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How free are free trading options?

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Abstract

This study represents an empirical analysis of free trading options (FTOs), options that arise due to the arrival of adverse information. The analysis purports to measure three characteristics of these options: (i) the probability of the option ending in-the-money as a consequence of adverse information arrival, (ii) the value of the free trading option and (iii) the time taken for the free trading option to become in the money (its duration). The empirical methodology was applied to 163 earnings announcements on the Australian Stock Exchange (ASX) and a number of limit order strategies investigated. The results show that such free trading options do exist, and have value dependent particularly on trading volume, firm size and pre-announcement bid–ask spread.

JEL classification: G10; G14
Keywords: Free trading options; Limit orders; Earnings announcements

> Public investors that place limit orders are most subject to the free trading option (FTO) problem since they find it most difficult to adjust limit orders quickly. (Stoll, 1992)

1. Introduction

When a limit order is placed, it creates a trading option for the rest of the market. A limit buy order is equivalent to writing a conditional free put option to the rest of the market. If adverse information arrives to reduce the market price below the limit order and the limit order is not cancelled, the limit order can be picked off at no cost. The difference between the limit order and the new market price is the value of a put option. FTOs have been described in

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a number of studies, inter alia Copeland and Galai (1983), Stoll (1992), Berkman (1996), Handa and Schwartz (1996), Foucault (1999) and Sandås (2001). In most limit order books, the free trading options are not exercised either because they are *out-of-the-money* (no price reversal) or because the limit order is cancelled on the arrival of adverse information.

To illustrate the presence of FTOs, consider the limit order book with the current best bid and ask prices, \$16.00 and \$17.00, respectively. Suppose, there are three limit buy orders, with prices \$15, \$15.50 and \$14.50 in the queue. If adverse information arrives to reduce the best bid to \$14.50, the limit buy orders of \$15, \$15.50 and \$16 all generate FTOs if they are not cancelled. The FTOs have a minimum value of \$0.50 and represent the cost of the information asymmetry to the limit order trader. Market participants are able to realise this value by executing the unadjusted limit order and buying back at the market ask (or equivalently submitting a market order to buy). The selling pressure attributable to the adverse information ensures the positivity of this value. The placing of a limit sell order analogously creates free call options, if information arrives to increase the market price above the limit order and if the limit order is not cancelled.

In this paper, we consider empirical estimation of the determinants of the expected cost of FTOs. We examine the FTOs of 223 stocks listed on the Australian Stock Exchange (ASX) in an information-rich period around the preliminary earnings announcements. For each of the 163 stocks, a hypothetical limit order is placed 60 minutes before the company's earnings announcement. These limit orders are submitted at various levels of the limit order book. The trading system is assumed to be such that the probability of the limit orders being picked off by informed traders is non-zero. For each of the FTOs created, we estimate the probability of moneyness of the FTO, the intrinsic value of the FTO and the time to maturity of the FTO. We then assess the determinants of moneyness, intrinsic value and time to maturity. In particular, we test that the value of the options and their moneyness depends on the bid–ask spread, the intraday volatility and the price before the announcement, and on the trading volume and firm size.

The results so obtained provide indications as to the heterogeneity of the costs of placing limit orders. These costs are associated with the ex ante risks of limit orders, risks that vary across stocks. We find that these risks are highest for small, high volume stocks with wide spreads. These risks also increase with price, and are highest for limit orders placed close to the market. Because we assume that the hypothetical limit order trader is uninformed, the results also provide an indirect measure of the cost of information asymmetry. In Section 2, we formalise the determination of FTOs in a three-period model. Section 3 discusses the theory of the determination of the probability of moneyness and the value of the FTO. Section 4 introduces our application to 223 stocks on the ASX and reports the results, and Section 5 concludes the paper.

2. A model of free trading options

To formalise FTOs, we consider a three-period model.

(i) At t, limit orders are placed conditional on an evolving set of information $I(t)$. Let $P_{\text{bid}}(t)$ denote the price of a limit buy order.