# OPERATING CASH FLOW VOLATILITY AND FIRM STOCK MARKET VALUE OF THE COMPANIES QUOTED AT THE NAIROBI SECURITIES EXCHANGE

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## ABSTRACT

Numerous factors influence investor perceptions about firm prospects and therefore market prices and the corresponding firm market capitalization. It is not clear if operating cash flow volatility is value relevant for companies listed at the Nairobi Securities Exchange (NSE). This lack of clarity arises from the conflicting theoretical and empirical evidence on the effect of operating cash flow volatility on market value. This study aimed to establish if the volatilities of cash flows from operations is a priced risk factor at the NSE. Market value was measured using the capitalization ratio while the operating cash flow volatility was based on the 3-year moving standard deviations of the operating cash flow ratios. The relevant theories that try to explain the interlinkage between operating cash flow volatility information with market values are the efficient market hypothesis, the functional fixation theory, the random walk theory and the MM value relevance theory. The research was undertaken as a census quantitative descriptive study based on a census of all the 66 listed companies. From these, 45 met the secondary data requirements resulting in 450 firm year observations for the 2011 to 2022 study period. After appropriate normality, autocorrelation and homoscedasticity tests, Hausman specification test demanded that the fixed effects panel regression model be used in the analysis. The test of hypothesis was done using the t-statistic and p-value at the 0.05 level of significance. The findings from the study revealed that the operating cash flow volatility had a negative effect on firm market value of the companies listed at the NSE. The study supports the EMH, Random Walk and MM value relevance theories but does not hold for the functional fixation theory. Since the study finds that operating cash flow volatility to be a priced information risk factor at the NSE, it recommends that more disclosures on information about operating cash flows should be reported among the items in the financial statements of listed companies in Kenya to aid investors in decision-making.


**Keywords:** Cashflow Volatility; Operating Cashflows; Firm Market Value.

## INTRODUCTION

Cash flow volatility (CFV) relate to the fluctuations in cash flows over successive periods arising from variations in sources and uses of cash from operating, investing and financing activities of an entity (Hadi, Bashir, Abolfazl & Maryam, 2013). The volatility is an indication of risk and uncertainty since the fluctuations in cash flows put a limit on the extent firms can plan for their operations and other activities. It may be interesting to know whether cash flow volatility over time is an information risk priced factor in the securities markets and if in need it has any bearing on the market value of the companies listed on securities Exchanges. This dilemma forms the gist of this study to be carried out at the Nairobi Securities Exchange (NSE).

Reports on the value relevance of CF and CFV have provided contradicting results from extant literature across the globe. Charitou, Clubb and Andreou (2001) for instance in their study did not find any stock market pricing effect of CF in the UK. This was the conclusion in the absence of the consideration of different contextual factors. Martinez (2003) also did not find any additional information content of CF besides what earnings contains with relation to France, similarly Saeedi and Ebrahimi (2010) found no significant statistical incremental value relevance of CF in the context of Iran.

Cheng and Hollie (2008) indicate that cash flows from operations (CFO) are the most significant category of cash flows. This is attributed to the fact that CFO arise from the major income-producing activities of the firm. They represent the capacity of the company to generate cash from its main activities. Incrementally, the CFOs fundamentally bolster the dividends and capital capacity of an entity. The volatility in cash flows from operations is likely to depend on a number of factors. These include the inventory cycle of a firm, the credit policy of the firm, the type of business, the market factors, the size of the business, the supply chain conditions and the scale of operations (Cheng & Hollie, 2008). Accordingly, a highly unpredictable credit policy coupled by volatility in the supply chain and market forces of demand and supply are likely to result in highly volatile cash flows and vice versa.

Extant literature reveals that moving or rolling standard deviation of cash flows and its metrics are a popular indicator of cash flow volatility. In Pakistan, Ashfaq (2018) measured standard deviation of cash flows on a 4-year rolling basis to measure the volatility of cash flows. The higher the standard deviation, the greater the volatility and vice versa. In the United States of America, Cox (2020) used a 3-year rolling standard deviations of cash flows to establish the volatility in cash flows. The odd number of years reflected the ease of centering the rolling values of standard deviations.

Firm market value is also called firm market capitalization. It is the value of the firm in the capital market based on the market price of the issued shares and the number of the issued shares. Since the issued shares remain fairly constant for long, the key determinant of firm market value is the price of its shares in the stock market (Brody, Meister & Parry 2012). Forces that increase the price of the shares of a firm like healthy financial performance and stable cash flows serve to enhance the value of the company and vice versa. Information that has an effect on the value of the share prices and therefore the market value of a firm is said to be value-relevant information (Barth, Beaver & Landman, 2001).

Information is termed as value relevant if it has a predicted association with equity market values (Barth, Beaver & Landman, 2001). If information is value relevant, it will directly influence a firm's market value and therefore value relevance research studies the relationship between the obtained information and equity market values by assuming that these values reflect the investors' aggregated beliefs (Barth *et al.*, 2001). The accounting numbers that affect stock value are said to be value relevant and are considered under value relevance studies (Barth *et al.*, 2001).

The prices of a company depend on investor perception about the value of the company. Firm market value is critical in determining the investment value of equity securities in a company. Despite this, companies at NSE have been experiencing fluctuations in their market valuations. It is not clear the role volatility in operating cash flows have played in this observed phenomenon. Whereas numerous factors have been shown to influence investor perceptions and thereby the value premium they place on a listed company and its equity securities, it is not clear if cash flow volatility is value relevant for companies listed at the Nairobi Securities Exchange (NSE). This lack of clarity arises from the conflicting theoretical and empirical evidence on the effect of operating cash flow volatility on market value and this creates a dilemma to investors in equity securities in their buy, hold and sell decisions. The subsequent section outlines the apparent contradictions in theoretical and empirical literature and is instrumental in developing this study's research hypothesis.

## LITERATURE REVIEW AND HYPOTHESIS DEVELOPMENT

Four theories are instrumental in explaining if operating cashflow volatility is a priced information risk factor that affects the market values of companies at the NSE. These are the Random Walk Theory of Burton (1973); the Efficient Market Hypothesis of Fama (1970); the MM Value Relevance Theory of Miller and Modigliani (1961) and the Functional Fixation Theory of Sloan (1996). The Random Walk Theory presupposes that information arrives in the stock market in an unpredictable fuzzy fashion and therefor is expected to impact stock prices and the firm market value in a random manner. In context, operating cash flow information is expected to arrive in a random manner, albeit within the frameworks provided by the capital markets Authority (CMA) in Kenya. The Efficient Market Hypothesis of Fama (1970) postulates that in an efficient market, security prices reflect available information in accordance to the level of efficiency ranging from weak form, semi strong form to strong form efficiency. In Kenya, Gichaiya et al. (2018) provided evidence that NSE is efficient in the weak form, hence as per Fama (1970), all historical operating cash flow information should be reflected in the security prices and thus firm market values.

The MM value relevance theory of Miller and Modigliani (1961) indicates that the expected future cash flow patterns affect the current price of equity securities of the relevant firm under consideration. If historical cash flow volatility can be used to forecast future cash flow volatility, then it is observed that cash flow volatility would affect firm value through changing security prices. According to the theory, the observed price of a share in the stock market is a direct reflection of the projected cash flows from the operations of the business. It asserts that the share price of a company is accordingly equivalent to the discounted value of the expected future cash flows per share from the operations of that business. The last theory of Sloan (1996) is rooted in behavioral finance and it presupposes that naïve investors rarely analyze financial statements beyond important reported figures like earnings information. In this respect, they are not expected to carry out a deep analysis of the statements to establish he volatility of operating cash flows. And if so, it is conceivable that operating cash flows are not value relevant for listed companies on stock markets. In addition to the confounding theoretical postulations in the foregoing paragraphs, empirical literature also provides contradicting evidence as to how volatility in cash flows from operations affect firm stock market value. In Pakistan for instance, Ashfaq (2018) investigated the impact of cash flow volatility on stock returns of companies listed at the Karachi Stock Exchange. The study

covered a period of 12 years from 2005 through 2016. The study used a 4-year rolling standard deviation to establish the level of cash flow volatility. The study decomposed cash flow volatility into two components. These were systematic cash flow volatility and idiosyncratic cash flow volatility. A random sample of 80 non-financial firms was used in the study. The panel Hausman specification tests led the study to settle on the fixed effects multiple linear pane regression model. The findings from that study revealed that historical cash flow volatilities had a negative influence on stock returns and that the higher the level of cash flow volatility, the lower the stock returns and vice versa. The negative effect of cash flow volatility remained significant and robust even after controlling for numerous pricing factors. These included the size factor; the market illiquidity factor; the value factor; as well as the earnings yield factor that represents firm growth.

Using a cross section of 21 developed markets, Palkar (2017) sought to establish how cash flow volatility affected market returns in the context of financial constraints. The study identified two categories of companies, which are the financially constrained companies and the financially non-constrained companies. The study also takes into account various country specific market-pricing factors in order to compute risk-adjusted return coefficients. These factors include the momentum factor; the size factor; the book to market factor as well as the market factor. The study involved taking a long position in the low cash flow volatility portfolio and taking a short position in the high cash flow volatility stocks. The findings revealed that there is a return premium on this strategy in more than 75% of the countries for the overall markets and 70% for the financially constrained markets.

Burke and Wieland (2017) sought to establish if cash flows from operating activities of banking operations are value relevant. This was particularly useful given that some scholars hold the opinion that earnings information is more critical than cash flow information for banks given that they are highly regulated and that their cash flow position is heavily influenced by regulatory actions. Burke and Wieland relied on the Ohlson valuation model and undertook their study over a period of 11 years that covered 2004 through 2014. The findings revealed that for banking activities, cash flows from operating activities are value relevant since the null hypothesis that they have no influence on share prices was rejected with the conclusion that they had a positive effect on share prices and thereby the market valuation of banks. In addition, the Burke and Wieland (2017) study found out that the value relevance of the operating cash flows is varied depending on the credit risk, profitability and the capital adequacy of the banks.

In Norway, Voroshina and Martinsen (2022) investigated the effect of operating cash flows, among other accounting values, on market value of companies listed at the Oslo Stock Exchange. The study had a time scope of sixteen years that covered 2005 all the way to 2020. They investigated the study by evaluating the period operating cash flow information as well as changes in those operating cash flows over time. Panel data regression analysis was used in the study whereas the explanatory power of the single period and the change in period cash flows on market value was based on the coefficient of determination. The findings indicated that operating cash flows was value relevant for the Norwegian firms and that it has a positive effect on share prices and therefore both share returns and market value. Interestingly and contrary to the Sloan (1996) functional fixation theory, operating cash flows were found to be more value relevant than the earnings numbers.

Cheng, Zishang, and Johnstone (2013) use stock returns for the period 1989 to 2008 for monthly returns data obtained from AMEX, NYSE and NASDAQ to examine the supplemental role of operating cash flows in explaining returns on stock. They use the correlation between returns on stock and earnings as a benchmark against which they compare and analyze the effect of various earnings quality measures on the role of operating cash flows and earning in explaining returns variations. The qualifying firms in the sample are those that have at least 30 monthly returns in the 60 month estimated period and the resulting sample is 31,866 firms- year observation for the AQ measure and 54,272 firm-year observation for the abnormal accruals measure. The sample is first arrived at by eliminating companies in the financial industries and utility companies. Other firm-year observations are eliminated due to lack missing earnings or cash flow data from the current and prior year and changes in the fiscal year. The first measure the earnings quality is the standard deviation of the residual from the regression of change in working capital on lead lag and current cash flows, changes in scale and gross property plan and equipment. The study applies cross-sectional linear regression models to examine the value relevance of cash flows from operations and earnings with respect to annual abnormal security return. They employ both change and level specifications to characterize the unexpected components of cash flows from operations and earnings. According to the study, both combined cash flows from operations and earnings show significant incremental informational content.

Akadeagre, Kwame and Opoku (2015) conducted a study on comparative predictive abilities of earnings and operating cash flows on future cash flows in Ghana using panel data from listed companies on the Ghana Stock Exchange from 2002 to 2012. For consistency reasons, those firms without published financial statement within the period of analysis were removed from the analysis. The research used ordinary Least Squares to estimate the likely influence of the three-lags of operating cash flows and earnings ratios on future operating cash flows of the listed firms. To eliminate the effect of size and heteroscedasticity, the variables were scaled by the average total assets of the firms. The conclusion of the study is that historical earnings and operating cash flows are significant in forecasting future cash flows, however historical earnings are superior on predicting ability on the future cash flows from operations as compared to operating cash flows. Operating cash flows therefore has lesser predictive ability on future operating cash flows. Also, it was established that investors who intend to predict future operating cash flows on their investments by depending on the three years ago earnings, two years ago earnings and a year ago earnings would make some gains in terms of precision than those using only one year past operating cash flows to forecast their future operating cash flow in a Ghanaian economy.

Khokan, Mollik, and Rahman (2013) conducted a study in Australia on the earnings and cash flows value relevance during the global financial crisis. This study was aimed at assessing the cash flow from operations (CFO) incremental value relevance provided with book value and earnings. Also, the study focused on the earnings and CFO and changes relative value relevance therein between 2008 - 2009 pre-crisis period and global financial crisis. Financial accounting data and market value data is collected from Data stream database. The sample period included 2004 to 2009. The initial sample consisted of 9,615 firm-year observation but remain with the appropriate sample, after excluding financial, negative earnings' firms, non-June year firms, the final sample composed of 4,885 firm-year observations. The study applied a regression model in data analysis. The study

findings suggest that CFO has incremental value relevance to book value and earnings. Moreover, earnings are superior to CFO in explaining variations in share prices in the Australian market during both the pre-crisis period and global financial crisis. This is also consistent with Choi, Kim, and Lee (2011) who find negative coefficient for CFO during the 1997 Asian financial crisis. The decrease in value relevance of CFO may be a noisy measure of a company financial performance during the financial crisis.

Based on the foregoing literature review, the conceptualization of the relationship between operating cash flow volatility and firm market capitalization is as indicated in figure 1.

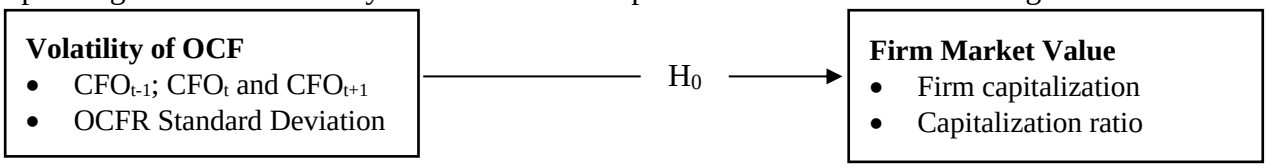


***Figure 1: The conceptual Framework***

In the conceptualization, the independent variable is specified as the volatility of the operating cash flows. The operating cash flows are measured as the operating cash flow ratio (OCFR) being the ratio of the cash flows from operations of a business in a certain year to the total cash flows generated by that entity in that period. The volatility in the cash flows from operations is measured using a 3-point moving standard deviation based on a specified period's cash flows from operations ($CFO_t$); previous period's cash flows from operations ($CFO_{t-1}$); and the successive period's cash flows from operations ($CFO_{t+1}$).

In the conceptualization, the dependent variable is specified as the firm market value of the listed firms at the NSE. Firm market value is measured using the firm capitalization ratio. This is the ratio of the firm's capitalization (number of shares outstanding multiplied by the market price per share at the end of each year) to the total market capitalization being the market value of all listed firms at the NSE on the specified date. The dependent and independent variables are connected by the null hypothesis as shown in figure 1 and as specified below:

**$H_0$**: Operating cash flow volatility has no significant effect on market value of companies listed at the Nairobi Securities Exchange in Kenya

## RESEARCH METHODOLOGY

This study adopted a positivism research philosophy which adheres to the view that truth is only learnt through science. It also deals with highly structured, large samples and quantifiable data which is analyzed through statistical analysis. The philosophy was used to show causes among the study variables through testing the hypothesis with a view of rejecting or verifying the relationship. It was assumed that there was a causal relationship between cash flow volatility and firm value for companies listed at the Nairobi Securities Exchange.

The study adopted quantitative causal descriptive research design. This is because the data to be obtained for analysis was quantitative in nature. The quantitative research design was used to develop a model that was used for testing the hypothesis of the study. The design fits this study

because it entails using quantitative data from corporate financial statements, which fits within the objectives research philosophy. The quantitative data that applies to the study includes market capitalization (as measured by the firm market capitalization ratio), and the operating cash flow volatility. The study period was 12 years from 2011 to 2022. Out of the population of 66 companies, 45 had requisite data for analysis. Since 3-point rolling standard deviation was used, the actual number of years were 2012 to 2021 giving 450-firm year observations for the study.

A panel data regression model was used to draw inference from the secondary data collected. Black (2022) as well as Gujarati (2022) suggest that when a phenomenon has both time series and cross-sectional variations, then it is better to use panel data analytical models. The independent variable for this model was the operating cash flows' volatility while the dependent variable is company market capitalization ratio ($CR_{i,t}$). The primary model used in the study is specified as:

$$CR_{i,t} = \beta_0 + \beta_1 \delta OCFR_{i,t} + e_{i,t} \quad ---------- (1)$$

The three-year moving standard deviation (δ) was used in stablishing the volatility of the operating cash flow ratio (OCFR) which is ratio of operating cash flows to total cash flows) as follows:

$$\delta OCFR_{i,t} = \sqrt{\frac{1}{n}\sum_{t=1}^{3}(OCFR_i - EOCFR)^2} \quad ----------(2)$$

EOCFR is the expected (average) operating cash flow ratio. Market value was based on the firm market capitalization ratio ($CR_{i,t}$) which was measured as follows:

$$CR_{i,t} = \frac{Firm\ Market\ Capitalization\ at\ time\ t}{Total\ Market\ Capitalization\ at\ time\ t} \quad ------- (3)$$

Accordingly, the panel regression model is modified to appear as follows:

$$CR_{i,t} = \beta_0 + \beta_1 OCFRV_{i,t} + e_{i,t} \quad ---------- (4)$$

The hypothesis on the panel regression relationship between operating cash flow volatility and market value of listed firms at NSE was undertaken at 95% confidence interval using the t-test and p-value at 0.05 level of significance. This was after appropriate model diagnostic tests. These included the normality test based on the Shapiro-Wilk test; the heteroscedasticity test based on the Breuch-Pagan Lagrange Multiplier (LM); the autocorrelation test based on the Durbin Watson d-test as well as the Hausman model specification test to check which of the fixed effects and random effects panel regression models was appropriate for analysis.

## RESEARCH FINDINGS AND DISCUSSION

The findings are at three levels: Descriptive findings, model diagnostic tests and inferential findings. At the descriptive level, it was found necessary to identify the unique characteristics of each of the sectors listed at the NSE in terms of cash flows, cash flow volatility, market values and financial performance as indicated by return on assets. The descriptive findings for each of the variables is identified in the tables that follow. The first to be presented is the descriptive statistics with respect to market value of each of the eleven sectors (Agriculture; Automobile; Banking; Commercial and Services; Construction; Energy; Insurance; Investment; Investment Services; Manufacturing and

Telecommunications). Market value was measured as the firm market capitalization ratio taken as the ratio of the firm market capitalization to the total market capitalization of the NSE. The measures on central tendency, dispersion, distribution and relative attributes are shown in table 1

***Table 1: Segmental Market Capitalization Ratio Segmental Descriptive Statistics***

| *Statistic* | *AGR* | *AUT* | *BANK* | *COMM* | *CONS* | *ENGY* | *INS* | *INV* | *INVS* | *MAN* | *TEL* |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Mean | 0.181 | 0.104 | 0.294 | 0.113 | 0.175 | 0.279 | 0.100 | 0.122 | 0.106 | 0.130 | 0.173 |
| Median | 0.193 | 0.044 | 0.214 | 0.086 | 0.039 | 0.099 | 0.062 | 0.038 | 0.192 | 0.051 | 0.048 |
| Std Dev | 2.338 | 0.129 | 0.428 | 0.451 | 0.241 | 0.392 | 0.327 | 0.200 | 0.634 | 0.191 | 0.286 |
| Variance | 5.466 | 0.017 | 0.183 | 0.204 | 0.058 | 0.154 | 0.107 | 0.040 | 0.402 | 0.036 | 0.082 |
| CV | 12.942 | 1.238 | 1.452 | 3.988 | 1.377 | 1.408 | 3.263 | 1.649 | 5.974 | 1.465 | 1.656 |
| Kurtosis | 3.819 | 3.375 | 3.411 | 3.684 | 0.423 | -1.342 | 3.031 | 3.806 | 3.624 | 3.023 | 1.632 |
| Skewness | 0.295 | 0.005 | 0.391 | -0.428 | 0.162 | 0.475 | -0.418 | 0.411 | -0.830 | 0.827 | 0.974 |
| Range | 20.380 | 0.441 | 2.962 | 4.240 | 1.142 | 1.144 | 1.901 | 1.004 | 2.458 | 0.918 | 1.494 |
| Sigf | 0.549 | 0.082 | 0.145 | 0.098 | 0.057 | 0.249 | 0.095 | 0.038 | 0.403 | 0.049 | 0.097 |

With respect to dispersion, variance and standard deviation are used. The investment segment has the highest volatility with a standard deviation of 0.6340 for the capitalization ratio. The least volatility is observed in the Automobile sector. As far as central tendency is concerned, the mean and median are used.

The largest sector is the banking sector with a mean of 0.29944 while the agricultural sector has the least average capitalization ratio. This is in line with the fact that the banking sector has the most companies in the listed category being nine banks and are the best performing as confirmed by Mudanya and Muturi (2018). Kurtosis and skewness are used to indicate the distribution aspects of the data. For all the sectors, the measures of kurtosis and skewness fall in the normal distribution range as recommended by Black (2023) who states that normal kurtosis values lie between approximately -3 and +3 while the skewness one fall within a range of -1 and +1. Lastly, coefficient of variation was used as a composite measure of both central tendency and dispersion. The agricultural segment posts the highest relative volatility as indicated by CV. This is possibly because of its small size. Table 2 provides the overall descriptive statistics for the entire NSE over the study period.

***Table 2: Overall NSE Market Capitalization Ratio Descriptive Statistics***

| Firm Market Capitalization Ratio | |
|---|---|
| Mean | 0.13361 |
| Median | 0.07599 |
| Standard Deviation | 0.92778 |
| Sample Variance | 0.86077 |
| Kurtosis | 3.52571 |
| Skewness | -1.726131 |
| Range | 24.60403 |
| Confidence Level (95.0%) | 0.07843 |

With respect to operating cash flow volatility findings are provided for each of the segments of the NSE and then for the overall values of the entire market over the 450 qualifying firm year observations. The segmental descriptive statistics for operating cash flow volatility are shown in table 3 while the overall statistics for the entire market are revealed in table 4. The findings from table 3 reveal that the highest mean volatilities of operating cash flows as represented by the standard deviation of the operating cash flow ratio is the construction industry which reports a mean of 0.2844 followed by the Investments Sector with a mean of 0.1480. The least volatile are the Automobiles and Manufacturing segments as indicated in figure 3.

***Table 3: Segmental Operating Cash Flow Ratio Volatility Descriptive Statistics***

| *OCFRV* | *AGR* | AUT | BANK | COMM | CONS | ENGY | *INSU* | *INVE* | *INVS* | *MANU* | *TEL* |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Mean | 0.144 | 0.072 | 0.110 | 0.077 | 0.284 | 0.090 | 0.092 | 0.162 | 0.148 | 0.076 | 0.147 |
| Median | 0.111 | 0.064 | 0.081 | 0.056 | 0.268 | 0.070 | 0.087 | 0.159 | 0.151 | 0.067 | 0.130 |
| Std Dev | 0.122 | 0.048 | 0.103 | 0.076 | 0.555 | 0.074 | 0.095 | 0.234 | 0.088 | 0.079 | 0.201 |
| Sample Var | 0.015 | 0.002 | 0.011 | 0.006 | 0.308 | 0.005 | 0.009 | 0.055 | 0.008 | 0.006 | 0.041 |
| CV | 0.852 | 0.665 | 0.936 | 0.975 | 1.952 | 0.819 | 1.029 | 1.444 | 0.592 | 1.030 | 1.366 |
| Kurtosis | 0.903 | -0.890 | 0.664 | 1.097 | 3.218 | -1.208 | 1.673 | 2.039 | -1.983 | 3.907 | -0.613 |
| Skewness | 1.200 | 0.082 | 1.241 | 2.671 | 2.786 | 0.530 | 1.548 | 1.827 | -0.073 | 1.669 | 1.166 |
| Range | 0.470 | 0.143 | 0.414 | 0.476 | 2.423 | 0.229 | 0.365 | 0.751 | 0.217 | 0.395 | 0.491 |
| Sigf | 0.035 | 0.034 | 0.022 | 0.018 | 0.158 | 0.027 | 0.030 | 0.087 | 0.063 | 0.020 | 0.144 |

The other measure of central tendency is the median and table 4 indicates that the mean and median values of OCFRV are close to each other for all the segments of the NSE an indicator of normal distribution over the 450 firm year and 110 segment-year observations. This can be confirmed from checking the Kurtosis and Skewness values all of which range in the -3 to +3 and -1 to +1 respectively, confirmation the approximate Gaussian distribution of OCFRV around the respective segmental means over the reported standard deviations. As far as the measures of dispersion are conserved, variance as converted to standard deviation was used.

For common size evaluation, a relative measure called coefficient of variation that related the standard deviation to the mean was used. The results in table 3 show that the most volatile OCFRV is reported in the construction sector while the least is exhibited in the Investment Services segment. This may be attributed to the idiosyncratic industry factors in the respective segments of the NSE.

***Table 4: Overall OCFRV Descriptive Statistics***

| *OCFRV* | |
|---|---|
| Mean | 0.124875 |
| Median | 0.064467 |
| Standard Deviation | 0.220596 |
| Sample Variance | 0.048663 |
| CV | 1.766535 |
| Kurtosis | 3.297580 |
| Skewness | 2.459029 |
| Range | 2.425840 |
| Confidence Level(95.0%) | 0.020437 |

With respect to correlation analysis, the findings are provided in Table 5. The values in Table 5 are statistically significant at 95% confidence interval.

***Table 5: Correlational Analytical Statistical Findings***

| *Variable* | *CR* | *OCFRV* |
|---|---|---|
| **CR** | 1 | |
| **OCFRV** | -0.427837 | 1 |

The findings from table 5 reveal that the correlation between CR and OCFRV is -0.427837. These indicates that there is a moderate negative correlation between the market value of a firm at NSE and the level of volatility in its cash flows from operating activities. The implication is that when the volatility of the operating cash flows is relatively high, the market value of the affected firm will correspondingly be relatively and vice versa. The negative correlation finding is in agreement with the findings of Huang (2009) who relying on standard deviations as has been done in this study showed that cash flow volatility is negatively associated with returns on a cross-sectional basis. The study related this phenomenon to other well established market effects like the size effect, the momentum effect and the value effect and showed that the effect could last for as long as five years. Though comparable, the difference with this study is that it divided the data into volatility deciles and made the comparisons. It also used a different set of measurements for cash flows being the cash flow to sales ratio and the cash flow to book equity.

With respect to the test of hypothesis in the study, the effect of operating cash flow ratio volatility (OCFRV) as measured by a 3-year moving standard deviation was tested using panel regression for the 45 qualifying firms over the 10 qualifying financial periods that provided 450 firm-year observations. Before undertaking the panel regression analysis, model diagnostic tests were conducted. The diagnostic test results are provided in Table 6.

***Table 6: Panel Diagnostics of Capitalization Ratio on OCFRV***

| **Diagnostic Assumption** | **Test** | **Statistic** | **Significance** |
|---|---|---|---|
| CR Normality | Shapiro-Wilk SM Test | 0.912710 | 0.131210 |
| OCFRV Normality | Shapiro-Wilk SM Test | 1.907810 | 0.220814 |
| Model Specification | Hausman Chi Square Test | 0.999853 | 0.000000 |
| Coefficient of Determination | R-Square | 0.183044 | ** |
| Model Stability | F-Ratio | 2.452701 | 0.000020 |
| Heteroscedasticity | Breuch-Pagan | 0.354961 | 0.551318 |
| Autocorrelation | Durbin-Watson | 2.18267 | ≃2 |
| Observations | 450 | - | - |

The first diagnostic test was establishing if the data reflected normal distribution. Shapiro-Wilk test was used in this case. Gujarati (2022) suggests that the Shapiro-Wilk p-value should be compared

with the level of significance, in this study 0.05, and the null hypothesis of non-normality be discarded if the out value probability is greater than this critical value. The Shapiro-Wilk SW value for CR is 0.9127 while the corresponding p-value is 0.1312. Following Gujarati (2022), the indication is that size data over the study period for the 450 firm year observations is normally distributed since the p-value of 0.13 is greater than the significance value of 0.05 at the 95% confidence interval.

The Shapiro-Wilk SW value for OCFRV from table 6 is 1.9078 while the corresponding p-value is 0.2208. The null hypotheses that the operating cash flow ratio volatility data is not normally distributed is therefore rejected since the output p-value is greater than the significant P-value of 0.05. This is in line with the suggestion by Gujarati (2022) when dealing with such data.

The second diagnostic test involved checking if the data should be analyzed using the fixed effects or the random effects panel regression analysis. This is in line with Gujarati (2022). The assumption made was that the random effects model is most suitable for the panel regression. The Hausman tests provided a chi square value of 0.999853 with a P-value of 0.000000. Since the P-value is less than the significance value of 0.05 at 95% confidence interval, the null hypothesizing as to the suitability of the random effects model was rejected and thereby the fixed effects model was utilized in the analysis with findings provided in table 7.

The stability of the fixed effects model was then tested in line with the suggestion of Black (2023) and this was based on the F-ratio and its related p-value. The analysis can only go on if the model is stable over the 12-year period over which the study is conducted. The findings in table 6 reveal an F-value of 2.452701. The corresponding p-value was determined to be 0.000020. This value is less than the critical value of 0.05 hence the model was found to be stable and suitable for the analysis.

The Table 6 also provides for the test of heteroscedasticity. According to Gujarati (2022), regression analysis only provides reliable data if the error term is homoscedastic. This is the case when the variance in the error term is approximately constant. The rule of the thumb when the Breuch-Pagan Lagrange Multiplier (LM) is used is that the data error term is homoscedastic is the LM has a P-value that is greater than the level of critical significance level, which in this case is 0.05 at the 95% confidence interval. The LM value for the panel model of CR on OCFRV provides an LM value 0.355. The null hypothesis that the data is not homoscedastic is rejected given that the P-value of 0.5513 is greater than 0.05.

Autocorrelation was also tested. This was based on the Durbin-Watson d-statistic. The findings in table 6 for this value is 2.183044. Gujarati (2022) suggests that the data is unlikely to have serious problems of serial correlation of the d-value is close to 2. In the output above, 2.18 is not significantly different from 2 and therefore the logical conclusion is that the data does not have serious problems of autocorrelation and that the fixed effects regression model found suitable for analysis can be applied in this regression.

From the table 6, coefficient of determination is also provided as measured by the R-Square value. This is an indicator of the explanatory power of the independent variable (OCFRV) with respect to the changes in the dependent variable (CR). The R-Square value is 0.183044. This indicates that OCFRV explains 18.3% of the market values of the companies listed at the NSE.

Having done the diagnostic tests, the panel bivariate regression of CR on OCRFV was conducted and the findings are reported in Tale 7.

***Table 4.30: Bivariate Panel Regression Output of Firm Market Value o OCFRV***

Fixed-*effects Included 45 cross-sectional units Time-series length = 10 (450 Observations)*
*Dependent variable: CR*

| | *Coefficient* | *Std. Error* | *t-ratio* | *p-value* |
|---|---|---|---|---|
| Const | 0.0701276 | 0.0453043 | 1.548 | 0.12235 |
| OCFRV | -0.1084551 | 0.0109148 | -9.937 | <0.00001 *** |

The findings from table 7 reveal that at the bivariate level, OCFRV has a negative effect on CR. This is because the output regression reveals that the OCFRV regression coefficient is -0.10846 with a corresponding t value of -9.937. Since the output t falls in the rejection region of the t-distribution because it is higher in absolute terms than the critical t value of -1.965261 for 449 degrees of freedom and 95% confidence interval. The null hypothesis that operating cash flow volatility has no effect of firm market valuation is rejected with the finding that it instead has a negative effect and that the higher the volatility of cash flows from operating activities, the lower the share market prices and therefore the lower the value of that company listed at the NSE.

This indicates that OCFRV is a priced risk factor and in line with the classical risk-return trade off, it is expected that the higher the risk, the higher the discounting rate and thereby the lower the value and vice versa. The findings can be compared with the P-value and in this case for table 4.28, the P-value is 0.00001 is less than the critical value of 0.05. The finding is in agreement with the Miller and Modigliani value relevance theory where cash flow patterns have an effect on firm valuation. It however is in contradiction with the functional fixation theory of Sloan (1996) which emphasizes on the fact that financial analysists focus on profitability data and ignore further analysis into trends like cash flow volatility. This then would mean OCFRV is not expected to affect firm value.

Besides the comparison with existing theories, the negative effect of OCFRV on CR was also compared with studies from other findings of a similar nature. When compared with Huang (2009) the findings are of a similar nature and in agreement with this study given that Huang (2009) revealed that cash flow volatility has a negative effect on returns. Thought comparable, the difference with this study is that capitalization ratio is used in this research while Huang (2009) used market returns of stock market listed firms.

The finding of a negative effect of cash flows on value was also reported by Altuntas et al. (2017) who had evaluated the effect of cash flow volatility among publicly traded life assurance companies. These were global life insurers in the SNL database over the period 2002 to 2012. Whereas the study is instrumental, it considers multiple regulatory environments as opposed to the current study that is based solely on listed companies in at the NSE in Kenya.

## Conclusion

In this section are provided the conclusion arrived at from the study findings. Firstly, with respect to volatilities in operating cash flows, it is concluded that there are varying levels of volatilities in cash flows for the various segments of the Nairobi Securities Exchange. The highest volatility is reported in the construction segment while the lowest is reported in the Automobiles segment of the NSE. Lastly, it is concluded that the bivariate evaluation of the effect of operating cash flow volatility on firm market value is negative and that operating cash flow volatility is an information risk priced factor at NSE that negatively predicts firm value. It is therefore concluded that OCFRV, has a negative pricing effect on shares of firms listed at the NSE as is consistent with the efficient market hypothesis of Fama (1970) and value relevance theory of Miller and Modigliani (1961). This reveals that the higher the volatility of the cash flows from operating activities, the lower the share prices and thereby the lower the firm market values.

Recommendations in this study arise from the findings established from the research. Firstly, the study found out that the volatility in cash flows from operating had a negative pricing influence for the companies listed at the Nairobi Securities Exchange. It is therefore recommended that the annual report should include cash flow ratios in the additional information reported in the notes to the financial statements. The study also found out that cash flow volatility is a market risk pricing factor that influenced share prices and thereby market valuations of companies listed at the Nairobi Securities Exchange. It is therefore recommended that market information at the end of the year should also be reported in financial statements.

To fill existing literature gaps, this study excluded non listed companies and this may limit the generalizability of the findings to such non-listed companies. It is therefore recommended that a similar study be carried out for companies that are non-listed and measure market valuation based on market value proxies. Finally, was also a conceptual limitation, in that whereas there are numerous factors that may moderate the relationship between market value of firms and the volatilities in their cash flows this study focused solely the direct relationship. It is therefore suggested that a similar study be carried out including a moderating variable such as firm size, firm age or corporate governance.

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