International Scholars Journals

International Journal of Management and Business Studies ISSN 2167-0439 Vol. 13 (6), pp. 001-006, June, 2024. Available online at www.internationalscholarsjournals.org © International Scholars Journals

Full Length Research Paper

Exploring Liquidity Solutions: The Potential of Derivatives in Mitigating Zimbabwe's Financial Volatility

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Accepted 13 March 2024

The Zimbabwean financial institutions and companies are faced with serious liquidity problems to meet their financial obligations since the inception of multi-currency system. The aim of this paper is to identify the source of current liquidity crisis and probable benefits of liquidity derivatives to ease economic liquidity problems. The Zimbabwe Stock Exchange listed OK Zimbabwe daily share price data from 19 February 2009 to 31 October 2012 was used. It has been found out that the market is the source of the current liquidity crisis. Therefore, it is strongly recommended that the ZSE should introduce the derivatives market which will ease the liquidity problems by attracting foreign investors, strengthening the monetary policy and security to would-be investors. Liquidity derivatives promote the optimization of commercial banks' capital structure and improve profit making abilities.

Keywords: Liquidity derivatives, price velocity, price acceleration.

INTRODUCTION

Financial disasters (such as the collapse of Trust Bank Corporation Limited, Barbican Bank Limited, CFX Bank Limited, CFX Merchant Bank, Intermarket Banking Corporation Limited, Intermarket Building Society, Intermarket Discount House, Royal Bank of Zimbabwe Limited, and Time Bank Zimbabwe Limited, and the subsequent establishment of the Zimbabwe Allied Banking Group (ZABG)) in the financial and banking sector in Zimbabwe in 2003 has been the major reason for having appropriate risk management techniques in place (Reserve Bank of Zimbabwe, 2006). After the introduction of multi-currency system, lack of liquidity led to Interfin Bank Limited to close its doors. Manufacturing companies are not spared and a number have closed their doors, downsize or relocated to Harare. The small banks and manufacturing companies failed to access funds to finance their operations, and service debts and loans. Thus a number of secular forces have led to liquidity risk management more important than ever before. One main role of the financial intermediaries is to provide liquidity. Liquidity and liquidity risk affects asset prices. Liquidity itself is not observable and therefore, has to be proxied by different liquidity measures. There are different domains that can be used to define liquidity. In terms of security assets, liquidity refers to ease with which it can be cashed back or traded, even in large amounts, on a secondary market**.** Using market as a domain, liquidity can be referred to as market's ability to match supply and demand at low cost and its ability to absorb large trades without significant price impact. Finally, in terms of financial intermediaries, liquidity refers to institutions' ability to fund increases in assets and meet obligations as they come due, without incurring high losses (Driessen, 2010).

The subject of liquidity has been well researched by different authors focusing on different aspects. Recently, ((Vento and La Ganga, 2009)) discussed the relationship between liquidity risks with other risks. Liquidity

determinants in Zimbabwean banking industry were researched by (Chagwiza, 2013). (Bonfim and Kim, 2011) looked at liquidity in banks. (Uremadu, 2009) researched on the determinants of financial system liquidity in Nigeria. (Alzahrani, 2011) explained liquidity determinants in Saudi Arabia. The value of liquidity was incorporated in asset pricing model by (Holmstrom et al., 2001). (Jarrow and Protter, 2005) discussed on liquidity risk and option pricing theory. (Bhaduri et al., 2007) explained liquidity derivatives that can be used in managing hedge funds and described five instruments. Liquidity options were described by (Golts and Kritzma, 2010).

The paper is organized as follows section 2 explains the aims and objectives of the research. The section 3, discusses the liquidity derivatives in general. In this section we give a brief explanation on how they can be structured and priced. Section 4 looks at the data used in determining the source of liquidity crisis. Results are presented in section 4. Finally, section 6 concludes the research with recommendations.

Research Objectives

The Zimbabwe's liquidity crisis requires an urgent solution and the aim of the paper is to determine whether the market itself is the source of liquidity crisis, and investigating the importance of liquidity derivatives. The Zimbabwe Stock Exchange (herein after ZSE) lacks innovation as compared to other African stock exchanges. The Johannesburg Stock Exchange (herein after JSE) is the most vibrant African stock exchange. The JSE offers derivatives instruments such as options, futures, swaps and swaptions to its large clientele base. JSE attracts foreign investors compared to ZSE. The Lagos Stock Exchange of Nigeria and Nairobi Stock Exchange are far ahead of ZSE in terms performance and liquidity (Adelegan, 2009).

LIQUIDITY DERIVATIVES

According to (Dodd, 2004, Tian, 2005), derivatives are a requirement to strengthen the financial market. Zimbabwe is in the time period of recovery and continuous growth, objectively requiring the deepening development of the financial market. The present situations of the Zimbabwe's financial market can be rescued by improving its effect of functions. ZSE lacks scientific pricing mechanism which can improve market efficient. The financial market is not performing well among the following functions; gathering, distributing, adjusting and reflecting due to lack of scientific pricing mechanism. ZSE lacks the risk distributing function, which needs risk-shifting mechanism innately owned by the derivative instruments. Therefore, derivatives instruments are risk-shifting devices and can be generally defined as a private contract whose value derives from some underlying asset price, reference rate or index. The players of derivatives can be grouped into the three classes; hedgers for risk management purposes, speculators, and arbitrageurs.

Financial institutions can use derivatives to mitigate liquidity risk.

Derivatives are broadly categorized as lock or option products. Lock products obligate the contractual parties to the terms over the life of the contract and include; swaps, futures, and forwards. On the other hand, option products provide the buyer the right, but not the obligation to enter the contract under the terms specified and include; interest rate caps, liquidity options and withdrawal options. Therefore, liquidity derivatives are liquidity risk shifting devices and the instruments include; withdrawal options, liquidity options, liquidity swaptions, total return swaps among others.

The production of liquidity services is regarded as the key function of the stock exchange and thus greater liquidity can translate into lower cost of capital for the companies concerned. Therefore, purchasing liquidity derivatives is driven by the quest for higher liquidity. Liquidity derivatives' purpose is to capture, in the form of price changes, some underlying price changes or events. Derivatives serve as insurance against unwanted price movements and reduce the volatility of companies' cashflows, which in turn results in more reliable forecasting, lower capital requirements and higher capital productivity (Bessis, 2002).

Liquidity Options

The first liquidity derivative is the liquidity option. The liquidity option, according to (Bhaduri et al., 2007), is an option when the investor can withdraw his investment in a publicly traded asset at the market price if the liquidity of the asset is low. In this case, if the barrier is reached the option knocks-in, and the investor has the right to sell the asset to the option seller at the market price. In other words, the investor has the right to sell the asset to option seller at the market price if the barrier has been reached. Thus liquidity option can be referred to as knock-in barriers, and will be exercised as rates fall below the stated rate.

According to (Golts and Kritzma, 2010), pointed out that investors should consider purchasing liquidity options to meet unscheduled capital calls. Liquidity options pays off when liquidity is needed and obviates the need to hold cash when expected returns are high. However, the purchase of liquidity options depend on yield on cash, opportunity cost of foregoing exposure to alternative risky investments, price of the liquidity option and investors' perception on the likelihood of capital call. To structure the liquidity option, we first need to identify the reference

process that will provide a reliable signal for the demand for liquidity. The reference process must be observable and thus the option price depends on the volatility δ of

$$\prod(\tau,\delta,B,S_0) = B\,N\frac{\frac{B}{S_0}+\frac{\delta^2}{2}}{\delta\sqrt{\tau}} + \frac{S_0}{B}\,N\frac{\frac{B}{S_0}-\frac{\delta^2}{2}}{\delta\sqrt{\tau}} \quad [1]$$

which can be written as equation [2] below, where $K = Be^{-rT}$ is the payoff of the option and K is the strike price, r is the interest rate, T is expiry date and S_0 is the initial stock price.

$$\prod(\tau,\delta,B,S_0) = e^{-r\tau}\left(KN(-d_2) + e^{r\tau}S_0\,N(-d_1)\right) \quad [2]$$

and

$$d_1 = \frac{\frac{B}{S_0}-\frac{\delta^2\tau}{2}}{\delta\sqrt{\tau}} = \frac{\frac{S_0}{K}+\frac{\delta^2\tau}{2}}{\delta\sqrt{\tau}} \quad [2']$$

$$d_2 = \frac{\frac{B}{S_0}+\frac{\delta^2\tau}{2}}{\delta\sqrt{\tau}} = \frac{\ln\frac{S_0}{K}+\left(r-\frac{\delta^2}{2}\right)\tau}{\delta\sqrt{\tau}} = d_1 - \delta\sqrt{\tau} \quad [2'']$$

The $N(.)$ is the cumulative normal distribution which can be obtained from the statistical tables.

Withdrawal Options

The second liquidity derivative is the withdrawal option. According to (Bhaduri et al., 2007), defined withdrawal option as the right to transfer illiquid investment to the option seller at the market price. Withdrawal option allows the investor to withdraw its locked-up investment at the market price. The investor can be prompted to withdraw his investment if liquidity needs arises. It should be noted that the withdrawal option should be exercised anytime the option is at-the-money or in-the-money, and can be priced as an American-style option. The withdrawal option gains its value because it allows the buyer to redeem an inferior investment. Therefore, this option is not used to protect against a value decline, but only against illiquidity (Bhaduri et al., 2007). It can be priced as an American-style call option using the Black-Scholes formula as;

$$\prod(\tau,\delta,S_0) = Max\left[0,\left(r_{fcd} - r_m\right)\right] \quad [3]$$

an observable reference process, time to expiry T and the length τ of the liquidity interval. According to (Golts, 2012) and (Golts and Kritzma, 2010), liquidity options are cliquets or ratchet of the first-passage options, resetting at the start of every liquidity interval. Thus under the risk-neutral measure $\propto = r$, the price of the first-passage option is given by the following equation [1] below;

where r_{fcd} and r_m are flexible certificate of deposit rate and market rate, respectively.

Total Return Swaps

The total return swap can be used as a liquidity derivative. According to (Bhaduri et al., 2007) and (Hull, 2006), total return swap involves swapping an obligation to pay interest based on a specified fixed or floating interest rate in return for an obligation representing the total return on a specified reference financial asset. Total return swaps involves two parties swapping the total returns that is, interest plus capital gains or minus capital losses of two related assets. In a standard interest rate swap, one party pays a fixed amount while the other counterparty's payments are explicitly linked to a short-term interest rate.

Total Return Swaption

The return swap can be modified to become a return swaption. In other words, return swaption is an option to enter into a return swap. A swaption reserves the right for its holder to purchase a swap at a prescribed time and interest rate in the future and can be a payer or receiver swaption. The swaptions are used to mitigate the effects of unfavorable interest rate fluctuations at a future date that may lead to liquidity crisis. So by hedging interest rate risk, the company will be hedging against liquidity risk (Bessis, 2002, Engel et al., 2005, and Jorion, 2007)

METHODOLOGY

To determine the source of liquidity crisis, we analysed price velocity and price acceleration. Through analyzing the speed at which the price moves up or down, give an insight to ascertain whether the ZSE is the source of liquidity crisis. The ZSE listed OK Zimbabwe daily share price was used. The data used was from 19 February 2009 to 31 October 2012. The OK Zimbabwe daily share price data was accessed through OK Zimbabwe website. The retail outlet was chosen basing on share performance and availability of data. The equation [4] below is the formula for calculating price velocity and can

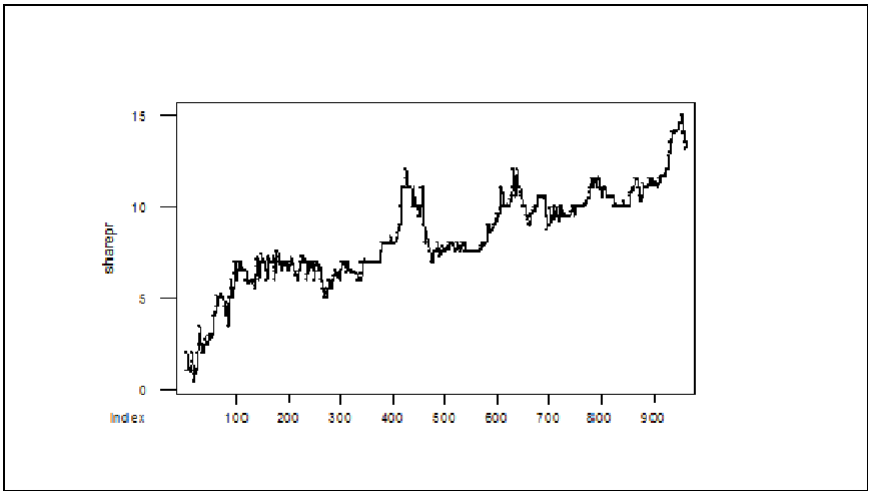

Figure 1. Daily Share Price

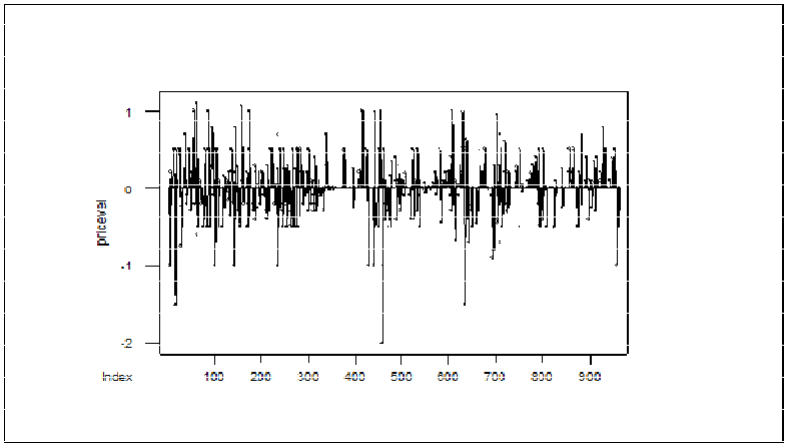

Figure 2. Daily Price Velocity

be defined as the speed at which price move over time measured in x cents per day (xc / day)

$$P_v(t) = \frac{P(t) - P(t-i)}{i} \qquad [4]$$

Where $P_v(t)$ is the price velocity and $P(t)$ is the share price at time t. Then the price acceleration can be computed by equation [5] below and refers to the speed at which price velocity moves over time measured in x cents per day per day (xc / day^{-2})

$$P_a(t) = \frac{P_v(t) - P_v(t-i)}{i} \qquad [5]$$

Where $P_a(t)$ is the price acceleration at time t. The Minitab 10.2 software was used to analyse the data.

RESULTS

Referring to figure 1, the daily share price is increasing fast in the first half year of 2009, when the country had introduced multi-currency system. Then the second half year of 2009, the share price was constant and this was due less liquid in the market. From June 2012, the share price increased constantly but at a slower pace. In the period year 2010, and 2011 to 2012, price movements are static. Trading in the market is not benefiting either the seller or the buyer. Thus price movement discourages speculators to fully participate in the market.

We can further analyse the share price velocity and price acceleration. Referring to figure 2, the price acceleration is concentrated in the region between $-2c / day$ to $2c / day$. However, price acceleration is oscillating

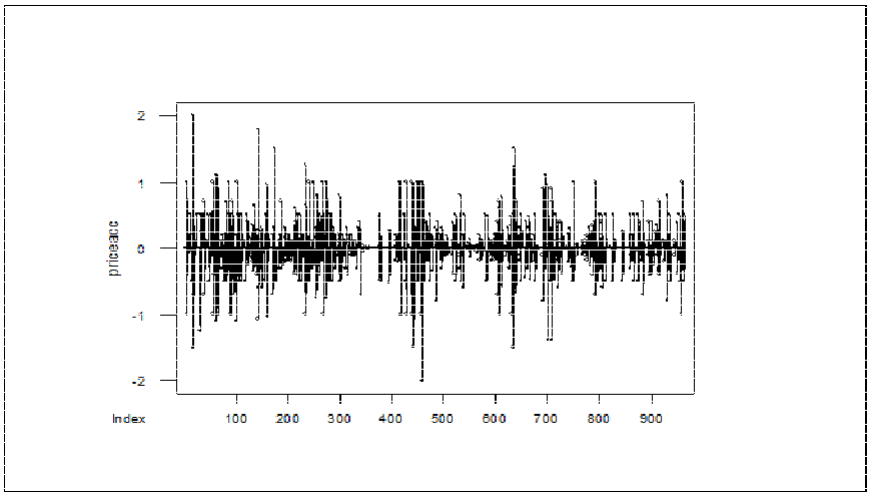

Figure 3: Daily Price Acceleration

between $-0.5c/day^{-2}$ and $0.5c/day^{-2}$, indicating small change in prices. Thus, we can infer that there is minimal trading activity taking place in the market. The price velocity and price acceleration are static, not indicating significant price movements in any direction

DISCUSSIONS

In Zimbabwe, the stock market trading activities are still at infancy stage. Traders are optimistic and ought not to be much involved in ZSE activities. The investors are being locked-in to their investments and market-makers are being exposed to increased risks. Thus the Zimbabwean economic sphere of liquidity problems are mainly caused by less active market participants as signified by price acceleration in figure 3. In other words, high price acceleration either to the negative or positive side implies that the market is active and trading is taking place. Notable price movements in any direction can be catalysed by introducing derivatives in the market. Speculators will push the price up or down permitting active trading on the stock market. The foreign investors are taking the back seat and are reluctant to invest on ZSE due to lack of hedging instruments and capital liquidity.

Zimbabwean liquidity can be encouraged by opening up competition in trading venues. The liquidity provision is more robust when market participants have a choice between trading models. It is noted that speculators and market-makers are the key contributors to the liquidity of ZSE market by putting up their capital in seeking to arbitrage differences in risk or time preferences. The liquidity derivatives allow market participants and the Reserve Bank of Zimbabwe (herein after RBZ) to extract forward looking, as opposed to historical information, especially in crafting the monetary policy. So all in all, we can infer that the ZSE performance is the source of liquidity crisis and there is urgent need for financial innovation. This is evidenced by non-active of the money market.

Establishing the derivatives market provides a number of economic benefits. Being speculative in nature, it provides the investor with a perception of the market not only in terms of current prices, but also in terms of the future. Derivatives markets transfer risks from those who have no appetite for them to those who do. Thus the ZSE market will enjoy higher trading volumes from more players as a result of risk mitigation. In a nut shell, the derivatives market will attract creative, educated, vibrant and intelligent investors who make optimal use of the opportunities offered and transfer their enthusiasm to new entrants as well. This perpetuates the entrepreneurial spirit within the economy, and not only creates better and new products, but also has a positive effect on the job market.

CONCLUSIONS

Introducing the derivative market is very crucial to Zimbabwe's economic growth and liquidity. The successful countries in the region such as South Africa, Nigeria and Kenya have proved the importance and necessity of the derivative market, which probably accelerate their economic growth. The benefits of liquidity derivatives are threefold; liquidity risk management, price discovery and enhancement of liquidity. In establishing the derivative market, it will strengthen the country's monetary policies effect by providing the RBZ with ample and effective information through its scientific pricing

mechanism, enough instruments and rational expectations about market. Thus the market can effectively improve the accuracy of monetary policies.

The derivative market itself will help in efficiently and effectively absorb foreign capital that the country desperately need. The market will protect foreign investors who are currently reluctant to invest in Zimbabwe's market due to lack of safety and capital liquidity. Thus the abundance of ZSE instruments will provide foreign investors with more choice of ways of entering and withdrawal to improve the liquidity profit. Liquidity derivatives and other derivatives in general, promote the optimization of commercial banks' capital structure and improve commercial bank's profit making ability thereby improving liquidity and economic development. In a nutshell, markets with derivatives have more liquidity and thus lower transaction costs compared to markets without derivatives. So the derivatives market can be extremely beneficial for both individuals and the overall economy of a country.

Therefore, it is strongly recommended that the ZSE should introduce new financial products through establishment of a derivatives market. Establishing a derivatives market is feasible because the country has already a functioning underlying market. Here, entrepreneurial players are energized to create new businesses, products and concomitant employment opportunities from the profits they make from the derivatives market. A task team should be established to oversee the operation of the market. In addition, the task force needs to educate market participants and stakeholders on operation of the market, for it to be success.

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ACKNOWLEDGEMENTS

The author is grateful to Zimbabwe Stock Exchange, OK Zimbabwe, Reserve Bank of Zimbabwe, Samabert Business Consultancy Pvt Ltd, and Univen and all financial intermediaries for their support with data and information. And also my wife too for her love and undying support.

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