

科技部補助專題研究計畫成果報告 期末報告

自我宣告之當沖交易人對期貨市場價格發現之影響

計畫類別：個別型計畫
計畫編號：MOST 106-2410-H-003-012-
執行期間：106年08月01日至107年07月31日
執行單位：國立臺灣師範大學管理研究所

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中文摘要：本研究利用台灣期貨交易所的當沖保證金規定，將當沖交易分為自我宣告之當沖交易及非自我宣告之當沖交易，並進一步分析自我宣告對當沖交易行為及期貨市場價格發現的影響。本研究發現，自我宣告之當沖交易無法提高期貨市場的價格發現，而非自我宣告之當沖交易則可以顯著提高期貨市場的價格發現。在不同投資人群組中，國外法人似乎擁有較佳的能力和紀律，故其自我宣告之當沖交易對價格發現仍有正向的影響；國內自然人之非自我宣告當沖交易亦對價格發現有正向的影響。此外，當沖交易在波動度高或是有新資訊產生的時期，對價格發現的正向影響會顯著增加。

中文關鍵詞：期貨市場；當沖交易；價格發現；資訊份額

英文摘要：Using a natural experiment of the futures market where day traders are self-declared ex ante, this paper investigates whether day traders can enhance price discovery at the market level. Self-declared day traders do not improve price discovery measured by information share; discretionary traders, who are not self-declared as day traders, improve price discovery. Heterogeneous day traders have differential effects on price discovery. Among self-declared day traders, foreign institutions increase information share; among discretionary day traders, individual investors increase information share. Last, day traders have more positive impacts on price discovery during periods of high volatility and arrival of new information.

英文關鍵詞：futures market; day trading; price discovery; information share

DO DAY TRADERS IMPROVE PRICE DISCOVERY?

EVIDENCE FROM THE FUTURES MARKET

Using a natural experiment of the futures market with institutional classification of day trading (where day traders are self-declared *ex ante* to benefit from low margin requirement), this paper examines whether day traders can enhance price discovery at the market level. Day trading refers to a type of trading activity in which traders actively buy and sell the same financial assets throughout a trading day to capture small profits on each trade. Day traders generally close out their positions by the end of each trading day to avoid the risk associated with changes in asset prices during non-trading hours. Day traders, given their short investment horizon, are often viewed as speculators in the literature [see, e.g., Barber, Lee, Liu, and Odean (2014)]. Existing studies relying on *ex post* identification of day traders find mixed evidence on day traders' performance [Kuo and Lin (2013)].¹ The tension of whether day traders are noise traders or informed traders² and the implications of day trading on overall market efficiency and price discovery are relatively underexplored in the literature.

This study is motivated by the above literature gaps and ongoing debate related to the role of day trading in financial markets. We address the following question that is rarely documented in the existing literature: *do day trading activities contribute to price discovery of the financial markets?* Using proprietary data in the Taiwan Futures Exchange (TAIFEX) that features

¹ As argued by Kuo and Lin (2013), existing studies such as Harris and Schultz (1998), Jordan and Diltz (2003), Garvey and Murphy (2004, 2005), Linnainmaa (2005), and Barber, et al. (2014) rely on *ex post* identification of day traders, which may contaminate the observation of day traders' motives and performance. Further, Linnainmaa (2011) shows that day traders' realized returns are significantly downward-biased measures of their true abilities.

² If day traders trade in the same manner as other traders, except for a shorter holding period, day trading activity should affect the market no more than the "normal" impact of trading volume. However, if they are more (less) informed or skilled, or if they exhibit herding behavior, they may exert significant influences on the market.

institutional classification of day trading, this paper examines the implications of day trading intensity on price discovery. The market setting of the TAIEX Futures (TX), contracted on Taiwan Stock Exchange Capitalization Weighted Stock Index (TAIEX), provides an ideal experiment to examine the market-level impacts of different types of day traders on price discovery. Importantly, the TAIEX experiment has distinctive institutional features that offer a natural classification of day trading: i.e., “self-declared” day trading vs. “non-declared” (discretionary) day trading.³ Since October 8, 2007, the TAIEX has employed a margin requirement policy that reduces the required margin by half for day trades. One of the motivations of this margin policy change is to provide a stimulating mechanism that enhances market trades and liquidity. In the TAIEX, self-declared day trading requires investors to indicate their orders as day-trading orders at submission to enjoy the low margin requirement.⁴ In other words, investors literally identified themselves as day traders *ex ante* by placing orders that are self-declared as day-trading orders.⁵

The crux of the price discovery role of day trading lies with the heterogeneity of day trader types. The natural classification of day trading in the TAIEX provides a salient feature (e.g., observable measures of different types of day traders) to empirically verify whether (and which types of) day traders can contribute to price discovery of the market. First, we examine the relation between day trading intensity and price discovery (measured by information share à la Hasbrouck (1995)) for self-declared day traders vs. non-declared discretionary day traders. We find that trading intensity of self-declared day trader does not improve price discovery measured by information share. This result suggests that aggressive day traders may be noise traders. In contrast, non-declared discretionary day traders, who are not confined to day trading, improve price discovery through their trading intensity.

³ Self-declared day trading requires investors to indicate their orders as day-trading orders when placed. In contrast, non-declared day traders are not subject to this requirement but they can still perform day trading at discretion.

⁴ The position resulting from executed day-trading orders is obliged to be closed out by 1:30 PM, 15 minutes before the market close. Otherwise, the position would be forced to close by a market order or a limit order that is within five ticks of the latest market price.

⁵ As shown by Kuo and Lin (2013), the policy implemented in the Taiwan futures market that provides a clear-cut way to identify day traders *ex ante* and the day traders’ commitment *ex ante* to liquidation makes them ideal candidates for studying the overconfidence hypothesis.

Second, we document differential impacts of heterogeneous day traders on price discovery. Self-declared day trading by foreign institutions has the greatest positive impact, indicating that foreign institutions that commit to day trades in advance are likely to be informed and competent. In contrast, self-declared day trading by domestic institutions has a negative impact on information share, indicating that domestic institutions that declare themselves to conduct day trades in advance are likely to be overconfident and noise traders. In terms of economic magnitude, self-declared trading by foreign institutions improves information share with a magnitude of +2.27%; in contrast, self-declared trading by domestic institutions reduces information share with a magnitude of -2.51%.

In comparison to self-declared day traders, discretionary day traders, who are individual investors, improve price discovery with a magnitude of +4.22%. Moreover, the trading experience of day traders also matters for price discovery. Self-declared day trades conducted by non-frequent (inexperienced) traders reduce information share with a magnitude of -3.19%, indicating that inexperienced investors who commit day trades in advance are likely to be overconfident and noise traders.

Third, we examine the relation between information share and day trading intensity for different market conditions. Given that day traders are likely speculators who can benefit from larger intraday volatility, we test the hypothesis that the relation between day trading and price discovery is strengthened during periods of high volatility – i.e., day traders may apply their superior fundamental information to speculation activities when they find a profitable opportunity during high-volatility periods.⁶ We find that self-declared day traders have a negative impact on information share for days with low market volatility while the impact is positive for days with high market volatility. For discretionary day traders, the impact of information shares is positive and significant during the period of high volatility. Furthermore, we find that discretionary day

⁶ See Section IV.C. When day traders commit to day trading transaction *ex ante*, they are unsure about the volatility of the remaining trading session and hence subject to the volatility risk. In contrast, discretionary investors are not pressured to close their position early and may find better opportunities to close positions with profits in high-volatility periods.

trading has a significant and positive impact on information share during periods of large absolute-returns, which reflects the consequence of new information arrival.⁷ Overall, our results suggest that certain types of day trading investors contribute to price discovery, possibly through their superior information acquisition and trading strategies.

This study provides the following contributions. First, the existing literature that examines day trading and price discovery in financial markets is limited. This research features a natural experiment with comprehensive account-level transaction data in the futures market, allowing us to observe and stratify different types of day traders. Based on this unique dataset, we examine day trading intensity (for different types of day traders) and their contributions to price discovery. Our futures market experiment provides a granular approach (supported by unique institutional features) to identify different day trading activities, i.e., our experimental design based on Taiwan futures market provides two clear-cut definitions of day trading: self-declared vs. non-declared (discretionary) day trades. Thus, this research sheds new light on understanding the nature of day trading behavior and the impact of day trading on financial market efficiency.⁸

Importantly, this research provides contributions to both the academic literature and derivatives market policies that address the economic roles of day trading and the resultant impact on financial markets. Our findings shed new light on understanding the impact of day trading stimulating rules or policies (such as reduction in margin) on information efficiency and price discovery of the futures markets. Our findings demonstrate the economic effects of day trading on price discovery and provide a policy analysis of a derivatives market regulation that reduces margin requirement for day traders who self-declared *ex ante*. Particularly, we present new evidence that different types of day traders, encouraged by the stimulating mechanism (such as reduction in margin), have heterogeneous effects on the price discovery of the market. The findings

⁷ See Section IV.D. We examine whether day traders, who contribute to price discovery more significantly during periods of large absolute-returns (arrivals of new information), are likely to be investors with superior information.

⁸ In contrast to existing studies (such as Kyröläinen (2008) and Chung, Choe, and Kho (2009)) that focus on the relation between day trading and volatility, our findings provide new insight on understanding whether day trades can accentuate or deter price discovery.

of this research also contribute to the design of regulatory policies and exchange trading rules (Cumming, Johan, and Li (2011); Budish, Cramton, and Shim (2015)) and the involvement of financial institutions in trading speed and technology (Biais, Foucault, and Moinas (2015)).

Our study is related to Kuo and Lin (2013) but differ in the following aspects. First, our study focuses on market-level analysis and implications of day traders on price discovery. Although Kuo and Lin (2013) suggest that overconfident investors lose money, it is unclear whether these investors have positive or negative impacts on price discovery. By examining the aggregate impacts of different types of day traders on price discovery at the market-level, our study sheds light on overall market-level and policy analysis. Second, while Kuo and Lin (2013) focus on self-declared day trades, their sample may represent a small sample of all day traders (i.e., among all day traders, only 10% of day traders are self-declared).⁹ In contrast, our study examines both self-declared and non-declared day traders (i.e., some investors made day trades without identifying themselves as day traders *ex ante*) and covers a longer time period (e.g., Kuo and Lin (2013) cover a 1-year sample from October 2007 to September 2008; our sample period covers October 2007 to December 2012). Third, our study differs from Kuo and Lin (2013) by highlighting the importance of heterogeneous day traders.¹⁰ Our results show that self-declared day traders foreign institutions improve information share but self-declared domestic institutions do not.

Our research differs from Barber, et al. (2014) by focusing on futures rather than stock markets. The futures market provides a different and potentially more important setting in examining day traders because the futures market can be a better market for day trading – i.e., the

⁹ While our study and Kuo and Lin (2013) both provide a clean test that identify day traders *ex ante*, our study differs from Kuo and Lin (2013) by comparing the *ex ante* and *ex post* identifications of day traders: i.e., we compare day traders who are identified *ex ante* vs. day traders who do not commit for day trading *ex ante* but still perform day trading activities. Our experiment contains a larger and more comprehensive sample in the futures market with considerations of heterogeneous types of day traders.

¹⁰ In contrast, Kuo and Lin (2013) look only at the institution as a whole, and they focus on the profitability of day traders. Additionally, Chou and Wang (2011) examine a unique dataset from the Taiwan Futures Exchange that records all account-level trades and orders. Similar to our study, their data and methodology have the advantage of being able to empirically differentiate different types of traders. In contrast to Chou and Wang (2011), who focus on behavioral biases of traders, we examine implications of heterogeneous day traders on price discovery.

futures market is a zero-supply market and may provide a more cost-effective setting for day traders to take a long or short position. In contrast, it may be more difficult for day traders to create a short-selling position in the stock market when there is a short-selling constraint (which is often the case in emerging markets) that affects the cost of day trading. Our research also differs from Barber, et al. (2014) with respect to the underlying asset. While Barber, et al. (2014) focus on the stock market with fundamental information of different listing companies, our research looks at index futures, which are not affected by firm-level information asymmetry.

Our research is related to Chou, Wang, and Wang (2015), who use the Taiwan index futures market to examine the investment strategies of individual day traders as well as their impact on market liquidity and volatility. Our research differs from Chou, et al. (2015) in the following ways. Chou, et al. (2015) examine the impact of day trading on market liquidity and volatility but our research focuses on examining how day traders' trading intensity affects price discovery. Importantly, our research provides a better controlled analysis of day trading. Unlike Chou, et al.'s setting that rely on *ex post* identification day trading, our research features a clean definition of day trading *ex ante*, which explicitly incorporates the regulatory features in identifying day traders and whether day traders facilitate information flow in the market. Although day traders are generally assumed to be speculators in the literature, our findings reveal that certain day traders may in fact provide contributions to price discovery.

Last, this research provides a boarder contribution to the recent literature and emerging economic theories on high-frequency trading, such as implications of fast traders in financial markets (Biais, et al. (2015)), performance of high-frequency traders (Baron, Brogaard, Hagströmer, and Kirilenko (2016)), and microstructure effects of high-frequency trading arms race (Budish, et al. (2015)). Our findings highlight the importance of heterogeneity of high-frequency traders and their differential roles in price discovery at the aggregate market level.

Overall, this paper is motivated by the academic literature and ongoing policy related to day trading in financial markets. Using a natural ex periment of the Taiwan futures market with

institutional classification of day trading (where day traders are self-declared *ex ante*) and comprehensive account-level transaction data, this paper is among the first to examine the implications of day trading intensity on price discovery of the futures market. Our experiment examines the competing views on whether day traders, given their short investment horizon, are noise traders or they are informed traders that can enhance price discovery at the market level.

Overall, we find that self-declared day traders in general do not improve price discovery, consistent with the notion that aggressive day traders are noise traders and subject to overconfidence. In contrast, discretionary traders, who are not confined to day trading, improve price discovery through their day trading. By stratifying investors into different types of day traders, we find that discretionary day trading made by individual investors has a positive and significant impact on price discovery of the futures market. Among self-declared day traders, foreign institutions have a statistically and economically significantly positive impact on price discovery; on the contrary, domestic institutions have a significantly negative impact on price discovery. Moreover, self-declared day trading made by non-frequent (inexperienced) investors has a significantly negative impact on information share. Furthermore, certain types of day traders have positive impacts on price discovery when the futures market experiences high volatility and the arrival of new information. Both self-declared and discretionary day traders have positive impacts on information share during the periods of high volatility. Discretionary day trading has a significant and positive impact on information share during the periods of large absolute-returns.

Our study also provides a policy analysis of a rule that reduces the margin requirement for day traders who self-declared *ex ante*. We examine the impact of such a day trading stimulating rule on the information efficiency of the financial markets. The TAIEX experiment provides an ideal setting to evaluate whether the rule of the lower margin requirement stimulates trading volume from day traders and enhances the information efficiency of the market. Paradoxically, the benefits of day trading, such as liquidity and price discovery proposed in the margin reduction policy, seem to contradict the existing academic literature that day trading is associated with losses

and noise traders. Particularly, our findings demonstrate the differential impacts of day trades conducted by various investor groups encouraged by the stimulating mechanism (introduced by the margin policy) on price discovery of the futures market.

To conclude, our findings provide new insight that the policy measure (i.e., reduction in the margin requirement) might be more suitable for markets participated in by sophisticated institutional investors.¹¹ Our analysis can provide a policy springboard for other financial market settings; e.g., financial market policies that reduce margin requirements and stimulate trades in high frequency, etc. However, as non-frequent traders contribute for a sizable part of the investor universe in emerging markets and non-frequent (inexperienced) traders reduce information share due to a lack of experience in the market dynamics, our research also calls for improving financial education and trading simulations for these markets.

¹¹ Our findings suggest that the policy measure that attempts to encourage liquidity could have a downside. An increase or decrease in margin requirements will affect the behavior of investors, liquidity, volume, and information share. For the Taiwan futures exchange, retail investors represent more than half of the market volume – this policy measure might reduce efficiency of the market. Our findings suggest that the effect of domestic institutions is not positive on price discovery.

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106年度專題研究計畫成果彙整表

計畫主持人：蔡蒔銓			計畫編號：106-2410-H-003-012-				
計畫名稱：自我宣告之當沖交易者對期貨市場價格發現之影響							
成果項目			量化	單位	質化 (說明：各成果項目請附佐證資料或細項說明，如期刊名稱、年份、卷期、起訖頁數、證號...等)		
國內	學術性論文	期刊論文		0	篇		
		研討會論文		0			
		專書		0	本		
		專書論文		0	章		
		技術報告		0	篇		
		其他		0	篇		
	智慧財產權及成果	專利權	發明專利	申請中	0	件	
				已獲得	0		
			新型/設計專利		0		
		商標權		0			
		營業秘密		0			
		積體電路電路布局權		0			
		著作權		0			
		品種權		0			
		其他		0			
	技術移轉	件數		0	件		
		收入		0	千元		
	國外	學術性論文	期刊論文		0	篇	
			研討會論文		1		已在數個國內及國際研討會發表
			專書		0	本	
專書論文			0	章			
技術報告			0	篇			
其他			0	篇			
智慧財產權及成果		專利權	發明專利	申請中	0	件	
				已獲得	0		
			新型/設計專利		0		
		商標權		0			
		營業秘密		0			
		積體電路電路布局權		0			
		著作權		0			
		品種權		0			
其他		0					

	技術移轉	件數	0	件	
		收入	0	千元	
參與計畫人力	本國籍	大專生	0	人次	聘任跨校多名碩士生，提供相關研究、程式、大數據、資料庫管理等訓練，並提供團隊合作的成功經驗與機會，對學生未來就業及發展有很大的助益。
		碩士生	8		
		博士生	0		
		博士後研究員	0		
		專任助理	0		
	非本國籍	大專生	0		
		碩士生	0		
		博士生	0		
		博士後研究員	0		
		專任助理	0		
其他成果 (無法以量化表達之成果如辦理學術活動、獲得獎項、重要國際合作、研究成果國際影響力及其他協助產業技術發展之具體效益事項等，請以文字敘述填列。)					

科技部補助專題研究計畫成果自評表

請就研究內容與原計畫相符程度、達成預期目標情況、研究成果之學術或應用價值（簡要敘述成果所代表之意義、價值、影響或進一步發展之可能性）、是否適合在學術期刊發表或申請專利、主要發現（簡要敘述成果是否具有政策應用參考價值及具影響公共利益之重大發現）或其他有關價值等，作一綜合評估。

1. 請就研究內容與原計畫相符程度、達成預期目標情況作一綜合評估

達成目標

未達成目標（請說明，以100字為限）

實驗失敗

因故實驗中斷

其他原因

說明：

2. 研究成果在學術期刊發表或申請專利等情形（請於其他欄註明專利及技轉之證號、合約、申請及洽談等詳細資訊）

論文： 已發表 未發表之文稿 撰寫中 無

專利： 已獲得 申請中 無

技轉： 已技轉 洽談中 無

其他：（以200字為限）

3. 請依學術成就、技術創新、社會影響等方面，評估研究成果之學術或應用價值（簡要敘述成果所代表之意義、價值、影響或進一步發展之可能性，以500字為限）

探討當沖交易與市場價格發現關係的文獻十分有限，本研究利用當沖保證金的規定作為自然的分類，分析當沖交易是否自我宣告對市場價格發現不同的影響，並探討不同投資人群組的過度自信。本研究在學術上對當沖交易、市場效率性、行為財務學提供新的實證分析，其結果對投資人從事當沖交易及主管機關管理當沖交易亦頗具參考價值，尤其是對目前主管機關金管會及期貨交易所針對當沖交易的相關規定及保證金放寬的妥適性，提供進一步的市場實證分析資料。

4. 主要發現

本研究具有政策應用參考價值： 否 是，建議提供機關

（勾選「是」者，請列舉建議可提供施政參考之業務主管機關）

本研究具影響公共利益之重大發現： 否 是

說明：（以150字為限）