



Measuring the impact of option market activity on the stock market: Bivariate point process models of stock and option transactions[☆]

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Abstract

I apply the bivariate Autoregressive Conditional Duration model of Engle and Lunde [2003. Trade and quotes: a bivariate point process. *Journal of Financial Econometrics* 1, 159–188] to stock and option market transactions. The first model uses option trades and stock trades. Shocks to option trade/option trade durations have a significant impact on option trade/stock trade durations. Higher implied volatility, larger stock and option market order imbalances, larger stock trades, larger spreads, smaller depths in the stock market and faster trading in the stock and option markets are all associated with faster trading in both markets. In the second model, option trade/option trade timing leads option trade/stock quote timing and several information-related stock and option market covariates impact the expected inter-market event durations.

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1. Introduction

Black (1975) claimed “Options trading is where the action is in the securities markets these days.” It still is today. Options provide leverage to informed traders and speculators seeking to benefit from variations in the underlying price, and allow equity market specialists to hedge their inventory exposure, portfolio managers to insure against negative events, and speculators to bet on swings in volatility. Uninformed liquidity traders might obtain a lower cost position in the options market. Perhaps the most important advantage of listed options is that they allow informed traders to hide their intentions (Anand and Chakravarty, 2007).

Can option market makers detect informed trading quickly enough to protect their inventory? If so, what variables should they monitor: trade size, signed volume, trade frequency or all of these? Early detection of suspect trading activity could permit the option market maker to widen his spread quickly and/or adjust his midquote, thereby discouraging informed traders. Equity market participants face similar challenges. Should the equity market maker monitor the same variables as the option market maker? Or are option market variables redundant? In the perfect derivative hedge model of Cho and Engle (1999) the costs of trading with better informed traders are naturally equilibrated as liquidity (and traders) flow between markets. This pooling equilibrium, with informed traders and liquidity providers utilizing both markets, adds another level of complexity, especially when market makers can hedge only imperfectly.

Recent research has begun to answer some of these questions. Easley et al., 1998 demonstrate that informed traders sometimes choose to trade in the option market first. Chakravarty et al., 2004 show that the information shares for options averaged around 20 percent in the late 1980s and early 1990s.¹ Since the information share is measured at the end of the trading day, the method could determine when it might have been useful to monitor the option market. But it is probably less helpful on an intraday basis. Anand and Chakravarty (2007) employ a similar technique to show that stealthy traders prefer to maintain their advantage by trading at-the-money calls and matching their order size with contract liquidity: medium sized trades for liquid contracts and small trades for less liquid contracts. Participants in both markets might benefit from monitoring activity in these contracts.

This paper applies the bivariate autoregressive conditional duration (ACD) model of Engle and Lunde (2003) to transaction level data from the stock and option markets. With option trades as the censoring process, the model measures the impact of option trade timing on stock market transactions. The model includes transaction variables such as volume, quoted spread and option contract details and assesses their impact on expected duration, providing a more complete understanding of the relations between the trade process variables and trade timing. In contrast to the vector autoregression models of Easley et al., 1998 and the price discovery work of Chakravarty et al., 2004, the ACD model permits inference regarding the impact of specific intraday trade characteristics on the relations between stock and option market activity.

The first bivariate ACD model employs option trades and stock trades. For the forty firms considered in this study, there is considerable evidence that option trade/option trade

¹Easley, O’Hara and Srinivas (1998) and Chakravarty, Gulen and Mayhew (2004) provide several additional references on earlier empirical studies of information flow between option and stock markets.

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