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NEW FRONTIERS IN FINANCE

OPTIONS AND VOLATILITY

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The 27th annual Financial Markets Research Center “New Frontiers in Finance” conference, held at Vanderbilt University May 15, 2015, focused on new areas of research in option markets and volatility. The conference coincided with FMRC Director Robert Whaley, Valere Blair Potter professor of management, winning the 2015 Joseph W. Sullivan Achievement Award for his lifetime contributions to the options industry. Highly regarded as a derivatives and financial markets expert, Whaley developed the CBOE Volatility Index® (VIX Index®) for the Chicago Board Options Exchange, followed by the CBOE NASDAQ-100 Volatility Index in 2000, the CBOE S&P 500 BuyWrite Index in 2001, and the NASDAQ Alpha Indexes in 2010. Researchers from universities around the world, as well as representatives of various global exchanges, attended the annual FMRC spring conference. The following pages recap the papers presented at the conference and a keynote address delivered by Bill Speth, vice president of research and product development at CBOE.



The Trouble with Options Spreads

Neil D. Pearson, University of Illinois at Urbana-Champaign

Why are bid-ask spreads for even the most liquid and actively traded options so large? Quoted spreads over a sample period of April 2003 to October 2003—during which options trading volume increased dramatically—averaged 8.1 cents per share and conventionally measured effective spreads averaged 6.2 cents per share. More puzzling, the spreads increased more for in-the-money options, according to the analysis. Those large spreads defy accepted theory and are significantly larger than the average 1.4 cents per share spread for the options' underlying stocks.

Actual option spreads turn out to be much smaller, the authors write, but only for sophisticated investors with an ability to time high-frequency trades. As much as 54 percent of the options trades the researchers examined displayed this high-frequency timing ability. Using an effective-spread measure that takes trade-timing ability into account resulted in a spread of only about 1.3 cents per share. The difference involves using an effective-spread measure that accounts for “expected future prices based on public information.” This is systematically different from the bid-ask midpoints used in most conventional effective-spread measures. One immediate implication of this finding is that execution timing by some traders increases the trading costs of those who are not able to time executions.



Illiquid Equity Options Offer Higher Return Spreads

Ruslan Goyenko, Desautels Faculty of Management, McGill University

In stock and bond markets, researchers have demonstrated evidence of illiquid assets having higher expected returns. The authors extend this analysis to equity option markets, finding a similar illiquidity premium there as well. Using daily returns, the study found an average risk-adjusted option return spread for calls of 23 basis points. “For puts, the returns spread is lower but still significant at 13 basis points per day,” the authors write. The results were confirmed from portfolio sorts using cross-sectional Fama-MacBeth regressions for daily and weekly delta-hedged returns. Additionally, the researchers controlled for stock volatility, lagged option returns, and other unique firm characteristics. The result: “An increase in option illiquidity has a positive and significant impact on next period’s option returns, suggesting the existence of illiquidity premiums in the options market.”





The Quickly Evolving Options Market

Bill Speth, Vice President of Research and Product Development at CBOE

When Bill Speth began his career in trading 33 years ago, there were times he stood in the pit baffled by the unfolding trading activity and would think, “Why did that happen? What the heck were they thinking?” Over the course of his career, Speth realized that nothing is ever taken in isolation. “The options industry is a business and people are trying to make money.” While some trading decisions, “both on the market-making side and on the customer side may or may not appear to be rational,” there are reasons behind them. And some of these reasons cause Speth to lose sleep.

Liquidity—where will it come from?

Liquidity is feeling the squeeze from regulatory, market-structure changes. Dealers report they now commit 30 to 35 percent of resources on compliance costs. Speth reported that banks, market managers – all market participants – now conduct an ROI analysis for every single business line that they operate and every single account that they deal with. Banks require twice the amount of capital as they did in 2009 to conduct the same amount of business, this means the deployment of capital is much more selective than ever. While the current impact has been minimal, and generally limited to increases in clearing costs and transaction fees, the CBOE continues to have concern about the banks’ ability to “de-lever the whole system.”

How does this affect the options market?

As options spreads have widened, the CBOE has observed a corresponding increase in the quoted bid-ask size, as if market-makers

are clearing out smaller trades and aggregating size at a wider price point. While Speth noted that the quoted and effective spreads are better, the prices people pay for options are increasing. As a result, the smaller market-maker firms tend to move off the floor and become what CBOE calls “professional customers”, which has its own interesting set of issues.

Expirations

A lion’s share of business is being done on options with expirations of less than 30 days. “Weeklies are exploding,” Speth adds, “and there’s continual demand to bring up new expirations.” The CBOE recently added 12 consecutive end-of-month options that expire at the end of the day. So far, the distribution of volume those end-of-month options are up 30-40% this year. CBOE analysis shows that the more opportunities you have for an expiration, it seems to increase volume. “One of the things we’ve kicked around for a long time is daily options. The industry cringes at that, but it is possible that at some point there could be options that expire every single day.”

Industry Growth

Despite capital constraints, the CBOE has seen an increase of adoption by new users. Of those who trade stocks, CBOE estimates that 15 to 20 percent have options accounts and report an uptick in usage by asset managers, pension funds, endowments looking to hedge risk, and insurance companies. In light of the concerns and challenges, this increase suggests a lot of potential for growth.

Exercise Boundary Violations in American Options: The Rule, not the Exception

Stephen Figlewski, Stern School of Business, New York University

Sometimes the current bid price for an American option in the market is below its intrinsic value. When this happens, an exercise boundary violation (EBV) occurs. What happens is that a seller at this price leaves money on the table and the buyer receives an arbitrage profit. In a liquid market, this arbitrage should be eliminated, in theory, because competition among dealers should drive up the bid prices. But an analysis of intraday data shows that EBVs are the norm, not the exception, with near-term, in-the-money equity calls and puts the most affected, according to research presented by Stephen Figlewski. Data from Figlewski and colleagues show that in March 2010, 48.6 percent of all in-the-money call options had EBV bid quotes and 11.5 percent of trading volume in those options occurred below the intrinsic value. This cost sellers an estimated \$39 million. “EBVs are highly persistent throughout the day, making it rational to liquidate an option by exercise rather than selling it in the market, in sharp contrast to textbook theory,” the authors wrote in a draft of their study. “Our empirical results show early exercise is strongly related to an option’s EBV.”



Beyond Discount Rates



Bryan Kelly, Booth School of Business, University of Chicago

One of the major organizing principles of the field of modern financial economics is that asset prices have excess volatility. Price fluctuations are only excessive relative to predictions from the constant discount rate model. Recognizing that discount rates are variable, the leading frameworks of modern finance center on descriptions of discount rate variation in models of rational expectations. But new research has found a hole in that logic. In a working paper, Bryan Kelly documented a form of excess volatility that is irreconcilable with standard models of prices, and cannot be explained by variation in the discount rates of rational agents. Kelly and a colleague compared behavior of prices to claims on the same stream of cash flows but with different maturities. Prices of long-maturity claims were dramatically more variable than justified by the behavior of short maturity claims. Their analysis suggests that investors pervasively violate the law of iterated values. “The violations that we document are highly significant both statistically and economically, and are evident in all asset classes we study, including equity options, credit default swaps, volatility swaps, interest rate swaps, inflation swaps, and dividend futures,” Kelly writes.

Understanding How Supply and Demand Affects Volatility

Michael O’Neill, University of Queensland, Australia

A decade ago, trading volatility on exchanges was in its infancy. Daily VIX futures trading volumes numbered in the hundreds of contracts. Today, exchange-traded volatility is booming in popularity, and those contracts now number in the tens of thousands. Starting with VIX futures in 2004, then VIX options in 2006 and VIX ETPs in 2009, the market has grown exponentially over the past decade. The daily open interest in volatility contracts is now in the tens of billions of dollars. With such a broad array of ways to trade and hold stock market volatility, developing a better awareness of the supply and demand dynamics in each of these markets and how they affect one another is critical, according to a working paper presented by Michael O’Neill. Some of the price relations are governed by arbitrage and are tightly linked. Others are not. “The relation between the VIX cash index and the VIX futures is not arbitrated,” writes O’Neill. “We show that where once VIX price changes led VIX futures price changes, the VIX futures now leads the cash.”



Central Bank Policy Impacts on the Distribution of Future Interest Rates

Douglas T. Breedon, Fuqua School of Business, Duke University

In the aftermath of the Great Recession of 2008, the U.S. Federal Reserve Board reduced short-term interest rates to near zero in an attempt to provide liquidity and stimulate the economy. Short-term interest rates have remained at a century low in the USA, Europe, the UK and Japan since the Great Recession and the European Sovereign Debt Crisis of 2010–2013. Due to historically high unemployment rates five years later, the Fed kept rates near zero for over four years and on multiple occasions announced their intent to keep rates historically low for increasingly distant periods. The European Central Bank also dramatically provided liquidity and reduced rates during Europe’s Sovereign Debt Crisis. In March 2013, short-term interest rates were still below 0.50% in the U.S. and the Eurozone, while longer-term interest

rates and derivatives contracts appear to reflect market expectations that rates will eventually increase. New research shows that these long-term interest rates reflect probability distributions that are very positively skewed for the distribution for 3-month LIBOR in 3-5 years. To uncover the changing implicit state prices and risk-neutral densities for future short-term interest rates, Douglas Breedon and a colleague, used the prices of interest rate caps and floors with various strike rates and maturities from three to five years. “We show that butterfly spreads of time, spreads of cap and floor prices give sensible implied risk-neutral densities and state prices that reflect key moves made by the Federal Reserve and the European Central Bank,” Breedon writes.



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