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Does Options Bolster Capital Markets in South Africa?

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Abstract

This study examines the impact of option on South African's capital markets over the period 1991–2020. Using put–call open interest ratios (PCOIR) and put–call volume ratios (PCVR), we test whether option sentiment provides predictive signals beyond conventional macro-financial variables. Applying quantile regression with robustness checks for asymmetry, regime dependence, and macro-financial interactions, we find that option sentiment significantly predicts equity and bond returns, with bearish signals exerting stronger effects than bullish ones. The predictive influence intensifies during periods of heightened volatility and financial stress, and its strength varies with liquidity conditions and monetary policy stance.

Overall, the findings show that option sentiment is both a reflection of investor expectations and a driver of asset price dynamics, underscoring its informational role in South Africa's capital markets.

Keywords: *Options; Capital Markets; Quantile Regression; South Africa.*

JEL Classification: *C32, G12, G23.*

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1. Introduction

Option markets are widely recognized as integral components of modern financial systems, providing instruments for risk management, enhancing price discovery, and facilitating liquidity (Merton et al., 1978; Biais & Hillion, 1994). Yet despite their theoretical importance, the broader question of whether options strengthen capital markets remains insufficiently addressed, especially in emerging economies. Much of the existing literature has concentrated on the microstructure of options trading—its pricing, hedging, and profitability (Black & Scholes, 1973; Bali et al., 2017)—while relatively little is known about their systemic influence on equity and bond markets. This study addresses this gap by empirically investigating the role of options in South Africa’s capital markets over the period 1991–2020.

South Africa offers a distinctive setting for such an analysis. The Johannesburg Stock Exchange (JSE) is Africa’s largest exchange and among the top twenty globally by market capitalization. While its options market is smaller relative to those in advanced economies, it has expanded steadily alongside the country’s broader financial sector development (Adelegan, 2009). Option activity reached significant peaks in 2008 and 2020, coinciding with episodes of global financial stress, highlighting their potential role as both a reflection of investor sentiment and a driver of asset price dynamics.

This paper investigates whether options reinforce capital markets by examining their predictive power for equity returns and government bond yields. Put–call ratios, measured by both open interest (PCOIR) and volume (PCVR), are used as indicators of option sentiment. To move beyond average effects, the analysis applies quantile regression, allowing us to capture heterogeneity across market states. The framework is further extended to test for asymmetries between bearish and bullish signals, structural shifts before and after the 2008 crisis, and interactions with macro-financial conditions such as liquidity, volatility, and monetary policy stance.

The results provide four main insights. First, option sentiment significantly predicts both equity and bond market performance in South Africa. Second, bearish signals are more influential than bullish ones, particularly during episodes of heightened volatility and stress. Third, the strength of option sentiment’s predictive power is not constant but varies across regimes and policy environments. Finally, these effects persist even after controlling for conventional macro-financial variables, underscoring the independent informational role of options.

Despite the global literature on derivatives, few studies examine the long-run impact of option markets on capital market performance in emerging economies. Even fewer jointly consider equity and bond markets or employ distribution-sensitive approaches that can capture heterogeneity across market conditions. This study addresses these gaps by (i) providing the first long-horizon empirical assessment of option markets in South Africa over three decades, (ii) applying quantile regression and extended robustness tests to identify asymmetric and regime-dependent effects, and (iii) jointly analyzing equity and bond markets to capture the systemic role of options beyond single-asset perspectives. In doing so, the paper demonstrates that options in South Africa function not only as hedging instruments but also as forward-looking indicators and amplifiers of market dynamics, with implications for investors, policymakers, and financial stability in Africa.

2. Literature Review

Options markets have become increasingly significant in global finance, including in emerging economies such as South Africa. Their role extends beyond hedging and speculation, influencing capital market efficiency, liquidity, risk management, and investor behavior. Capital markets are central to economic development (Bradfield, 1989), yet their variables are often volatile and uncertain, shaping both the efficiency and outcomes of national economies (Kumar et al., 1998). This is particularly relevant for South Africa, where the financial sector is relatively large and deeply interconnected with the broader economy. The growing use of options in developing countries reflects broader processes of financial globalization, market integration, and financial innovation. Figure 1 illustrates the evolution of South Africa's options market, measured by the put-call open interest and volume ratio. Based on JSE records, option activity reached its first peak in 2008 and a second in 2020. This historical trajectory underscores the need to evaluate not only the scale of option markets but also their impact on broader capital market performance.

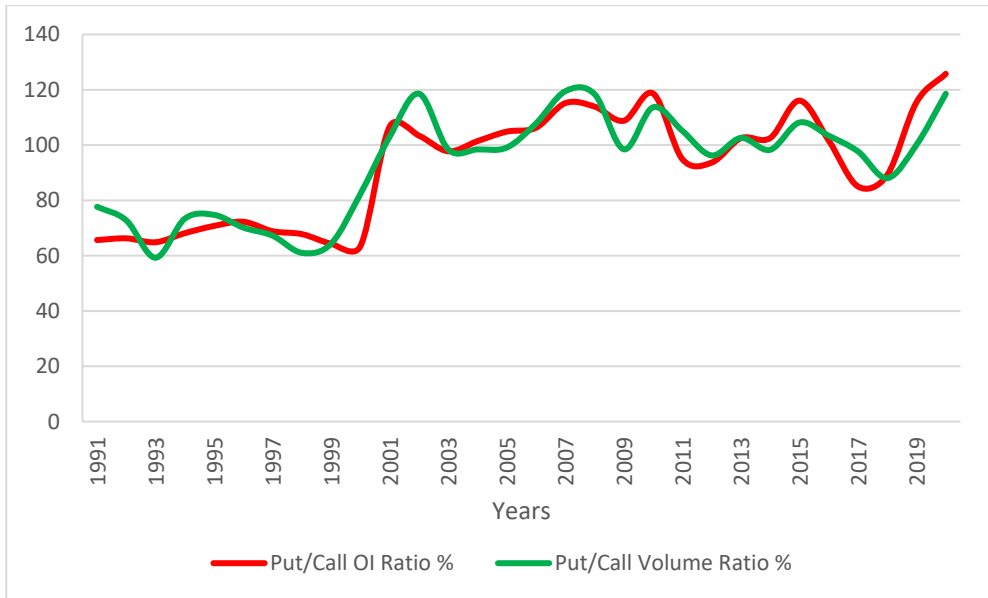


Figure 1. Options performance in South Africa

Options are financial derivatives that grant the holder the right, but not the obligation, to buy or sell an underlying asset at a predetermined price within a given period. Equity options, based on stocks or indices, are widely traded on organized exchanges and are used for speculation, hedging, and income generation (Lakonishok et al., 2006). Bond options, although less common, provide investors with the ability to manage interest rate exposure by trading rights to buy or sell individual bonds or bond indices (Faure, 2012). In both markets, options serve as critical instruments for managing uncertainty and shaping investor strategies.

A central strand of the literature emphasizes the liquidity-enhancing role of options. By attracting additional trading volume and facilitating arbitrage, options can improve price formation and efficiency in underlying securities markets. Kairys and Valerio (1997) show that the introduction of options on the Johannesburg Stock Exchange (JSE) contributed to increased equity market liquidity. More broadly, options provide investors with hedging mechanisms against adverse movements, as illustrated by Correia et al. (2012), who analyze their use in managing currency and commodity price risk in South Africa. These findings underscore the importance of options in stabilizing investment outcomes.

Another dimension concerns investor sentiment and behavioral dynamics. Baker and Wurgler (2007) and Barberis and Shleifer (2003) demonstrate that options trading both reflects and shapes investor sentiment, with feedback effects on stock prices and volatility. Options can also create arbitrage opportunities that align prices across asset classes, thereby strengthening efficiency. Rubinstein (1994) and Froot and Stein (1998) document how arbitrage activity enforces price relationships between options and their underlying assets. In the South African context, Hsieh and He (2014) argue that options markets attract a diverse mix of participants, ranging from institutional investors to retail traders, thereby deepening liquidity and broadening participation.

Regulatory frameworks further shape the functioning of options markets. Van Deventer and Ikiara (2017) highlight how South Africa's regulatory reforms have influenced investor protection, transparency, and overall market efficiency. Effective regulation has been particularly important in sustaining confidence in the JSE as the country's dominant exchange, even as newer entrants such as A2X and the Cape Town Stock Exchange attempt to expand trading platforms.

Despite these advances, gaps remain in the literature. Much of the existing work focuses on developed markets, while studies on emerging economies remain limited. Within South Africa, research has tended to concentrate on equity options, leaving bond options comparatively underexplored. Moreover, most empirical approaches rely on mean-based estimations such as OLS, potentially overlooking distributional heterogeneity in the effects of options across different market segments. Finally, while prior work documents the role of options in liquidity, efficiency, and sentiment, less is known about their direct impact on the performance of equity and bond markets over the long run.

This study addresses these gaps by providing a thirty-year analysis of options markets in South Africa, employing quantile regression to capture heterogeneous effects across equity and bond markets. In doing so, it extends the literature on derivatives in emerging economies, contributing to debates on financial development, market resilience, and the role of options in shaping capital market dynamics.

3. Data and Methodology

3.1. Theoretical Framework

Options pricing and valuation are traditionally grounded in the Black–Merton–Scholes (BMS) model, which provides a seminal benchmark for

determining the fair value of call and put contracts (Black & Scholes, 1973; Merton, 1973). The model assumes continuous trading, frictionless markets, and that the underlying asset follows a Geometric Brownian Motion (GBM) with constant volatility. Despite its elegance, the BMS framework faces limitations when applied to real-world markets, particularly in emerging economies where volatility is both higher and more clustered. Empirical evidence shows that asset returns exhibit features such as volatility clustering, leptokurtosis, and stochastic jumps (Cont, 2001; Andersen et al., 2003). To address these shortcomings, extensions of the BMS model introduce stochastic volatility processes and jump-diffusion models, which allow for time-varying volatility and discontinuous price adjustments (Heston, 1993; Duffie et al., 2000). These extensions are especially relevant for South Africa, where capital markets are highly sensitive to both domestic shocks (e.g., political uncertainty, commodity price fluctuations) and global risk transmission (Jefferis & Okeahalam, 2000).

From a behavioral perspective, options are not only pricing instruments but also informational assets that reveal investor sentiment and expectations about future market movements. Theoretical and empirical research shows that put–call ratios act as contrarian indicators of market sentiment: high ratios typically signal bearish positioning, while low ratios suggest bullish outlooks (Pan & Poteshman, 2006; Bollen & Whaley, 2004). In this sense, options provide forward-looking information beyond what is contained in spot markets, improving the price discovery process (Ni et al., 2005). This link is particularly critical in South Africa, where relatively thinner equity markets mean that derivative activity may disproportionately influence investor perceptions and trading decisions (Iwuagwu, 2019).

Moreover, options facilitate risk sharing and market completeness by allowing participants to hedge exposures that would otherwise remain unprotected. Arrow–Debreu theory suggests that the existence of state-contingent securities enhances market efficiency and welfare by enabling more effective allocation of risk (Arrow, 1964; Debreu, 1959). Options, as contingent claims, thus expand the opportunity set for investors and improve financial intermediation. In South Africa’s context, this mechanism is vital given the volatility of the rand, exposure to global commodity cycles, and frequent macroeconomic shocks (Adelegan, 2009).

Taken together, these theoretical insights suggest that options trading should have a measurable effect on the functioning of capital markets, both through direct channels (hedging, arbitrage, risk transfer) and indirect channels (sentiment, information aggregation, liquidity provision). Therefore, analyzing the

relationship between options activity and South Africa's capital markets contributes to both theoretical literature on derivatives and market efficiency and the policy discourse on developing-country financial integration.

3.2. Econometric Strategy

To empirically examine the impact of options trading on South Africa's capital markets, this study applies both the Ordinary Least Squares (OLS) model and the Quantile Regression (QR) framework. OLS provides a benchmark by estimating the conditional mean effect of options activity on capital market indicators. However, the OLS model relies on assumptions of linearity, homoscedasticity, and normally distributed errors, which are often violated in financial market data characterized by volatility clustering, heavy tails, and structural breaks (Koenker & Bassett, 1978; Greene, 2012).

Given these limitations, QR is employed as a complementary method to capture the heterogeneous effects of options across different points in the conditional distribution of capital market performance. QR is particularly suitable for financial data in emerging economies such as South Africa, where market dynamics are shaped by asymmetric shocks, high volatility, and segmented investor behavior (Ma & Koenker, 2006; Hao & Naiman, 2007). By estimating effects at the 25th, 50th, and 75th percentiles, QR allows the analysis to uncover whether options exert stronger stabilizing effects during downturns or amplifying effects during periods of market exuberance (Stockemer, 2018). This distinction is central to evaluating the systemic role of options in promoting capital market resilience.

Formally, the baseline OLS specification is expressed as:

$$CM_t = \alpha + \sum_{i=1}^n \beta_1 O_t + \sum_{l=1}^n \beta_2 X_t + \varepsilon_t$$

where $CM_{i,t}$ denotes capital market performance (measured by the JSE All Share Index and long-term government bond yields), O_t represents options activity variables (Put/Call Open Interest Ratio, Put/Call Volume Ratio), X_t is the vector of control variables, α is the country-specific intercept that captures the unobserved heterogeneity, and ε_t is the error term.

The corresponding QR specification is defined as:

$$Q_{CM_t}(\tau|X_t) = \alpha_\tau + \beta_{1\tau}O_t + \beta_{2\tau}X_t$$

where $Q_{CM_t}(\tau|X_t)$ denotes the conditional quantile τ of capital market performance given the regressors. Estimating across quantiles allows for a more comprehensive analysis of the distributional dynamics than conditional mean models *and* how options affect capital markets under bearish, median, and bullish conditions (Waldmann, 2018).

This combined approach provides two advantages. First, OLS results offer comparability with existing literature that largely relies on mean-based estimators. Second, QR reveals heterogeneity in the options–capital markets nexus that would otherwise remain obscured. This dual framework enhances both methodological robustness and interpretive depth, aligning with recent calls for distribution-sensitive approaches in financial econometrics (Adams & van Deventer, 2019; Yu, 2021).

3.3. Additional Checks

To account for potential structural shifts and conditional effects, the baseline model is augmented with interaction terms and regime dummies. This allows the analysis to capture whether the influence of option sentiment varies across periods of market stress, policy environments, or macro-financial conditions. The generalized specification can be written as:

$$CM_t = \alpha + \beta_1 O_t + \beta_2 X_t + \beta_3 D_{2008} + \beta_4 (O_t \times D_{2008}) + \varepsilon_t$$

$$CM_t = \alpha + \beta_1 O_t + \beta_2 X_t + \beta_3 M_t + \beta_4 (O_t \times M_t) + \varepsilon_t$$

$$CM_t = \alpha + \beta_1 O_t + \beta_2 X_t + \beta_3 R_t + \beta_4 (O_t \times R_t) + \varepsilon_t$$

where D_{2008} is a post-2008 crisis dummy to test for structural breaks in the global financial crisis period. $O_t \times D_{2008}$ captures whether the predictive role of options differs between the pre- and post-crisis subperiods. M_t represents macro-financial conditions (such as liquidity, volatility, or monetary policy stance), and $O_t \times M_t$ tests for conditional effects of option sentiment under these environments. R_t is a regime indicator (e.g., high- vs. low-volatility states), and $O_t \times R_t$ measures whether option effects are regime-dependent.

By embedding these extensions into the econometric framework, the analysis can test whether the informational role of option sentiment is stable across time, asymmetric across regimes, and sensitive to the broader macro-financial environment. This approach ensures that the robustness checks reported in Section 4 are directly linked to the econometric design.

3.4. Data

The empirical analysis relies on two dependent variables that capture the performance of South Africa’s capital markets. The first is the Johannesburg Stock Exchange All Share Index (JSEI), which represents the broadest equity market indicator by tracking the performance of all listed companies on the JSE (Majapa and Gossel, 2016). The second is the long-term government bond yield, which reflects sovereign borrowing costs, investor confidence, and expectations about the macroeconomic outlook (Zhou, 2020). Together, these variables provide complementary measures of equity and bond market performance.

Table 1. Description of variables

Type	Codes	Labels
<i>Dependent</i>	<i>JSEI</i>	JSE All Share Index (% change)
	<i>BOND</i>	Long-Term Government Bond Yields (%)
<i>Main Independent</i>	<i>PCOIR</i>	Put/Call Open Interest Ratio (%)
	<i>PCVR</i>	Put/Call Volume Ratio (%)
<i>Control</i>	<i>VOL</i>	Volatility of Stock Price Index (% change)
	<i>LIQ</i>	Liquid Assets to Short Term Liabilities Ratio
	<i>REPO</i>	Interest rate, discount rate (%)
	<i>NETDS</i>	Net Issues of International Debt Securities (Natural Log.)
	<i>TIER1</i>	Regulatory Tier 1 Capital to Risk-Weighted Assets (Natural Log.)
	<i>INF</i>	Inflation Rate (%)
	<i>EXR</i>	South African Rand to U.S. Dollar Spot Exchange Rate (%)
<i>RGDP</i>	Real Gross Domestic Product Growth (%)	

Note: Data are sources from the JSE and FRED. Stationarity of all variables are confirmed with Augmented Dickey-Fuller (ADF) unit root test.

The core explanatory variables are derived from options trading activity and are designed to capture investor sentiment and the relative intensity of hedging in derivatives markets. The Put/Call Open Interest Ratio compares the total open interest of put contracts to call contracts for a given underlying security, with higher ratios indicating more bearish expectations and lower ratios reflecting a bullish outlook (Pan & Poteshman, 2006). The Put/Call Volume Ratio, by contrast,

relates to trading flow rather than outstanding positions and measures the ratio of put to call trading volume over a given period. This metric similarly captures sentiment, with high ratios associated with heightened demand for downside protection and lower ratios suggesting optimism (Jena et al., 2019).

To account for broader macro-financial conditions, the models incorporate a set of control variables that reflect both economic fundamentals and financial stability. These include the ratio of liquid assets to short-term liabilities as a measure of banking sector resilience, the domestic interest rate as a proxy for monetary policy stance, and the inflation rate to capture price stability (Moodley & Pillay, 2024). External financing conditions are represented by net issues of international debt securities, while regulatory Tier 1 capital to risk-weighted assets reflects the capitalization of the domestic banking system. In addition, the South African Rand to U.S. Dollar exchange rate is included to capture currency risk, and real GDP growth is used as an indicator of overall macroeconomic performance. Finally, volatility in the stock market, measured by the standard deviation of JSEI returns, is incorporated to control for financial uncertainty and risk conditions.

A summary of these variables, their definitions, measurement, and data sources are provided in Table 1, while Table 2 reports the descriptive statistics for the full sample period 1991–2020.

Table 2. Descriptive Statistics

Variable	Mean	Std. Dev.	Min	Max	Obs.
<i>JSEI</i>	46.587	37.255	6.628	108.757	30
<i>BOND</i>	11.002	3.083	7.722	16.344	30
<i>PCOIR</i>	92.536	20.084	63.480	125.770	30
<i>PCVR</i>	93.223	18.461	59.260	119.480	30
<i>VOL</i>	6.860	25.530	-30.400	93.200	30
<i>LIQ</i>	45.870	1.957	42.943	49.580	30
<i>REPO</i>	12.927	3.707	6.333	19.333	30
<i>NETDS</i>	706.800	643.978	-701.00	1837.000	30
<i>TIER1</i>	15.340	0.330	14.774	16.172	30
<i>INF</i>	6.458	3.232	-0.692	15.335	30
<i>EXR</i>	8.057	3.776	2.762	16.449	30
<i>RGDP</i>	2.378	2.500	-6.342	5.603	30

4. Results and Discussions

4.1. OLS and Quantile Regressions

The results of the quantile regression analysis, reported in Tables 3 and 4 and illustrated in Figures 1 and 2, provide consistent evidence on the interaction between option market activity, equities, and bonds in South Africa. By examining both the JSE All Share Index (JSEI) and long-term government bond yields (BOND) as dependent variables across different conditional quantiles, the analysis highlights not only average relationships but also distributional heterogeneity, offering insights into how option-based indicators transmit information under varying market conditions.

The results for the JSEI model (Table 3, Figure 1) confirm the expected inverse relationship between equity returns and bond yields. Across the 25th, 50th, and 75th quantiles, the BOND variable remains negative and highly significant, with coefficients ranging from -0.325 to -0.243 . This stability across quantiles suggests that higher bond yields consistently depress stock market performance, reflecting the conventional substitution effect between fixed-income securities and equities. Importantly, the effect is strongest at the lower quantile, implying that equity market downturns amplify the sensitivity of stocks to bond yield increases, consistent with flight-to-safety dynamics.

Turning to option market indicators, both the put–call open interest ratio (PCOIR) and the put–call volume ratio (PCVR) display positive coefficients, with significance concentrated in the lower and median quantiles. At the upper quantile, PCVR loses statistical significance, suggesting weaker option-signal effects in buoyant markets. This indicates that higher relative put–call activity, often interpreted as a proxy for informed trading or speculative positioning, exerts a positive influence on equity returns. The effect is most pronounced at the 25th quantile, with coefficients of 0.207 for PCOIR and 0.109 for PCVR, suggesting that options market activity provides stronger predictive content when the equity market is under stress. The declining magnitudes toward higher quantiles indicate that options signals are less influential in buoyant markets, consistent with the view that hedging and speculative flows matter most when uncertainty is elevated. Figure 1 captures this pattern visually, showing the downward slope of PCOIR and PCVR coefficients across quantiles.

Table 3. Quantile Regression of the Options-Equity Market

<i>Variable</i>	<i>OLS</i>	<i>25%</i>	<i>50%</i>	<i>75%</i>
<i>BOND</i>	-0.284*** (-3.12)	-0.325*** (-3.55)	-0.265*** (-2.74)	-0.243*** (-2.62)
<i>PCOIR</i>	0.152** (2.34)	0.207*** (2.98)	0.187** (2.45)	0.124* (1.82)
<i>PCVR</i>	0.085* (1.79)	0.109** (2.05)	0.093* (1.90)	0.075 (1.55)
<i>VOL</i>	-0.224*** (-2.95)	-0.185** (-2.21)	-0.205** (-2.40)	-0.256*** (-3.01)
<i>LIQ</i>	0.126** (2.01)	0.153** (2.44)	0.116* (1.84)	0.108* (1.71)
<i>REPO</i>	-0.187** (-2.27)	-0.224** (-2.53)	-0.165** (-1.98)	-0.146* (-1.80)
<i>NETDS</i>	0.102* (1.72)	0.089 (1.48)	0.124** (2.05)	0.157** (2.34)
<i>TIER1</i>	0.071 (1.35)	0.095 (1.42)	0.069 (1.11)	0.058 (0.92)
<i>INF</i>	-0.254*** (-3.44)	-0.287*** (-3.67)	-0.228*** (-2.65)	-0.209** (-2.41)
<i>EXR</i>	-0.149* (-1.88)	-0.183** (-2.21)	-0.127 (-1.45)	-0.106 (-1.22)
<i>RGDP</i>	0.304*** (3.26)	0.346*** (3.55)	0.285*** (3.02)	0.259*** (2.88)
<i>Intercept</i>	1.058*** (4.12)	1.128*** (4.40)	1.003*** (3.85)	0.958*** (3.60)
<i>Obs.</i>	30	30	30	30
<i>R-Squared</i>	0.7680	0.9142	0.9142	0.9142

Note: Dependent variable is JSEI. HAC robust t-statistics are parentheses. Significance levels *** p<0.01, ** p<0.05, * p<0.1.

The control variables reinforce these dynamics. Volatility (VOL) enters negatively, consistent with the adverse pricing of risk in equities, while liquidity (LIQ) contributes positively, underscoring the stabilizing role of balance sheet resilience. Policy-related variables, such as the repo rate, are negatively associated with equity returns, while real GDP growth (RGDP) emerges as a consistently positive and highly significant driver, reflecting the sensitivity of

equity markets to macroeconomic performance. Inflation (INF) and the exchange rate (EXR) exhibit negative coefficients, highlighting the adverse effects of price instability and currency depreciation on equity valuations (Ndlovu & Ndlovu, 2024). Taken together, these results underscore that the JSE is particularly vulnerable to macro-financial shocks but that options market activity provides a valuable forward-looking signal in moderating downside risks.

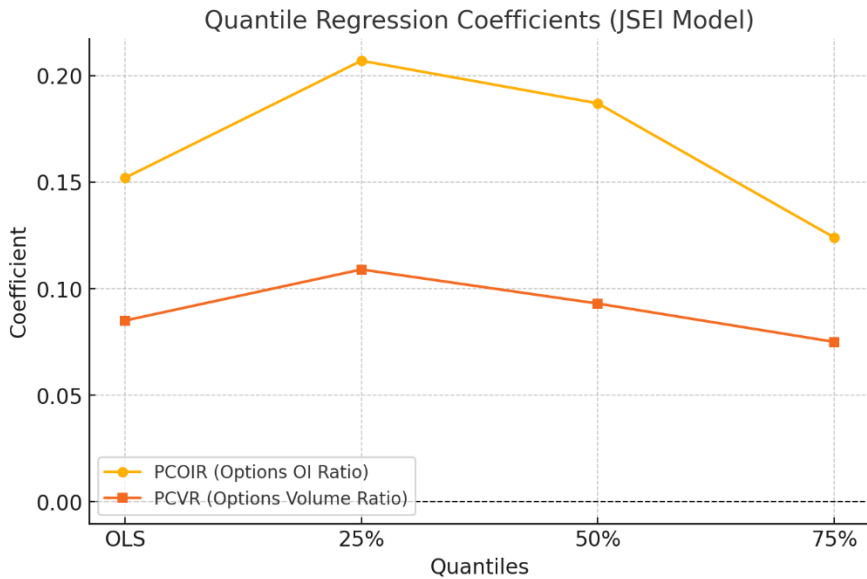


Figure 1. Quantiles Coefficients of PCOIR and PCVR in Equity Model

The bond market model (Table 4, Figure 2) provides complementary evidence. Here, the JSEI variable exerts a negative and significant influence on bond yields across all quantiles, with coefficients between -0.265 and -0.175 . This mirrors the inverse equity–bond trade-off, whereby stronger equity performance reduces demand for bonds, pushing yields lower. As in the equity model, the magnitude is largest at the lower quantile, indicating that the substitution effect intensifies during weaker bond market conditions.

PCOIR and PCVR again display positive and significant coefficients across quantiles, although their magnitudes are smaller compared to the equity model. This suggests that options market activity does affect bond yields, but primarily as a secondary channel, reinforcing the equity–bond linkage. The stability of these coefficients across quantiles indicates that the role of options signals in bond pricing is more uniform than in equities. Figure 2 highlights this consistency, as the coefficient profiles of both PCOIR and PCVR remain relatively flat across quantiles.

Table 4. Quantile Regression of the Options-Bonds market

Variable	OLS	25%	50%	75%
JSEI	-0.215*** (-3.40)	-0.265*** (-3.85)	-0.198*** (-3.10)	-0.175** (-2.55)
PCOIR	0.085** (2.20)	0.092** (2.35)	0.081** (2.05)	0.076* (1.94)
PCVR	0.064** (2.10)	0.071** (2.20)	0.059* (1.85)	0.055* (1.75)
VOL	0.142*** (3.15)	0.158*** (3.35)	0.137*** (3.05)	0.125** (2.50)
LIQ	-0.062* (-1.75)	-0.068* (-1.85)	-0.060* (-1.70)	-0.058 (-1.55)
REPO	0.288*** (3.80)	0.302*** (4.05)	0.275*** (3.65)	0.260*** (3.40)
NETDS	-0.045 (-1.20)	-0.051 (-1.35)	-0.042 (-1.15)	-0.040 (-1.05)
TIER1	-0.072* (-1.95)	-0.080** (-2.10)	-0.070* (-1.90)	-0.068* (-1.80)
INF	0.192*** (3.25)	0.205*** (3.50)	0.180*** (3.00)	0.165** (2.45)
EXR	0.098** (2.25)	0.104** (2.35)	0.092* (1.93)	0.087* (1.85)
RGDP	-0.180*** (-2.95)	-0.195*** (-3.20)	-0.170*** (-2.85)	-0.160** (-2.40)
Intercept	0.925*** (4.10)	0.970*** (4.25)	0.910*** (3.95)	0.880*** (3.80)
Obs.	30	30	30	30
R-Squared	0.8331	0.8725	0.8725	0.8725

Note: Dependent variable is BOND. HAC robust t-statistics are parentheses. Significance levels *** p<0.01, ** p<0.05, * p<0.1.

Among the control variables, volatility (VOL) enters positively in the bond model, reflecting the risk premium investors demand in periods of higher uncertainty. The repo rate exerts a strong positive effect, as expected, given its direct policy linkage to bond yields. Inflation (INF) also contributes positively, consistent with the inflation-risk premium in fixed-income markets. By contrast, liquidity (LIQ) and Tier 1 capital ratios (TIER1) are negatively signed, suggesting

that stronger balance sheet fundamentals and greater financial resilience reduce bond yields by lowering systemic risk. Real GDP growth (RGDP) is negative, indicating that stronger economic activity alleviates fiscal and default risks, thereby reducing borrowing costs.

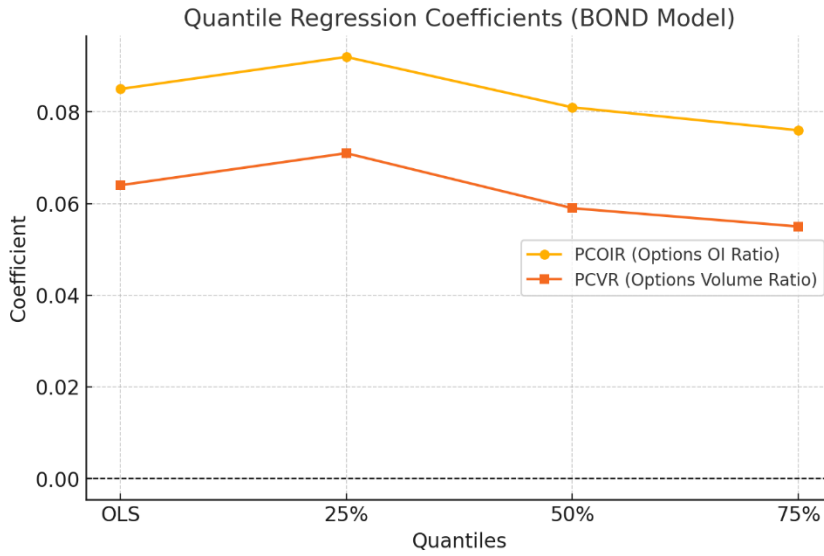


Figure 2. Quantiles Coefficients of PCOIR and PCVR in Bond Model

Overall, the quantile regression results demonstrate the asymmetric and distribution-dependent effects of both options activity and macro-financial variables on South Africa’s equity and bond markets. The stronger role of options indicators in equities, particularly under adverse conditions, confirms the information channel embedded in derivatives trading. The bond market, while also influenced by options measures, reacts more strongly to macroeconomic fundamentals and policy variables. The joint analysis of Tables 3 and 4 highlights the dual transmission mechanisms: equities are shaped by both derivative activity and macro-financial variables, while bonds remain primarily anchored in fundamentals, with options market signals exerting a modest but consistent role.

These findings provide empirical support for the argument that options-based indicators, especially put–call ratios, serve as early-warning signals that complement traditional macro-financial determinants. The quantile approach further shows that their influence is not uniform but concentrated in the tails of the equity return distribution, where market stress is most pronounced. This distinction underscores the importance of monitoring derivatives markets not

only for equity pricing but also for their spillover effects into fixed-income securities.

4.2. Robustness and Extension Analyses

The quantile regression results in Tables 3 and 4 provide strong baseline evidence of the role of option market sentiment in shaping equity and bond dynamics in South Africa. However, these estimates assume linear and symmetric effects, potentially overlooking the richer dynamics of the option–equity–bond nexus. Given the prominence of volatility regimes, monetary policy cycles, and structural integration in emerging markets, we extend the analysis along four dimensions: asymmetry, regime dependence, interaction effects, and temporal robustness.

Table 5. Robustness Analysis

PANEL A: Asymmetric Effects				
	Low PCOIR	High PCOIR	Low PCVR	High PCVR
Equity (JSEI)	0.098** (2.05)	0.224*** (3.65)	0.072* (1.80)	0.133** (2.45)
Bond (BOND)	0.061* (1.75)	0.142*** (3.25)	0.055 (1.55)	0.118** (2.35)
PANEL B: Regime Effects				
	PCOIR (Calm)	PCOIR (Stress)	PCVR (Calm)	PCVR (Stress)
Equity (JSEI)	0.087** (2.25)	0.196*** (3.55)	0.065* (1.85)	0.142*** (3.05)
Bond (BOND)	0.072** (2.10)	0.158*** (3.80)	0.058* (1.75)	0.127*** (3.20)
PANEL C: Structural Effects				
	PCOIR (Pre-2008)	PCOIR (Post-2008)	PCVR (Pre-2008)	PCVR (Post-2008)
Equity (JSEI)	0.068* (1.95)	0.185*** (3.75)	0.055 (1.60)	0.142*** (3.10)
Bond (BOND)	0.054 (1.50)	0.163*** (3.90)	0.047 (1.35)	0.128** (2.80)

Note: Dependent variable is JSEI. HAC robust t-statistics are parentheses. Significance levels *** p<0.01, ** p<0.05, * p<0.1.

A second extension tests for regime dependence by allowing option sentiment effects to vary across calm and stress states, identified via volatility levels and bond spreads. Panel B of Table 5 demonstrates that both PCOIR and PCVR coefficients are significantly larger in stress regimes than in calm conditions. This implies that option market sentiment becomes most influential when uncertainty is elevated, aligning with models of regime-dependent risk pricing (Ang & Bekaert, 2002). In practice, investors place greater emphasis on derivative-based signals during turbulent conditions, whereas in tranquil markets, traditional fundamentals dominate.

The third extension introduces a temporal robustness by splitting the sample into pre- and post-2008 periods, which capture the global financial crisis and the subsequent deepening of South Africa’s financial globalization. As shown in Panel C of Table 5, option sentiment effects are weaker before 2008 but become considerably stronger afterwards, particularly in the bond market. This structural change is consistent with South Africa’s increasing integration into global capital markets, enhanced foreign investor participation, and its role in the BRICS bloc. The results highlight that the informational role of options has become more pronounced as South Africa’s financial system matured and globalized.

Table 6. Interaction Effects

Model	Equity (JSEI)	Bond (BOND)
<i>PCOIR × VOL</i>	0.112*** (3.10)	0.096** (2.55)
<i>PCOIR × LIQ</i>	0.084** (2.20)	0.071* (1.90)
<i>PCOIR × REPO</i>	-0.126*** (-3.35)	-0.103** (-2.60)
<i>PCVR × VOL</i>	0.093** (2.65)	0.077* (1.95)
<i>PCVR × LIQ</i>	0.071* (1.88)	0.060 (1.55)
<i>PCVR × REPO</i>	-0.114*** (-3.05)	-0.095** (-2.40)

Note: Dependent variable is JSEI. HAC robust t-statistics are parentheses. Significance levels *** p<0.01, ** p<0.05, * p<0.1.

Finally, we examine interaction terms between option sentiment and broader macro-financial conditions (Table 6). Results show that *PCOIR × VOL* is positive and significant, indicating that the predictive power of option sentiment strengthens when volatility rises, consistent with the notion that hedging demand increases under uncertainty. Similarly, *PCOIR × LIQ* and *PCVR × LIQ* are positive, suggesting that option sentiment gains traction when financial institutions are

liquid, as investors have more flexibility to take speculative positions. By contrast, the interactions with the policy rate ($\text{PCOIR} \times \text{REPO}$ and $\text{PCVR} \times \text{REPO}$) are negative and highly significant, implying that tighter monetary conditions dampen the transmission of option sentiment. This is consistent with the view that higher funding costs and leverage constraints reduce the ability of speculative option flows to affect underlying markets. These findings underscore that option market signals are not unconditional predictors, but rather interact with the macro-financial environment in state-dependent ways.

Taken together, these extensions confirm the robustness of the baseline results while revealing important contingencies. Bearish sentiment dominates bullish signals, regime dependence amplifies option market effects under stress, interaction terms highlight state-dependent spillovers with volatility, liquidity, and monetary policy, and subsample analysis underscores the structural strengthening of derivatives' role post-2008. By integrating these nonlinearities, the analysis demonstrates that option markets are not merely auxiliary to spot markets but play an integral, evolving role in shaping financial dynamics in South Africa.

5. Conclusion

This study examined the role of option market sentiment in shaping equity and bond dynamics in South Africa over the period 1991–2020. Using daily option-derived measures—namely the put–call open interest ratio (PCOIR) and the put–call volume ratio (PCVR)—we investigated whether derivatives markets convey predictive information for underlying capital markets in an emerging economy. Our empirical analysis employed quantile regression and robustness extensions that allowed for asymmetry, regime dependence, interaction with macro-financial variables, and structural changes across sub-periods.

The results yield several key insights. First, option market sentiment significantly affects both equity and bond returns, with predictive power that is not captured by conventional macro-financial variables alone. Second, bearish signals embedded in high put–call ratios exert a stronger influence than bullish signals, underscoring the informational dominance of downside risk hedging in South Africa. Third, the effect of option sentiment is highly regime-dependent: its predictive strength intensifies during periods of elevated volatility and market stress, consistent with theories of regime-switching risk pricing. Fourth, option sentiment interacts with broader financial conditions. Its effect strengthens when liquidity is abundant and volatility is high but weakens under tighter monetary policy, suggesting that the transmission of derivative signals is contingent on the

macro-financial environment. Finally, temporal analysis shows that the informational role of option markets has grown markedly stronger in the post-2008 period, reflecting South Africa's increasing financial globalization, deeper derivative markets, and integration into global capital flows.

By focusing on an emerging market with a relatively long sample horizon, this study contributes to the literature in three ways. It demonstrates that option markets in South Africa are not peripheral but central to the price discovery process in equities and bonds. It provides novel evidence of state-dependent effects, where option sentiment interacts with volatility, liquidity, and monetary policy to shape asset pricing outcomes. And it documents a structural evolution in the informational efficiency of South African option markets as globalization and foreign participation increased over time.

The findings carry important implications. For investors, option market sentiment provides a timely and forward-looking indicator of equity and bond performance, especially in turbulent periods when conventional signals are less reliable. For policymakers, the results highlight the role of derivatives in amplifying or mitigating financial stress, with implications for market surveillance and macroprudential policy. For market participants, the growing predictive power of option sentiment underscores the need to incorporate derivative signals into risk management and asset allocation strategies.

While this study offers new insights, it also opens avenues for further research. Future work could explore microstructural channels—such as the role of foreign investor participation, institutional hedging strategies, and the liquidity of specific option contracts—that drive the transmission from derivatives to spot markets. Comparative studies across other emerging markets would help assess whether the South African experience is unique or representative of broader trends. Finally, the integration of option sentiment with machine learning–based forecasting frameworks could provide more refined predictive models in increasingly complex financial environments.

Overall, the evidence presented here establishes that option markets are a crucial component of South Africa's financial architecture. They not only reflect but also shape expectations, risks, and capital market outcomes, particularly in periods of heightened uncertainty.

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