Stock Market Returns Volatility and Its Effect on the Growth of the Listed Companies in Kenya

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Abstract

In this paper, we analyze the effect of stock returns volatility on the growth of listed companies in Kenya under the Nairobi Securities Exchange 20 share index. We specified a dynamic panel data model used to capture this relationship. Using a panel of 228 observations from 19 listed companies over a period of 12 years from 2011 to 2022, we estimated both the difference and the system GMM. The findings show that stock returns volatility has a robust adverse effect on the growth rate of listed companies in Kenya. Further, the estimated model results support the theory that the growth of firms depends on their liquidity and retention ratios. These findings are critical to policymakers, investors, and companies as they strategize their effective portfolio allocations and interventions in the presence of a volatile market, as well as adding literature to the broader academic discourse.

Keywords: firm's growth; stock returns volatility; difference GMM; system GMM; Kenya

JEL Classification Codes: G12, G32

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1. Introduction

The growth of firms is crucial in the country's economic growth, especially for developing countries. Firms, whether big or small, provide the employment opportunities needed for the population (Beck, Demirguc-Kunt, & Levine, 2005; Ayyagari, Demirgüç-Kunt, & Maksimovic, 2011). However, the failure of financial and other institutions hampers their development. Arguably, the strength of any country's growth is associated with the strength of its financial institutions and, hence, the growth of firms.

Financial institutions and capital markets provide local and international firms with easier access to finance through liquidity provision. This is done through the primary markets for issuing new shares and the secondary markets for enhancing the transactions of existing shares. Thus, as financial systems get stronger, stock markets become a more important segment of the financial sector (Dabwor, Iorember & Yusuf Danjuma, 2022).

Meanwhile, in modern companies, managers and shareholders are often constrained by each party's interest. The goal of managers is to maximize growth of firms while that of shareholders is to reap dividends (Marris, 1964). In general, a company's growth can be traced in many factors such as sales, employees and assets, its age and size, and external finance (Shepherd & Wiklund, 2009; Gopinath, 2012; Bouazza, Ardjouman & Abada, 2015). Marris (1964) argued that the growth of a company is associated with managers' decisions and efficiency in reinvesting profits and investments of external finance. These steps positively impact growth (Vuković et al, 2022) which makes companies more attractive to investors consequently attracting more external capital. External sources of capital include loans from financial institutions such as banks, grants, and equity financing from the stock market. Creditworthiness is considered an important criterion when applying for loans (Goyal, Nova & Zanetti, 2011; Kira, 2013; Jin, Gao, & Wang, 2021). On the other hand, raising funds from the stock market is through listing in that market. This way, a company can trade its shares and finance its growth agendas.

A good indicator of a firm's growth is its growth in assets. Growth in assets provides a broader focus in measuring the growth of firms compared to what growth in other variables can capture, such as growth in investment and financing activities. In addition, asset growth performs better in predicting cross-section stock returns than any other single growth component (Cooper, Gulen & Schill, 2008). Moreover, asset value can capture other sub-components of growth from a given balance sheet, as it is the sum of all, making it a preferred measure of growth.

Firms that seek money for growth through equity financing prefer when the stock market is highly capitalized and more liquid. Liquidity favors investors who trade their shares to obtain returns since buying and selling stocks becomes easier. Empirical evidence shows that stock market liquidity significantly affects stock returns (Kahuthu, 2017). Meanwhile, companies benefit more from liquidity since raising equity capital also becomes easier. More importantly, companies can use the information from the stock market to forecast their future cash flows and decide their future output growth (Fama, 1990). In efficient markets, investors are assumed to be rational and in the long run, they cannot outperform the market to get more than the average market returns without taking an extra risk (Fama, 1990). However, many stock markets are inefficient and stock returns are volatile. This behavior is evident in developed and emerging stock markets (Bakry et al., 2022; Muguto & Muzindutsi, 2022).

Stock returns volatility is the variation of stock returns over a given trading period, measured using its standard deviation. It results from various reasons such as information asymmetry (Fama, 1990) and investors' sentiments (Altuwaijri, 2016; Avramov, Chordia, Jostova & Philipov, 2019), among other factors. Various levels of stock returns volatility affect how companies react to their long-term growth strategies. Both instances of very high and very low levels of volatility expose companies to liquidity risks, that is, the company's inability to meet its short-term financial obligations due to a shortage of funds.

Exposure to financial risk increases the company's stock returns volatility. As a result, investors demand higher returns or risk premiums to compensate for the additional perceived risk, thus increasing the company's cost of equity. The higher cost of capital makes it more expensive for a company to raise funds, which can hinder its ability to finance growth initiatives such as research and development, acquisitions, or project expansion. According to Cooper, Gulen, and Schill (2008), asset accumulation and subsequent abnormal stock returns had a negative correlation. However, at the same time as companies increase their growth strategies, stock returns volatility can be high (Gharbi, Sahut, & Teulon, 2014; Lashgari & Ahmadi, 2014). In the Kenyan context, firms' cash flow patterns have been found to affect the behavior of stock returns in non-financial firms listed under the Nairobi Securities Exchange (M'muriungi, Muturi, & Oluoch, 2019). Firm size in Kenya was also found to be a significant moderator of financial structure and financial growth (see Samuel, 2022).

1.1 The Kenyan Stock Market and the Assets Growth

The Kenyan stock market, called the Nairobi Securities Exchange (NSE), was established in 1954. Since then, it has helped in stock price discovery and liquidity provision to companies by facilitating the issuance of shares through Initial Public Offer (IPO) and trading of shares. This has been achieved through implementing policies that include creating share indices, such as the Nairobi All-share index (NASI), the Nairobi Securities Exchange 20 share index (NSE 20), and the Nairobi Securities Exchange 25 share index (NSE 25). Companies under each index comprise different performance characteristics based on the number of deals and shares traded, market capitalization, and turnover for a 12-month period. The NSE 20 and NSE 25, respectively, monitor the 20 and 25 best-performing companies, while the NASI monitors the performance of all listed companies in Kenya (Nairobi Securities Exchange [NSE], 2022).

Despite the NSE's important contribution to the trading of shares, its development has its own challenges. Over the past 34 years, that is, from 1998 to 2022, NSE has experienced stagnation in the yearly total number of listing companies. There were as few as 6 companies that had been enlisted over that period. Meanwhile, some other companies were delisted due to increasing market challenges. In 2002, the market recorded the highest number of 8 companies delisting. During this period, the performance of the NSE in terms of new listings has been below its annual target of 10 new listings (NSE, 2022). The problems apparently are mainly due to the reluctance of small, family-owned businesses to dilute their ownership and the high cost of company listing. Moreover, companies perceive that the risks associated with additional disclosure are not adequately compensated for by stock returns (Capital Markets Authority, 2012).

As in other capital markets, the Kenyan market also faces other challenges in its development such as low investors' confidence, lack of awareness and competitive pressure, low liquidity level, and

vulnerability to market shocks (Nyasha & Odhiambo, 2014). Market shocks affect stock returns, making them volatile. These movements are shown in Figure 1 where the stock returns of listed companies under the NSE 20 have been volatile for over a long period of time.

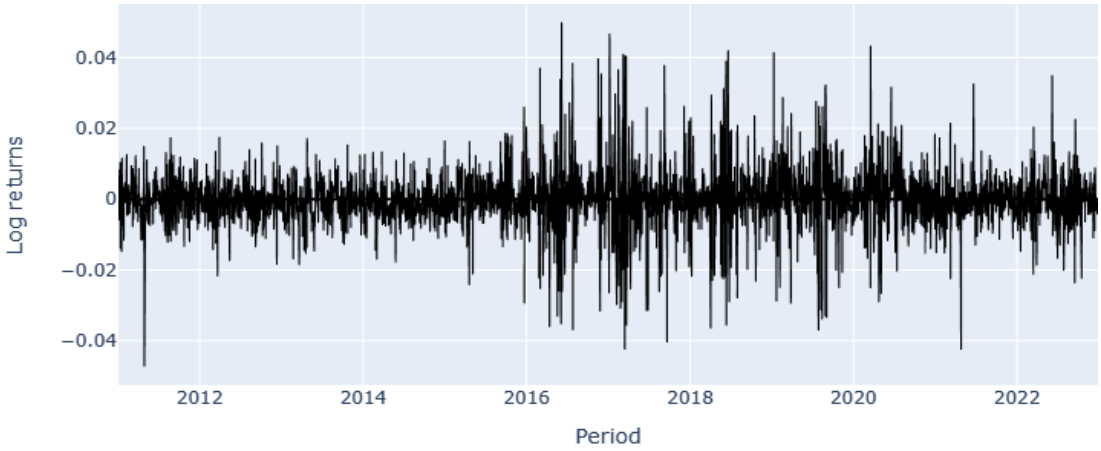

Figure 1: Stock Returns Volatility Trend for NSE 20, 2011-2023
Source of data: Wall Street Journal (2023).

Figure 1 shows that stock returns volatility was relatively calm from 2011 to around the end of 2015. It then got more pronounced henceforth, although it was relatively more relaxed towards the second half of 2021 to the beginning of 2022. The turbulent period could be associated with some remarkable domestic and global events, such as the droughts in 2015 and 2016, the highly contested Kenyan election of 2017, and the COVID-19 pandemic from 2020 to the middle of 2023. All these events reflect the distress in the stock market due to uncertainties in the financial markets. Despite NSE 20 listed companies experiencing various levels of volatility as shown in Figure 1, the constituent companies were not exposed to risk higher than the broader market risk. The majority of the companies are associated with values of beta that is between 0 and 1 over the study period. This implies that the company's stock returns are only exposed to lower risk in comparison to the broader market risk. The beta index is a volatility index that measures the level of an individual company's stock returns risk exposure compared to the broader market risk. (see Appendix A).

Meanwhile, in line with its Vision 2030 agenda, the Kenyan government had implemented policies that promote a good business environment and hence, growth in Kenyan firms. However, the companies' rates of growth vary due to a number of factors such as competition, the company's size, market penetration, technology adoption, and innovation (Akotch, 2018; Mugo & Macharia, 2020). Figure 2 shows that the asset growth outcomes of Kenyan firms fluctuate over the 2011 to 2022 period.

Fig 2: Trend of Asset Growth Rates for NSE 20, 2011-2022
Source of data: Wall Street Journal and African Financials (2023)

The highest NSE 20 asset growth of around 19 percent was attained in 2014 while the lowest growth of 7 percent was recorded in 2018. Clearly, the growth rates in asset were higher when stock returns volatility was relatively calm, and the slack growth coincided with the rough period. From 2019 to 2022, growth picked up an upward trajectory – resilient to the devastating effects of COVID-19 pandemic.

This study objective hence motivated by these trends seeks to explores directly on how stock returns volatility affects the growth rate of listed companies in Kenya. Earlier studies focused on the relationship between stock market returns volatility and macroeconomic variables (Olweny & Omondi, 2011; Kirui, Wawire, & Onono, 2014), and on the behaviors of stock market returns volatility (Ombaba, 2015; Kalovwe, Mwaniki, & Simwa, 2021; Ngigi & Njuguna, 2024). Therefore, this study has a unique contribution in enriching the literature on market returns volatility and growth using the Kenyan case.

The remainder of the paper is structured as follows. Section 2 briefly reviews the relevant literature on firms' growth and stock returns. Section 3 specifies the empirical model and describes the dataset used in the analysis. Results and discussions are presented in Section 4. Finally, Section 5 concludes the paper with policy recommendations.

2. Related Literature

2.1 The Growth of a Firm

Gibrat (1931) described the growth of a firm as one characterized by a stochastic behavior. He argued that the firm's proportionate growth rate and absolute size are independent implying that firms grow following a random phenomenon which is not affected by its size. Additionally, factors affecting the growth of a firm are randomly distributed across firms in the same industry. These include managerial capacities, organizational structures, demand growth, innovation, and luck. Hence, this theory suggested that whether a firm is big or small, its growth pattern is a random phenomenon and that the probability of one firm's growth is equal to other firms in the industry in the same period. Moreover, the growth realized by a firm in the past does not affect its current growth.

Meanwhile, Marris (1964) argued that the firm's main objective is to maximize a balanced growth rate. To achieve this, managers intensify the demand-side growth, focusing on the expansion of firm product demand. Demand-side growth enables a firm to generate more income from selling goods and services. At the same time, managers also endeavor to increase growth on the supply side, that is, the supply of capital to the firm from investors and shareholders. However, both sides are constrained by various factors, including firms' managerial capacity. Managers with better skills can balance various sub-components of growth while taking care of the shareholders' interests.

Further, Jovanovic (1982) claimed that firms grow using a learning model. This approach was called the "noisy selection" model, which was based on the "lifecycle learning theory". Contrary to Gibrat's proposition, firms differ in size due to their different efficiency in learning rates as they age. Hence, efficient firms will grow, while inefficient firms will decline or fail. Efficiency includes the firm's approach of gaining from flexibility to the industry's dynamics and true costs. Thus, where initially, a firm does not know its real efficiency level, it keeps learning and updating itself.

2.2 The Stock Returns and The Firm's Growth

One dominant behavior of asset returns is its volatility, that is, its tendency to reach new highs and lows with time. Stocks behave in a similar manner due to mispricing brought about by the inefficiency in stock markets. Many studies found that stock returns volatility has persistent behavior (Coffie, 2015; Muguto & Muzindutsi, 2022; Ngigi & Njuguna, 2024), volatility clustering behavior (Ning, Xu, & Wirjanto, 2015; Kim & Song, 2020; Ngigi & Njuguna, 2024), and asymmetry behavior (Abdalla & Winker, 2012). This stock returns volatility behavior was observed by Song (2016) to affect the asset growth rate. Moreover, Cooper, Gulen, & Schill (2008) established that asset growth rate and stock returns were negatively correlated.

From the mispricing hypothesis, insufficient information about a firm's managerial behavior causes investors to misvalue firms' investment projects (Gonenc & Ursu, 2018). Financial assets such as stocks or bonds can systematically get mispriced due to over-optimism and over-pessimism (Lakonishok, Shleifer & Vishny, 1994), periods of high sentiments (Baker & Wurgler, 2006), and limited attention by investors over long-term projects (Barber, Odean & Zhu, 2008). However, after getting all the information about the overvalued or undervalued projects, mispricing corrects itself, and hence, stock returns volatility changes.

The optimal investment hypothesis explains how firms can raise cheaper funds to finance high asset growth while minimizing risk. For example, firms with higher investments get lower discount rates, hence lower rates of expected returns (Gonenc & Ursu, 2018). Unlike the efficient market hypothesis (Fama, 1970), the optimal investment hypothesis acknowledged that markets are inefficient and hence risky. Watanabe et al. (2013) observed that the asset growth effect exists in efficient markets, as in developed countries' stock markets, and in inefficient markets, as in many developing countries' stock markets. However, the phenomenon is weaker in developed countries' stock markets than in developing ones. Moreover, Li, Becker and Rosenfeld (2012) show that a returns level has predictive power for asset growth, and hence firm growth rate.

The firms' growth rate has also been found to behave differently as firm matures. As firms grow older, they learn to tackle internal and external shocks. New firms or startups are heavily focused on growth objectives such as increasing market share, achieving product-market fit, and validating their business models. On the other hand, mature and older firms focus more on sustainability goals such as stabilizing their market position and increasing their operational efficiency (see, among others, Ries, 2011; Kotler & Keller, 2012; Blank, 2020). With time, older firms would have already acquired a team of experienced managers, economies of scale and scope, and more financial resources over time compared to startups (Rauf et al., 2023).

Despite the advantages of mature firms, Megaravalli and Sampagnaro (2018) found evidence that small firms grow faster than older firms. Nonetheless, Navaretti, Castellani, and Pieri (2014) observed that the probability of firms' decline was similar across Europe, such as in France, Italy, and Spain. Meanwhile, in Africa, Kenya in particular, Shibia and Barako (2017) found that the age of a firm does not affect a small firm's growth.

The literature discussed above, however, shows a lighter depth in the direct effects of stock returns volatility on firms' growth globally. In addition, as stock data is a very high-frequency data and its evolution is rather more dynamic, the need for an updated research covering a longer period arises. On the other hand, the study saw the need to fill the gap in literature as few researches have focused on the Kenyan stock market and especially in its behavioral effects on growth of listed companies.

3. Model Specification and Data

3.1 The Empirical Model

This study adopted the balanced growth framework by Marris (1964), which is the growth maximization based on shareholders' and managers' utilities. As mentioned earlier, the goal of a firm manager is to intensify demand-side growth but at the same time, endeavors to increase supply-side growth. The supply-side growth of firms depends on the involvement of investors and shareholders. Following Marris (1964), the balanced growth equation is given as:

$$BG_r = G_d = G_s \tag{1}$$

where BG_r is balanced growth, G_d is demand side growth, and G_s is supply side growth.
Specifically, the demand-side growth is expressed as:

$$G_d = f(R\&D, A) \tag{2}$$

According to Marris (1964), the rate of successful diversification is brought by research and development ($R\&D$) and the level of advertising (A), which characterizes the growth of the demand side of a firm. Both $R\&D$ and advertising are expected to increase a firm's product demand.
On the other hand, the supply-side growth equation is written as (Marris, 1964):

$$Gs = f\ (DR, LR, RR) \tag{3}$$

where DR is the debt ratio, LR is the liquidity ratio, and RR is the retention ratio of a firm. A high debt ratio is expected to lower a firm's growth since investors associate it with a firm's lower

resilience to debts, and hence, it poses an investment risk. On the other hand, a high liquidity ratio implies that a firm can easily meet its short run financial obligations and finance growth, hence, gives a good signal to investors on growth prospects. Meanwhile, retention ratio depends on the goals of various investors. Some investors prefer a low retention ratio and expect a higher dividends payout. However, other investors who aim at the long run returns prefer it when a firm has higher retention ratio, which means allocating most of its earning to spur growth, for higher earnings in the future.

In this study, the supply-side growth model in Equation (3) is used to analyze the firm total assets' average growth since the factors affecting growth of NSE's listed companies are more inclined to the supply-side of growth, which is brought by the provision of external finance from sale of company shares in the stock markets. Shareholders bring about the supply of capital to the firms, which firms use to finance their growth.

The nature of the dependent variable, i.e., growth, in its evolution is affected nowadays by its lagged values, implying a dynamic adjustment behavior. This makes traditional estimators like the ordinary least squares method or fixed effects biased and inconsistent due to the correlation between the lagged dependent variable and the error term. For this reason, the study employs a dynamic panel data model, which also accounts for time-invariant unobserved heterogeneity**.**

Following Davidsson, Achtenhagen and Naldi (2005), they proposed that the growth of a firm needs to be analyzed preferably in a concurrent longitudinal design since its size changes over time. Bond (2002) also argued that it may be crucial to allow for dynamics in the underlying process to get consistent estimates of the parameters in the model. Therefore, the model incorporates both within-group variations over time and between-group variations across different units at a specific point in time. The empirical model may be written as:

$$GR_{it} = \omega_i + \phi GR_{it-1} + X'_{it}\,\beta + \mu_{it}, \quad i = 1, 2, \ldots, N;\ t = 1, 2, \ldots, T \tag{4}$$

where GR_{it} is growth of assets of the i^{th} individual company at the t^{th} period and GR_{it-1} is the first lag of growth of assets; X_{it} is a vector of explanatory variables; ω_i is the unobserved individual-specific heterogeneity effect; ϕ and β are unknown parameters; and μ_{it} represents the unobserved random error.

The model is augmented with stock returns volatility variable (S_VOL) and the age of a listed company (AGE). These variables were found in the literature to have potential impacts on the growth of listed companies. Watanabe et al. (2013) found that asset growth and stock returns are negatively correlated. On the other hand, Jovanovic (1982) argued that firms differ in size because they have different efficiency in learning rates as they age. Thus, putting together all these explanatory variables, the growth model in Equation (4) is specifically written as:

$$GR_{it} = \omega_i + \phi GR_{it-1} + \beta_1\, DR_{it} + \beta_2 LR_{it} + \beta_3 RR_{it} + \beta_4 S\_VOL_{it} + \beta_5\, AGE_{it} + \mu_{it}, \tag{5}$$

where ϕ, β_1, β_2, β_3, β_4 and β_5 are unknown parameters.

3.2 Data and Measurements

The data used to estimate the model in Equation (5) are secondary data from the African Financials website[1] and the Wall Street Journal website[2]. It comprised a panel of 228 observations from 19 NSE 20 companies collected over a period of 12 years from 2011 to 2022[3]. The study used the NSE 20 listed companies for empirical analysis since they have a better reflection of the stock market behavior in Kenya. This is because they are categorized as the best performing index i.e., the NSE 20, thus their overall behavior is a better than other NSE indices. Additionally, the longer period of analysis could statistically provide more reliable results. The definition and unit of measurement for each variable included in the model estimation are presented in Table 1.

Table 1: Definitions and Measurements of Variables

Variables	Definition and Measurement
Stock returns	The difference between the closing prices of stocks of listed companies between different trading periods (In Kenyan shillings).
Stock returns volatility	A measure of annual dispersion of stock returns using standard deviation.
Growth rate of total assets	The percentage changes in the value of a company's total assets in a financial year (in percent).
Debt ratio	Measure the amount of assets a company has bought using debt, that is, the total liabilities divided by total assets (in percent).
Retention ratio	The proportion of total earnings that is credited back to a company after paying dividends, that is, the retained earnings divided by net income (in percent).
Liquidity ratio	The measure of a company's ability to pay off its current liabilities with its total current assets, that is, the current assets divided by current liabilities (in percent).
Age	The number of years since the company was listed.

[1] https://africanfinancials.com/african-listed-companies/?wpv-tax-country=ke
[2] https://www.wsj.com/market-data
[3] The NCBA Group was excluded due to the unavailability of consistent data, resulting from a merger between the Commercial Bank of Africa (CBA) and the National Industrial Credit (NIC) Bank Group in 2019.

4. Empirical Results and Discussion

4.1 Summary Statistics

Table 2 shows the descriptive statistics of the variables used in the model estimation. These include the mean, standard deviation, minimum, and maximum.

Table 2: Panel Data Variables Descriptive Statistics

Variables	Minimum	Maximum	Mean	Standard Deviation
Growth rate (%)	-31.72	144.05	12.28	15.78
Liquidity ratio (%)	0.0003	519.00	146.27	77.01
Debt ratio (%)	13.20	113.73	62.71	22.98
Retention Ratio (%)	-859.22	100	46.28	0.93
Age (Years)	0	68	27.41	18.49
Volatility (%)	12.7841	78.9881	29.872	9.2401

Source: Authors' Computation

From Table 2, some statistics worth mentioning include the remarkable achievement of the listed companies in terms of growth, liquidity, and retention ratio. The highest asset growth rate of 144.04 percent was achieved by Centum Investment Company PLC in 2015. Notably, the same company reached a maximum value of liquidity ratio at 519 percent in 2013, leading to its massive growth recorded in 2015. Meanwhile, the maximum value of retention ratio at 100 percent was experienced by various companies in different years, such as BRITAM Holding PLC in 2019 and 2022, KENGEN in 2017, Nation Media Group in 2020 and 2021, DTB in 2021, Equity Group Holding PLC in 2020 and 2021, and ABSA Bank Kenya PLC in 2021.

On the other hand, the lowest growth rate among the listed firms was -31.72 percent, which was recorded by the WPP-Scan group in 2020. This coincides with the period when the COVID-19 pandemic started. The growth rate had a mean of 12.28 percent and a standard deviation of 15.78. The liquidity ratio reached the lowest value of approximately 0 percent, recorded by ABSA Bank Kenya PLC in 2011. The retention rate lowest value of -859.22 percent was observed in 2010 from the Kenya Reinsurance Corporation Limited record. The retention ratio has a mean value of 46.28 percent and a standard deviation of 93.93.

For the debt ratio, the minimum value of 13.2 percent and a maximum of 113.73 percent were respectively associated with the Centum Investment Company PLC and Kenya Power and Lighting Company, which both occurred in 2012. Its mean value was 62.71 percent with a standard deviation of 22.98. Further, the oldest company in the sample is 68 years old, with a mean of 27 years and a standard deviation of 18.

A pairwise correlation coefficient helps to establish the degree of association between variables and also can indicate the potential presence of multicollinearity. The estimated correlation coefficients of the variables in the model are displayed in Table 3.

Table 3. Pairwise Correlation Coefficients

Variables	Growth rate	Liquidity ratio	Debt ratio	Retention ratio	Age	Volatility
Growth rate	1.0000					
Liquidity ratio	0.0129	1.0000				
Debt ratio	0.0962	-0.4550	1.0000			
Retention ratio	0.3141	-0.0321	0.1504	1.0000		
Age	-0.0540	-0.1279	-0.0898	-0.0315	1.0000	
Volatility	-0.1868	0.2449	-0.2604	-0.3444	-0.1472	1.0000

Source: Authors' Computation

Results show that, notably, age had a negative correlation with all other variables in the study. Stock returns volatility was negatively correlated with all variables apart from the liquidity ratio. However, the growth rate was positively correlated with liquidity, retention, and debt ratio. In terms of magnitude, all correlation coefficients are less than 0.50 in absolute value. Therefore, there is no indication of potential multicollinearity between the variables of interest.

4.2 Methods and Results

The dynamic model in Equation (5) cannot be estimated using methods usually employed in static panel data models. The problem of endogeneity arises in the differenced equation since the transformed lagged dependent variable would be correlated with the transformed error (Baltagi, 2010). Thus, Equation (5) needs to be estimated using instrumental variable (IV) estimation. A generalized method of moments (GMM) can simultaneously address the problems of correlated individual effects and endogenous explanatory variables that result in inconsistent estimates. The GMM method is more efficient than the IV methods introduced by Anderson and Hsiao (1982). It is well known that imposing one more moment condition increases the efficiency of the estimators provided that the additional conditions are valid. Arellano and Bond (1991) suggest that the list of instruments can be extended by exploiting additional moment conditions and letting their number vary with time, t.

The growth model in Equation (5) was estimated applying GMM methods using both the difference GMM by Arellano and Bond (1991) and the system GMM developed by Arellano and Bover (1995) and Blundell & Bond (1998). The system GMM extended the difference estimator with the added assumption that first differences of instrument variables are uncorrelated with the fixed effects. The system GMM is composed of two equations, namely, the original equation and the difference equation. The addition of more instruments naturally increased the efficiency of the estimator (Roodman, 2009). In the estimation, robust variance was calculated to correct for arbitrary heteroskedasticity and serial correlation. For system GMM, the variance was corrected using the Windmeijer finite-sample correction to prevent having severely downward-biased standard errors (see Roodman, 2009). The estimation results are presented in Table 4.

Both the difference GMM and the system GMM results showed robust coefficients for stock market returns volatility, and retention ratio variables. The stock market returns volatility coefficient is negative and significant at 5 percent level of significance. This shows evidence that stock volatility has a negative effect on the growth of companies' assets accumulation, supporting the study by Cooper, Gulen and Schill (2008). This also implies that a high volatility in stock

market returns is not beneficial to the growth of Kenyan firms. On the other hand, the retention ratio coefficient is positive and highly significant at 1 percent level of significance in both methods. This indicates that the greater the proportion of total earnings that is credited back to a company after paying dividends, the greater the likelihood of the company's accumulating more assets or the higher rate of growth of the firm. This supports the theory that the retained profit ratio is a determinant of the supply side of growth (Maris, 1964).

Meanwhile, the estimation results also signal the importance of the effect on a firm's growth, the company's ability to pay off its current liabilities. This is denoted by liquidity ratio variable coefficient, which is positive and significant in both methods using Kenyan sample. Although the estimated coefficient is highly significant in the difference GMM results, it only showed weak effect on growth in the system GMM results.

Interestingly, the study found that the coefficient of the lagged growth rate of total assets is not significant in both methods. This conforms with Gibrat's theory, that the growth pattern of a firm is a random phenomenon, and that the growth rate of a firm does not adjust to its optimal level through a dynamic adjustment process. Likewise, the coefficient of the debt ratio variable is not significant in any of the estimated models, indicating that the debt ratio does not seem to have a sizable contribution to the growth of assets in the Kenyan firms.

Notably, the age variable was excluded from the GMM models. This was largely due to its predictability and lack of variations, hence a weak instrument. It could produce biased estimators and distortions in conclusions derived from hypothesis testing (Stock & Yogo, 2002). However, in a fixed effects model (Appendix B), it was found to be statistically significant at a 5 percent significance level. However, the negative sign is ambiguous, although Jovanovic (1982) argued that firms adapt to different efficiencies in learning rates as they age.

Finally, some diagnostic tests for the two estimated models were also conducted. Firstly, the Sargan test of overidentifying restrictions affirms that all the respective instruments used in both GMM estimations are valid since the null hypothesis of valid instruments is not rejected. Secondly, for the autocorrelation tests of the first-differenced errors, there is no presence of autocorrelation if there exists a first-order serial correlation in the differenced residuals, but not a second-order serial correlation (Arellano & Bond, 1991). Both of these conditions were satisfied for the difference GMM and system GMM test results. Thus, the estimated models do not display any incidence of autocorrelation in the first-differenced residuals. Lastly, the values of Wald statistics and their corresponding *p*-values for both models indicate that taking all explanatory variables together provides very high statistically significant information to explain the variations in asset growth.

Table 4. Results-Difference GMM and System GMM

Variables	Difference GMM (z - values)	System GMM (z - values)
Lagged Growth Rate	0. 0119 (0.14)	0. 0415 (0.53)
Stocks Volatility	-45.7834** (-2.27)	-38.2199** (-2.39)
Debt ratio	37.9608 (0.99)	13.0152 (0.99)
Retention Ratio	3.8563*** (3.19)	5.0161*** (3.01)
Liquidity ratio	7.0774*** (3.02)	6.1440* (1.84)
Constant	-10.6646 (-0.49)	3.1589 (0.28)
Number of observations	190	209
Number of instruments	51	105
Model overall significance	Wald = 64.26 p-value ≈ 0.000	Wald = 35.38 p-value ≈ 0.000
Sargan Test *H*0: Overidentifying restrictions are valid.	Chi-square = 56.13 (df = 45) p-value = 0.1235	Chi-square = 15.49 (df = 99) p-value ≈ 1.00
Autocorrelation tests (first-differenced errors) *H*0: No autocorrelation.	First-order: z = -1.8364* p-value = 0.0663 Second order: z = 1.381 p-value = 0.1908	First-order: z = -2.0305** p-value = 0.0423 Second order: z = 1.3663 p-value = 0.1719

*Notes: The numbers in parentheses are z – values; *Significant at 10%; **significant at 5%; ***significant at 1%.*
Source: Authors' computations

5. Conclusions and Policy Recommendations

In this study, we sought to determine the effect of stock returns volatility on the growth rate of listed companies in Kenya. We used 228 observations spanning 12 years from 2011 to 2022. The dataset was collected from the African Financials and Wall Street Journal online databases. The stock returns were less volatile from 2011 to around 2015 and thereafter, stock volatility became

more pronounced. Likewise, the growth rate of assets fluctuates over time but was higher during periods when stock returns volatility was relatively calm.

The empirical findings show that stock returns volatility adversely affects the growth rate of assets of the listed companies in Kenya. In addition, financial ratios of retention and liquidity positively affected companies' growth rate. The study also revealed that the lagged growth rate and debt ratio did not exhibit significant effects on growth.

These results give an important insight as decision makers strategize on their portfolio allocations in a volatile market. The study found several areas of policy recommendation as follows: the listed companies can spur their assets' growth rate by adjusting their capital structure, maintaining some level of liquidity, and increasing their ability to retain a higher proportion of their earnings. In addition, they could implement measures to lower their stock returns volatility. These measures include precise dissemination of information to the public to reduce information asymmetry. This can help investors avoid mispricing stocks and sentimental pricing analysis associated with over-pessimism and over-optimism, consequently reducing levels of stock returns volatility. Future studies can focus on other NSE indices since the current study limited its scope only to the NSE 20 share index.

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Appendix A. Beta Index for NSE 20 Companies, 2011 to 2022

Company	Beta
1. British American Tobacco Kenya PLC	0.796
2. East African Breweries Limited	0.0539
3. Bamburi Cement PLC	0.0303
4. Nation Media Group	0.0275
5. Diamond Trust Bank	0.0211
6. Centum Investment Company PLC	0.0046
7. Equity Group Holding PLC	0.0034
8. Kenya Commercial Bank Group PLC	0.0031
9. I&M Holding PLC	0.0023
10. SCAN Group Limited	0.0041
11. BRITAM Holding PLC	0.0014
12. Safaricom Limited	0.0014
13. Kenya Electricity Generating Company Limited	0.0006
14. Absa Bank Kenya PLC	0.0005
15. Kenya Power and Lighting Company PLC	0.0005
16. Standard Chartered Bank	0.00033
17. Co-operative Bank of Kenya Limited	0.0002
18. Stanbic Bank Kenya Limited	-0.0012
19. Kenya Reinsurance Corporation Limited	-7E-06

Notes: The beta value =1, means the company's stock returns are exposed to a risk equal to the broader market risk; The beta value > 1, implies the company's stock returns are exposed to more than the broader market risk; The 0 < beta value < 1, shows the company's stock returns are exposed to a lower risk in comparison to the broader market risk; The beta value < 0 implies that the company's stock returns are exposed to a risk that moves in the opposite direction from the broader market risk.

Source: Authors calculation based on Wall Street Journal online dataset (2011-2022).

Appendix B. Fixed Effects Panel Model Estimation Results

Variable	Coefficient	Standard error	*t*-statistics	*p*-value
Debt ratio	-3.1704	15.5402	-0.20	0.841
Liquidity ratio	1.2808	1.0156	1.26	0.223
Retention ratio	3.1110***	0.5183	6.00	0.000
Age	-0.7946**	0.3545	-2.24	0.038
Stocks volatility	-12.3591	13.2442	-0.93	0.363
Constant	36.4282**	14.9306	2.44	0.025
Number of observations = 228				
Hausman Specification Test, *H*0: No correlated effects. Chi-square = 11.87** (df = 5); *p*-value = 0.0367				

Note: ** and * denote statistical significance level of 5% and 10%, respectively.
Source: Authors Computation