

The Empirical Evaluation of the Association between Derivatives Markets and Market Factors in Zimbabwe and Botswana

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Abstract

The study evaluated the association between financial markets and financial stability (as measured by bank credits to deposits), financial efficiency (as measured by bank costs to income ratio), financial access (as measured by bank accounts per 1000) and financial depth (as measured by bank deposits to GDP). A Generalised Linear Model (GLM) was run from the year 2009 to the year 2021. The GLM revealed at 99% level of confidence that, the financial markets are significantly and positively related to financial efficiency as measured by bank costs to income ratio. It is further observed that financial markets with higher bank costs to income ratio catalyses derivative usage. However, in contrast the financial markets were observed to have a negative significant relationship with the other constructs used in the model at 99% level of confidence. The results of the document review exposed the reason for non-use of derivatives as unique to each market relating possibly to differences in economic, political, financial infrastructure, market infrastructure, legal and regulatory and market timing. More so document analysis revealed that an evolving benefit of derivatives is enabling channelling of capital to sustainable investments. It is recommended that promotion of financial efficiency in the financial markets must be the main thrust of the policy makers through the establishment of properly functioning derivative markets in Zimbabwe and Botswana. Further policy makers must implore the use of sustainability linked derivatives (SLDs) in their markets as a vital option to allocate capital to environmentally friendly investments.

Keywords: Document Analysis, Financial Development Indicators, Financial Efficiency, Generalised Linear Model (GLM), Sustainability Linked Derivatives (SLDs).

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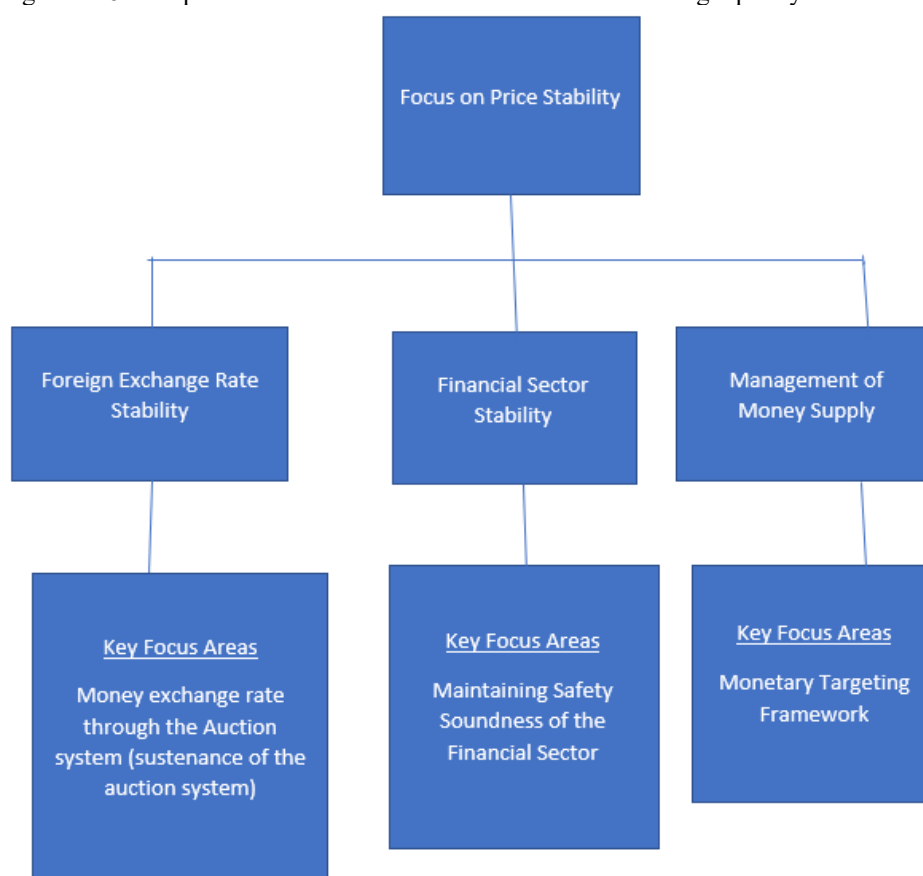
1. Introduction

The study explored whether there is a relationship between derivative markets and market factors in Zimbabwe and Botswana. The research evaluated whether there is a connection between derivative markets and financial development factors in Zimbabwe and Botswana. Financial development measures were translated into four components of financial depth (as measured by Bank deposits to GDP), financial efficiency (as measured by Bank costs to Income Ratio), financial stability (as measured by Z-score/Bank credit to Bank Deposits) and financial access (Bank Accounts per 1000/ATMs per 100,000), to facilitate the examination of the markets. The next section explores the current focus by policy makers of Zimbabwe and Botswana.

1.1 Current focus by policy makers in Zimbabwe

The current focus by policy makers in Zimbabwe is to achieve Macroeconomic stability as promulgated in the National Strategic Development (NDSP) 1-2021-2025. The strategy by policy makers of Zimbabwe in achieving macroeconomic stability is the achievement of the major outcomes of currency and price stability. In order to achieve currency and price stability the following targets were set including, reducing inflation levels by a single digit level of between 3% to 7% by 2025, building reserves from more than one month import cover in 2020 to six months import cover by 2025, exchange rate stability through the alignment of reserve money growth to levels consistent with low and stable inflation as well as exchange rate stability, Increased use of Zimbabwean dollar as a legal tender by 2025 and financial sector stability. Figure 1.15 illustrates the key focus area of price stability and the sub-key focus areas to be implemented to achieve price stability (ibid).

Figure 1.15: Adopted from the Reserve Bank of Zimbabwe strategic policy framework



Source: Reserve Bank of Zimbabwe, 2020 Monetary Policy Strategies

The means of maintaining safety and soundness of the financial sector would be implemented through the calling of minimum capital requirements, strict monitoring of the mobile banking system and through an efficient payment system. The monetary targeting framework would be met through setting quarterly reserve money targets consistent with the inflation target, using bank policy rate and medium-term facility rate and through the deployment of appropriate money market instruments. Domestic foreign mobilization and export promotion, mobilization of lines of credit, broadening and deepening participation and sources of forex are the three means of achieving a market exchange rate.

1.2 Policy Focus-Achievement of Sustainable Economic Growth

The NDS-1-2021-2025 aspires to increase per capita to US\$3,200 by 2025 and anticipates this level to be supported by increased investment levels and increased GDP growth. This is claimed to resonate with the objective of Zimbabwe's vision 2030 of becoming an upper middle-income society. NDS-1 aims to focus on growing the economy at an average growth rate of 5% per annum between 2021 to 2025. The key strategies for the achievement of sustainable economic growth is envisaged to be private sector led whilst the government focuses on overseeing policy implementation, structural, institutional and legal reforms in strengthening macroeconomic stability and improvement of the business environment. In promoting investments, the NDS-1 strategizes to quickly implement ease of doing business reforms in relation to in combating corruption, property rights, ensuring rule of the law and prioritizing investments in key enablers. With regard to sectoral growth strategies, the NDS-1 proposed to improve the marketing of agricultural produce through the operationalization of the commodity exchange through the operation of a well-regulated warehouse receipting system.

According to the NDP-1-2021-2025, Zimbabwe had been experiencing volatile GDP for so long in that the overall GDP growth rate contracted by -6.0% and -4.1% in 2019 and 2020 respectively which was caused by output losses in Agriculture and manufacturing activities (refer to table 1.1.5 below). In addition, the GDP growth rate volatility was contributed by challenges relating to macroeconomic instability, weak institutions, corruption and infrastructural deficiencies in many sectors of the economy. During the NDS-1 the focus of policy is that strong sectoral growth rates are envisaged during the NDS-1-2021-2025 period (refer to table 1.1.50). The overall GDP growth rate is expected to increase tremendously to 5.0% in 2025 from a contracted level of -6.0% in 2019 (refer to table 1.15). The expected GDP growth rates are expected to be underpinned by

stability in the macroeconomic environment, recovery in the global economy and COVID'19 and through political will of quickly implementing sectoral policies.

Table 1.1.5 Adopted Sectoral GDP growth rates (%) (2019-2025)

	2019	2020	2021	2022	2023	2024	2025
Overall GDP	-6.0	-4.1	7.4	5.5	5.2	5.2	5.0
Agricultural & Forestry	-17.8	-0.2	11.3	8.9	7.6	9.5	10.4
Mining & Quarrying	-12.4	-4.7	11.0	7.4	8.8	9.2	8.0
Manufacturing	-8.7	-9.6	6.5	6.5	7.7	6.1	5.9
Electricity & Water	-19.2	-7.9	18.8	14.4	5.9	4.5	4.8
Construction	-13.9	-11.4	7.2	5.0	4.0	5.0	4.0
Distribution	-8.2	-6.8	5.7	5.5	5.0	4.5	4.1
Transport & Communication	12.9	13.4	7.1	4.5	4.3	4.8	4.4
Finance & Insurance	-6.1	-6.5	7.2	3.3	5.2	6.1	5.0
Government Service	1.4	-2.1	6.2	2.9	2.5	2.3	2.0
Other service	-3.7	-2.0	4.4	2.7	2.6	2.5	2.5

Source: Ministry of Finance and Economic Development and RBZ, 2020

1.3 Current focus by policy makers in Botswana

Current Focus by Policy Makers in Botswana

Botswana's vision 2036 aims to transform Botswana to a higher income class up from a middle income country by the year 2036. The vision 2036 is being delivered through the National Transformation Strategy (NTS) and the NTS would be executed through National Development Plans (NDPs) including through the District and Urban Development plans. The Vision 2036 comprise of four pillars namely Pillar 1; Sustainable Economic Development, Pillar 2; Human and Social Development, Pillar 3; Sustainable Environment and Pillar 4; Governance Peace and Security.

This study focuses on Pillar 1; Sustainable Economic Development. Under Pillar 1 the economy of Botswana is envisaged to be diversified, private sector led with viable and sustainable opportunities as well as having a strong external focus. In addition, the economy is expected to be innovative, vibrant, efficient, knowledge based, with access to skilled and competitive workforce. Further the economy of Botswana is expected to have leading edge technology and infrastructure by the 2036. Under Pillar 1 the country aims to have an agricultural sector that is commercial viable, sustainable and technological driven. The development of private sector led value chains is highly encouraged in the agricultural sector under Pillar 1 of Vision 2036 through, production, processing, marketing and distribution activities. The manufacturing sector is expected to produce commercially viable high value products for the export markets. In the Information and Communication Technology (ICT) the country expects to have an enabling environment that include digital access and intends to improve relevant regulatory frameworks to enable a private sector led ICT industry. Under Pillar 1, with regard to Financial and Business services, the country is expected to focus on utilizing developed financial services capability to fund investment opportunities and generate wealth through the export of financial services. This would be achieved through the improvement of the existing business and financial services to international standards and as well as by means of diversification of the business and financial services products and then exporting them.

1.4 Research Objectives

1. To investigate the factors influencing the trading of derivatives in Zimbabwe.
2. To determine the factors considered for non-use of derivatives in Zimbabwe.
3. To explore the evolving benefits of using derivatives to policy makers in Zimbabwe.

1.5 Research Questions

1. What are the market factors influencing the trading of derivatives in Zimbabwe?
2. What are the market factors considered for the decision for non-use of derivatives in Zimbabwe?
3. What are the evolving benefits of derivatives markets to the country of Zimbabwe?

1.6 Hypothesis of the study

H0: There is no association between derivative markets and market factors in Zimbabwe.

H1: There is association between derivative markets and market factors in Zimbabwe.

2. Literature Review

Lela (2020) found that derivative markets had a significant negative impact on financial stability in Argentina,

Russia and Argentina which depends on the existence of proper financial system. The research was based on empirical testing conducted through Ordinary Least Squares (OLS) regression. The results of the study confirmed the research by Dodd (2008) which asserted that derivatives can be used for economically harmful purposes if used in a poorly structured and improperly regulated derivatives markets under the conditions of rapid and full liberalization of the economy. Willem and Verschoor (2012) further argued that the increase in the credit default derivatives within financial institutions reduces the financial stability of the financial sector. Yüncü (2018) postulated that a well-functioning derivatives markets makes it possible for firms to efficiently share risks and allows them to conduct high risk projects resulting in the boosting of economic activity.

Duc, Son, Anh and Dao (2019) investigated the dynamic relationship between derivatives markets and economic development in four large economies comprising China, India, Japan and the US. The study was based on Granger-causality test in the framework of a vector error correlation model (VECM). The derivatives markets were proved to contribute to economic development in the short run in the US, Japan and India with the effect disappearing in the long run. It was further revealed that derivatives had a negative effect on economic development in the short run in China but however a positive effect was observed in the long run through the use of dynamic ordinary least squares and modified ordinary least squares. The development of derivatives caused volatility in India both in the short run and long run (ibid).

A further study was conducted on the impact of derivatives on economic growth in some of the major world economies that included the European Union, United States, Japan, China, India and Brazil. This study was based on the estimation of the dynamic panel data model by using the Generalized Method of Moments (GMM) and the empirical evidence in the study revealed and supported the hypothesis that an increased volume of the derivatives market has a positive impact on economic growth for the period 2002-2014. The study demonstrated that a positive relationship existed between increasing the volumes of derivatives and the real per capita growth GDP in the six countries that were studied. It was recommended that policy makers and decision makers should look for instruments and incentives that encourage implementation of derivative markets in order to boost economic growth as well as raising economic welfare (Bujari, Venegas, Francisco and Gilberto, 2016).

Hungkij, Pecharat, and Mula (2017) in their study conducted in Thailand, claimed that the use of derivatives such as swaps, options, futures and forward contracts in risk mitigation were positively correlated with inflation, interest rates and economic performance of the country as well as political stability in Thailand.

Miguel et al., (2009) asserted that the most pervasive issue influencing the non-use of derivatives in Peru were that training in financial derivatives and hedges were limited and that deficiency was considered by firms the most obstacle in the development of the derivative markets. The study was conducted in Peru with 60 non-financial firms and a logistic regression was run.

Olatundun (2009) alluded the main benefits of using the derivatives in Sub Saharan Africa as enabling investors to self-insure against the volatility of capital flows. Further it was reiterated that derivatives use resulted in the reduction of overdependence on bank credit as source of income. In addition, it was observed that the introduction of commodity futures could improve the producers' management of seasonal risk. The study was conducted in South Africa as part of the International Monetary Fund Working paper.

3. Research Methodology and Design

The study used Mixed Method Research. For the quantitative part of the study a Generalised Linear Model (GLM) was applied in the study from 2009 to 2021 to determine whether there is an association between the financial or derivative markets with the financial market factors of financial depth (measured by Bank deposits to GDP), financial efficiency (measured by Bank costs to Income), financial stability (measured by Bank credits to Bank deposits) and financial access (measured by Bank Accounts per 1000). Nelder and Wedderburn (1972) expounded the GLM as a technique of iterative linear regression that can be used to find maximum likelihood estimates of the parameters with observations distributed according to some exponential family and systematic effects that can be made linear with some suitable transformation. Hence the GLM was suitable for use in this study as the relationship between derivative markets and market factors are non-parametric (distribution free tests), non-linear and dependent on whether the market used a derivative (1) or not (0). The Financial Development Indicators used in this study were sourced from the World Bank Financial Development Indicators data base.

For the qualitative part of the research regarding the evolving benefits of derivatives, a document analysis was performed on documents drawn from the European Capital Markets Institute (ECMI) and Centre for European Policy Studies (CEPS) and International Organization of Securities commission (IOSCO). Document analysis is regarded as a systematic procedure for reviewing or evaluating documents, both printed and in electronic material. Document analysis is analytical qualitative research that requires data to be examined and interpreted to elicit meaning, gain understanding and develop empirical knowledge (Cobin & Strauss, 2008 and Rapley, 2007). Bowen (2009) applauded that mixed method research sometimes include document analysis.

For each country financial market information was sought on the country's potential use of derivatives as

well as on the proposed explanatory variables of financial stability (measured by % Bank credits to Bank deposits), financial efficiency (measured by bank costs to Income ratio), financial depth (measured by bank deposits to GDP) and financial access (measured by Bank Accounts per 1000).

The GLM model was run from 2009 to 2021 to find the financial characteristic associated with the financial market or derivative market as manifested in the following equation:

$$\text{Financial Market/Derivative market}_{it} = \alpha_i + \beta_1 \text{ Bank credits to Bank Deposits}_{it} + \beta_2 \text{ Bank Costs to Income}_{it} + \beta_3 \text{ Bank deposits to GDP}_{it} + \beta_4 \text{ Bank Accounts per 1000}_{it} + v_{it} \quad (1)$$

where, it is the subscript for the country financial market i in year t of the country financial market's global financial development annual report (2009- 2021).

USE_{it} for country financial institution i in year t takes the value of 1 if the country had a derivative market and is otherwise zero.

β₁- Percentage of Bank Credits to Bank Deposits per annum.

β₂-Bank Costs to Income ratio as percentage per annum.

β₃- Percentage of Bank Deposits to GDP per annum.

β₄-Bank Accounts per 1000 adults-percentage age of 15 years and above per annum.

v_{it} is the error term.

4. Presentation and Discussions of Research Findings

This part discusses the possible outcome of the study. Section 4.1 presents the factors considered for non-use of derivatives. Section 4.2 discusses the benefits of using derivatives. Table 1 below shows the type of regulated derivatives that are available in Zimbabwe and Botswana as of 30 September 2022. Zimbabwe has a derivative market that is at its infancy, trading stock options, stock futures and index futures whilst in comparison Botswana does not have a regulated derivative market. Table 2 contains descriptive statistics for the observations described in terms of mean, median, standard deviation, maximum and minimum for the observations of the study. Table 3 presents the results of the association between derivative markets and market factors.

4.1 Factors considered for non-use of derivatives.

IOSCO (1994) confirmed the existence of a possible relationship among economic, political, financial, legal and regulatory factors and the growth of financial markets general and derivative markets in particular.

IOSCO (1994) affirmed that there is no consistent economic pattern which can be identified in countries with derivative exchanges or in those countries which are planning such institutions. It is further re-iterated that successful derivative markets exist only for those products whose prices are not controlled.

IOSCO (1994) stressed that countries with successful derivative exchanges generally have well developed financial infrastructures. A survey conducted by IOSCO (1994) on thirteen emerging countries indicated a need to develop some elements of the financial infrastructure in-order to support the derivative exchange.

IOSCO (1994) unveiled that countries without futures and options indicated the need for additional laws in this area to authorise the trading of the derivatives and indicated a further need to establish regulatory system for the derivatives.

It was also observed from survey results that most derivative markets developed after the cash market for the underlying has been well established [IOSCO, 1994].

IOSCO (1994) observed in its survey that many of the potential users of derivatives and some of the relevant governmental authorities were not aware of the benefits of derivatives.

Michael (2016) in a study conducted in Kenya unveiled the main challenges inhibiting commercial banks in developing derivative markets as poor structural facilities, inaccessibility to trading platforms, poor trading systems, weak trading rules and absence of a central counterparty.

4.2 Evolving benefits of using derivatives

Lannoo and Thomadakis (2020) expounded the main benefits of using derivatives as, enabling capital to be channelled towards sustainable investments, helping firms hedge against risks related to Environmental, Social and Governance (ESG) factors, facilitate transparency, price discovery and market efficiency and contributing to long-termism.

Table 1: Regulated Derivative Products availability on the derivative trading platforms as of September 2022.

Financial Market	Stock Options	Stock futures	Index Futures
Zimbabwe	Yes	Yes	Yes
Botswana	No	No	No

Source: Finsec- <https://finsec.co.zw/derivatives>

Table 2 Descriptive Statistics for Financial Development Indicators from 2009 to 2021 for the study.

Item	Mean	Median	Standard Deviation	Maximum	Minimum
Bank deposits to GDP (%)	33.81923	39.15000	12.39726	50.60000	14.30000
Bank Credit to Income Ratio (%)	60.01154	59.40000	10.05852	81.30000	45.60000
Bank Accounts per 1000(%)	41.84231	50.55000	27.48240	81.50000	0.0000
Bank Credits to Bank Deposits (%)	69.48846	76.25000	17.54250	93.90000	33.50000

Table 3 Relationship between Financial (Derivative) Markets and Market Factors using the Generalised Linear Model (GLM).

Model \ Variable	Generalised Linear Model (June 2009-July 2021)	Generalised Linear Model (June 2009-July 2021)	Generalised Linear Model (June 2009-July 2021)
	Coefficient	z-Statistic	Prob.
Constant	1.033700	2.731171	0.0063
Bank Deposit to GDP	-0.024609	-4.811326	0.0000
Bank Credit to Income Ratio	0.015444	2.915571	0.0036
Bank Accounts per 1000	-0.002245	-1.054933	0.2915
Bank Credits to Bank Deposits	-0.007690	-2.896854	0.0038

Tested @ 99% level of confidence.

Table 3 above shows the coefficients of the Generalised Linear 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 was Financial Market or Derivative market and took a value of 1 if a financial market had a derivative trading platform and otherwise zero if a financial market had no derivative exchange.

The results of Table 3 reflected that, financial markets are significantly and positively associated with Bank credit to Income ratio, a measure of financial efficiency.

4.3 Conclusion and Recommendations

The study revealed that financial market with higher Bank Credit to Income ratio have a high likelihood towards the growth of a derivative market than that without. The financial indicators of Bank Deposit to GDP, Bank accounts per 1000 and Bank credits to Bank deposits were observed to be negatively associated with the financial market growth.

4.3.1 Recommendation(s):

It is recommended that policy makers from emerging countries should promote financial efficiency in their markets in-order to facilitate the establishment and growth of properly functional derivative exchanges. This resonates with extant literature that were conducted elsewhere in the globe (Yüncü, 2018, Duc et al., 2019 and Wilbert et al., 2022). In addition, policy makers have a fundamental option to promote the issuance of Sustainability Linked Derivatives (SLDs) that enables the allocation of capital towards sustainable investments.

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