E-mini

50 ETF

93　9　21

: E-mini 50

ETF

Liquidity effects of the introduction of the index instruments on the underlying stocks: the cases of US E-mini index futures and Taiwan ETF

☑

( ) ☑

93 9 20

（　　）　　　　　　　　　　　　　(keywords)

　　　　　　　　　　　　　　　　　　　　　　　　　Exchange Traded Funds (ETF)
　　　　　　　　　　　E-mini　　　　　(E-mini futures)

　　　　　　　　　　　　　　　　　　　　　　　　　　　　(informed traders)
　　　　　　　　　　　(liquidity or uninformed traders)
　　　　　　　　　　　　　　　　　　　　　　　　　　　(information
asymmetric costs)
　　　　　　　　　　　　　　　(　　　　　　　ETF)
　　　　　　　　　　　　　　　　E-mini
　　　　　　　　　　　　E-mini
E-mini　　　　　　NYSE　　TAQ

　　　　　　　　　　　　　　E-mini

　　　　E-mini　ETF

ABSTRACT

    This research investigates the liquidity effects on the underlying assets after index instruments introduction for both US market and an emerging market, Taiwan. This research examines the impact of the introduction of the US E-mini index futures on the liquidity of the underlying stocks. The introduction of index futures provides an alternative trading opportunity for uninformed traders.　We conjecture that the introduction of index securities such as E-mini futures and ETFs increases information asymmetric in the underlying asset market as uninformed traders migrate their trades to index instruments. Although there already exist regular futures in the US markets, given the strong growth of the US E-mini futures markets, it remains important to examine whether there is any incremental effect on the liquidity of the underlying stocks after E-mini introduction. Using TAQ database, we investigate the liquidity effects of E-mini introduction on the underlying stocks.

Key Words:　E-mini Futures; ETF; Liquidity; Information Asymmetric Costs

（   ）

1.　(**Introduction**)

In the past decade there has been a discernible growth in the markets for index securities. In particular, index instruments such as E-mini index futures and ETF are now very popular trading instruments for investors. Pioneered by CME and launched respectively, in 1997 and 1999, the E-mini S&P 500 and E-mini Nasdaq-100 have proven themselves to be rapidly growing futures in CME. While the regular and E-mini futures contracts are essentially identical instruments, trading E-mini stock index futures offers investors many advantages. E-mini stock index futures are sized at one-fifth of their regular, floor traded, counter-part to make E-mini trading affordable to traders with small margin accounts.　Furthermore, E-mini stock index futures provide investors with online opportunities to take advantage of market moves virtually 24 hours a day. In April 2002, the Chicago Board of Trade (CBOT) introduced a mini-sized, fully electronic futures contract on the Dow Jones Industrial Average, enabling traders to easily express their views in this bellwether index.

In addition to its rapid growth, recent studies have shown that the E-mini futures contracts dominate price discovery in the S&P 500 and Nasdaq-100 index instrument markets (Hasbrouck, 2002). [1]Although, at first glance, these new securities would seem to be highly redundant and incapable of expanding investors' opportunity sets in any significant way, in terms of trading volume, they are extraordinarily successful. Furthermore, researches on the liquidity impact of E-mini on the underlying individual stocks are only a few.

2.　(**The purpose of this research**)

There is relatively little research addressing the issue of the liquidity impact on the underlying assets after E-mini introduction. Subrahmanyam (1991) states that in a frictionless market assets that trade basket of securities would be redundant. In a market populated with both informed and uninformed traders, the uninformed must always bear the cost of trading against those more informed.　Subrahmanyam (1991) hypothesizes that the introduction of the index futures contract has a negative effect on the liquidity of underlying stocks and this is caused by the fact that uninformed traders who are well diversified might move to index futures. Jegadeesh and Subrahmanyam (1993) examine the bid-ask spread in the stock market around the introduction of S&P 500 index futures contract and their test results show that average spread of S&P 500 component stocks increase significantly.

For the case of E-mini futures, uninformed traders might have greater incentives to migrate their trades from underlying, since E-mini futures are sized at one-fifth of the regular futures and are more attractive to uninformed traders with small margin accounts.　Furthermore, the trading in E-mini possesses the advantages of increased speed of execution, timely reporting of fills, transparency of market quote depth, and anonymity. If indeed contract size and electronic trading

---

[1] Kurov and Lasser (2002) examine the price discovery process in the S&P 500 and Nasdaq-100 index futures contracts and show that price discovery of trades initiated in the E-mini index and is driven by exchange locals.

are relatively important factors affecting uninformed traders' trading preference, there might have a significant bid-ask spread change in the underlying stock when E-mini introduced.

This research explores the microstructure effects of the E-mini futures on the underlying stocks. In particular, the liquidity of the underlying component stocks is investigated.

3.   (Literature Review)   (Research Methodology)

While the market for US equity indexes has traditionally comprised floor-traded index futures contracts and the individual markets for the components stocks, the ecology of index securities has been altered by the advent of ETFs and E-minis. On Sep. 9, 1997 CME started trading of E-mini S&P 500 Futures and on June 21, 1999 E-mini Nasdaq-100 Futures was introduced. Motivated by the CME's E-mini, CBOT commenced trading in E-mini DJIA Index Futures on April 5, 2002. The regular and E-mini futures contracts are essentially identical instruments, while the major differences between them are the smaller size of the E-mini contracts and the fact that, as opposed to the regular futures, the E-minis are traded electronically through GLOBEX.

Trading E-mini stock index futures offers investors many advantages. Important advantages of E-mini trading that could lead to significant improvements in price discovery include increased speed of execution, timely reporting of fills, transparency of market quote depth, and trader anonymity. The rapid growth of trading volumes of E-minis has demonstrated themselves as the successful products in CME history. The E-mini trading terminals on the CME floor are located in an area adjacent to the trading pits. Floor traders are able to use handheld electronic trading devices to execute trades in GLOBEX while stationed in the pits. Hasbrouck (2002) find that the E-mini futures contracts dominate price discovery in the S&P 500 and Nasdaq-100 indexes. Kurov and Lasser (2002) examine the price discovery process in the S&P 500 and Nasdaq-100 index futures contracts and show that price discovery of trades initiated in the E-mini index and is driven by exchange locals and that the information advantage of locals increases in periods when trading is more active or when order flow is more informative.

Despite the successful development of E-mini index futures and ETF, research on their impact of market liquidity are only a few and most of the research has concentrated on the price discovery of E-mini.   This research contributes to the study of the impact of the introduction of the E-mini index futures on the liquidity of the underlying stocks. While the introduction of index futures provides an alternative trading opportunities for uninformed traders, we test the hypothesis that the introduction of index securities such as E-mini futures and ETFs increases information asymmetric in the underlying asset market by drawing away uninformed traders.

Since the successful issuance of the Standard and Poor Depository Receipts (SPDR – pronounced Spiders), the issuances of Exchange Traded Funds (ETF) in international markets have being increasing. ETF markets are also popular in Asian Financial markets; for example,

Hong Kong, Japan and Taiwan list or schedule to list ETF in their major stock exchanges. In addition to its popularity, we extend our basic research methodology to investigate the liquidity impact of Taiwan ETF on the underlying stocks. We conjecture that after the introduction of ETF uninformed investors migrate to the new index securities and results in a greater portion of informed investors trading the underlying stocks. We should observe an increase in the spread and adverse selection component of the spread for the underlying stocks.

Data and Research Methodology

To examine the liauidity impact of E-min introduction, this study employs intraday trade data from the New York Stock Exchange TAQ (Trade and Quote) database. As a comparison this research examine the liquidity effects of the introduction of S&P500 E-mini, and Nasdaq-100 E-mini. The sample period covers the 30 days before and after the introduction of E-mini, a total of 60 days. For example, Nasdaq-100 E-mini was introduced on June 21, 1999. Hence, for the Nasdaq-100 E-mini the sample period is from May 10, 1999 to June 18, 1999. We delete the trades and quotes that were out of time sequence or involved an error. We also omit quotes for the following three conditions: (1) either ask or bid price was equal to or less than zero; (2) either the bid or ask depth was equal to or less than zero; and (3) either the price or volume was equal to or less than zero. We further minimize data errors by eliminating quotes with characteristics described in Huang and Stoll (1996).

Matching Samples

Previous studies have found that share price, trade size, return volatility, and market capitalization are important determinants of the spread[2]. We match each stock in the index with a counterpart on the basis of the above four stock attributes. The matching is done during the 30 trading days prior to the introduction of the Diamonds. We calculate the match score for each stock in our sample.

Test Hypotheses:

Upon the introduction of E-mini futures, there might be an increase in the spread and adverse selection component of the spread of the underlying stocks as uninformed traders migrate to E-mini futures. The introduction of stock index futures provides liquidity traders a vehicle for investing in a diversified portfolio without having to purchase individual securities.

Spread, Effective Spread, and Price Improvement

We use percentage spread as the measure of trading costs in this study and each is computed using transaction data and averaged for each security for each day of the sample. As summarized by Stoll (2002), research has clearly established that the cross-section variation in spreads can be

---

[2] See Stoll (1978), McInish and Wood (1992), Huang and Stoll (1996) and the review by Stoll (2002)

explained by economic variables and that the relation between the spread of a security and trading characteristics of that security is one of the strongest and most robust relations in finance. Demsetz (1968) finds that spread is positively related to price and volume, and Stoll (1978) finds that spreads are positively related to volatility. Additionally, Lin et. al. (1995) find that spreads are an increasing function of trade size. To control for these factors that might be important in determining the spread, the following regression mode is investigated.

$$Effective\ Spread_{it} = b_0 + b_0^{Mini} D_t + b_1\ P_{it} + b_2\ TS_{it} + b_3\ N\_trade_{it} + b_4 \sigma_{MID} + \varepsilon_{it}$$

where D_t is a dummy variable which is assigned a value of one on days after E-mini introduction and zero in the pre-futures period. P_{it} is the average trade price, TS_{it} is the average trade size, N_trade_{it} is the average number of trades, and σ_{MID} is the standard deviation of quote midpoint.

Information Asymmetry Component

In the market microstructure literature, the bid-ask spread is modeled as arising from three sources: adverse selection, fixed costs, and inventory holding costs due to risk aversion. The adverse-selection component compensates the market maker for losses incurred on trades with informed traders. In a market with asymmetric information, the uninformed must always bear the cost of trading against those more informed, since informed traders will sell at the bid if they have information justifying that the actual price is lower and they will buy at the ask if they have information justifying a higher price. Hence, in the presence of information asymmetric, index securities may provide liquidity traders a low cost alternative to direct investment in the underlying stocks.

Previous studies have argued that index futures markets form a convenient trading medium for uninformed traders who are well diversified (Gammill and Perold 1989; Subrahmanyam 1991), because the information asymmetries that arise due to firm-specific private information are considerably less severe in the index futures market than in the underlying asset markets. If they are informed traders they will prefer trading the underlying stocks. Uninformed traders should trade the E-mini if they believe that it is a good alternative to avoid paying the higher adverse selection costs. We then go on to investigate the impact of E-mini on the adverse selection components of the underlying stocks and matching sample. The issue is examined by estimating the adverse selection costs for each underlying stock and matched sample stock before and after the introduction. We use the methods of Lin, Sanger, and Booth (1995) and Huang and Stoll (1997) to calculate adverse selection costs. This research attempt to examine the adverse selection costs for each individual stocks before and after the introduction of E-mini.

Alternatively, a related issue derived from this research project is to examine the impacts on

the volatility of the underlying index after E-mini introduction. We use a GARCH in mean model specification to examine the issue. We examine particularly the impact on risk (volatility) and return of Nasdaq 100 and S&P 500 index after the introduction of E-mini, which might induce more speculative and small traders into the futures market and thus increase the market volatility.

4.   (Results and Discussion)

The market for US equity indexes has traditionally comprised floor-traded index futures contracts and the individual markets for the components stocks. This market ecology has been shaped by the recent development of ETFs and E-minis. The regular and E-mini futures contracts are essentially identical instruments, while the major differences between them are the smaller size of the E-mini contracts and the fact that, as opposed to the regular futures, the E-minis are traded electronically through GLOBEX. Important advantages of E-mini trading that could lead to significant improvements in price discovery include increased speed of execution, timely reporting of fills, transparency of market quote depth, and trader anonymity. The rapid growth of trading volumes of E-minis has demonstrated themselves as one of the most successful products in CME history. The E-mini trading terminals on the CME floor are located in an area adjacent to the trading pits. Floor traders are able to use handheld electronic trading devices to execute trades in GLOBEX while stationed in the pits. Hasbrouck (2002) find that the E-mini futures contracts dominate price discovery in the S&P 500 and Nasdaq-100 indexes. Kurov and Lasser (2004) examine the price discovery process in the S&P 500 and Nasdaq-100 index futures contracts and show that price discovery of trades initiated in the E-mini index and is driven by exchange locals and that the information advantage of locals increases in periods when trading is more active or when order flow is more informative.

The results based on the liquidity of individual stocks before and after the introduction of S&P 500 E-mini do not show particular changes in the liquidity of individual stocks after E-mini introduction. We argue that this might be due to the fact that presented in Ates and Wang (2004). They show that price discovery of E-mini futures differs in each stage and the contribution of price discovery in its early stage is relatively weak. Hence, the liquidity impacts on individual stocks might be insignificant.

Besides, the following related papers are derived from this research and will be forthcoming in an international academic journal. By using a modified univariate conditional volatility model to examine the major indexes in the U.S., the paper finds that the average return on stocks declined following the introduction of trading in E-mini futures contracts. Both in the short-run and the long run, the unconditional volatility declines in the cases of the Nasdaq 100 and Dow Jones indexes following the introduction of E-mini futures contracts, but increases in the case of the S&P 500 index. In general, our results find no pervasive evidence that the introduction of mini-sized electronically traded index futures increases the volatility of the underlying asset. The paper's key results may be summarized as follows. The returns of spot markets following the

introduction to trading in E-mini futures seem to be slightly decreased. Each market exhibits a different day-of-the-week effect. The weekday effect seemed to change after the trading of E-mini futures. In the meantime, we find that, when volatility is higher, the return is also higher. Investigating the short-run and long-run effects, we find that the unconditional volatility has declined following the introduction of E-mini futures contracts for the Dow Jones and Nasdaq-100 indexes, but in the case of the S&P 500 index, it has increased. With regard to the Dow Jones index, the sensitivity to past errors and the persistence of past conditional variances have given rise to the current conditional variance increases. Both in the short run and the long run, the sensitivity of the S&P 500 and Nasdaq-100 indexes to past errors has decreased following the introduction to E-mini futures trading, while the persistence of past conditional variance to current conditional variance has increased. We also observe the existence of asymmetrical responses to news following the introduction of E-mini trading.

Two related working papers that derived from this project are currently under reviewed in international academic journals.

REFERENCES

Ate, A. and G. H. K. Wang, 2004. When size matters: The case of Equity Index Futures, Paper presented at European Financial Management Association Annual meeting June 30 - July 3, 2004, Basel, Switzerland.

Demsetz, H., 1968, The costs of transacting, Quarterly Journal of Economics 82, 33-58.

George, T. J., G Kual, and M. Nimalendra, 1991, Estimating the bid-ask spread and its components: A new approach, Review of Financial Studies 4, 623-656.

Hasbrouck J., 2003, Intraday price formation in US equity index markets, Journal of Finance.

Huang R., and H. R. Stoll, 1997, The Components of the bid-ask spread: A general approach," Review of Financial Studies, 10: 995-1034.

Huang R., and H. R. Stoll, 1996, Dealer versus auction markets: A paired comparison of execution costs on Nasdaq and the NYSE, Journal of Financial Economics, 41: 313-357.

Jegadeesh N. and A. Subrahmanyam 1993, Liquidity effects of the introduction of the S&P 500 index futures contract on the underlying stocks, Journal of Business, 66 April, 171-187.

Kurov A. and D. Lasser, 2002, Price discovery in the E-mini futures market: Is the tail wagging the dog? Journal of Financial and Quantitative Analysis.

Lin, J.-C., G. Sanger, and G. G. Booth, 1995, Trade size and the components of the bid-ask spread, Review of Financial Studies 8, 1153-1183.

Stoll H. R., 1978, The supply of dealer services in securities markets, Journal of Finance 33, 1133-1151.

Stoll H. R., 2000, Friction, Journal of Finance 55, 1479-1514.

Stoll H. R., 2002, Market microstructure, in Handbook of the Economics of Finance.

Subrahmanyam A., 1991, A Theory of Trading in Stock Index Futures," Review Of Financial Studies, vol. 4, no. 1, 1991.

Subrahmanyam A. and H. Choi, 1994, Using intraday data to test for effects of index futures on the underlying stock markets, Journal of Futures Markets, May.

Wang G. H. K., and A. Ates, 2001, Information transmission and electronic versus open outcry trading systems: An intraday analysis of E-Mini S&P Futures, S&P 500 index futures and S&P 500 cash index, Paper presented at 12th Annual Asia-Pacific Research Symposium.