

An Empirical Examination of the Correlation between Derivatives Usage and Key Financial Indicators in Botswana

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Abstract

The study evaluated derivative usage of 21 firms listed on the Botswana Stock Exchange (BSE) in relation to five key financial indicators that included financial gearing, solvency, liquidity, profitability, and firm size. A logit regression model was run on the data covering 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 financial gearing as measured by non-current liabilities to total equity (D/E) ratio. The study also revealed that usage of derivatives by firms listed on the Botswana Stock Exchange (BSE) had no significant relationship with solvency ratio (as measured by total liabilities to total assets ratio), firm size (as measured by total assets) and liquidity ratio (as measured by cash and cash equivalents to total assets). However, the research observed a significant and negative association between derivative usage and profitability ratio (as measured by Profit Before Interest and Taxation (PBIT) to Average total assets ratio). It was further noted that listed firms in Botswana are only using employee options, collateral based swaps, interest rate swaps, and foreign exchange swaps to hedge risks. Hence the study recommends policy makers to institutionalize derivative markets that offer a variety of products that include futures derivative contracts which are currently not in use in the market. The establishment of derivative market in Botswana will reduce an over-reliance on financial borrowing from the banking sector and government agencies by local investors, domestic firms, and multinational firms in Botswana. The use of derivatives also reduces the weighted average cost of capital and hence increases firm's market value.

Keywords: Derivative usage, key financial indicators, logit regression model, futures contracts

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1. Introduction

The study evaluated whether there is a relationship between derivatives usage and key financial indicators of financial gearing, profitability, 'solvency, liquidity, and firm size in Botswana. According to Financial Securities Exchange (FINSEC, 2022) a derivative is regarded as a financial instrument whose value is derived from the value of the underlying asset and that the underlying asset can be equity shares or index, commodities, precious metals, currencies, interest rates etc. The next section looks at the forms of derivatives and the potential users of the derivatives.

1.1 Forms of Derivatives

The International Organization of Securities Commission (IOSCO, 1994) classified derivatives into two broad types of derivatives namely, option type contracts and forward type contracts and that the most other types of derivatives are created from the combination of options and the forward type contracts.

1.1.1 Forward & Futures Contracts

A futures contract was regarded as an agreement between two parties to buy or sell an asset at a certain time in the future and at a certain price (Hull, 2017). Futures contracts are traded on regulated exchanges and have standardized features. IOSCO (1994) asserted that futures contracts are highly standardized, and that profit and losses are settled daily known as "marked to market". Further a margin or variation margin or maintenance margin is required as collateral at the initiation or during the period of the contract.

IOSCO considered futures contract as essentially the same as forward contracts but with additional characteristics including standardized contracts contract sizes, standardized delivery and expiry dates and standardized minimum price fluctuations. Futures contracts are traded on organized regulated exchanges and unlike forward contracts, however parties to a futures contract do not intend to take delivery of the commodity or item, but can close out of the contract before its expiration.

IOSCO alluded that futures contracts are a form of forward contract where the exchange or clearing house act as a counterparty to both buyer and seller and in so doing payment under the futures contract would be guaranteed in case either party defaulted. Furthermore, once the futures contract is concluded the clearing house intercedes and become the buyer to the seller and the seller to the buyer and hence it would be unnecessary for the counterparties to verify the credit worthiness of their counterparties.

1.1.2 Swaps Contract

Mauritius Financial Service Commission (FSC) (2014) regarded a SWAP as a contractual agreement between two parties to exchange cash flows that are determined based on exchange rates, interest rates, prices of commodities and indexes. It is further reiterated that Swaps are traded on the OTC markets and are customized

to meet the requirements of the counterparties.

The FSC further outline the main salient features of Swaps as; a combination of a forward contract and possess all the properties of forward contract; swaps are long term whilst forward contracts are short term; there must a double coincidence of wants, that is two parties should meet with equal opposite and matching needs and two counterparties may meet each through the facilitation by a financial intermediary.

The Mauritius Financial Standard Council (FSC) proclaimed that they are different types of swaps but the most common ones were the interest or plain vanilla swap, commodity swap, currency swap and equity swap. A plain vanilla swap involves the exchange of fixed rate loan with floating rate loan and has the ability of transforming a fixed rate loan into a floating rate loan or vice versa.

The commodity swap involves an agreement between counterparties to exchange cash flows that are based on the commodity prices. An equity swap is a contract between parties to exchange cash flows that are based on rates of return of stocks, some stock market index or some basket of stocks.

A currency swap involves exchanging principal and interest rates in one currency for another equal loan in a different currency.

1.1.3 Options Contract

The IOSCO, (1994) proclaimed that, in exchange of a premium, an option contract gives the right but not the obligation, to buy or sell an underlying asset at a price within a specified period or on a specific date at the price stipulated in the options contract (strike price). IOSCO further reiterated that holders of options benefited from favorable movements in price of the underlying. Put options were regarded as giving the buyer the right to sell in contrast to call options giving the holder the right to buy. Lastly IOSCO claimed the existence of American options which are executed at any time up to the expiration date and European options that are only exercised at the expiration date.

IOSCO (1994) declared that options combinations can produce various trading combinations such as “collars”, straddles” and “butterflies” which result from the combination of put options and call options and providing users with customized risk return trade of. Futures exchanges tend to trade options as “options on futures” or “future options” where the deliverable instrument would be a futures contract. Options traded on stock exchanges are considered to be cash options where the physical stock or commodity or cash is delivered at expiration. Lastly options can also be combined with swaps resulting in “swaptions”, which are options on swaps, giving the holder the right and not the obligation to enter into a swap with a swap seller.

Berg & Pascal (2016) postulated the existence of linear and non-linear derivatives whereby linear derivatives vary in line with the underlying, for instance a tick change in the underlying will change the valuation of the derivative by the same magnitude of the tick change. Forward and futures contract were regarded as linear derivatives. Non-linear derivatives change with change in the underlying volatility, time to maturity and interest rates and options were regarded as falling under this class of derivatives.

Berg & Pascal (2016) further stressed that derivatives could be segmented in accordance with the type of underlying namely credit derivatives, equity derivatives, commodity derivatives, interest rate derivatives, foreign exchange derivatives and foreign exchange derivatives.

1.1.4 Credit Derivatives

Rangarajan (2012) affirmed that credit derivatives were derivatives written on the credit risk of the underlying reference entity and mentioned the credit default swaps (CDS) as the most popular form of credit derivatives. In the study CDS was claimed to be similar to insurance against default. One counterparty or “the buyer of protection” makes regular payments to other counterparty, the “seller of protection” and in exchange the seller of the protection agrees to compensate the buyer of protection for any loss that would occur if a default event occurred during the period of the CDS contract. It is refuted that 75% of credit derivatives are traded in the form of CDS and CDS indices.

1.2 Potential Users of Derivatives

IOSCO, (1994) proclaimed that they exist overlapping categories of derivatives users namely commercial users, professional users and speculators. The users of derivatives included trade houses, banks, brokerage companies, institutional investors, professional traders and arbitrageurs, retail customers and individual speculators, producers and consumers, processors and fabricators. IOSCO further asserted that these categories of users are not mutually exclusive as speculators may temporarily hedge certain positions, professional users might take hedging positions and commercial users often “overhedge” resulting in them speculating.

1.2.1 Professional Users

According to International Organization for Securities Exchange (IOSCO) Professional users add liquidity to the markets by executing and attracting orders to the market. Professional users improved the efficiency of the markets through competitive market making and cash or futures intra market arbitrage.

IOSCO further stressed that professional users include market making firms, brokerage firms and arbitrage operations. Participation in the derivatives is the primary activity of such institutions and this distinguishes them

from the commercial users. In addition, professional users avoid market risk as opposed to speculators. Professional users participate either as traders for profits from market making or arbitrage or they participate as intermediaries in order to earn a commission.

Professional traders are frequently exposed to basis risk, as well as basis risk and sometimes take speculative positions.

1.2.2 Commercial Users

IOSCO claimed that commercial users use derivatives to hedge their market exposures, allocate assets and execute their primary business strategies. This category include participates in the underlying cash market for the options and futures market. The class of commercial users can include investment banks, equity fund managers, asset management firms and insurance companies just to mention a few. Commercial users of futures and options participant in the market to avoid or offset against price risk.

1.2.3 Speculators

IOSCO postulated that speculators are participants in the futures and options market who take positions in order to profit from price movements. This group includes proprietary trading desks of investment banks and banks, large and small retail customers of brokerage firms, managed future funds and the “locals” referring to individual traders operating on the floors of an exchange.

IOSCO regarded speculators as part of a well-functioning futures and options market as they assume market risk positions. A speculator in the market works with the objective of achieving profits through the anticipation of the direction of price movements in the market. Speculators act as bridge between other traders as their time horizons differ significantly with professional users, hedgers and commercial users. Hence speculators are a necessary component of the futures and options as speculators add liquidity and efficiency to the markets.

1.3 Types of Derivatives Markets

There are two well-known forms of derivatives markets namely the Regulated Exchanges and the Over-the counter exchanges (OTC). Brooksley (2001) affirmed that derivatives markets consists of options and futures trading on exchanges located in exchanges in the USA and a number of other countries. Brooksley (2001) further stressed that the derivatives markets also include the enormous global OTC markets in swaps, forwards, swaptions and other derivatives.

1.3.1 Regulated Derivatives Markets

Rena and Kathleen (2012) asserted that regulated exchanges are centralized markets where all buying and selling interests come together, through a regulated exchange. It was further clarified that traders who wanted to buy an item would take a long position and those who wanted to sell an item would assume a short position in the regulated markets.

1.3.2 Over the Counter Derivatives Markets (OTC)

Rena and Kathleen (2012) also affirmed that in the OTC markets contracts would be made bilaterally or unofficially, typically between an end user and a dealer and there was no requirement to disclose the price, the terms and existence of the contract to regulators or to the public.

Berg and Pascal (2016) asserted that an OTC market represent derivatives that are not traded on regulated exchange but which are traded by mutual agreement between two counterparties and the mutual agreement is regarded as the over the counter transactions. Further Investopedia.com defined the OTC markets as a market without a central physical location where market participants trade with one another through various communication modes such as through proprietary trading electronic means, telephone and email.

Research Objectives

1. To explore the key financial indicators influencing the usage of derivatives in Botswana.
2. To determine the benefits of derivatives markets to individual and institutional investors of Botswana.

Research Questions

1. What are the key financial indicators influencing the usage of derivatives in Botswana?
2. What are the benefits of derivatives markets to individual and institutional investors in Botswana?

Hypothesis of the study

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

H1: There is association between derivative markets and firm specific factors in Botswana.

2. Literature Review

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).

Yantao et al., (2021) asserted that firm size, operational cashflows, research and development investments, tax shield and bankruptcy determine firm's decisions to invest in derivatives. The study was examined in the context of Chinese firms and the study involved 15309 firm year observations covering a period of 11 years from 2005 to 2015. The study used a two-stage regression conceptual model adopted from Lau (2016).

Zaminor et al., (2021) examined 200 non-financial firms engaged in derivatives for the period 2012 to 2017. The methodology used in the study was the Generalised Method of Moments (GMM) to establish the influence of derivatives and managerial ownership on firm value. The study found that derivatives usage has a positive influence on firm value as proposed by the hedging theory. The study also found a significant negative association between derivatives and managerial share ownership. The fore the study concluded that mangers less hedge when having significant share ownership in the firm.

Yuhartil, 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.

Collin and Edson (2020) stressed that there is a hedging premium for South African non-financial firms that use derivatives and amongst derivative users, such that firms with great extent of derivative use generate higher firm value. The study applied a dynamic panel data model estimated with the Generalised method of Moments (GMM) on a panel of 150 non-financial firms listed on the Johannesburg Stock Exchange (JSE).

Jacek and Anieszka (2018) expounded that factors such as company size, risk of default and debt usage have a significant positive effect on derivative usage. The study was conducted in Poland on 308 no-financial firms listed on the Warsaw Stock Exchange for the period covering 2008 to 2011. A logit model was used to test the hypothesis.

Numan et al., (2017) asserted that financial distressed firms, having lower managerial holdings and lower interest cover ratio with high foreign sales are using foreign exchange derivatives in Pakistan. The logistic regression model was used to analyse the impact of the impact of financial distress costs, tax convexity, underinvestment problem, profitability, managerial holding of a company and foreign sales on a firm's decision on whether to use foreign exchange derivatives for hedging purposes or not. The study used data obtained from 51 non-financial firms listed on the Pakistan Stock Exchange from 2010 to 2013.

Lau (2016) found that capital markets imposed a 'discount' on derivative users in that derivative use is negatively associated with firm value. The study revealed that firms with lower operating income margins tend to use derivatives to protect this already thin margin from the potential financial risks.

Afza and Alam (2011) affirmed that firm's extent of usage of derivatives is positively related with lower financial distress costs, higher debt, underinvestment problem and fewer managerial holdings. The study was performed using logit model on 105 non-financial firms listed on the Karachi Stock Exchange covering the period 2004 to 2008.

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. The data for key financial indicators were obtained from the audited financial statements of 21 firms listed on the Botswana Stock Exchange (BSE) and this information was run through E-Views version 12 through the following logit regression model. Table i below contains information relating to the proxies of the independent variables that were regressed in the model.

$$USE_{it} = \alpha_i + \beta_1 \text{ Financial gearing}_{it} + \beta_2 \text{ Firm Size}_{it} + \beta_3 \text{ Liquidity ratio}_{it} + \beta_4 \text{ Profitability ratio}_{it} + \beta_5 \text{ Solvency ratio}_{it} + v_{it} \quad (1)$$

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).

USE_{it} for firm i in year t takes the value of 1 if the firm used derivatives and is otherwise zero.

β_1 -Financial gearing as measured by Long-term debt to Equity (D/E) ratio.

β_2 - Firm Size as measured by the natural Logarithm of Total Assets.

β_3 - Liquidity as measured by Cash and Cash equivalents to Total assets.

β_4 - Profitability as measured by Profit Before Interest and Tax (PBIT) to Average Assets.

β_5 - Solvency ratio as measured by Total Liabilities to Total Assets.

v_{it} is the error term.

Table i: 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))
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

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 ii and table iii below:

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

Indicator	Mean	Median	Standard Deviation	Maximum	Minimum
Financial Gearing	26	22	227	929	-971
Firm Size	9	7	11	9.4	5.5
Liquidity	11	8	11	45	0.1
Profitability	6	6	11	32	-29
Solvency	49	39	34	126	0.9

Source: Descriptive statistics from E-Views 12.

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

Model \ Variable	Logit (2019-2021)	Logit (2019-2021)	Logit (2019-2021)
	Coefficient	z-Statistic	Prob.
Constant	4.204	1.319	0.1871
Financial Gearing	0.013	3.091	0.0165
Firm Size	-0.577	-1.512	0.1305
Liquidity ratio	0.023	0.446	0.6553
Profitability	-0.388	-3.476	0.0005
Solvency	0.050	2.405	0.1871

Source: Logit regression results

Tested @ 99% level of confidence.

Table iii above shows the coefficients of the Logit Regression Model β_1 , β_2 , β_3 , β_4 and β_5 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 financial gearing ratio at 99% level of confidence. Table iii also revealed that the usage of derivatives is significantly and negatively correlated with profitability at the 1 % level of significance. As for the other financial constructs, they were found to have an insignificant influence over the usage of derivatives notably firm size, solvency ratio and liquidity ratio.

4.2 Conclusion and Recommendations

The research unveiled that, Firms in Botswana with high financial gearing ratio have a prowess towards the use

of financial derivatives such as employee options, foreign exchange swaps, interest rate swaps and collateral based swaps than those without. Further firms struggling to earn positive profits in Botswana were inclined to use financial derivatives than those earning high profits.

4.2.1 Recommendation(s):

It is recommended that, policy makers in Botswana should seriously consider the establishment of a formal derivative exchange that will offer from simple to complicated derivatives products, including futures contracts on diamonds, gold, and other commodities. The institutionalization of formal derivative exchange would reduce the entire economy's overreliance on credit facilities from the banking industry, as derivatives products would offer a cost-effective, value-added alternative.

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