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An Empirical Analysis of the Correlation Between Derivatives Usage and Firm Specific Factors in Zimbabwe

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Abstract
The research examined 45 firms' derivative usage in relation to their financial gearing, size, liquidity, profitability, and solvency ratio. A logit regression model was run from the year 2019 to the year 2021. The logit model revealed at 99% level of confidence that, a firm's derivative usage is significantly and positively related to its liquidity ratio as measured by cash and cash equivalents to total assets ratio. The study also revealed that usage of share options by firms listed on the Zimbabwe Stock Exchange had no significant relationship with financial gearing, firm size, profitability, and solvency ratio at 1% level of significance. Hence the study encourages firms to significantly improve on their liquidity positions prior to the issuance of employees' stock options, in-order to provide robust safety nets for vesting.
Keywords: Derivative usage, liquidity ratio, logit regression model, share options
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1.Introduction

The study examined whether there is a relationship between derivatives usage and firm specific financial indicators in Zimbabwe. Derivative is regarded as a financial instrument whose value is derived from the value of the underlying asset. The underlying asset can be equity shares or index, commodities, precious metals, currencies, interest rates etc.[FINSEC, 2022].

The study focused on the examination of 45 equity listed companies on the Zimbabwe Stock Exchange. Zimbabwe currently boast of a newly founded derivative trading platform established by Financial Securities Exchange (FINSEC) (Private) Limited in the year 2022.The derivative exchange offers stock options, index futures and stock futures to individuals and institutional investors. FINSEC derivatives market facilitates the writing, listing, trading and settlement of standardised futures and options contracts. FINSEC's derivative market is fully automated using Derivatives Market Technology (DMT) to ensure security, convenience, and efficiency (FINSEC, 2022].

Prior to the creation of the FINSEC's derivative trading platform the most common type of derivative instrument used by listed companies in Zimbabwe was the employee share option. The next section that follows explains the key fundamentals of FINSEC's stock options, FINSEC's index futures, FINSEC's stock futures and employee share options that are currently used by listed entities in Zimbabwe.

1.1 FINSEC's Stock options

Stock options gives the buyer the right and not the obligation to buy (call) or sell (put) an underlying stock on a certain date and at a specific price. FINSEC offers European style options meaning that they can only be exercised at maturity. The stock options traded at FINSEC derivatives market are cash settled. The underlying financial instruments for the stock options are Delta Corporation, Innscor Limited, Simbisa brands, Econet wireless and Ecocash Holdings. The method used for the valuation of the stock options at FINSEC is based on the Volume Weighted Average Price (VWAP) of underlying instruments of liquid contracts and theoretical price (spot plus cost of carry) for illiquid contracts. The contract size for the stock options is 100 shares per contract. Market fees are charged based on notional contract value. The market fees include the following types of charges Sec levy (0.05%), IPF levy (0.025%), Platform levy (0.14%), Guarantee fund levy (0.025%), Brokerage fees (0.14%) and VAT of 15% on Brokerage fees [FINSEC, 2022]. The contract months are quarterly that include March, June, September and December. The expiry date of the stock futures is the last Thursday of the expiry month at 12 o'clock Central African Time.

1.2 FINSEC's Index Futures

Index futures index contract allow an investor to buy or sell a contract that is derived from a financial index to be settled at a future date. FINSEC provides clearing house facilities for margin management. The underlying instrument for index futures are the M & C Technology, Media and Telecoms Index, M & C consumer index, M & C Industrial Index and M & C all share index.

1.3 FINSEC's Stock Futures

Stock futures are standardized legal contracts to buy or sell an underlying stock at a predetermined price for delivery at a specified time in the future. FINSEC provides clearing facilities for margin management. The contract size, underlying financial instruments, expiry date, method used for valuation and market fees are on the same basis as those mentioned for stock options in the preceding sections [FINSEC, 2022].

1.4 Employee Stock Options

According to the Corporate Finance Institute (CFI) employee stock options (ESO) is a form of financial equity compensation offered to employees and executives by their organization. The stock options come in the form of regular call options and allows the employee or executive to purchase their organisation's stocks at a specified price and time [CFI, 2022]. It further asserted that they are two forms of employee stock options notably Incentive Stock Option (ISOs) and Non-Qualified Stock Option (NSOs). Incentive Stock Options sometimes are referred to as qualified or statutory options are regarded as stock options offered to important employees or upper level of management. Non-qualified stock options are also stock options offered to all levels of employment [CFI, 2022].

The most benefits of ESO are that they make compensation packages more attractive, cost effective, increases employee retention, gives employees ownership of the company, increases employee motivation as they may be linked to firm's stock performance and provide tax advantages [CFI, 2022].

The major disadvantages of the employee stock options are that they can lead to complicated tax implications for the employees and are considered as derivatives and can be difficult to value [CFI, 2022].

Research Objectives

1. To explore the firm specific factors influencing the usage of derivatives in Zimbabwe.
2. To determine the benefits of derivatives markets to institutional investors of Zimbabwe.

Research Questions

1. What are the firm specific factors influencing the usage of derivatives in Zimbabwe?
2. What are the benefits of derivatives markets to institutional investors in Zimbabwe?

Hypothesis of the study

H0: There is no association between derivative markets and firm specific factors in Zimbabwe.
H1: There is association between derivative markets and firm specific factors in Zimbabwe.

2. Literature Review

Yuhasril, Wahyono and Sumiyarsih (2020) showed that firm size has a significant effect on decision. Liquidity, growth opportunity and leverage has no significant effect on hedging activities. The study was based on logistic regression analysis based on a sample of 40 companies listed on the Indonesian Stock Exchange from 2015 to 2018.

Mizerka and Stróżyńska-Szajek (2018) acclaimed that company size, debt usage and risk of default have a significant positive effect on derivatives usage. In addition, there was no permanent statistical relationship between derivative usage and liquidity ratios. The study was based on 308 non-financial firms listed on the Warsaw Stock Exchange of Poland for the period 2008 to 2011. The option to develop had a negative significant relationship with the usage of derivatives. the study was subject to logistic regression.

In a further study on derivative usage by Austrian industrial firms, based on panel data logistic regression analysis, it was indicated that the use of derivatives in Australia was influenced by a firm's gearing ratio and negatively by its propensity to growth (Tanha, Dempsey and Labeb, 2018).

Sriwati (2021) stated that the cost of debt and corporate governance significantly affect the company's decision to use derivatives. It was also indicated that Return on Assets (ROA) significantly affect a company's decision to use derivatives and whilst firm size had no significant effect on the company's decision to use derivatives. More so it was discovered that risk management and foreign sales did not affect significantly the company's decision to use derivatives (ibid). Their research was conducted in Indonesia based on logistic regression through the application of Statistical Product and Service Solution software (SPSS).

According to a study by Akay, Küçüksaraç and Yilmaz (2019) whose aim was to identify the common characteristics of non-financial firms that uses foreign currency derivatives. In the probit model study conducted on Turkish non- financial firms, it was discovered that firms with higher leverage ratios and of larger sizes used many foreign currency derivatives whilst those with higher tangible assets and significant ample liquidity buffers

tends to use fewer foreign currency derivatives. In addition, the determinants of derivative usage were explored using a fixed effects panel data logistic regression and it was uncovered that degree of internationalization, firm size and tangibility ratio were found to be the significant determinants of derivative usage for the Turkish non-financial firms.

In yet another study by Song and Hee (2017) based on panel data logistic regression analysis conducted in Korea, concerning factors affecting derivative use for life insurance companies, it was discovered that asset size, foreign assets and liabilities, deposit insurance, liquidity and risk backed capital (RBC) affect derivative usage by life insurance companies. The study was based on multivariate analysis.

In a separate study by Tahir, Arif and Khan (2018) based on probit regression analysis it was unveiled that user banks with risky assets and portfolios having non-performing loans were observed to be more oriented towards using derivatives in order to achieve higher returns. In addition, it was observed that large capitalized banks were more likely to use derivatives instruments as a result of regulatory pressures to meet the restrictive regulatory prescriptions required to comply with Basel 3 and as an effective substitute to manage portfolio risk. It was also revealed that banks are more likely to use derivatives when financial distress costs increase.

According to another study that used logit regression to empirically test the hypotheses of the study, to examine which firm specific factor determine the decision by the Pakistan financial sector to use derivatives. It was uncovered that, organizations used derivatives when they were short of funds, had high growth, had high levels of gearing and if they wanted to operate internationally (Kouser, Muhammad, Bano and Aamir, 2016).

Bhagawan and Lukose (2016) discovered that firm's decision to hedge was positively related to its size, leverage and foreign exposure. It was also noted that firm's decision to hedge was negatively related to investment opportunities and liquidity. Firms with higher derivatives usage were those with high financial distress costs and higher currency risks. The empirical study was performed based on the collection of data on foreign currency derivatives on firms' annual reports and Tobit regression was used followed by conditional regression since firms decide on whether to hedge and followed by how much to hedge. The study was based on Indian non-financial firms. The study used Haushalter's (2000) approach to investigate the determinants of a firm's decision on currency hedging.

Özek (2016) examined the factors related to the use of derivatives by non-financial firms in Turkey. The study was based on a sample of 115 firms listed on the local bourse between 2009 and 2014. The study uncovered that 35% of the firms in the sample used derivatives. The study was based on univariate and logistic regression analysis and results obtained were that the use of derivatives is positively associated with leverage and firm size. Further net profit margin and earnings volatility were found to be negatively associated with derivatives usage. Lastly the study stressed that it does not provide sufficient evidence linking the use of derivative instruments to firm value.

Salah et al., (2019) concluded that firm value was inconclusive evidence of determining derivative usage among firms quoted on the Nairobi Securities Exchange. However, the study noted that the desire to increase sales was a determinant of derivative use among the companies listed on the Nairobi Securities Exchange. The study was conducted based on logistic regression on the variables that were obtained on past literature.

Khumawala, Ranasinghe and Yan (2016) revealed that the propensity to use derivatives and as well as the extent of usage of derivatives is higher for municipality that are larger and financially constrained. Growth was not found to be related to municipality derivative usage. Managerial opportunism was unveiled as an insignificant factor in municipal derivative usage, contrary to suggestions that were made in the popular press. Further it was discovered that less sophisticated managers of small municipality and managers of large municipalities are more likely to use derivatives. the study was based on 300 observations of large cities and counties. The study was results were analyzed based on the Probit regression and ordinary Least Squares.

Noor et al., (2013) concluded that leverage, debt to equity, capital expenditure and number of shareholding has a positive significant relationship with derivative usage whilst dividend payout, current ratio, quick ratio, return on asset ratio and return on equity has a negative and insignificant relationship with derivative usage. The study was analyzed using Regression analysis based on a sample of 826 Malaysia non-financial firms over the period 2010 and 2011.

Velasco (2014) alluded that employee stock options and firm size were significant incentives for firms to use corporate hedging. It is further argued that only large and financially sophisticated firms, such as those that develop stock options plans are more likely to use derivatives for hedging. The results from the logistic regression revealed that the following variables significantly influenced the decision of firms to use derivatives for risk management purposes, namely firm size, growth opportunities, liquidity and presence of employees' stock option plans. Employee stock options and firm size were positively related to derivative usage whilst growth options and liquidity had a negative influence on derivative usage as manifested by the results of the logistic regression analysis. Lastly leverage and tax incentives had no significant influence on derivative usage on companies listed on the Philippine Stock Exchange. The research was based on data from annual reports of 74 corporations covering the period from 2007 to 2011.

Chaudhry, Mehmood and Mehmood (2014) suggested that there is a strong relationship between derivative usage and firm's foreign purchase, liquidity, growth options and size in Pakistan. The study was based on 75 non-financial Pakistan firms listed on the Karachi Stock Exchange covering the period from 2007 to 2011. The study divided the data into two groups of users and non-users and Mann-Whitney U test was used to determine the difference prevailing in the two data sets. The results from the Mann-Whitney U test suggested that firms with higher foreign purchase volume and growth opportunities are active users of derivatives. The results from Spearman correlation also revealed that derivative usage has a positive significant relationship with growth options and the study did not find any correlation between derivatives and market to book value of equity, market value of the firm and dividend per share. The study also used regression analysis and the regression results confirmed the previous findings that derivatives usage is positively associated with firms' growth options, liquidity, foreign purchase and size.

Lantara et al., (2013) provided evidence that the decision to use derivatives by Japanese insurance companies is positively related to leverage, firm size, proportion of assets invested in stocks and bonds and organizational form. It was also refuted that the decision to use derivatives was negatively correlated with reinsurance dependency. It was also found that the decision by Japanese insurance companies to expand globally increases the probability for the need for derivatives contracts. The study was based on the Probit and Logit regression models for the period 2001 to 2011.

Ahmad and Haris (2012) revealed that current ratios and market to book ratio are the main factors influencing companies to use derivatives by Malaysian non-financial companies. The study was based on binary logistic regression analysis. The findings of the study were in tandem with the underinvestment cost hypotheses and were not in support of the financial distress and agency costs hypotheses. Firm size and leverage appeared not to be the driving forces behind the probability of firms using derivatives in Malaysia non-financial companies.

On another study on determinants of corporate hedging decision conducted by Sprcic and Sevic (2012) on Croatian and Slovenian companies, it was argued that firms have to pay high transaction costs when using derivatives, so only large firms can afford and hedge their risk cost effectively than small firms'.

According to Charumathi and Kota (2012)'s study on the determinants of derivative usage by large Indian non-financial firms it was revealed that size is the major determinant of derivative usage by large Indian non-financial companies. The study used cross sectional panel data for three years from 2007 to 2009 and applied the multi regression model. Firm specific characteristics such as economies of scale, financial distress costs, agency variables, underinvestment costs and multi-nationality were regressed against the notional amount of derivatives that were reported from hedging activities.

Bartram, Brown and Conrad (2011) on the study on effects of derivatives on firm risk and value proclaimed that there is strong evidence that, the use of financial derivatives reduces both total risk and systematic risk. The study uncovered that the use of derivatives use on firm value is positive. Further use of derivatives by firms in the study were associated with significantly higher value, abnormal returns and higher profits during the economic downturn of 2001 to 2002 suggesting that firms were using derivatives to hedge downside risk.

Hardwick and Adams (1998) indicated that the propensity to use derivative instruments is positively related to leverage, firm size and international links and negatively related to the extent of reinsurance. Further it was found that mutual life insurance had a greater propensity to use derivatives than proprietary firms. The negation association with reinsurance and the positive correlation with leverage supported the hypotheses that UK life insurance use derivatives to hedge risk rather than for speculation means of generating income. The study was analyzed using the logistic regression model and a Heckman two stage sample selection regression model based on a sample of a sample of 88 UK life insurers in 1995.

Judge (2006) claimed that the empirical tests in the study provided strong evidence of the link between foreign currency hedging and various proxies for the expected cost of financial distress. A firm's liquidity was also found to be a determinant of foreign currency hedging. The empirical analysis of the study reflected that a firm's foreign exposure was an important factor that would prompt firms to hedge. The study also indicated that larger firms are more likely to hedge than smaller ones and this was evidenced by a regressed positive correlation between firm size and foreign currency hedging decision. The study analyzed using logistic regression analysis on a sample of 366 large UK non-financial firms.

In yet another study El-Masry (2003) proclaimed that larger firms are more likely to use derivatives than medium and smaller firms. In addition, it was noted that public firms are more likely to use derivatives than private firms. It was further revealed that the greatest users of derivatives are international firms as compared to local firms(ibid). El-Masry (2003) conducted the study using questionnaire survey on derivatives usage by UK non-financial firms. The study was based on 401 UK non-financial companies.

Afza and Alam (2011) stressed that the use of derivatives to reduce risk in perfect market conditions becomes useless. Their view was based on the theory of Modigliani and Miller. Afza et al., (2011) conducted the study to identify the factors affecting firm decisions to use foreign exchange derivative instruments by using data

for 86 non-financial firms quoted on the Karachi Stock Exchange. Non users and users of derivatives were examined using non parametric tests. Further the logit model was used to analyze the impact of a firm's underinvestment problem, tax convexity, managerial ownership, foreign exchange exposure and financial distress costs on a firm's decision to use foreign exchange derivatives instruments to hedge risk. It was affirmed that firms with higher foreign sales and financial distressed large sized firms with managerial holdings and financial constraints were more likely to use foreign exchange derivatives instruments.

On the study on Firm Value and Derivatives Use: Evidence from Nairobi Securities Exchange. It was revealed that derivative users were, large companies with high asset value and turnover. Logistic regression analysis was used because normal Ordinal Least Square (OLS) could not apply (Salah et al., 2015).

Deng, Elyasiani and Mao (2016) in support of the risk allocation hypotheses in Bank Holding Companies alluded that banks reduce their exposure to interest rates and exchange rate risk through the deployment of derivatives hedging resulting in simultaneous extension of loans and assumption of greater credit risk in lending in order to earn increased economic rents. It was further noted that during the financial crisis of 2007 through to 2009 this dynamic relationship broke down resulting in negative relationship between derivatives hedging and cost of debt (ibid).

Al-Slehat , Al-Sharifl & Qwader (2018) proclaimed that accounting, legal factors, financial and administrative factors have an impact on the use of financial derivatives. The study used the analytical descriptive approach. A questionnaire was designed and distributed to directors and head of sections of 12 commercial banks.

Bowen, Kaburu and Mwambia (2017) claimed that the growth of derivatives in Kenya was influenced by changes in innovation, risk management, regional market integration and regulatory frameworks. Financial innovation had the greatest influence on the growth of derivatives market in Kenya. The study was based on a sample of 39 employees from 12 firms on the Nairobi Security Exchange in Kenya. The results of the study was analyzed using a regression equation.

Zeng (2014) concluded that the firm's motives to use derivatives is to exploit the tax timing option. The purpose of the study was to examine the relationship of using derivatives financial instruments, tax aggressiveness and firm market value. The research designed an empirical study and developed an analytical model. The research was based on data derived from large Canadian public companies. The study proclaimed that firm's unrealized gains and realized gains from using derivatives are negatively correlated with the effective tax rate. Further it was postulated that the firm's realized gains and unrealized gains arising from using derivatives are positively correlated with its market value. It was declared that companies use derivatives to signal managerial quality, hedge risk, reduce costs of agency and financial difficulties, and to reduce tax debt(ibid).

According to the results of a questionnaire survey comprising of 2000 non-financial companies of varying sizes performed in the United States, a questionnaire based survey revealed that, there was a strong positive correlation between usage of derivatives and firm size, with small firms less likely to use derivatives as compared to large firms. In the same study it was discovered that derivatives were used for hedging risk and not for speculative trading (Bodnar, Hayt, Marston and Smithson, 1995).

In the study conducted in South Africa, it was noted that the enhancement of derivative market development would be brought about by a good system of good corporate governance, transparency, clear accounting standards, easy tax codes and payment system for derivatives activities. It was further proclaimed that overreliance on bank credit as a source of credit could be reduced through the introduction of commodity derivatives and farmers could improve the management of their seasonal risk, albeit with proper regulations and supervision (Adelegan, 2009).

In the study on institutionalization of derivatives trading and growth-evidence from South Africa, it was stated that the establishment of a vibrant, well supervised and well-regulated derivative markets is crucial to avoid the risks of derivative aggravated disasters occurring and hence the need to anticipate the infrastructural requirements of these markets (Bekale, 2015).

3. Research Methodology and Design

The research used quantitative research method including some document review on benefits of derivative markets. The logit regression model was used for the research design. Specific firm information was obtained from the audited financial statements of 45 firms listed on the Zimbabwe Stock Exchange and this information was run through the following logit regression model. Table 1 below contains information relating to the proxies of the independent variables that were regressed in the model.

USE*it* = *α*i + β1 Financial gearing*it* + β2 Firm Size*it*+ β3 Liquidity ratio*it* + β4 Profitability ratio*it* + β5 Solvency ratio*it* + *υit* (1)

where, ***it*** is the subscript for the firm derivative usage i in year t of the firm's audited inflation adjusted annual report (2019- 2021).

USEit for firm i in year t takes the value of 1 if the firm used derivatives and is otherwise zero.
β1-Financial gearing as measured by Long-term debt to Equity (D/E) ratio.
β2- Firm Size as measured by the natural Logarithm of Total Assets.
β3- Liquidity as measured by Cash and Cash equivalents to Total assets.
β4- Profitability as measured by Profit Before Interest and Tax (PBIT) to Average Assets.
β5- Solvency ratio as measured by Total Liabilities to Total Assets.
vit is the error term.

Table 1: The following proxies were used for independent variables

Independent variables	Definition of the variables
Liquidity (Proxy)	Cash and cash equivalents to Total Assets-(Kouser et al., 2016)
Financial gearing (Proxy ratio-Debt ratio)	Ratio of long-term debt to net equity-(Bhagawan & Lukose (2016))
Foreign Business (Proxy ratio)	Ratio of Foreign Revenue to Total Sales-(Bhagawan & Lukose (2016))
Firm size-(Proxy)	Natural log of total assets-(Kouser et al., 2016)
Profitability-(Proxy-ROA)	Ratio of EBITDA/PBIT and Average Assets-(Bhagawan & Lukose (2016))
Financial Distress costs/Solvency ratio-(Proxy ratio)	Total debt to total assets-(Kouser et al., 2016)
Derivative usage	Derivative usage is 1 if company uses derivatives while 0 if company do not use derivatives-(Kouser et al., 2016)

4.Presentation and Discussions of Research Findings

This section comprises of section 4.1 that briefly explains the benefits of derivative market to investors and section 4.2 contains the conclusion and recommendations of the study.

4.1 The benefits of derivatives markets

FINSEC [2022] asserted that investors use derivative markets for the purpose of hedging, arbitrage and for speculation. IOSCO [1994] expounded capital market development and the development of the cash market as the most benefits derived from the derivative markets. Other benefits of derivative markets that were observed are for price discovery and the provision of business opportunities to domestic firms [IOSCO, 1994].
The outcome of the logit regression is summarised in table 2 and table 3 below:

Table 2: Descriptive Statistics for Derivative usage Indicators from 2019 to 2021 for the study.

Indicator	Mean	Median	Standard Deviation	Maximum	Minimum
Financial Gearing	22.08	17.95	32.69	-210	150
Firm Size	8.35	8.5	1.39	10.80	5.4
Liquidity	8.70	5.75	9.10	44.00	-2.36
Profitability	21.4	14.95	42.08	276	-176
Solvency	45.79	42.45	24.68	157	2.50

Source: Descriptive statistics from E-views 12.

Table 3: Relationship between Financial (Derivative) Markets and Market Factors using the Logit Model.

Variable / **Model**	Logit (2019-2021)	Logit (2019-2021)	Logit (2019-2021)
	Coefficient	**z-Statistic**	**Prob.**
Constant	1.480143	0.2357/1.248219	1.248219
Financial Gearing	0.002943	0.442667/0.006648	0.006648
Firm Size	-0.320289	-.232258/0.143482	0.143482
Liquidity ratio	0.079913	3.183309/0.025104	0.025104
Profitability	0.000252	0.055380/0.004545	0.004545
Solvency	-0.008533	-.936073/0.009116	0.009116

Source: Logit regression results
Tested @ 99% level of confidence.

Table 3 above shows the coefficients of the Logit Regression Model β1, β2, β3, β4 and β5 of equation (1) that were run through e Views student version 12. The dependant variable being Derivative usage and took a value of 1 if a firm used derivatives and otherwise zero if a firm did not use derivatives in any particular year.

The results of Table iii reflected that, derivative usage is significantly and positively associated with liquidity ratio at 99% level of confidence.

4.2 Conclusion and Recommendations

The study revealed that, in Zimbabwe firms with a high liquidity ratio have a high inclination towards the use of share options than those without. This partly concurs with the study of Velasco (2014), Song and Hee (2017) and Chaudhry et al., (2014). Financial indicators of financial gearing, firm size, profitability, and solvency were observed to have no significant association with the usage of share options at the 1% level of significance.

4.2.1Recommendation(s):

It is recommended that, insufficiently liquid firms in hyperinflation environments should focus on improving their liquidity prior to the issuance of employee share options, in-order to incentivize targeted employees to contract and be able to meet employee's liquidity requirement at the time when the share options vest. Policy makers are strongly advised to advertently rally behind the idea of establishing derivatives markets in the country and must speed up the institutionalization of derivative markets in-order to enhance capital market development and the deepening of the cash markets of Zimbabwe.

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