Empirical Analysis of the relationship between profitability and idiosyncratic volatility of stock returns: Panel Data Evidence from Nairobi Securities Exchange, Kenya.

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Abstract: *With the increased technological disturbance in the global securities exchanges, stiff competition among corporates, global political environment and both global and local fluctuations in economic growth rates, volatility of securities exchanges has been heightened. However, there is no empirical evidence directly linking idiosyncratic risks posed by profitability to volatility of stock returns. Therefore, the present study sought to examine the relationship between profitability and volatility of stock returns amongst NSE quoted firms. The study employed quantitative research paradigm and correlational research design; secondary data was used in the study. The study used purposive sampling method where 24 listed firms were sampled yielding 240 firm-year observations from 2010 to 2019. The study used fixed effects model with panel data regression model in data analysis. Results revealed that the relationship between profitability, measured by EPS, PE and ROE and idiosyncratic Volatility of stock returns, amongst NSE listed firms, is negative and significant (EPS: β = -0.010357, p = 0.0056; P_E: β = -0.017284, p = 0.0000 & ROE: β = -0.033448, p = 0.0000). Therefore, it is concluded that profitability, measured by EPS, PE and ROE, significantly and negatively affect stock returns volatility amongst NSE listed companies in Kenya.*

Keywords: - Stock returns, volatility, profitability, price earnings ratio, return on equity, earning per share, idiosyncratic risks

1. INTRODUCTION

Studies on the relationship between profitability and volatility of stock returns are inconclusive. Nathania and Sung (2021) and Paulus, Irvan, and Nursanita (2018) established a positive and significant relationship between profitability (measured by ROA) and volatility of stock returns. However, when ROE was used as a measure of profitability, Nathania and Sung (2021) found a positive relationship while Paulus, Irvan, and Nursanita (2018) found a negative relationship with stock returns. These studies did not endeavor to establish a relationship between profitability and volatility of stock returns. Aiyabei, Olweny and Macharia (2019 posited that EPS, DPS and cash flow were positively and significantly connected with firm specific volatility of stock returns amongst NSE listed companies. The study also showed that book value per share and liquidity negatively and significantly relate with idiosyncratic volatility of stock returns. However, this study posited a weak relationship between the variables and also the prediction ability of the model was weak. This makes it necessary to re-

assess the relationship using other metrics of profitability, that is, PE and ROE besides the EPS. Thus, this study also sought to establish the relationship between Profitability (measured as EPS, PE and ROE) and volatility of stock returns using evidence from firms listed in NSE.

Despite the importance of NSE both locally and regionally, high stock returns volatility has proved to be a common phenomenon in the market for the past 8 years. This is evidenced by a continuous decline in the NSE 20 share index from 5,406 points in 2014 to1,672 points in 2022, an indication of high exit of investors from the bourse (Capital Market Authority QSB, 2022). Therefore, it is necessary and important to determine the causes of idiosyncratic volatility shocks at the

NSE so as to institute mitigation measures to avert unnecessary losses to investors. It is also important to understand how NSE listed firms' respond to idiosyncratic volatility shocks and volatility contagion across periods since this has a bearing on portfolio construction processes, volatility forecasting, and mitigation of the negative consequences of the shocks and cross period

volatility contagion. A graph on the trend of the NSE 20 share index for the past 8 years illustrates the declining trend from the year 2014 to the year 2022 as shown in figure 1.1 below.
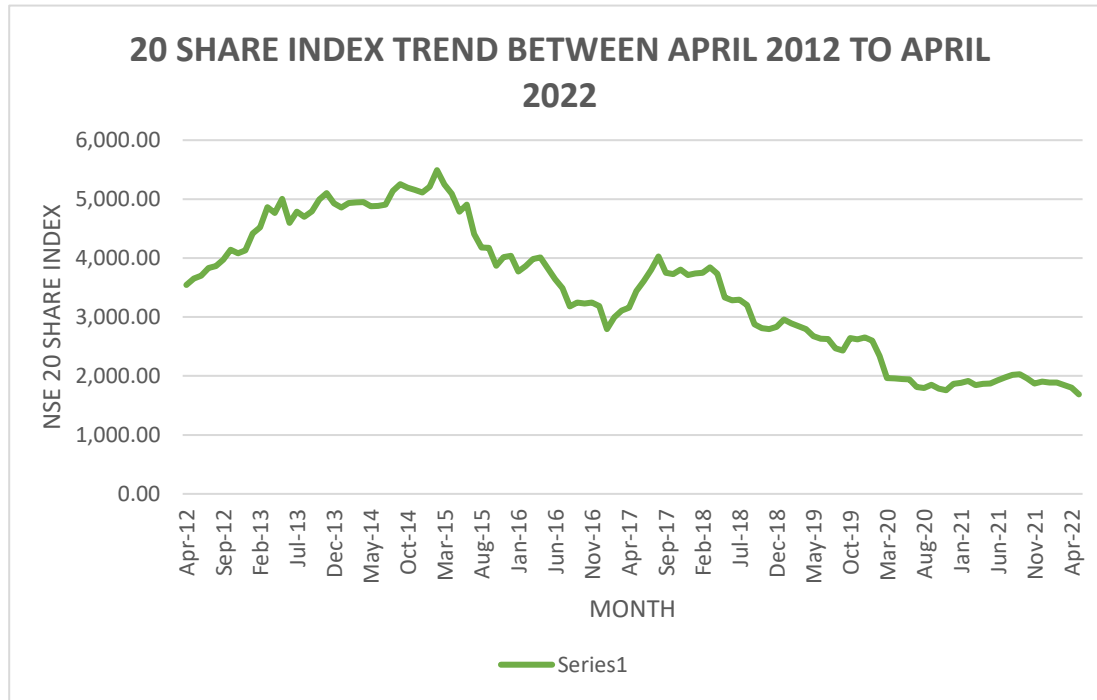

20 SHARE INDEX TREND BETWEEN APRIL 2012 TO APRIL 2022

Figure 1: Trend of the NSE 20- Share Index for the Period Jan. 2014- April. 2022

Source: CMA QSB, 2022.

1.2 Conceptual Framework.

INDEPENDENT VARIABLES

PROFITABILITY
- Price earnings ratio (P_E) $_{i, t}$
- Return on Equity (ROE) $_{i, t}$
- Earnings Per Share (EPS) $_{i, t}$

DEPENDENT VARIABLE

STOCK RETURN VOLATILITY(SRV) $_{i, t}$
- Standard deviation of the residuals (ε_{it}) from Fama and French three factor model
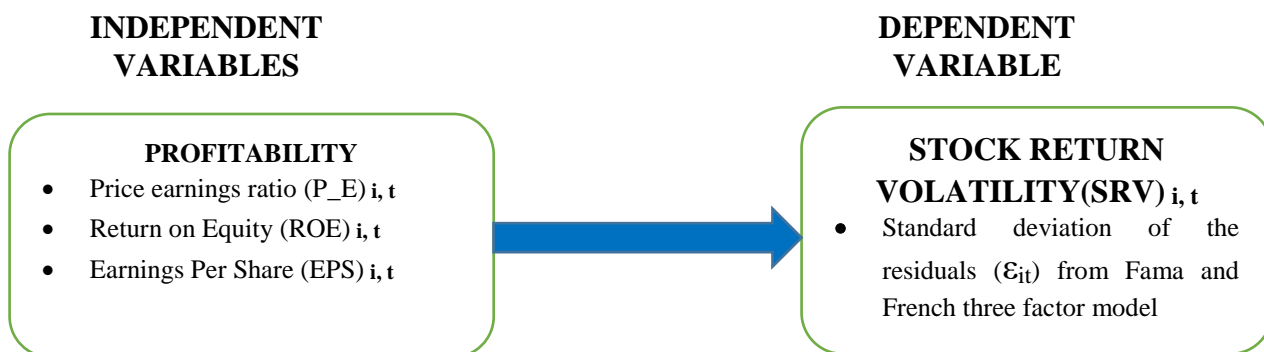
Figure 3: A Analysis of profitability and idiosyncratic volatility of stock returns

2. LITERATURE REVIEW

Nathania and Sung (2021) analyzed the influence of Profitability on Expected Stock Return amongst firms listed in the stock markets in the ASEAN countries. The study sampled 1,010 companies listed in ASEAN countries for ten years between 2010 to 2019. Time series regression analysis was conducted and the result indicated that

profitability significantly and positively relates to stock returns in all the stock markets in ASEAN. The regression analysis confirmed that company profitability (ROE and ROA) significantly and positively affects stock returns amongst firms in the ASEAN equity markets. In this study, the link between profitability and volatility of stock returns was not adequately analyzed. The study also made use of only two profitability metrics while ignoring others like EPS, PER and ROE. The study also did not capture the elements of volatility clustering.

Luqman and Kusmanto (2020) undertook a study to establish the factors influencing stock returns amongst firms in the Mining sector in Indonesian Stock Exchange. The study aimed to establish the individual or joint implication of Bank Certificate, forex rate, cash flow from operations, liquidity and net profit on stock returns. The study sampled 12 firms, in the mining sector, from the entire 40 firms listed on the IDX. This study employed fixed effects panel regression model (FEM) for data analysis, with the help of Econometric-views application. The result showed that net profit positively and significantly influences stock returns. The study concluded that increased profits lead to increased dividends payout to investors which has an effect locking in the investors as well as attracting new potential investors. The converse is also true, that depressed profits will lead to reduction in dividend payout to investors who will end up disposing the firms' stocks for alternative investments. This may result in the decline of companies' equity prices in the long run due to drop in demand. However, not all investors are motivated by profits to invest, as the study suggest, but rather by wealth creation through capital gains. Stock return volatility was not captured in this study and the sampling technique used was biased and therefore, the findings of the study could also be biased.

Chandra , *et al* (2019) conducted a study whose purpose was to evaluate the determinants of financial gearing, profitability and stock returns. The study also established how financial gearing, profitability and stock returns relate. The predictor variables in this study constituted financial gearing, profitability and stock returns, whereas the response variables constituted company size, expansion opportunity, asset tangibility, working capital, stock returns volatility and uniqueness. 64 firms were sampled from a population comprising of firms listed on the compass index 100 in the month of August 2016. To analyze the data, path analysis technique was employed with help of AMOS software. From the results obtained, the researchers concluded that only profitability variables had an effect on stock returns. Financial gearing, corporate size, expansion opportunity, asset tangibility and working capital did not relate significantly to stock returns. Financial gearing was influenced only by expansionary opportunities, while other variables had a statistically insignificant relationship. Profitability was affected by corporate size, expansionary opportunities, uniqueness and stock returns volatility. Even though the study findings show a relationship between volatility and profitability, the study focused more on the determinants of profitability as opposed to stock returns volatility.

Firmansyah, Sihombing and Kusumastuti (2020) did a study on the factors influencing firm specific stock returns volatility in Indonesia banking industries. The result indicated that corporate size, dividend policy, PER and profitability are negatively related with firm specific stock returns volatility while companies operating performance and institutional ownership were found not to have any relationship with idiosyncratic stock returns volatility. Other firm fundamentals such as capital expenditure, financial gearing and profitability were not considered in this research. The researchers also considered only firms in the banking industry and the results could not be generalized to firms in other sectors.

Paulus, Irvan, and Nursanita (2018) did an analysis on how profitability relate to stock returns. They also analyzed the influence of inflation on profitability and stock returns. Metrics for profitability included ROA, ROE and Net Profit Margin (NPM). The study sampled 12 automotive firms which were continuously listed for the period 2013- 2017. Panel data regression analysis was used to test the study hypothesis. The findings

indicated an Adjusted R-squared of 0.15, which implied that the magnitude of the effect of the predictor variable, with inflation as moderator, on the response variable that could be accounted for by the model was 15%. While the remaining 85% was as a result of other variables not incorporated in the regression model. The researchers concluded that ROA is positively and significantly related with stock returns, ROE negatively and significantly relate to stock returns and NPM had no significant influence on stock returns. ROA moderated by inflation had a negative influence on stock returns. ROE, moderated by inflation had a significant and positive relationship with stock returns while NPM moderated by inflation does not have any significant influence on stock returns. The regression model's goodness of fit was too low at 15%, an indication that profitability is not a good predictor of stock returns as it can only account for 15% of the stock returns, leaving a larger percentage of the returns to be determined by other factors not included in the model.

Liu, Amalia and Ashton (2014) did an examination on how stock fundamental ratios and firm specific volatility relate amongst firms listed at the Australian Securities Exchange between 1993 and 2010. The portfolio analysis results showed that companies with high firm specific volatility tend to have a small corporate size and low value. The regression analysis results indicated that dividend yield was positively related to firm specific volatility. Price to earnings ratio and return on equity are negatively related to the firm specific volatility. The relationships between the firm specific volatility and the stock fundamental ratios remained robust in presence of size, but it is not known whether this robustness could hold in the presence of earnings quality.

Aiyabei, Olweny and Macharia (2019) examined the Influence of Earnings per Share on firm specific stock returns volatility amongst NSE Listed Firms. The study was quantitative with a correlational research design. It was a census study targeting the entire 39 NSE listed companies that existed at the time and their stocks actively traded at the NSE from the year 1998 to 2017. Dynamic panel regression analysis was conducted to test the study hypothesis. The findings indicated that EPS significantly and positively relate to stock returns volatility ($\beta = 0.001$, p=0.027). This was supported by F statistic of 4.89 and a t statistic of 2.210 which were greater than the critical F and critical t of 1.96. The findings showed existence of positive and significant relationship between EPS and firm specific stock returns Volatility at 95% confidence level. The R^2 was 0.31 an indication of low prediction ability of the model. This study estimated volatility as the variance of the residuals of the CAPM, the single factor model, which only took care of the market factors (β) but not portfolio size (SMB) and portfolio value (HML). Despite the fact that the researcher used a dynamic panel regression model, the model did not account for serial autocorrelation exhibited by firm specific volatility of stock returns. The study covered the period from 1998 to 2017, but the author ignored the confounding effect of the global financial crisis of the year 2008 and 2009 as well as the political turmoil around the study area within the same period. This study also did not include other metrics for profitability as well as other idiosyncratic risks in evaluating their influence on stock return volatility. Finally, this study evaluated the influence of profitability and firm specific stock returns volatility but could not establish the influence of earnings quality on the same relationship

3. METHODS

3.1 Research Design

Research design is a none action process mostly equated to conceptualization and planning phases in project management. However, according to Kothari (2004) and Coopers and Schindler (2014) research design is a blue print which is geared towards achieving research objectives and answering research questions. While (Vibha & Walsh, 2019) opines that research design is a glue that holds various research components together, Philips (1987); Creswell (1994) postulates that research design may follow either quantitative paradigm or qualitative paradigm. With the increased research in this area of research design, a different perspective has been going around with the idea that the most important aspect of research is the reliability and validity of the study and not the design. Therefore, triangulation, mixed

methods and pragmatism genres of research design has gained momentum among scholars in the recent past (Creswell & Clark, 2011, Tashakkori & Teddie 1998, Goles & Hirschheim, 2000, Maxcy, 2003). It is evidenced that irrespective of different definitions of research design, all the definitions points to the importance of research design in achieving valid and viable research output which can be generalized and practically be applied. Therefore, this study employed a quantitative research philosophy where secondary data was used in the study. The design used in this study is hence correlational research design. To help achieve reliable and valid results, various diagnostic tests and data transformation were performed.

3.2 Study Area

This research was carried out in Nairobi Securities Exchange; the burse is the securities exchange in Kenya. The Securities Exchange is based in Nairobi which is the head quarter of Kenya. According to the 2019 population census by the government of Kenya, the city had a population of 4,397,073.

3.3 Target Population

The target population of this study comprised the 25 firms used for coming up with NSE 25 Share Index for the period ranging 1st January 2010 to 31st December 2019. These firms were targeted because they constitute 80% of the NSE'S total capitalization especially during the period under investigation. The study targeted the listed firms because they are required by law to avail their financial statements through publications. The annual financial statements were therefore available to the public and collection of data using them was made easy.

3.4. Model Specification

The following model was specified to analyze the relationship between profitability and stock returns volatility amongst NSE listed firms;

$$Y_{i,t} = \beta_{30} + \beta_{31} X_{3\,i,t} + \beta_{32} Y_{i,(t-2)} + \varepsilon_{i,t} \ldots\ldots (1)$$

Where;

Y_{it} = stock return volatility for company i during time t;

$X_{3\,i,t}$ = profitability for company i during time t;

β_{30} = constant (intercept).

β_{31} = Regression coefficient for profitability.

β_{32} = Regression coefficient for one period lag volatility.

i = NSE listed companies ranging from 1 to 24;

t = Time in Years covering the period from 2010 to 2019;

$\varepsilon_{i,t}$ = Residual term of firm i, during time t.

4. RESULTS

To actualize the study objective, a null hypothesis that profitability has no effect on volatility of stock returns amongst NSE quoted firms, was formulated. Hypothesis testing was done with the help of dynamic, fixed effects regression model. The regression results in Table 1 indicates that profitability, measured by Earnings Per Share (EPS), Price Earnings Ratio (PE) and Return on Equity (ROE) significantly and negatively affect volatility of stock returns amongst NSE listed firms (EPS: β = -0.010357, p = 0.0056; P_E: β = -0.017284, p = 0.0000 and ROE: β = -0.232885, p = 0.0000). This indicates that a 1% increase in profitability measured by EPS causes a decline in stock return volatility by 1.0357%, 1% increase in Price Earnings Ratio causes a decline in volatility of stock return by 1.7284% and also 1% increase in Return on Equity Ratio causes a decline in volatility of stock returns by 23.2885%. The results of the regression analysis are presented in Table 1.

Table 1. Effect of Profitability on Volatility of stock returns at the NSE.

Dependent Variable: SRV

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.058015	0.011357	-5.108277	0.0000
LNEPS	-0.010357	0.003707	-2.793987	0.0056
LNP_E	-0.017284	0.003859	-4.478701	0.0000
LNROE	-0.232885	0.035061	-6.642288	0.0000
SRV (-2)	0.473653	0.048257	9.815258	0.0000
R-squared	0.571927	Mean dependent var		0.221339
Adjusted R-squared	0.564578	S.D. dependent var		0.120656
S.E. of regression	0.079614	Akaike info criterion		-2.202467
Sum squared resid	1.476848	Schwarz criterion		-2.129520
Log likelihood	267.0936	Hannan-Quinn criter.		-2.173068
F-statistic	77.82478	Durbin-Watson stat		1.142623
Prob(F-statistic)	0.000000			

Source: Research Data, 2023

Key: SRV-stock returns volatility, LNEPS- natural logarithm of Earnings per share, LNP_E – Natural logarithm of price earnings ratio, LNROE- natural logarithm of Return on Equity

The resulting models 4.51, 4.52 and 4.53 are presented as follows:

$$SRV = -0.058015 - 0.010357 \text{ EPS} + 0.473653 \, SRV_{t-2} + \varepsilon_{i,t} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (2)$$

$$SRV = -0.058015 - 0.017284 \, PE + 0.473653 \, SRV_{t-2} + \varepsilon_{i,t} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (3)$$

$$SRV = -0.058015 - 0.232885 \text{ ROE} + 0.473653 \, SRV_{t-2} + \varepsilon_{i,t} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (4)$$

The regression analysis in table 1 give rise to models 2, 3 and 4 above. Model 2 indicates that, all factors held constant, 1% increase in EPS causes a decline in volatility of stock returns by 1.0357%. This implies that an increase in earnings attributable to shareholders reduces spooking amongst investors making them hold onto their investments creating stability in stock prices which reduces volatility in stock returns. Model 3 indicates that, all factors held constant, 1% increase in PE leads to a decrease in volatility of stock returns by 1.7284%. This implies that increase in stock prices at the NSE could be interpreted as a sign of financial stability and increase in value of the respective firms. Thus, investors respond to this information positively by holding onto their stocks leading to stability and decline in volatility of the stock returns.

The recorded R^2 (coefficient of determination) of 0.564578 indicates that Profitability, measured as EPS, P_E and ROE, together with the two periods lag volatility, will predict 56.4578% of idiosyncratic volatility of stock returns. Factors outside this model could predict the remaining 43.5422%. The strong R^2 is an indicator that the model is robust and a good predictor of firm specific stock returns volatility with profitability as the independent variable. The study findings conform with those of: Paulus, Irvan and Nursanita (2018) recording $R^2 = 15.38\%$; Firmansyah, Sihombing and Kusumastuti (2020)

and Bin, Amalia and Ashton (2014). The study of Paulus, Irvan and Nursanita (2018) used a sample consisting of only 12 automotive companies which could not be considered to be representative enough. The study also related profitability to stock returns and not stock return volatility and therefore neither measured volatility nor accounted for sensitivity of the stock to the market (β), portfolio size (SMB) and portfolio value (HML) factors. The study did also not capture the asymmetric pattern in variance and change of magnitude over time exhibited by idiosyncratic stock returns volatility. The study of Firmansyah, Sihombing and Kusumastuti (2020) and Bin, Amalia and Ashton (2014) used the root variance of the residuals of the FF3F model to estimate volatility but failed to account for volatility clustering exhibited by firm-idiosyncratic volatility. Thus, the current study cured the weakness noted in past studies by measuring volatility as the standard deviation of residuals of FF3F model, which accounted for market factors, portfolio size and portfolio value. The current study also modelled volatility using the GARCH model which captures the asymmetric pattern in variance and change of magnitude over time exhibited by idiosyncratic volatility of stock returns.

On the contrary, the results of the current study contradict that of Aiyabei, Olweny and Macharia (2019); Nathania and Sung (2021) and Luqman and Kusmanto (2020) who found that profitability relate significantly and positively with stock returns and/or stock returns volatility. The study by Aiyabei, Olweny and Macharia (2019) did not model volatility using the GARCH model, which accounts for volatility clustering exhibited by idiosyncratic volatility. In addition, Cheruiyot, et al. (2019) measured volatility as variance of residuals of CAPM, the single factor model, taking care of only the sensitivity to market (β) factors but not the sensitivity to portfolio size (SMB) and portfolio value factors. The study of Nathania and Sung (2021) linked profitability to stock returns but did not link profitability to stock returns volatility. The study also ignored other profitability metrics which are of interest to the investor such as the EPS, PER and ROE. Finally, the study of Luqman and

Kusmanto (2020) sampled only 12 firms in the mining sector, which was not representative enough. The study used net profit as the only metric of profitability and assumed that all investors are motivated by profits to invest. The study linked profitability to stock returns and not stock return volatility. Therefore, this study went further to establish the relationship between profitability, measured as EPS, PE and ROE, on stock returns volatility, for NSE listed companies. A sample of 24 firms picked from different sectors of the Kenyan economy were used in the study, giving more credibility to the results obtained. The current study estimated volatility as variance of residuals of the FF3F model, which accounts for Market (β), size and value factors and captured volatility clustering using the GARCH model.

Hypothesis testing was done using the dynamic panel regression represented in table 1, and was decided based on the probability values. The criterion for acceptance or rejection was a probability value 0.05. The study hypothesis is rejected if the p-value is below 0.05 but if the p-value is greater than 0.05, the hypothesis is accepted. The findings in Table 1 shows that the relationship between profitability, measured by EPS, PE and ROE and Firm Specific Stock Returns Volatility, amongst NSE listed firms, is negative and significant (EPS: $\beta = -0.010357$, $p = 0.0056$; P_E: $\beta = -0.017284$, $p = 0.0000$ & ROE: $\beta = -0.033448$, $p = 0.0000$). A calculated t-statistic of 2.793987, 4.478701 and 4.258616 respectively, supported these results. Based on these findings, the formulated null hypothesis that profitability does not significantly affect stock returns volatility amongst NSE listed firms in Kenya is rejected. Therefore, it is concluded that profitability, measured by EPS, P_E and ROE, significantly and negatively affect stock returns volatility amongst NSE listed companies in Kenya.

5. CONCLUSION

Results revealed that EPS, PE and ROE have a statistically significant and negative relationship with volatility of stock returns at the NSE. This indicates that increase in investor returns

causes a decline in volatility of stock returns amongst firms listed at the NSE. All these profitability ratios point towards an increase of investors welfare. Therefore, it is concluded that managers should strive to increase investors welfare in order to reduce stock return volatility. This supports of the investors' wealth maximization objective. When EPS, P_E and ROE are calculated over a number of years, they give an indication of whether the earning power of the company has improved or deteriorated. Growth in EPS, PE and ROE, is therefore an important measure of management performance because it shows how much money the company is making for its shareholders, not only due to changes in profit, but also after all the effects of issuance of new shares. Thus, it can be concluded that improvement in management efficiency and performance over time lowers the firm's idiosyncratic risk which increases stability in stock returns.

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