.0000
D(NPLOANS(-2))	0.025017	0.152445	0.164108	0.8698
D(TASSETS(-1))	0.227706	0.124332	1.831435	0.0000
D(TASSETS(-2))	0.168688	0.124126	1.359005	0.1759
C	0.017624	0.303466	0.058075	0.9538
R-squared	0.193598	Mean dependent var		0.031697
Adjusted R-squared	0.153053	S.D. dependent var		4.524481
S.E. of regression	4.163868	Akaike info criterion		5.742225
Sum squared resid	3103.466	Schwarz criterion		5.913746
Log likelihood	-532.6403	Hannan-Quinn criter.		5.811712
F-statistic	4.774851	Durbin-Watson stat		1.997557
Prob(F-statistic)	0.000010			

$$\Delta \ln Per_t = -0.116111 ECT_{t-1} + 0.140019 \Delta per_{t-1} - 0.065763 \Delta Classet_{t-1} - 0.059361 \Delta \ln Nploans_{t-1} + 0.227706 \Delta Tassets_{t-1} + 0.017624 \text{-----} \quad (9)$$

It is clear that the annual deviation from long-term equilibrium is recovered at a rate of 57.1% based on the positive correlation between core liquid assets to short-term liabilities and stock price (price earnings ratio). Rate at which shares can be bought or sold without materially impacting the stock price is also indicated. Liquidity issues might make selling equities difficult in times of financial hardship. Nonperforming loans have also been shown to have a negative relationship with stock prices. This would imply that there are more nonperforming loans when the stock price is lower and the reverse is also true. With a negative coefficient of 1.171319, long-term nonperforming loans will deviate from equilibrium by about 117.13 per cent in the event of disequilibrium. Moreover, the ratio of core liquid assets to total assets is positively correlated with stock price over the long run; i.e., as total assets rise, so does stock price. In table 4, the coefficient of total assets is negative; hence a rise in total assets would boost the price earnings ratio or stock price by 12.4%, all else being equal.

How quickly the model can re-establish equilibrium after experiencing a period of disequilibrium is represented by its error correction coefficient (speed of adjustment). Table 4

shows that there is a statistically significant negative value for the coefficient of the error correction term. If there is any disequilibrium, the rate of adjustment of the model to achieve long-term equilibrium will rise by 11.6%. Assuming everything else is equal, the present value of stock price depends on its past value, and this is true even in the short run, when there is a positive link between the lag value of stock price and its present value. Non-performing loans have a strong inverse relationship to stock price, with a decrease in NPLs leading to a short-term stock price increase of 5.9% on average. The stock price goes up in the short run as nonperforming loans go down. Core liquid assets as a percentage of total assets have a positive and statistically significant relationship with stock price, such that when stock prices increase in the short run, the ratio of core liquid assets to total assets increases on average. A 2.2% increase in stock price can be expected if the ratio of core liquid assets to total assets increases.

Diagnosics Checking

Table six (6), seven (7), and eight (8) show the residual diagnostics performed to check for serial correlation, heteroskedasticity, and normality of the residuals of the model's adequacy. From table 5, all the p-values in the table are not statistically significant, and we can therefore reject the null hypothesis of no serial correlation. Also the normality test conducted in table 6 indicates that the residuals are normally distributed, as the p-values are more than 0.05. Finally, the heteroskedasticity test suggests that the residuals have constant variance and therefore there is no heteroskedasticity in the model and hence the residuals are homoscedastic.

Table 6. Serial correlation

Lag	LRE* stat	df	Prob.	Rao F-stat	df	Prob.
1	9.658997	16	0.8838	0.601190	(16, 526.1)	0.8838
2	9.655130	16	0.8840	0.600948	(16, 526.1)	0.8840
3	10.15156	16	0.8586	0.632141	(16, 526.1)	0.8586
Lag	LRE* stat	df	Prob.	Rao F-stat	df	Prob.
1	9.658997	16	0.8838	0.601190	(16, 526.1)	0.8838
2	21.92008	32	0.9095	0.680507	(32, 621.1)	0.9096
3	46.90439	48	0.5177	0.977442	(48, 633.8)	0.5186

*Edgeworth expansion corrected likelihood ratio statistic.

Table 7. Normality Test

Component	Jarque-Bera	df	Prob.
1	629.7205	2	0.2265
2	9629.931	2	0.9043
3	0.090082	2	0.9560
4	4864.661	2	0.1025
Joint	15124.40	8	0.0812

Table 8. Heteroskedasticity

Joint test:		
Chi-sq	df	Prob.
226.2781	180	0.2110

CONCLUSION, RECOMMENDATIONS AND POLICY IMPLICATIONS

Based on the preceding discussion and findings, it can be inferred that the stock price (price earnings per share), core liquid asset to share-term liabilities, core liquid asset to total assets, and non-performing loans data can be modelled using vector error correction model (VECM). Using this model, it was determined that there is a cointegration relationship between the variables and, consequently, that the model has both short-run and long-run effects. In the short term, there was a significant relationship between stock price (price earnings ratio) and core liquid assets to short-term obligations, but in the long run, there was no relationship between the variables. In addition, it was discovered that there are both short-run and long-run effects between stocks, liquid assets, and nonperforming loans. According to the findings, non-performing loans have a negative impact on stock prices in both the short and long term, meaning that the greater the non-performing loans, the lower the stock price. This research is backed by the studies of Gashi, Tafa, and Bajrami (2022). Their investigations demonstrated that poor performers had an effect on prices. This study contradicts the findings of (Ozili, 2022; Loizos, 2022). Thus, the results demonstrate that nonperforming loans have little impact on stock prices. There is also a significant relationship between the ratio of core liquid assets to total assets and the stock price over the short and long term; more liquid shares would reduce investors' investment exit risk.

The results also demonstrated that the speed of adjustment coefficient was negative and statistically significant, indicating how quickly the model may return to equilibrium in the long run following a period of disequilibrium. In order to improve stock price, policymakers should consider formulating policies to encourage companies and individuals to repurchase their own stock. This will increase the value of stock prices and help to reduce the availability of stock on the market. When stocks are scarce on the market, stock prices will rise, all else being equal. In addition, organizations with a distinctive product or service that has the potential to disrupt the financial sector benefit from increased stock prices, which is especially advantageous for start-ups. It is recommended that start-ups investigate these stock-price-enhancing strategies. The

level of earnings per share, dividends per share, and cash flow per share are elements that influence the stock prices in the banking sector. It is proposed that policymakers concentrate their efforts on the aforementioned areas to continuously increase stock values. The research is limited by the fact that there are no institutional safeguards in place to prevent reckless trading, ensure market uniformity, or monitor and supervise the listing of securities in the stock exchange market in Ghana. Highly recommended is future research on the impact of core liquid assets on total assets and stock prices.

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