THE ENHANCEMENT OF THE DETERIORATED SOUTH AFRICAN BOND OPTIONS MARKET

Coert Frederik Erasmus*

Abstract

Investments, especially those in the bond market, carry a level of risk. Risks in the bond market can be mitigated by transacting in option contracts. In the developing South African economy, trading activity of over-the-counter (OTC) bond options decreased significantly. Possible deteriorating factors and interventions to enhance OTC bond options were investigated in this research. Experts in the OTC bond option market were surveyed and the quantitative data collected was analysed with descriptive statistical methods. Results indicated that three factors were positively identified as deteriorating factors in the OTC bond option market and that five different interventions were possible to possible enhance this market.

Keywords: Bond Options, Deterioration, Developing Economy, Enhancement, Over-the-counter (OTC), South Africa

**University of South Africa (Unisa), AJH vd Walt Building, Office 5-104, Preller Street, Muckleneuk, Pretoria, 0003, South Africa*
Tel: +27 12 429 4949

1 Introduction

Investors entrust funds with assets manager that attempt to achieve profits as prescribed in individual fund mandates (Financial Services Board [FSB], 2007). The fund mandates prescribe the required rate of return and the financial instruments that asset managers are allowed to use as investment vehicles (FSB, 2007). The risk-return of a fund can be improved by adding financial instruments such as derivatives to a portfolio (Graf et al., 2014; Johnson, 2014). Option contracts were often used within a fund to reduce risk and increase the returns (Graf et al., 2014).

The standardised options contracts introduced by the Chicago Board of Options Exchange in 1973 became a popular instrument soon after introduction (Bodie et al., 2009). Almost more than a decade later, in 1987, standardised bond option contracts were introduced into the South African financial market (Bullard, 1987). The South African OTC bond option market flourished until 2001 (Johannesburg Stock Exchange [JSE], 2011).

However, the South African OTC bond option market deteriorated since 2001. In 2011 this market deteriorated to such an extent that it could be considered as insignificant (JSE, 2011).

This research attempts to determine the possible causes that led to the apparent deterioration of the South African OTC bond option market between 2001 and 2011. This research will further suggest possible methods that could again enhance this market to ascertain the benefits of an active OTC bond option market.

The benefits of bond options range from protection against economic crises to informational efficiency (Hakansson, 1999; Maniar, 2007). According to Almeida and Vicente (2009), investor preferences are communicated through options. Further, Cao and Ou-Yang (2009) found that without options, investors would not be able to take a position in the market based on informational events. Therefore it is possible that market activity could decrease if the possible benefits that bond options offered are foregone (Cao and Ou-Yang, 2009).

Several researchers recently focused on the pricing of bond options, all attempting to improve pricing models (Bermin, 2012; Becherer and Davis, 2010; Jamshidian, 2010; Milne, 2009). Only a few attempted to research the South African derivatives market (Bekale et al., 2015; Adelegan, 2009). This research is therefore unique. Firstly, because it identifies the determinants of the apparent deterioration of the South African OTC bond option market. And secondly, possible interventions are proposed to enhance the OTC bond option market.

The subsequent sections are structured as follows. Section 2 reviews the relevant literature and studies relating to the current research. Section 3 describes the research methodology used in, including information on the benefits and detriments. In section 4 the empirical results is presented and discussed. Finally, section 5 concludes the research.

2 Literature review

Derivative instruments, such as option contracts, are often used by financial institutions for arbitrage, speculation or hedging purposes in order to achieve their objectives in the financial market (Hull, 2008). The CEC (2009) found that financial instruments in the derivatives market have established risk management structures. However, even considering the established structures some stumbling blocks remain. Bezzina and Grima (2012) are of the opinion that derivatives are not fully utilised in the international financial markets. If derivative instruments are underutilised it could lead to decreased market activity.

2.1 Causes of the apparent deterioration of the South African OTC bond option market

The objective of the South African derivatives market is to improve liquidity and risk management in order to be more competitive internationally in the derivatives market (Adelegan, 2009). The OTC bond option market in South Africa however deteriorated to such an extent in the period between 2001 and 2011 that it was considered insignificant by 2011 (JSE, 2011). The different factors that could potentially improve the OTC bond option market are also the factors that could have led to the deterioration in this market. These factors include the underlying asset class of the derivatives, liquidity, pricing, exchanges and regulation.

Developed financial markets, such as the Australian Securities Exchange (ASX), have a flourishing OTC bond option market as well as an effective bond market (PIMCO, 2011). The example of the Australian market indicates that a relationship exists between an effective bond market and bond option market. Mu et al. (2013) reported in 2013 that South Africa had the largest bond market among the sub Saharan African countries.

The most liquid bonds in the South African bond market are the bonds issued by the South African government (Aling and Hassan, 2012). There are however fewer corporate bonds available (National Treasury, n.d.). The limited number of corporate bonds in South Africa negatively affects the liquidity in the market (Ball et al., 2011; Reid, 2009). The illiquidity in the South African corporate bond market therefore has a potentially negative effect on the South African bond option market.

Illiquidity in an underlying market often leads to inaccurate pricing in the derivative market (cf. Goyenko et al., 2011). In the South African context the lack of liquidity in the corporate bond market might have caused deterioration in the bond option market. Hull and White (2014) suggest that liquidity is essential to value a derivative accurately. Incorrectly priced derivatives are often the source of financial losses and incorrect financial information disseminated into the market (Dodd, 2009; Milne, 2009).

However, the illiquidity in the OTC bond option market could potentially be attributed to the nature of the OTC market as OTC markets tend to be illiquid (Choudhry, 2001; Deuskar et al., 2011; Stulz, 2005). The deterioration in the South African financial market in the period between 2001 and 2011 was therefore not necessarily the result of a lack of accurate pricing but perhaps a consequence of the nature of the OTC market. Deuskar et al., (2011) describe the nature of an OTC market to be illiquid. Further, Dodd (2012) and Stulz (2005) conclude that the investors in the OTC market are informed, indicating that investors have the knowledge to value derivatives in the OTC market accurately.

Ball et al. (2011) is however of opinion that the only difference between an OTC market and an ET market is the regulatory consequences of trading in the respective markets. In South Africa the OTC bond option market is standardised but unregulated (National Treasury, 2012). According to Adelegan (2009), South Africa does not have the capacity to regulate the financial market with prudential regulation.

Erasmus and Makina (2014) however stated that the conservative South African financial regulations limited the devastating effects of the 2007 subprime crisis since the regulation reduced the market exposure to foreign market risk. Botha and Makina (2011) reported that South Africa has two regulatory authorities, the South African Reserve Bank (SARB) and the Financial Services Board (FSB). South Africa also has self-regulatory authorities, namely the JSE and the central securities depository (CSD), Strate CSD. These authorities all form part of the innovations in the South African regulatory environment. The latest suggested regulatory framework is the Twin Peaks model that is focused on coordination, prudential regulation and market conduct (Goodspeed, 2013). Proper regulation has the ability to improve market efficiency (Caporale, Rault, Sova and Sova, 2015).

2.2 Enhancing the South African OTC bond option market

The primary objective of an investor who hedges a position is to limit the upside and downside risk of an investment (Hull, 2008). Investors who wish to hedge their positions often do not make use of the most suitable instrument (Dodd, 2009). If an investor uses an inappropriate derivative to hedge the risks associated with his or her open position, the hedge is often inefficient (Milne, 2009). To improve the marketability of OTC bond options risk management techniques should be re-evaluated, regulation should be improved, liquidity should be enhanced and

derivatives should be priced accurately (Adelegan, 2009).

Sherman (2009) concludes that the most effective method to limit market inefficiencies is effective regulation. Financial engineers however consistently engineer new methods to exploit regulation to their own benefit (Arestis and Karakitsos, 2009). The regulation to transact in the OTC bond option market must therefore be specific for the derivatives market in order to improve the market activity (Adelegan, 2009).

An increase in market activity could enhance OTC bond options in the financial market. Adelegan (2009) concludes that improved market activity would broaden the base of institutional investors and increase liquidity. Improved liquidity positively influences the price and pricing of a bond option. A liquid market allows reduced transaction costs and adaptable contract sizes (Deuskar et al., 2011). The improved liquidity, adaptable contract sizes and reduced transaction costs could allow more accurate pricing of OTC bond options and enhance this OTC bond options as hedging instrument in the South African financial market.

According to Amihud and Mendelson (1988) one of the most important components of a financial instrument is liquidity. Deuskar et al. (2011) concluded that a positive relationship exist in the bond option market between liquidity and asset prices. Lawton (2012) found that liquid assets can be transferred at a lower cost. Therefore, prices in the OTC bond option market would be reflected more accurately once the liquidity in the market improves.

The reviewed literature illustrated that a relationship exists between certain factors that influence the deterioration and the enhancement of OTC bond options. Factors such as liquidity, regulation and pricing could either have a beneficial or detrimental effect on the use of OTC bond options. Risk management techniques, the underlying asset and the type of option contract have an influence on the OTC bond option contracts. The next section discusses the methodology followed to determine the causes for the deterioration and possible interventions that could enhance the South African OTC bond option market.

3 Methodology

Empirical research was conducted in order to quantify the opinions of individuals who were employed by institutions that were active in the South African OTC bond option market at the time of the research. A quantitative research design is a design that allows the researcher to measure data to a definite degree of certainty (Crowther and Lancaster, 2009). Quantitative data is generally more exact compared to qualitative data as numerical data is described with standard statistical techniques (Crowther and Lancaster, 2009; Remenyi et al., 1998). The quantitative design also allows the collection of primary data. The primary data has the benefit of creating data to address a specific research question (McDaniel et al., 2008). A research instrument is required to collect primary data.

In the current research a survey was used as the research instrument. According to Remenyi et al. (1998), a survey is a quantitative tool that is used to collect data based on a respondent's knowledge, opinion or attitude. Surveys allow knowledge, opinions and attitudes to be reduced to numerical responses that are easily analysed by using statistics (Cooper and Schindler, 2008).

Data obtained from a survey is measured according to different scales. The ratio scale is the top level of measurement scales because it incorporates the abilities of all the lower-level measurements, namely the nominal, ordinal and interval scale and the ratio scale has a definite zero (Gershkoff, 2008). Additionally, a full range of statistical analysis techniques and mathematical tests is valid when data is measured with a ratio scale (Cooper and Schindler, 2008; Gill and Johnson, 2010; Remenyi et al., 1998).

The population for the current research was identified from data collected by the Profile Group (n.d.). The Profile Group regularly publishes a directory of the South African financial market employers. This directory includes all major financial institutions in South Africa. The population identified comprised all companies that were listed in the Profile Group Financial Market category of interest rate market members at the JSE.

The institutions that were involved in the option market were identified as issuers, market makers, intermediaries, participants and regulators. An issuer was defined as an institution that created a financial asset such as a bond (Wuite, 2009). Market makers bought and sold assets in the financial market at the quoted bid–offer prices (Van Heerden and Van der Westhuizen, 2008). Intermediaries in the financial market were purchasers of financial instruments on behalf of entities with surplus funds (Kalač et al., 2013). According to Adelegan (2009), participants acted in a similar capacity as an intermediary, with the exception that participants were retail investors or professional asset managers. However, participants did not buy on behalf of various entities but only for a specific entity (Adelegan, 2009). Lastly, regulators imposed legislation to combat market inefficiencies in the financial environment (Wuite, 2009).

The population of the current research comprised individuals who were employed by institutions who formed part of the South African OTC bond option market at the time of the research. Gill and Johnson (2010) state it would be unrealistic to distribute the questionnaires to the entire population; therefore, sampling is used. Since this research aimed to obtain data from experts in the field, who form part of a specialised population of OTC bond options investors, purposive sampling was the most appropriate (cf. Ishak and Bakar, 2014). The non-probability

purposive sampling technique is a superior non-probability sampling technique (Daniel, 2012).

The initial sample population consisted of 70 employers who employed individual whom were considered to be part of the interest rate market on the JSE. Each of these institutions was contacted to form part of the research. However, twenty-one of these institutions were only active in the interest rate market but did not participate in the interest rate derivatives market and were removed from the sample. The sample population was therefore reduced from 70 employers to only 49 employers. The sample population was distributed as indicated in Table 1.

Table 1. Sample population

Participants	26
Market makers	9
Intermediaries	9
Issuers	3
Regulators	2
Total Sample	**49**

Source: own composition

The questionnaire was distributed to individuals who were employed within this sample population. Questionnaires were sent to all the individuals who were identified from the sample population. Each respondent identified the extent of agreement with certain statements by indicating a percentage out of 100. The questionnaire sent to the individuals was constructed in order to obtain data on the causes of the deterioration in the South African OTC bond option market and the possible interventions that could enhance this market.

The questions that were identified as possible determinants of the deterioration of the South African OTC bond option market is listed in Table 2.

The possible factors that could enhance the South African OTC bond option market were identified and the determinants of the market enhancements are listed in Table 3.

The data collected with the research instrument was captured, stored and analysed (Bryman and Bell, 2011). The data collected during the current research was stored electronically in a password-protected Adobe Acrobat Professional X document. The data was then exported into Microsoft Office Excel 2010. Thereafter, the Microsoft Office Excel 2010 data was imported into the Statistical Package for Social Sciences (SPSS) program for data analysis. Lastly, the statistical results were interpreted in order to draw reliable conclusions, make recommendations and identify possible areas for further research. The next section reports the results from the statistically analysed data.

Table 2. Determinants of deterioration in the South African OTC bond option market

Question 1	Did bond issuers have a role in the deterioration of the OTC bond option market?
Question 2	Did the decline in the short-term interest rates since 2004 affected the OTC bond option activity?
Question 3	Was the OTC bond option pricing method that incorporated the volatility in the modified Black formula (1976) effective?
Question 4	Did wide bid–offer spreads have a deteriorating effect on the OTC bond option market?
Question 5	Was the OTC bond option market is efficiently regulated and overseen?
Question 6	Were International Swaps & Derivatives Association (ISDA) agreements sufficient to regulate the OTC bond option market?
Question 7	Did the ET bond option market crowd out the OTC bond option market?
Question 8	Were intermediaries active in the OTC bond option market?
Question 9	Did all institutional investors have access to the OTC bond option market?

Source: own composition

Table 3. Determinants of enhancements in the South African OTC bond option market

Question 10	Do investors fully understand the OTC bond option market?
Question 11	Is the OTC bond option market effectively integrated into the financial market?
Question 12	Would shorter-maturity OTC bond options stimulate the OTC bond option market?
Question 13	Is there regular interbank trading of OTC bond options?
Question 14	Did exotic options crowd out OTC bond options?
Question 15	Is the secondary bond market liquid and active?
Question 16	Is the OTC bond option market transparent?

Source: own composition

4 Results

The methodology used to collect data for this empirical research delivered comprehensive results as the respondents were representative of the South African OTC bond option market. The respondents from the sample population represented employers who acted as issuers (9%), intermediaries (9%), market makers (18%), regulators (9%) and participants (55%). The objectives of these

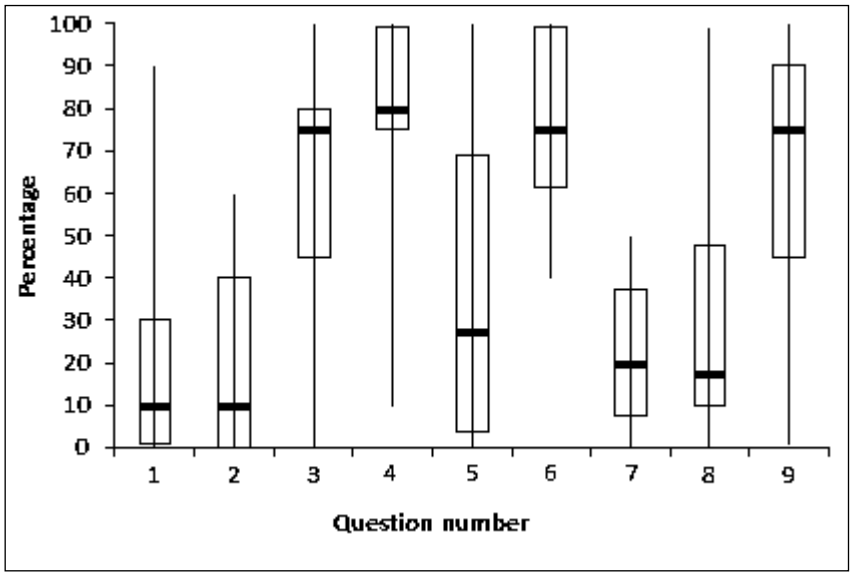
respondents who formed part of the market was speculative (37%), arbitrage (25%) and hedging (38%). The data obtained made it possible to identify the possible causes for the deterioration in the SA OTC bond option market and suggests the possible methods that could enhance this market.

4.1 Deterioration of the South African OTC bond option market

The literature review identified factors that could possibly have added to the deterioration of the South African OTC bond option market in the period 2001 to 2011. The factors that were identified were the lack of new bond issues, the declining short-term interest rate, the bond option pricing using the modified Black formula and incorporating the volatility skew, the effect that wide bid–offer spreads have on bond option activity, the market regulation and oversight, the standardised ISDA agreements used as binding contracts, the market in which OTC bond option contracts trade, the intermediary and broker participation in the market; and access to the market (Adelegan, 2009; Ball et al., 2011; Chinzara, 2010; Chordia et al., 2001; De Larosière, 2009; Durbin and Ng, 2005; Goyenko et al., 2011; Greenwood and Vayanos, 2010; Hearn and Piesse, 2012; IOSCO, 2010; JSE, 2011; Milne, 2009).

The deterioration was measured from the perspective of the respondent when answering question 1 to question 9 as presented in Table 2. Figure 1 is an illustration of the results obtained from the research instrument regarding the deterioration of the market.

Figure 1. Possible deteriorating factors in the South African OTC bond option market
(Box plot of question 1 to question 9)



Source: own composition

The respondents only perceived 33% of the determinants to be possible factors that contributed to the market inactivity. The survey results showed that unreasonable bid–offer spreads ($\overline{x_4}^{23} = 80.27$) resulted in the largest contributing factor to the deterioration in the market. The regulation and market oversight ($\overline{x_5} = 36.50$) was also identified as a factor that deteriorated the market as respondents did not deem the market to be efficiently regulated and overseen. The respondents found that the intermediaries also did not actively participate ($\overline{x_8} = 30.5$) in this market, which was also a perceived cause of deterioration.

The respondents did not agree that there was a lack of bonds issued ($\overline{x_1} = 22.36$) in the market to write underlying option contracts. Even though market regulation and oversight was perceived as inefficient the binding ISDA agreements ($\overline{x_6} = 76.4$) were considered sufficient. The declining interest rates ($\overline{x_2} = 16.55$) and bond option pricing method ($\overline{x_3} = 61.11$) were also not perceived as deteriorating factors. The results showed that the market was open to investors ($\overline{x_9} = 63.44$) and that exchange-traded trading alternatives ($\overline{x_7} = 22.22$) did not influence the market negatively.

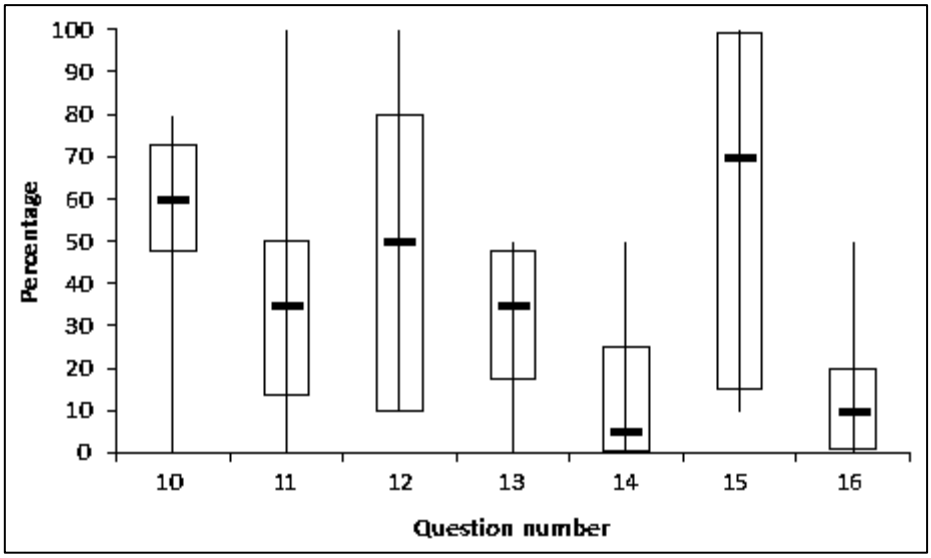
The effects of the determinants on the market deterioration were severe as the JSE (2011) stated the market could be considered as insignificant. The respondents were surveyed on the possible interventions that are possible to enhance this market.

[23] $\overline{x_q}$ is the average obtained from the results per question.

4.2 Enhancement of the South African OTC bond option market

There appears to be several possible methods available to restore the South African OTC bond option market. The literature suggested that investor education, market integration, shorter maturity options, liquidity and efficient regulation could possibly aid the enhancement of the South African OTC bond option market (Ameer et al., 2011; Arestis and Karakitsos, 2009; Bezzina and Grima, 2012; Choudhry, 2001; Cummins et al., 2001; Dodd, 2012; Dodd, 2009; Dodd and Griffith-Jones, 2007; IOSCO, 2010; PIMCO, 2011; Stulz, 2005). Figure 2 is an illustration of the results obtained regarding the enhancement of the market.

Figure 2. Factors perceived that could enhance the South African OTC bond option market
(Box plot of question 10 to question 16)



Source: own composition

According to the respondents, some methods could enhance the South African OTC bond option market. Results indicated that investors who were active in the financial market was uninformed ($\overline{x_{10}} = 55.0$) and did not fully comprehend the benefits of using OTC bond options, and therefore they did not make use of the instrument. The respondents were of the opinion that the market was non-transparent ($\overline{x_{16}} = 14.18$), which further decreased the use of this instrument. According to the respondents, at the time of the study, the OTC bond option market was neither fully integrated ($\overline{x_{11}} = 37.5$) nor was the instrument regularly traded between banks ($\overline{x_{13}} = 31.25$) in the financial market.

The secondary bond market was considered to be liquid and active ($\overline{x_{15}} = 60.82$) and would not currently have an impact on enhancing the market as the market was considered as functional. Respondents were however of the opinion that none of the interventions such as new exotic options ($\overline{x_{14}} = 14.0$) or the shorter maturity ($\overline{x_{12}} = 46.36$) OTC bond options would restore the OTC bond option market activity. Improved investor education, regulation, integration and liquidity could however potentially restore or improve activity in this market.

The empirical results of the current research were based on the opinions of the respondents who participated in this research. These respondents were experts in the field and active in the South African OTC bond option market. The respondents were employed to perform hedging, speculative or arbitrage transactions at the institutions where they were employed at the time of the research. The institutions formed part of the market as issuers, market makers, intermediaries, participants and regulators. The respondents provided their perspectives on the most probable causes for the deterioration of the OTC bond option market between 2001 and 2011, and possible methods for enhancing segments of this market.

5 Conclusion

The current research determined which factors led to the deterioration of the OTC bond option market in South Africa in the period between 2001 and 2011 and the interventions that could be effective to enhance the OTC bond option market. Table 4 is a summary of the actual factors that led to the OTC bond option market deterioration and the effective interventions that could enhance the OTC bond option market activity as perceived by the respondents from the sample population.

Table 4. Deteriorating factors and possible enhancement interventions

Actual factors	Effective interventions
Inactive intermediaries	Improved liquidity
Unreasonable bid–offer spreads	Investor education
Regulation and market oversight	Improved transparency
	Increased interbank trading
	Improved integration in the financial markets

Source: own composition

The OTC bond option market in South Africa could potentially be an effective tool for risk management (Adelegan, 2009). However, factors such as inactive intermediaries, wide bid-offer spreads as well as inefficient regulation and market oversight had a deteriorating effect on the market. Currently, the lack of liquidity and market integration in the South African OTC bond option market prohibit investors from benefiting from the use of OTC bond options. The limited market integration makes hedging inefficient to investors.

It is recommended that issuers, intermediaries, market makers, participants and regulators act on the following recommendations to restore the South African OTC bond option market:

- increase the liquidity in the OTC bond option market;
- encourage regular interbank trading of OTC bond options;
- encourage continuous education for investors and traders;
- improve the transparency in the OTC bond option market; and
- integrate the various financial instruments effectively in the financial markets.

The liquidity intervention could be addressed by encouraging intermediaries to actively participate in the market. Furthermore, liquidity would be enhanced if the wide or one-directional bid-offer quotes by primary dealers are discouraged. Liquidity would also be improved once regular interbank trading of the OTC bond options take place. The findings showed that shorter maturity OTC bond options would not enhance the market but it could promote interbank trading. Banks should also be encouraged to transact directly in the market as the use of brokers or intermediaries reduces transparency.

Transparency is reduced in some transactions as certain institutions make use of intermediaries. This is to limit the information about their financial position that is disseminated into the financial market. Institutions should be encouraged to transact in the market in their unique legal capacity. Once the OTC bond option market is perceived as liquid and transparent, OTC bond options could possible integrate into the financial market. The transparent market could become attractive to investors and a liquid market would extend itself to properly priced financial instruments that could stimulate the market.

Investors are however perceived not to be fully informed of the market functionalities. The South African OTC bond option has changed considerably since inception in the 1980s. It is therefore recommended that traders and investors who are active within the OTC bond option market form part of a professional body that encourages continuous professional development.

If the bond option market was restored, bond options could potentially be used to hedge, speculate or derive arbitrage profits. Though these recommendations may restore the South African OTC bond option market it is recommended that further research be conducted on regulatory changes and its effects on OTC derivative markets, the preferred derivative instrument for risk management, and identification of appropriate CPD interventions for South African OTC bond option market participants.

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