



Information content of investor trading behavior: Evidence from Taiwan index options market

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ABSTRACT

In this study, we analyze the information content of the TXO market using *decoupled O/S* ratio. First, we find that, among four classes of traders, only foreign institutional investors have significant predictive power in the TXO market, thereby providing evidence that foreign investor flows do indeed have an impact on host-country stock returns. Second, the decoupled O/S (specifically, call O/S) ratio appears to outperform the overall O/S and put-call ratios as an information-content variable. Third, we find that foreign institutional investors exhibit greater predictive ability with regard to the OTM and short-horizon TXO options, which implies that leverage, rather than liquidity, is considered by the informed traders. To the best of our knowledge, this study represents the first of its kind to investigate the information content of decoupled O/S ratios in the index-option market.

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1. Introduction

Extant literature has suggested that the options markets attract informed trading because investors can benefit from high leverage (see, e.g., Black (1975)), low transaction costs (see, e.g., Fleming et al. (1996)) and the flexibility to engage in a variety of trading strategies that are unavailable to them in the spot market (see, e.g., Figlewski and Webb (1993), Chaput and Ederington (2005) and Ni et al. (2008)).

Indeed, when investors choose to engage in informed trading within the options markets, the trading process may generate rich information content on future stock prices. It is well documented that the prices of options play a leading role in price discovery (see, e.g., Fleming et al. (1996), Easley et al. (1998) and Cao et al. (2005)), and that they are even capable of predicting future price movements (see, e.g., Chakravarty et al. (2004), Pan and Poteshman (2006) and Chan et al. (2009)). Thus, our focus in the present study is on the information content of options trading volume.

The Taiwan Stock Exchange (TAIEX) is one of the major exchanges in the emerging markets. In 2012, the TAIEX was ranked *twentieth* in terms of market capitalization and *fifteenth* in terms of trading volume in the world. Furthermore, the Taiwan Market Index Options (TXO), with the underlying asset being the TAIEX Weighted Stock Index (TWI), were ranked as the *third* most frequently traded index options on a global scale.¹

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¹ For detailed statistics, see the Statistics Section and Derivatives Market Survey available at the World Federation of Exchanges website: <http://www.worldexchanges.org/>.

Prior studies (see, e.g., Richards (2005) and Barber et al. (2009)) have found that abnormal stock returns in the TAIEX are associated with foreign capital inflows, and foreign institutional investors are the main winners over other types of investors, whilst Chang et al. (2009) and Hsieh and He (2014) go on to use TXO options transaction data to demonstrate that index options trading by foreign institutional investors exhibit significant predictive power on the underlying TWI index returns, and foreign institutional investors are the most informed traders.²

Although in a large equity market (such as the U.S. market) it is unlikely that anyone might possess private information about the market index (see, e.g., Richards (2005)), foreign capital flows in an emerging market (such as the Taiwan market) can be so large that they might actually create price pressure and offer profitable opportunities for those who have access to the flow information (see, e.g., Chang et al. (2009)). For example, a foreign trader, who knew that a large mutual fund would increase its portfolio weighting in the Taiwan market, may take advantage of this information to build long-call positions, which might lead to capital inflows from informed traders in Taiwan's options market.

The empirical evidence provided by Chang et al. (2009) and Hsieh and He (2014) referred to above seems to suggest that trading volume plays a much more aggressive informational role in index options than had previously been suggested within other studies (see, e.g., Schlag and Stoll (2005) and Pan and Poteshman (2006)).³ Our study can be viewed as an extension of the Chang et al. (2009) and Hsieh and He (2014) studies, in which evidence has been found of predictive power in TXO options among foreign institutional investors, particularly with regard to their trading positions in near-the-money and middle-horizon options.

Our primary aim is to follow (and further modify) the methodology of Roll et al. (2010), in which the predictive ability of options volume is investigated by regressing the next τ -day index returns on the overall options/stock (O/S) trading volume ratio.⁴ The empirical model adopted for Chang et al. (2009) and Hsieh and He (2014), on the other hand, follows the methodology of Pan and Poteshman (2006), in which the predictive ability of options volume is examined by regressing the next τ -day index returns on the option put-call volume ratio.⁵

A common intuition is that call volume reflects good news and put volume reflects bad news. Johnson and So (2012) demonstrate that this intuition does not hold, because informed traders buy calls and sell puts for good news, and buy puts and sell calls for bad news.⁶ Unless trade direction is observable, it is unclear whether put/call volume reflects good or bad news. Moreover, prior research (see, e.g., Brennan et al. (1998), Lee and Swaminathan (2000), Gervais et al. (2001) and Llorente et al. (2002)) have established that equity volume, the denominator of overall O/S, is useful by itself in predicting future returns.⁷ Thus, in our study we follow the overall O/S ratio first developed by Roll et al. (2010) to examine the predictive ability of options volume.

To distinguish between good and bad news embedded in options trade, we further *decouple* overall O/S into separate measures of call and put option volume: (1) call O/S ratio and (2) put O/S ratio. Our model makes prediction about the trading volume in call (put) options and stocks together. As Ge et al. (2015) suggest that the embedded option leverage, rather than the equity short-sale costs, is the most important channel why overall O/S predicts stock returns, we focus on informed traders' choice between call and put options as we formulate our hypothesis for call (put) O/S ratios. Therefore, our decoupled O/S ratio is the ratio of call (put) option volume to equity volume, rather than the overall combined option volume to equity volume.

We begin by classifying the volume of all TXO options trading attributable to four classes of traders, namely, individual investors, market makers, foreign institutional investors and domestic institutional investors.⁸ We then examine the predictive ability of the decoupled O/S ratio on next τ -day TWI index returns for each of these classes of traders.

First, our results indicate that the TXO trading volume provided by *foreign institutional investors* contains rich information related to future changes in the TWI index, whereas transactions by other classes of traders are found to be uninformative.⁹ This finding is consistent with those of Griffin et al. (2004) and Richards (2005), in which the capital flows from foreign institutional investors do indeed have significant predictive power with regard to next-day spot index returns, whereas flows from other types of investors appear to have no significant predictive power. This finding is also consistent with Chang et al. (2009) and Hsieh and

² Chou and Wang (2009) also identify a clear tendency for stealth trading among foreign institutional investors and proprietary firms in the index futures market in Taiwan, a finding which implies that foreign institutional investors may well possess informational advantages related to aggregate market trend.

³ Schlag and Stoll (2005) find that the price impact of options volume on the DAX index is only a temporary phenomenon, thereby implying the presence of a liquidity effect as opposed to an information effect. Pan and Poteshman (2006) also show that index options trading volume contains no information on future index movements, whereas equity options trading volume has strong information content on future stock price movements.

⁴ Roll et al. (2010) show that the overall O/S ratio in the days immediately prior to earnings announcement predicts the magnitude of announcement returns, indicating that overall O/S reflects traders' private information and can be used as an information variable.

⁵ Pan and Poteshman (2006) propose that the put-call ratio of options trading volume initiated by buyers, who open new positions, can be taken as an information variable, since the options volume ratio is found to predict stock returns for the next five days, with both economic and statistical significance.

⁶ More specifically, Johnson and So (2012) find that informed traders buy puts for extremely bad news, sell calls for moderate bad news, sell puts for moderate good news, and buy calls for extremely good news. We are sincerely thankful to the anonymous reviewer for bringing up this valuable point.

⁷ Specifically, Lee and Swaminathan (2000) show that high (low) volume winners (losers) experience faster momentum reversals, and Llorente et al. (2002) show that the relation between equity volume and return autocorrelation changes sign depending on the amount of informed trading for a given equity.

⁸ We are sincerely thankful to the Taiwan Futures Exchange (TAIFEX) (website: www.taifex.com.tw) for making its TXO tick-by-tick dataset available to us. The TAIFEX dataset includes detailed information on all transaction records within the TXO option market, which enables us to identify the different classes of investors.

⁹ We use option trades initiated by buyers to open new positions as our information variables. Since the entire informed traders (i.e., foreign institutional investors) in the TXO option market account for about less than 10% of the total trading volume in open positions, there is no evidence of any relationship between the aggregate option flows and underlying asset returns in Taiwan.

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