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Predictive power of implied volatility of structured call warrants: Evidence from Singapore

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Abstract

This paper examines the information content of implied volatility of structured call warrants in the Singapore Stock Exchange. The study is among the first to examine the implied volatility of equity options (structured call warrants) outside the United States. Using a daily dataset for 252 trading days between August 1, 2014 and July 31, 2015, we test whether implied volatility is an unbiased estimate of realized volatility (RV). In other words, we ask whether implied volatility contains information on future RV, and scrutinize the efficiency of implied volatility and its predictive power compared to historical volatility (HV). Our findings suggest that although implied volatility does contain some relevant information about future volatility, it remains a biased forecast of RV. The efficiency of implied volatility is trivial, and its predictive power is not superior to HV.

KEYWORDS
equity options, implied volatility, Singapore, structured call warrants

1 | INTRODUCTION

Hedgers and speculators assign great importance to the volatility of an asset as implied by its option price. This volatility metric is derived by reverse engineering an option pricing model based on the option price. To most market agents, the absolute price level is less important. Rather, the price changes in a future contract attract more attention since it translates to capital appreciation or loss. Extant research shows that in addition to fundamental supply and demand factors, market participants seek to exploit relationships between prices, trading volumes, volatility and open interest. In fact, prevailing option pricing theories build on the premise that a positive relationship exists between the option price and volatility. As such, as per these theories, when volatility waxes, option prices go up, and vice versa. Moreover, the expectation of changes in volatility, too, can trigger

changes in option prices. Given the importance of this metric, market agents and researchers have sought to horse race the relative efficiencies of option implied volatility (IV) and historical volatility (HV) in predicting future realized volatility (RV). The thrust of this paper is to contribute to this domain of financial literature with a specific empiric focus on the Singapore Stock Exchange (SGX)—an important developed market situated in a crowded circuit of emerging economies.

This paper's principal motivation is the fact that empirical evidence on the information content of IV of an individual stock or equity options is rather scant. A substantial literature void exists in IV-related literature for non-US markets as well. Moreover, very few studies focus on structured warrants. In terms of results, our literature survey—expounded on in Section 2—shows that 80% of the existing studies record a predictive superiority

content of IV since they are content paying a premium for warrants with a higher probability of being worthless at the maturity date. These findings align with Lamoureux and Lastrapes (1993), who suggest that information contained in IV options is unreliable.

There are several explanations that reflect the outcome of the regression of IV and HV on future realized volatility. One possible explanation of the results is the issue of liquidity on structured call warrants. Considering SGX is treated as a developed market, the daily transaction value recorded is quite small. Earlier researchers have noted that in order for volatility implied by options to be meaningful, the underlying market dynamics need to be active; if not, options are unlikely to reflect prevailing market sentiments (Ryu, 2012). Furthermore, the complexity of warrant trading makes it less attractive for small investors. Besides, the findings also raise the question of whether and why the investors appear less interested in minimizing investment risk. Another plausible explanation for the difference observed from the outcome in the subsamples could be tied to governmental policies (Nikmanesh, 2016), though it is difficult to rationalize it for SGX due to Singapore's historical trade openness and free-market policies. As for future researchers, we suggest looking into the time-varying volatility through error-component models and dummy variable models through the regression of IV on time-to-maturity and exercise price.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study could be subscribed from Bloomberg. Authors are restricted from sharing the data used in this study.

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ENDNOTES

[1] See www.aseanexhanges.com

[2] Means call option exercise price is lower than option's spot price. (E < S).

[3] Parity between exercise and spot price. (E ~ S).

[4] Call option exercise price exceeds spot price. (E > S).

[5] We calculate the mean IV and HV as the sum of all IV and RV divided by number of observations, respectively.

[6] Our approach slightly differs with prior literature in some ways at this stage. Notably, we deviate in the procedure of Christensen and Prabhala (1998) and Christensen and Hansen (2002) because our constructed dataset is immune from overlapping samples. Both papers mentioned here investigated the S&P index monthly closing options prices, which involved considerable overlaps. For

details, the reader may refer to the Table 1 which details the papers' datasets.

REFERENCES

Black, F., & Scholes, M. (1973). The pricing of options and corporate liabilities. *Journal of Political Economy*, *81*(3), 637–654. https://doi.org/10.1086/260062

Canina, L., & Figlewski, S. (1993). The informational content of implied volatility. *Review of Financial Studies*, *6*(3), 659–681.

Cao, C., Yu, F., & Zhong, Z. (2010). The information content of option-implied volatility for credit default swap valuation. *Journal of Financial Markets*, *13*(3), 321–343.

Charoenwong, C., Jenwittayaroje, N., & Low, B. S. (2009). Who knows more about future currency volatility? *Journal of Futures Markets: Futures, Options, and Other Derivative Products*, *29*(3), 270–295.

Cheng, X., & Fung, J. K. (2012). The information content of model-free implied volatility. *Journal of Futures Markets*, *32*(8), 792–806.

Chiras, D. P., & Manaster, S. (1978). The information content of option prices and a test of market efficiency. *Journal of Financial Economics*, *6*(2–3), 213–234. https://doi.org/10.1016/0304-405x(78)90030-2

Christensen, B., & Hansen, C. (2002). New evidence on the implied-realized volatility relation. *The European Journal of Finance*, *8*, 187–205.

Christensen, B., & Prabhala, N. (1998). The relation between implied and realized volatility. *Journal of Financial Economics*, *50*, 125–150.

Day, T. E., & Lewis, C. M. (1992). Stock market volatility and the information content of stock index option. *Journal of Econometrics*, *52*(1), 267–287.

Hull, J. C. (2009). *Options, futures and other derivatives* (7th ed.). New Jersey: Pearson Prentice Hall.

Jiang, G. J., & Tian, Y. S. (2005). The model-free implied volatility and its information content. *The Review of Financial Studies*, *18*(4), 1305–1342.

Jorion, P. (1995). Predicting volatility in the foreign exchange market. *The Journal of Finance*, *50*(2), 507–528.

Latane, H., & Rendleman, R. J. (1976). Standard deviations of stock price ratios implied in option prices. *Journal of Finance*, *31*, 369–326.

Lamoureux, C. G., & Lastrapes, W. D. (1993). Forecasting stock-return variance: Toward an understanding of stochastic implied volatility. *The Review of Financial Studies*, *6*(2), 293–326.

Mayhew, S., & Stivers, C. (2003). Stock return dynamics, option volume, and the information content of implied volatility. *Journal of Futures Markets: Futures, Options, and Other Derivative Products*, *23*(7), 615–646.

McHattie, A. (1996). *The investor's guide to warrants: Capitalize on the fastest growing sector of the stock market* (2nd ed.). London: Pitman Publishing.

Nikmanesh, L. (2016). Trade openness and stock market volatility in the ASEAN-5 countries: New evidence using SUR. *Investment Analysts Journal*, *45*(3), 194–211.

Ryu, D. (2012). Implied volatility index of KOSPI200: Information contents and properties. *Emerging Markets Finance and Trade*, *48*(2), 24–39. https://doi.org/10.2753/REE1540-496X48S202

Schwert, G. (1989). Test roots: A Monte Carlo investigation. *Journal of Business and Economic Statistics*, *7*(2), 5–17.

Szakmary, A., Ors, E., Kim, J. K., & Davidson, W. N. (2003). The predictive power of implied volatility: Evidence from 35 futures markets. *Journal of Banking & Finance*, *27*, 2151–2175.

Taylor, S. J., Yadav, P. K., & Zhang, Y. (2010). The information content of implied volatilities and model-free volatility expectations: Evidence from options written on individual stocks. *Journal of Banking & Finance*, *34*(4), 871–881.

Wayne, W. Y., Lui, E. C., & Wang, J. W. (2010). The predictive power of the implied volatility of options traded OTC and on exchanges. *Journal of Banking & Finance*, *34*(1), 1–11.

Yeandle, M., & Mainelli, M. (2015). *THE: Global financial centres index 10* (p. 2016). London: Z YEN Limited.