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農曆新年與反處置效應†

The Chinese Lunar New Year and Reverse Disposition Effect

傅小芃 *Hsiao-Peng Fu*
靜宜大學財務金融學系
Department of Finance,
Providence University

謝舒帆 *Shu-Fan Hsieh**
國立高雄第一科技大學金融系
Department of Money and Banking,
National Kaohsiung First University of Science and Technology

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* Corresponding Author: Shu-Fan Hsieh.

摘要

農曆新年在中華文化具有一元復始，萬象更新的象徵。本文假設投資人賣出股票的投資決策，亦受這文化象徵影響。根據Ingersoll & Jin (2013) 建立的反處置效應模式，本文假設投資人在年前可能賣出較多帳面虧損的股票，卻賣出較少帳面獲利的股票──一種反處置效應行為。如此，虧損股票在年後可以重新建立部分，好處是新的參考價格可能較舊部位的參考價格為低。於是，增加未來賣出部位時的獲利可能性。也就是在年前認賠，俾股票投資績效在年後展開新局面。本文實證結果和預期相同，即發現購買帳面獲利股票及同時賣出帳面虧損股票的投資策略在年後平均將導致顯著損失。相對而言，該投資策略在年前僅有不顯著的損失。最重要的，該投資策略年後的損失主要來自帳面虧損股票的價格反轉。可見年後帳面虧損股票上漲的幅度較帳面獲利股票為高，同時隱含年前前者較後者面臨較大賣壓。鑑於實務上觀察發現，農曆年前有資金需求強烈的現象，本文假設前期M1B減少的愈嚴重，代表短期資金供給愈不足，則上述反處置效應行為愈強烈。再者，考慮共同基金可能在年底有增加持股(portfolio pumping)的行為，以推升其持股較重股票的股價。此買盤可能會抵銷處置股票的賣盤，故本文假設共同基金持股水準愈高，上述反處置效應愈弱。上述二假設都獲得證實，同時相關結果無法由Fama & French (1993) 的風險三因子解釋之。

關鍵詞：反處置效應、農曆新年、季節性、假日效應

Abstract

The Chinese Lunar New Year (CLNY) traditionally symbolizes a fresh start, including for investment performance. Therefore, we assume the presence of a reverse disposition effect prior to the CLNY in the Taiwanese stock market, that is, investors are more willing to sell losers than winners to reset the reference prices of losers so as to realize gains in future as predicted by Ingersoll & Jin (2013).

Consistent with the predictions, we find that the arbitrage portfolios of longing paper-winners and shorting paper-losers generate significantly negative returns in the post-CLNY period but the portfolios yield only weak negative returns in the pre-CLNY period. More importantly, this strong negativity is primarily attributable to a price reversal of losers. Furthermore, we use the lagged change of M1B to inversely proxy for the necessity to sell stocks to satisfy the customary liquidity demands prior to the CLNY and thereby hypothesize an inverse relationship between the money supply and the reverse disposition effect. Moreover, we assume that mutual fund holdings are negatively associated with the effect because (due to year-end portfolio pumping behaviors) mutual funds provide a buying force against the aforementioned selling forces. Consistent with the assumptions, the evidence indicates that a significant negative arbitrage return is observed during the post-CLNY period when there is a decreased lagged change in M1B and for stocks with low or medium levels of mutual fund holdings. The conditional negative arbitrage returns survive tests of the three risk factors identified by Fama & French (1993).

Keywords: Reverse Disposition Effect, Chinese Lunar New Year, Seasonality, Holiday Effect

1. INTRODUCTION

The pioneering work by Shefrin & Statman (1985) reported the tendency of investors to hold on winners for too short a time and on losers for too long a time, i.e., the disposition effect.[1] Recently, the opposite behavior has been found; market

[1] The disposition effect has been found among investors in stock markets of the U.S. (Odean, 1998; Cici, 2012), Israel (Shapira & Venezia, 2001), Finland (Grinblatt & Keloharju, 2001), Australia (Brown et al., 2006), China (Feng & Seasholes, 2005; Chen et al., 2007), and Taiwan (Barber et al., 2007), among others. The effect has also been detected in settings other than stock markets, such as in futures markets (Coval & Shumway, 2005; Cheng et al., 2013), in exercising of stock options by executives (Heath et al., 1999), and in real estate sales (Genesove & Mayer, 2001). Further, some empirical evidence documents a role of the disposition effect in driving market anomalies of, for example, price momentum (Grinblatt & Han, 2005; Li & Yang, 2013) and post-earnings-announcement drift (Frazzini, 2006).

participants are more inclined to sell losers than winners, i.e., the reverse disposition effect. Among others, Grinblatt & Han (2005) confirm the reverse disposition effect and argue that it is stimulated by tax-loss selling behaviors in December.[2] However, there is no capital gain tax in the Taiwanese stock market. Therefore, we examine whether factors other than the tax-loss selling may also instigate a reverse disposition effect in the tax-free market. Specifically, we observe whether the selling behavior prior to the Chinese Lunar New Year (CLNY) induces the effect. According to the realization utility model presented in Ingersoll & Jin (2013), a reverse disposition effect surfaces when selling losers benefits investors by resetting reference prices and thereby increasing the possibility of realizing gains in future.[3] Hence, the willingness to sell losers (instead of winners) increases when the potential benefits outweigh the negative utility of selling at a loss. The outweighing is possible since the positive marginal utility of small gains is large. In traditional Chinese culture, the CNLY symbolizes a fresh start, including that associated with investment performance. Therefore, in this paper, we empirically test Ingersll and Jin's argument by examining whether the investors who are primarily ethnically Chinese would be more likely to sell paper-losing stocks than paper-winning stocks prior to the CLNY to reset reference prices of losers and to enhance the chances of realizing gains subsequent to the CLNY. Among the five Asian stock markets with a large proportion of ethnic Chinese investors, the Taiwanese stock market is our focus since it has the third largest trading value in the five Asian markets.[4] Besides, it is also the world's sixteenth largest market in terms of trading volume.[5]

In addition, we examine another phenomenon prior to the CLNY that might influence the selling of stocks, that is, the traditional increases in liquidity demands prior to the CLNY. Empirical evidence has confirmed the existence of an increased

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[2] Other empirical evidence for the reverse disposition effect can be found in studies such as Kraus et al. (2009), Talpsepp (2011), and Ben-David & Hirshleifer (2011).

[3] Among others, the annual gain/loss model presented in Barberis & Xiong (2009) can also explain the reverse disposition effect. However, their rationale for the effect is less relevant to the CLNY analysis in this paper.

[4] The trading values of the five stock markets with large proportions of ethnic Chinese investors are ranked as follows: China, Hong Kong, Taiwan, Singapore, and Malaysia (p. 69, *The Economist Pocket World in Figures*. London: Profile Books, 2013).

[5] See p. 69, *The Economist Pocket World in Figures*. London: Profile Books, 2013.

liquidity demand prior to the CLNY and a resulting weaker January effect in the market (Chien & Chen, 2007). The strong liquidity demands are driven by several factors. First, a number of traditional expenditures arise before the CLNY, including the repayment of all debts by the beginning of a new year, payment of annual bonuses to employees, purchases of gifts and groceries for the largest annual festival, travelling expenditures to winter resorts during the longest national holiday, and pocket money given to junior relatives and friends on the eve of the CLNY (Tong, 1992). Although some behaviors only transfer money from one person to another, investors' heterogeneity in wealth allocation is likely to continue to introduce strong liquidity demands prior to the CLNY. Second, during the holidays, the Taiwanese stock market is closed for the longest period of the year. For example, the CLNY holidays during the period of 2010-2014 ranged from five to nine days of which the stock market was closed for three to five trading days.[6] Consequently, investors are expected to liquidate stock positions prior to the longest holiday to mitigate financial risk because stock markets abroad remain open despite the closure of the domestic stock market. Finally, this market is well known for its high trading volume and for its domination by individual investors.[7] This indicates that a large proportion of Taiwanese investors are frequent traders who frequently and closely monitor the market (Barber & Odean, 2013). As a result, frequent traders are likely to liquidate stock positions prior to the holiday because they cannot closely monitor the market and thus have little control over the performance of their investments.

Turning to the issue of measuring strength of the liquidity demands prior to the CLNY, it is difficult to directly measure the liquidity demands. Therefore, we use a short-term aggregate money supply indicator, i.e., M1B, as a proxy for the

[6] According to government regulations for national holidays, there are at least five holidays for the CLNY. That is, the holiday starts on the eve of the CLNY and ends on the third day after the CLNY, plus the preceding day prior to the eve when that day is a Monday and the day following the third day when that day is a Friday.

[7] As shown in Table 1, the mean turnover ratio is 3.94% per week or 204.88% per annum. The proportion of shares held by retail investors averaged approximately 44.42% at end of the year from 2001 to 2013. During the same time period, their trading volume accounts for approximately 76% of the total trading value in the market. Apparently, retail investors trade more frequently than other types of investors in the market (Taiwan Stock Exchange, *Annual Statistics Report*, 2003, 2008, and 2014).

necessity to sell stocks to satisfy the increased liquidity demands. By definition, M1B consists of currency, demand deposits and savings in checking accounts. We assume that the necessity to satisfy liquidity demands are strong if the *ex-ante* short-term money supply is relatively low. The rationale is that a low lagging short-term money supply reflects a low money supply prior to the current period. The low money supply therefore causes investors to withdraw money from the stock market to meet their liquidity demands. Actually, we use the lagged *change* of M1B to measure whether the lagged money supply is in a relatively low level. In sum, we expect that a decreased (increased) lagged change in M1B is associated with strong (weak) necessity to liquidate stocks prior to the CLNY.

In the existing financial economic literature, controversial empirical results exist regarding the lead-lag association between money supply and stock prices. Some studies observe a relationship, while others do not detect a relationship. Among other authors, Ho (1983) finds a lead-lag connection between M1 (as well as M2) and stock indices in Japan and the Philippines, as well as similar evidence for M2 in Hong Kong, Australia and Thailand. Lastrapes (1993, 1998) detects responses of stock prices to shocks in the money supply in the G7 countries and the Netherlands during the post-war period. Ariff et al. (2012) report a lead-lag link between the money supply and stock prices in Canada. In contrast, Wu (2001) finds no role for the money supply (in terms of either M1 or M2) in leading the Straits Times Industrials Index in Singapore. Similar evidence for no relationship has been reported in the South Korean stock market by Kwon & Shin (1999). Unlike existing studies that generally consider the impact of the money supply on stock returns, this is the first analysis of the relationship between money supply and a reverse disposition effect, i.e., a market anomaly.

Further, we consider a mitigating factor in the reverse disposition effect. That is, the end-of-year performance evaluation mechanisms of mutual funds can induce a buying strategy (as opposed to the aforementioned selling strategy by investors) of mutual funds for their heavily held stocks, or portfolio pumping (Carhart et al., 2002; Ng & Wang, 2004; Hu et al., 2014), particularly for paper-losing stocks (Cici, 2012). As a result, we expect that the reverse disposition effect would deteriorate for stocks with high mutual fund holdings.

We utilize the cost-based estimation of paper gains developed by Grinblatt & Han (2005). They assume and empirically confirm that the reverse disposition effect occurs in December in the U.S., when investors sell more paper-losing stocks than paper-gaining stocks due to a tax-saving rationale. As a result, a stronger price reversal of paper losers (as compared with price reversals of paper winners) occurs in the subsequent month of January. Therefore, in the present study, we expect the heavier selling of paper losers than paper winners prior to the CLNY would be followed by a stronger future price reversal of paper-losers than paper-winners during the post-CLNY period. In other words, we anticipate reversals of stock prices starting in the trading days following the national holiday. However, it is difficult to identify exactly when the liquidity (or the heavier selling of paper losers) begins. We therefore hypothesize that the reversals occur strongly during the post-CLNY period in January and February (because the CLNY occurs in either January or February), whereas the reversals are weak during the pre-CLNY period in January and February in terms of economic magnitude and/or statistical significance.

As expected, during the post-CLNY period in January and February, the arbitrage strategy yields a significant negative return, primarily due to a price reversal of paper losers. In contrast, the counterpart returns are only weakly negative over the pre-CLNY period and positive from March to December. Furthermore, consistent with the assumptions, the evidence shows that a significant negative arbitrage return is observed during the post-CLNY period when there is a decreased lagged change in M1B and for stocks with low or medium levels of mutual fund holdings. Additionally, the conditional negative arbitrage returns survive tests of the three risk factors identified by Fama & French (1993).

The research most similar to our analysis is the study conducted by Chien & Chen (2008). They observe that Taiwanese investors are prone to the disposition effect in January when the market index in the prior December is in a upward trend, i.e., the market return in the prior December is higher than the mean return in the rest months of the year. The rationale is that risk aversion is induced by an overall gain in prior December and thereby the disposition effect happens in the coming January. The primary difference between our analysis and that of Chien & Chen

(2008) is that we take into account the cultural factors associated with the CLNY and find the presence of the *reverse* disposition effect as opposed to their findings of the existence of the disposition effect.

A stream of behavioral finance literature investigates the role of cultural factors in determining prices of assets. For instance, Chui et al. (2010) contend an association between individualism and overconfidence/self-attribution. They further confirm that price momentum is stronger in stock markets with individualistic cultures than in stock markets with collectivistic cultures due to higher overconfidence/self-attribution inherent from individualism. Our analysis contributes to this line of literature by exploring the influence of the Chinese culture in triggering the reverse disposition behaviors prior to the CLNY period. Consequently, to the best of our knowledge, the present study is the first attempt to formally test the influence of the CLNY in triggering the reverse disposition effect. We thereby shed further light on the determinants of the effect and confirm the predictions of the realization utility model in Ingersoll & Jin (2013). Despite growing evidence confirming the existence of the reverse disposition effect, few papers have investigated the rationale behind this effect. We report a new rationale: voluntary sales at a loss prior to the CLNY associated with “fresh start” cultural symbolism. The potential driving forces that have been proposed in the literature include, for example, the January effect stemming from tax-related selling in December (in the U.S.) (Grinblatt & Han, 2005), high expected returns (Barberis & Xiong, 2009), trading with short investment horizons (Barberis & Xiong, 2009), and trading from foreign investors (in Estonia) (Talpsepp, 2011). Our findings on the reverse disposition effect imply that the effect may be a general phenomenon in global stock markets but that its cause is market-specific. This insight could be helpful not only for academics in modeling the reverse disposition effect but also for practitioners in developing trading strategies.

Existing CLNY studies generally pay attention to higher returns around the CLNY.[8] Therefore, we also contribute to the CLNY literature by exploring a new

[8] The CLNY effect research includes Ho (1990), Wong et al. (1990), Cadsby & Ratner (1992), Yen & Shyy (1993), Claessens et al. (1995), Mougoue (1996), Ahmad & Hussain (2001), Yen et al. (2001), Gao & Kling (2005), McGuinness (2005), Ong (2006), McGuinness & Harris (2011), and Abidin et al. (2012).

phenomenon, namely the seasonal reverse disposition effect. This new CLNY effect could apply to other countries that also celebrate the CLNY, such as China, Hong Kong, Malaysia, and Singapore.

The remainder of this study is organized as follows. The second section describes the data and methodology. The third section presents the empirical results. The final section concludes the paper.

2. DATA AND METHODOLOGY

Our sample includes common stocks listed on the Taiwan Stock Exchange (TAIEX) from January 1, 2001, to August 1, 2014 due to the availability of mutual fund holdings. We obtain all of the data from the *Taiwan Economic Journal*. We exclude stocks with prices below five New Taiwan Dollars or market capitalizations in the lowest 0.5% of the population to decrease micro-structural effects, illiquidity, and thin trading issues (Bhootra & Hur, 2012). Additionally, following Grinblatt & Han (2005), we compute paper gains at weekly intervals to improve the estimation accuracy based on monthly data and to reduce the potential bid-ask bias induced by daily data.

Equations (1) and (2) are used to compute the cost-based aggregate reference price.

$$P_t^r = \frac{1}{k_t}\sum_{n=1}^{J}(V_{t-n}\prod_{\tau=1}^{n}[1-V_{t-n+\tau}])\times P_{t-n} \tag{1}$$

$$k_t = \sum_{n=1}^{J}(V_{t-n}\prod_{\tau=1}^{n}[1-V_{t-n+\tau}]) \tag{2}$$

Here, P_t^r is the reference price for individual stocks at the end of week t, namely the date of portfolio formation; J is the number of formation weeks for paper gains, i.e., 26, 52 and 156 weeks;[9] and V_t is the turnover at week t. In equation (1), the

[9] In the U.S., Grinblatt & Han (2005) used formation horizons of three, five, and seven years to estimate paper gains. However, we use formation periods shorter than those in the US study because Kuo (2008) conducted a survey of investors in Taiwan and found that the majority of the surveyed investors closed their positions within one year. Consequently, in this study, the formation periods are 26, 52, and 156 weeks.

term in parentheses adjacent to the summation mark and before P_{t-n} is the probability that the stock is purchased at price P_{t-n} and is still held at week t.

The paper gains of individual stocks are estimated using equation (3).

$$g_t = \frac{P_{t-1} - P_t^r}{P_{t-1}} \tag{3}$$

Here, g_t is paper gains; P_t^r is the reference price estimated using equations (1) and (2); P_{t-1} is the stock price at the end of week t–1. Skipping one week between the date of the reference price and the date of the stock price helps us to avoid market microstructure issues, such as the bid-ask spread (Blume & Stambaugh, 1983; Grinblatt & Han, 2005).

At the end of each week t, we construct quartiles on the basis of g; that is, portfolios of G1 and G4 consist of stocks with the lowest and highest paper gains, respectively. Portfolios with fewer than five stocks are dropped (Chui et al., 2003). The holding period is one week. To facilitate calendar month analysis, a holding week is categorized into a calendar month based on the ending date of the week. Holding weeks in January and February are partitioned into pre- and post-CLNY weeks, where the former (later) weeks are those before (after) the CLNY. For comparison purposes, we compute both equally- and value-weighted portfolio returns. To test for the potential cause of the reverse disposition effect, we form two-variable portfolios based sequentially on mutual fund holdings and paper gains. Further, the holding weeks for the pre-CLNY (or post-CLNY) period are divided into two sub-periods (i.e., the decreased and increased lagged M1B periods) with the mean lagged change of M1B as the breakpoint. In addition to the portfolio approach, we conduct a regression analysis based on individual stock returns to assess the results of the portfolio approach.

Table 1 reports summary statistics for all of the variables. The mean paper gain is negative for each of the three estimation periods (i.e., 26, 52 and 156 weeks), indicating that investors who hold stocks on average suffer from a paper loss during the sample period. Of the three estimation periods for paper gains, the 52-week interval is most frequently used in this paper. Among the unreported statistics, the 10th and 90th percentiles for 52-week paper gains are -0.3378 and 0.1410, respectively, with a difference of 0.4788 between the two values. The magnitude of this difference is similar to the difference of 0.5932 for 260-week paper gains in the U.S. stock markets in Grinblatt & Han (2005) (i.e., it is the only estimation period with the 10th and 90th percentiles shown in Grinblatt & Han (2005); see Table 1). Note that the mean turnover ratio is 3.94% per week (or 204.88% per annum), which is high relative to the turnover ratio in the U.S. Consequently, we use shorter time intervals to estimate reference prices than U.S. studies do, as mentioned previously.

Table 1

Descriptive Statistics

Panel A: Weekly Data over January 1, 2001–August 1, 2014						
	Firm-Week (*n*)	Mean	Median	Std. Dev.	Min.	Max.
g(26-week)	311,424	-0.0879	-0.0263	0.2886	-6.9043	0.7935
g(52-week)	431,675	-0.0750	-0.0243	0.2425	-6.1638	0.7010
g(156-week)	449,185	-0.0480	-0.0157	0.1819	-6.0618	0.5817
Turnover	431,675	0.0394	0.0508	0.0200	0.0002	0.3469
Size	431,675	8.7460	1.3866	8.5949	4.9836	13.2157
Price	431,675	26.2034	49.0705	15.5300	5.0000	2,335.55
Beta	431,675	0.8596	0.5875	0.8425	-7.1756	7.1404
Mutual Fund Holdings (%)	431,675	1.6257	3.4771	0.1600	0.0000	62.5300

Panel B: Other Variables over January 1, 2001–August 1, 2014						
	Months/Weeks	Mean	Median	Std. Dev.	Min.	Max.
Lagged Change of M1B (Monthly)	162	0.0869	0.0751	0.0755	-0.0651	0.3051
Lagged Change of Interbank Call Loan Rate (Monthly)	162	0.0311	0.0013	0.5122	-0.9539	1.5192
MKT(%)(Weekly)	703	0.1713	0.4137	3.1349	-12.2469	20.1638
SMB(%)(Weekly)	703	0.0714	0.1305	1.6141	-6.6219	4.9829
HML(%)(Weekly)	703	0.1186	-0.0048	2.2765	-10.1388	14.3462

Notes: This table presents summary statistics for all variables. Unrealized capital gain (g) is estimated with formation periods of 26, 52 and 156 weeks. Turnover (V) is the average weekly ratio of numbers of shares traded during the ranking week to the number of shares outstanding at the end of the week. Size (S) is the natural logarithm of market capitalization, measured by multiplying market price by outstanding shares at the end of the ranking week. Price (in New Taiwan Dollars) is the closing price at the end of the ranking week. Beta is the CAPM beta estimated by the market model. Mutual fund holdings in percentage are the proportion of outstanding shares at the end of rank week, held by mutual funds. M1B consists of currency, demand deposits, and savings in checking accounts. A lagged change of M1B is estimated by subtracting the change of M1B at the end of the same calendar-month of the prior year from the change of M1B at the end of the calendar month m – 1 of the current year, scaling the difference of change according to the change at the end of the calendar month of prior year. Interbank Call Loan Rates (ICLR) are the interest rates of overnight interbank loans. A lagged Change of Interbank Call Loan Rate is estimated in a similar fashion to a lagged change of M1B. MKT, SMB, and HML are risk factors in the study by Fama & French (1993).

Data source: this research

3. RESULTS

3.1 Seasonality

Our first hypothesis is that paper-losing stocks are expected to experience more selling than paper-winning stocks do before the post-CLNY period in January and February to reset the reference prices of losers, as predicted by Ingersoll & Jin (2013). A stronger rebound of paper-losing stocks (compared to paper-winning stocks) is therefore predicted during the post-CLNY period. In other words, the reverse disposition effect induced reversals in stock prices will be relatively weak during the pre-CLNY period compared to those observed during the post-CLNY period.

Because seasonality is a key feature of the reverse disposition effect in Taiwan, we begin by performing a seasonal analysis with sub-periods of January-February, the pre-/post-CLNY periods in January-February, and March-December, respectively. Our hypothesis is that zero-investment arbitrage portfolios of G4–G1 will exhibit strong negative returns during the post-CLNY period but only weak returns during the pre-CLNY period. This strong performance is expected to be concentrated in stocks with large paper losses, i.e., G1.

Both the equally- and value-weighted portfolios in Panel B of Table 2 indicate that large paper losers (i.e., G1) experience significant performance reversals during the post-CLNY period. Weekly mean returns of 0.0129 for G1-portfolios result in significant mean negative returns of -0.0067 on the G4－G1 arbitrage portfolios. The returns during the pre-CLNY period dramatically deteriorate to a weak arbitrage return of -0.0021. Furthermore, return patterns in January-February are dominated by return patterns in the post-CLNY weeks. In brief, as expected, we find a pronounced reverse disposition effect leading to a significant reversal during the post-CLNY period. Note that mean arbitrage returns during the March-December period are weakly positive, and stocks with large paper gains (or G4) generate marginally significantly positive mean returns, implying a weak disposition effect prior to the holding weeks. Panels A and C present similar results based on the paper gains estimated from the previous 26- and 156-week data, respectively.

The investigation below focuses on 52-week capital gains because Kuo (2008) finds that most Taiwanese investors liquidate their positions in stocks within one year.

Table 2

Seasonality of the Reverse Disposition Effect

	Equal-Weighted					Value-Weighted				
	G1	G2	G3	G4	G4－G1	G1	G2	G3	G4	G4－G1
Panel A: 26-week *g*										
January-	0.0080	0.0056	0.0049	0.0042	-0.0038	0.0081	0.0057	0.0051	0.0045	-0.0035
February	(2.518)	(2.111)	(1.939)	(1.618)	(-1.824)	(2.472)	(2.101)	(1.977)	(1.679)	(-1.612)
Pre-	0.0058	0.0039	0.0035	0.0026	-0.0032	0.0060	0.0042	0.0037	0.0031	-0.0029
CLNY	(1.262)	(1.036)	(0.952)	(0.748)	(-1.115)	(1.264)	(1.074)	(0.991)	(0.854)	(-0.948)
Post-	0.0116	0.0083	0.0072	0.0068	-0.0048	0.0115	0.0081	0.0074	0.0069	-0.0046
CLNY	(3.153)	(2.629)	(2.421)	(1.814)	(-1.635)	(3.069)	(2.538)	(2.448)	(1.766)	(-1.521)
March-	0.0018	0.0015	0.0019	0.0026	0.0008	0.0016	0.0016	0.002	0.0028	0.0012
December	(1.267)	(1.238)	(1.657)	(2.320)	(1.020)	(1.102)	(1.247)	(1.684)	(2.419)	(1.427)
Panel B: 52-week *g*										
January-	0.0082	0.0050	0.0042	0.0043	-0.0038	0.0086	0.0052	0.0045	0.0049	-0.0038
February	(2.403)	(1.729)	(1.501)	(1.688)	(-1.788)	(2.422)	(1.752)	(1.587)	(1.788)	(-1.633)
Pre-	0.0053	0.0036	0.0028	0.0032	-0.0021	0.0059	0.0039	0.0032	0.0040	-0.0019
CLNY	(1.069)	(0.880)	(0.725)	(0.929)	(-0.722)	(1.137)	(0.929)	(0.806)	(1.104)	(-0.601)
Post-	0.0129	0.0072	0.0064	0.0062	-0.0067	0.0131	0.0072	0.0066	0.0062	-0.0069
CLNY	(3.316)	(2.071)	(1.737)	(1.646)	(-2.102)	(3.264)	(2.031)	(1.798)	(1.566)	(-2.037)
March-	0.0014	0.0011	0.0014	0.0021	0.0007	0.0013	0.0011	0.0015	0.0023	0.0010
December	(0.951)	(0.836)	(1.189)	(1.856)	(0.852)	(0.827)	(0.818)	(1.228)	(1.981)	(1.206)
Panel C: 156-week *g*										
January-	0.0074	0.0059	0.0046	0.0039	-0.0035	0.0076	0.0061	0.0047	0.0040	-0.0035
February	(2.551)	(2.332)	(1.747)	(1.781)	(-1.842)	(2.546)	(2.365)	(1.761)	(1.795)	(-1.761)
Pre-	0.0055	0.0046	0.0034	0.0026	-0.0029	0.0056	0.0050	0.0036	0.0028	-0.0028
CLNY	(1.298)	(1.281)	(0.922)	(0.878)	(-1.063)	(1.294)	(1.368)	(0.957)	(0.920)	(-0.973)
Post-	0.0106	0.0081	0.0065	0.0061	-0.0045	0.0108	0.0080	0.0065	0.0061	-0.0047
CLNY	(3.208)	(2.532)	(1.919)	(1.900)	(-1.908)	(3.268)	(2.421)	(1.899)	(1.883)	(-1.963)
March-	0.0026	0.0020	0.0025	0.0030	0.0005	0.0026	0.0020	0.0026	0.0030	0.0004
December	(1.986)	(1.685)	(2.343)	(2.887)	(0.622)	(1.942)	(1.681)	(2.300)	(2.781)	(0.524)

Notes: This table reports time-series average weekly returns for equal-/value-weighted quartile portfolios based on paper gains estimated by past 26-week, 52-week, and 156-week historical data, respectively. Quartile portfolios of G1 and G4 are composed of stocks with the lowest and highest unrealized capital gains, respectively. Data in parentheses are *t*-values.

Data source: this research

3.2 Money supply

Recall that we assume that the reverse disposition effect is closely associated with increased liquidity demand related to the CLNY. However, it is difficult to directly measure the strength of the demands. Hence, we examine the short-term money supply at the end of month $m - 1$ (note that only monthly data were available for the short-term money supply) to indirectly estimate the necessity to liquidate stocks at the beginning of month-*m* (the month-*m* includes all of week-*t* with the last trading date falling in month-*m* and note that paper-gain portfolios are formed at the end of week-*t*). From an ex-ante perspective, the lower short-term money supply at the end of month $m - 1$ indicates a greater necessity to liquidate stocks in the coming weeks starting in week *t* (in month-*m*), trigging a stronger sale of stocks and potentially resulting in a more evident reversal of stock prices in future weeks beginning in week $t + 1$.

We use M1B as a proxy for short-term money supply because, anecdotally, M1B is positively associated with future aggregate stock price trends. By definition, M1B consists of currency, demand deposits, and savings in checking accounts. We hypothesize that, over the post-CLNY weeks, a lower M1B at the end of month $m - 1$ will induce increased stock sales during week *t* (which belongs to month *m*) and, in turn, a greater rebound in stock prices from week $t + 1$ onwards.

Instead of a raw value of lagged M1B, a lagged *change* in M1B is computed by subtracting the change of M1B at the end of the same calendar-month of the prior year from the change of M1B at the end of the calendar month $m - 1$ of the current year (where month-*m* is the month in which the portfolio formation week ends), scaling the difference of change according to the change at the end of the calendar month of prior year. Note that the lagged change in M1B occurs on a monthly basis, whereas paper gains are estimated at weekly intervals. Consequently, all weeks *t* with portfolio formation dates ending in month-*m* share the same lagged change of M1B estimated at the end of month-*m*. We use the mean lagged change in M1B to partition the whole sample period into the decreased-M1B and increased-M1B periods.

Panel B in Table 3 reveals that during post-CLNY weeks, a decreased lagged change in M1B is associated with significant negative arbitrage returns under both equally- and value-weighted computations. Most importantly, the significant results are primarily driven by significant reversals in the prices of losers (or G1). Moreover, the negative arbitrage returns are significantly lower than the arbitrage returns over periods with increased lagged change in M1B (see the results in the fourth and seventh columns). This result is reminiscent of our prediction of a stronger prior period reverse disposition effect triggered by a decreased lagged money supply rather than an increased lagged money supply. In contrast, significance does not hold during the pre-CLNY weeks for evidence of decreased lagged change in M1B or return difference between the two M1B scenarios (see the results in Panel A). Apparently, a money-supply related reverse disposition effect occurs only prior to the holding weeks in the *post*-CLNY period, whereas similar evidence is absent prior to the holding weeks in the *pre*-CLNY period. In the unreported tables, results do not materially alter for estimation of paper gains in the basis of prior 26- and 156-week historical data.

Table 3

Returns for Paper-Gain Portfolios Controlled for Lagged Change of M1B

	Equal-Weighted			Value-Weighted		
	Decreased M1B	Increased M1B	Decreased－Increased	Decreased M1B	Increased M1B	Decreased－Increased
Panel A: The pre-CLNY period						
G1	0.0092	0.0014	0.0078	0.0104	0.0014	0.0090
	(1.261)	(0.216)	(0.797)	(1.321)	(0.219)	(0.873)
G2	0.007	0.0004	0.0066	0.0077	0.0003	0.0073
	(1.141)	(0.068)	(0.805)	(1.201)	(0.061)	(0.866)
G3	0.0055	0.0002	0.0053	0.0060	0.0005	0.0056
	(1.007)	(0.033)	(0.692)	(1.063)	(0.086)	(0.700)
G4	0.0047	0.0018	0.0029	0.0055	0.0026	0.0029
	(1.048)	(0.340)	(0.422)	(1.184)	(0.466)	(0.396)
G4－G1	-0.0046	0.0004	-0.0049	-0.0050	0.0012	-0.0061
	(-1.050)	(0.098)	(-0.873)	(-1.043)	(0.291)	(-1.003)
Panel B: The post-CLNY period						
G1	0.0187	0.0071	0.0116	0.0189	0.0072	0.0117
	(3.050)	(1.604)	(1.528)	(2.977)	(1.602)	(1.499)
G2	0.0111	0.0032	0.0078	0.0110	0.0034	0.0076
	(2.046)	(0.788)	(1.151)	(1.960)	(0.818)	(1.080)
G3	0.0083	0.0045	0.0038	0.0084	0.0049	0.0035
	(1.514)	(0.919)	(0.526)	(1.524)	(0.999)	(0.479)
G4	0.0066	0.0059	0.0007	0.0065	0.0059	0.0006
	(1.315)	(1.034)	(0.096)	(1.256)	(0.984)	(0.077)
G4－G1	-0.0122	-0.0013	-0.0109	-0.0124	-0.0013	-0.0111
	(-2.859)	(-0.283)	(-1.787)	(-2.803)	(-0.272)	(-1.724)

Notes: This table reports time-series average weekly returns for equal-/value-weighted quartile portfolios based on paper gains estimated by past 52-week historical data. Portfolios of G1 and G4 are composed of stocks with the lowest and highest unrealized capital gains, respectively. A lagged change in M1B is computed by subtracting the change of M1B at the end of the same calendar-month of the prior year from the change of M1B at the end of the calendar month $m - 1$ of the current year (where month-m is the month in which the portfolio formation week ends), scaling the difference of changes according to the change at the end of the calendar month of prior year. All weeks with portfolio formation dates ending in month-m share the same lagged change of M1B estimated at the end of month-m. We use the mean lagged change in M1B to partition whole sample period into the decreased-M1B and increased-M1B periods. Data in parentheses are t-values.

Data source: this research

Next, we analyze whether the money-supply related reverse disposition effect is primarily driven by risk loadings. Specifically, portfolio returns in weeks across entire years are regressed on three dummy variables (each denoting one of the three sub-periods), lagged change in M1B over the post-CLNY period, and the three risk factors noted by Fama & French (1993). The exact regression equation is as follows:

$$R_{t+1} = b_0 \times D\_MarDec_{t+1} + b_1 \times D\_PreCLNY_{t+1} + b_2 \times D\_PostCLNY_{t+1}$$

$$+ b_3 \times D\_PostCLNY_{t+1} \times (-M1B_t) + b_4 \times MKT_{t+1} + b_5 \times HML_{t+1}$$

$$+ b_6 \times SMB_{t+1} + e_t \tag{4}$$

Here, R_{t+1} is the excess return at week t+1 for the portfolios of G1, G4, or G4 −G1 during all weeks. D_MarDec_{t+1}, $D\_PreCLNY_{t+1}$, and $D\_PostCLNY_{t+1}$ are indicators (for week t+1) of the sub-period of March-December, the pre-CLNY period in January-February, and the post-CLNY period in January-February, respectively. $M1B_t$ is the lagged change in M1B at week t. MKT_{t+1}, HML_{t+1}, and SMB_{t+1} are the three risk factors defined in the study by Fama & French (1993). In the setting of the Taiwanese stock market, these factors are: (1) the returns on the Taiwan Stock Exchange Capitalization Weighted Stock Index in excess of risk-free returns (proxy by the one-month demand deposit rate of the First Commercial Bank), (2) the value-firm premium controlled for size effect, and (3) the size premium, respectively.

Presented in Table 4, in the post-CLNY period, results conditional on excess market returns and value firm premium confirm our predictions and the unconditional findings presented in Tables 2 and 3. Including the size premium, however, reduces the statistical significance of the conditional results. Specifically, consistent with Table 2, the results controlled for the three risk factors in model (1) show that reversals of losers only significantly manifest in the post-CLNY period (i.e., not in the pre-CLNY period nor in March through December). Moreover, outcomes in the model also indicate that M1B triggers an incremental reversal for losers in the post-CLNY weeks. Most importantly, in accordance with the evidence in Table 3, the conditional incremental reversal monotonically increases with a decrease in the lagged change in M1B, which is revealed by the positive regression coefficient for the interaction term, *D_PostCLNY*×(-M1B), after controlling for the three risk factors (the coefficients are 0.0529 and 0.0562 for equal- and value-weighting, respectively). Additionally, a weak incremental reversal of the prices of winners occurs for conditional evidence (see the regression coefficient of -0.0203 and -0.0018 in model (2) of Panels A and B). Considering the conditional incremental price reversal dynamics of losers and winners, an incremental negative return on arbitrage portfolios (i.e., G4－G1) conditional on risk arises during the post-CLNY period (as indicated by a marginally significant regression coefficient of -0.0732 in model (4) of Panel A). The marginal significance of the *equal-weighted* incremental arbitrage returns, however, attenuates to marginal insignificance for the corresponding *value-weighted* returns (see the regression coefficient of -0.0742 with a t-statistic of -1.553 in model (4) of Panel B). The reduction of statistical significance for the value-weighted results indicates that firm size affects the reverse disposition effect. This finding is unsurprising. Recall that this paper assumes that the motivations for selling at a loss are to reset the reference prices of losers and to fulfill liquidity needs stemming from expenditure needs and/or the avoidance of financial risk prior to the longest national holiday, among others. The existing literature shows that small firms are normally disproportionally held by retail investors (Kumar & Lee, 2006), who are reported to engage in trading behaviors such as over-trading (Barber & Odean, 2013). Thus, it is plausible that retail investors of small stocks over-trade and are thereby prone to reset the reference prices of losing stocks to realize future gains and to avoid financial risk prior to the CLNY because small stocks generally are riskier than large stocks are (Chen & Chien, 2011).

Table 4
Regression of Returns for Paper-Gain Portfolios over the Post-CLNY Period on the Lagged Change of M1B and Risk Factors

Models:	(1)	(2)	(3)
Dependent Variables:	G1	G4	G4-G1
Panel A: Equal-weighted			
D_MarDec	-0.0003	0.0008*	0.0010
	(-0.459)	(1.874)	(1.267)
D_PreCLNY	0.0001	-0.0009	-0.0010
	(0.044)	(-0.897)	(-0.455)
D_PostCLNY	0.0067**	-0.0014	-0.0080*
	(2.461)	(-0.539)	(-1.751)
D_PostCLNY*(-M1B)	0.0529*	-0.0203	-0.0732*
	(1.882)	(-0.892)	(-1.677)
MKT	0.0108***	0.008***	-0.0028***
	(35.322)	(38.898)	(-8.623)
HML	0.0009**	0.0021***	0.0012**
	(2.260)	(8.004)	(2.312)
SMB	0.0084***	0.0043***	-0.0042***
	(16.122)	(12.807)	(-6.542)
Adjust R^2	0.8674	0.8755	0.2061
Panel B: Value-weighted			
D_MarDec	-0.0005	0.0009**	0.0014*
	(-0.891)	(2.281)	(1.762)
D_PreCLNY	0.0004	-0.0002	-0.0006
	(0.263)	(-0.196)	(-0.270)
D_PostCLNY	0.0063**	-0.0013	-0.0076
	(2.128)	(-0.498)	(-1.495)
D_PostCLNY*(-M1B)	0.0562*	-0.018	-0.0742
	(1.864)	(-0.794)	(-1.553)
MKT	0.0117***	0.0085***	-0.0032***
	(49.682)	(46.59)	(-9.561)
HML	0.0008*	0.0021***	0.0014**
	(1.788)	(7.774)	(2.325)
SMB	0.0088***	0.0041***	-0.0048***
	(18.595)	(13.368)	(-7.208)
Adjust R^2	0.8863	0.8874	0.2402

Notes: This table reports results of regression of returns for quartile paper-gain portfolios. The regression equation is described in the below:

$$R_{t+1} = b_0 \times D\_MarDec_{t+1} + b_1 \times D\_\mathrm{Pr}eCLNY_{t+1} + b_2 \times D\_PostCLNY_{t+1},$$
$$+ b_3 \times D\_PostCLNY_{t+1} \times (-M1B_t) + b_4 \times MKT_{t+1} + b_5 \times HML_{t+1},$$
$$+ b_6 \times SMB_{t+1} + e_t,$$

where R_{t+1} is the excess return at week t+1 for the portfolios of G1, G4, or G4－G1 during all weeks. D_MarDec_{t+1}, $D\_PreCLNY_{t+1}$, and $D\_PostCLNY_{t+1}$ are indicators (for week t+1) of the sub-period of March-December, the pre-CLNY period in January-February, and the post-CLNY period in January-February, respectively. $M1B_t$ is the lagged change in M1B at week t. A lagged change in M1B is computed by subtracting the change of M1B at the end of the same calendar-month of the prior year from the change of M1B at the end of the calendar month m – 1 of the current year (where month-m is the month in which the portfolio formation week ends), scaling the difference of changes according to the change at the end of the calendar month of prior year. MKT_{t+1}, HML_{t+1}, and SMB_{t+1} are the three risk factors defined in the study by Fama & French (1993). In the setting of the Taiwanese stock market, these factors are: (1) the returns on the Taiwan Stock Exchange Capitalization Weighted Stock Index in excess of risk-free returns (proxy by the one-month demand deposit rate of the First Commercial Bank), (2) the value-firm premium controlled for size effect, and (3) the size premium, respectively. Data in parentheses are t-values estimated by Newey–West standard errors with correction for heteroskedasticity and autocorrelation.

***, **, and * denote significance at 1%, 5%, and 10% levels, respectively.

Data source: this research

For a robustness check of the money supply effect, we use an alternative measurement proxy for short-term money supply—a short-term interest rate because the economics literature has recognized a negative relationship between short-term changes in money supply and interest rates (see, for example, Bermanke & Blinder, 1992; Gordon & Leeper, 1994). Interbank Call Loan Rates (ICLR) are the interest rates of overnight interbank loans, which serve as a good proxy for the equilibrium rate determined via short-term money supply and demands, as confirmed by Kao & Wan (2012). Based on the negative relationship commonly observed between short-term money supply and interest rates, we assume a positive association between ICLR and the extent of necessity to liquidate stocks to satisfy the liquidity needs. Therefore, the hypothesis here is that high ICLR are associated with a strong sell strategy prior to the CLNY, leading to a subsequent strong reversal in stock prices (particularly for losers as assumed in this paper) after the CLNY. Again, we use the lagged change in ICLR as the explanatory variable for the same reason as that for M1B. In addition, the estimation of the lagged change in ICLR is similar to that of the lagged change in M1B because historical data for both measurements are available on a monthly basis.

In unreported results, the asymmetric results between the pre- and post-CLNY periods and between the decreased- and increased-ICLR periods are consistent with our hypotheses. However, the differential performance between decreased and increased ICLR scenarios in the post-CLNY period reports only a weak expected negative direction. Nevertheless, the weak outcomes are not surprising because practitioners normally do not suggest a close relationship between ICLR and future stock prices. Based on anecdotal experience, significant results for M1B appear to be more plausible than the mixed results for ICLR.

3.3 Mutual fund holdings

Another influential force presumably associated with the reverse disposition effect, but in an offset direction, arises from trading activities in mutual funds at the end of a year. That is, fund managers are required to demonstrate good annual performance at the end of a year. The yearly review is the most important evaluation interval among all intervals (others include, for example, quarterly and semiannual evaluations). Previous research has found that, to improve annual performance, U.S. fund managers may engage in a year-end strategy of more longing than shorting stocks that are heavily held, or portfolio pumping (Carhart et al., 2002; Ng & Wang, 2004; Hu et al., 2014). Additionally, U.S. equity funds are known to increase their holdings of paper-losing stocks at the end of a year (Cici, 2012). Based on the evidence, we therefore expect that stocks strongly held and supported by mutual funds will suffer *less* from sell strategies at year-end and thus rebound to an equally lesser extent in January and February of the subsequent year. In other words, we hypothesize that strong future reversals in stock prices during the post-CLNY period will decrease with the holdings of mutual funds.

To test this hypothesis, we construct bivariate portfolios sequentially on mutual fund holdings and paper gains. Stocks are assigned to one of three mutual fund-holding portfolios, where MFH1, MFH2, and MFH3 portfolios consist of stocks with holdings of zero, less than 10%, and equal to or greater than 10% of outstanding shares, respectively. In addition, sample weeks are divided into decreased versus increased M1B periods, as defined in the previous section.

Panel A of Table 5 reveals that over periods with a decreased lagged change in M1B, the strength of the negative returns for the arbitrage portfolios monotonically decreases with holdings of mutual funds, which is consistent with our prediction. Specifically, the equally weighted arbitrage return of G4－G1 averages -0.0125 (t-stat.= -2.417), -0.0080 (t-stat.=-2.052), and -0.0064 (t-stat.= -1.353) for stocks in the MFH1, MFH2, and MFH3 portfolios, respectively, during the one-week holding period. Moreover, the primary source of the reversal shows similar trends; reversals for prices of paper-losing stocks (or G1) monotonically decrease with mutual fund holdings with holding returns of 0.0212, 0.0153, and 0.0133 per week for the MFH1, MFH2, and MHF3 portfolios, respectively. Evidence for value-weighted returns is qualitatively identical to that for equally weighted returns. As in the previous section, the arbitrage results for the increased-M1B sample are generally insignificant.

Table 5
Returns for Paper-Gain Portfolios Controlled for the Lagged Change of M1B and Mutual Fund Holdings over the Post-CLNY Period in January and February

	Equal-Weighted			Value-Weighted		
	MFH1	MFH2	MFH3	MFH1	MFH2	MFH3
Panel A: Decreased lagged change of M1B						
G1	0.0212	0.0153	0.0133	0.0214	0.0150	0.0130
	(3.126)	(2.298)	(1.830)	(3.109)	(2.199)	(1.751)
G2	0.0187	0.0094	0.0083	0.0189	0.0091	0.0082
	(2.917)	(1.653)	(1.302)	(2.910)	(1.623)	(1.301)
G3	0.0113	0.0071	0.0073	0.0117	0.0069	0.0072
	(2.143)	(1.313)	(1.188)	(2.180)	(1.278)	(1.176)
G4	0.0087	0.0073	0.0069	0.0089	0.0071	0.0066
	(1.939)	(1.311)	(1.113)	(1.953)	(1.262)	(1.073)
G4–G1	-0.0125	-0.0080	-0.0064	-0.0124	-0.0078	-0.0063
	(-2.417)	(-2.052)	(-1.353)	(-2.378)	(-1.973)	(-1.329)
Panel B: Increased lagged change of M1B						
G1	0.0099	0.0053	0.0057	0.010	0.0055	0.0059
	(2.479)	(1.105)	(1.149)	(2.479)	(1.149)	(1.175)
G2	0.0047	0.0025	0.0037	0.0049	0.0028	0.0039
	(1.105)	(0.574)	(0.784)	(1.166)	(0.633)	(0.823)
G3	0.0052	0.0053	0.0048	0.0055	0.0056	0.0051
	(1.10)	(1.101)	(0.998)	(1.164)	(1.169)	(1.071)
G4	0.0023	0.0069	0.0073	0.0027	0.0069	0.0073
	(0.373)	(1.099)	(1.13)	(0.425)	(1.090)	(1.127)
G4–G1	-0.0075	0.0017	0.0016	-0.0073	0.0014	0.0014
	(-1.346)	(0.322)	(0.290)	(-1.300)	(0.276)	(0.253)

Notes: This table reports time-series average weekly returns for equal-/value-weighted bivariate portfolios. The bivariate portfolios are ranked first on mutual fund holdings (MFH). That is, stocks are assigned to one of three mutual fund-holding portfolios, where MFH1, MFH2, and MFH3 portfolios consist of stocks with holdings of zero, less than 10%, and equal to or greater than 10% of outstanding shares, respectively. Then, within each MFH portfolio, quartile portfolios are further formed in the basis of the paper gains estimated by past 52-week historical data. A lagged change in M1B is computed by subtracting the change of M1B at the end of the same calendar-month of the prior year from the change of M1B at the end of the calendar month m – 1 of the current year (where month-m is the month in which the portfolio formation week ends), scaling the difference of changes according to the change at the end of the calendar month of prior year. We use the mean lagged change in M1B to partition the whole sample period into the decreased-M1B and increased-M1B periods. Data in parentheses are t-values.

Data source: this research

To address whether the mutual fund effect can be explained by economic risk, we next regress the portfolio returns on explanatory variables (including the three risk factors in Fama & French (1993)), using the following equations:

$$R_{t+1} = b_0 \times D\_MarDec_{t+1} + b_1 \times D\_PreCLNY_{t+1} + b_2 \times D\_PostCLNY_{t+1}$$

$$+ b_3 \times D\_PostCLNY_{t+1} \times D\_DecrdM1B_t \times D\_MFH1_t$$

$$+ b_4 \times D\_PostCLNY_{t+1} \times D\_DecrdM1B_t \times D\_MFH2_t$$

$$+ b_5 \times D\_PostCLNY_{t+1} \times D\_DecrdM1B_t \times D\_MFH3_t$$

$$+ b_6 \times MKT_{t+1} + b_7 \times HML_{t+1} + b_8 \times SMB_{t+1} + e_t, \quad (5)$$

$$R_{t+1} = b_0 \times D\_MarDec_{t+1} + b_1 \times D\_PreCLNY_{t+1} + b_2 \times D\_PostCLNY_{t+1}$$

$$+ b_3 \times D\_PostCLNY_{t+1} \times (1 - D\_DecrdM1B_t) \times D\_MFH1_t$$

$$+ b_4 \times D\_PostCLNY_{t+1} \times (1 - D\_DecrdM1B_t) \times D\_MFH2_t$$

$$+ b_5 \times D\_PostCLNY_{t+1} \times (1 - D\_DecrdM1B_t) \times D\_MFH3_t$$

$$+ b_6 \times MKT_{t+1} + b_7 \times HML_{t+1} + b_8 \times SMB_{t+1} + e_t, \quad (6)$$

where R_{t+1} is the excess return for the portfolios G1, G4, or G4－G1 at week t+1 throughout an entire year. $D\_DecrdM1B_t$ is a dummy variable with a value of one when the lagged change in M1B decreases at the end of week t and a value of zero otherwise. D_MFH1_t, D_MFH2_t, and D_MFH3_t are indicators of portfolios formed at the end of week t as having low, medium, and high mutual fund ownership, respectively. The definitions of the other variables are the same as those in equation (4).

In Table 6, the regression results with and without control variables of risk corroborate the unconditional results presented in Table 5 and the other tables. First, the returns for the arbitrage portfolios of G4－G1 are distinct over the three sub-periods (see model (3) in Panel A), implying different sell strategies over the times prior to holding weeks in each of the three sub-periods. In particular, the implications are that there is a marginally significant disposition, weak reverse disposition, and strong reverse disposition effects prior to holding weeks in the period of March-December, pre-CLNY, and post-CLNY, which is generally consistent with the results presented in Table 2. Second, when comparing regression coefficients for the three interaction terms in model (6), the coefficient is significantly negative only for the interaction term with the post-CLNY period, *decreased* money supply, and *low* mutual fund holdings (i.e., -0.014 with t-stat.=-2.646) and not the interaction terms with medium or high mutual fund holdings. The significant negative coefficient indicates that, over the post-CLNY period, stocks with *low* mutual fund holdings yield an incremental negative arbitrage return in reduced money supply periods. Moreover, the incremental effect is primarily driven by a significant price reversal for paper-losing stocks (as indicated in models (4) and (5)), which is also consistent with our hypothesis. The incremental results over the post-CLNY period survive the risk tests (see models (7) to (9) in Panel B).[10] For comparison purposes, models (7) to (9) in Panel A present similar tests for the pre-CLNY period. Results show that only marginally significant incremental negative arbitrage profits are generated for stocks with low mutual fund holdings during the decreased money supply periods. More importantly, a significant price reversal for losers is absent and therefore consistent with our prediction.

[10] Note that similar to the findings of the risk tests of the money supply effect (in Table 4), the significance of the initial arbitrage return over the post-CLNY period decreases controlling for the systematic risk and value firm premiums and further deteriorates controlling for all three risk factors (see models (3) and (6) in Panel B of Table 6).

Table 6

Regression of Returns for Paper-Gain Portfolios on the Lagged Change of M1B, Mutual Fund Holdings, and Risk Factors

Models:	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Dependent Variables:	G1	G4	G4－G1	G1	G4	G4－G1	G1	G4	G4－G1
Panel A: Without control variables									
D_MarDec	0.0014	0.0023***	0.001*	0.0013	0.0023***	0.001*	0.0014	0.0023***	0.0010*
	(1.341)	(2.81)	(1.748)	(1.292)	(2.748)	(1.746)	(1.340)	(2.808)	(1.746)
D_PreCLNY	0.0059*	0.0036*	-0.0023	0.0058*	0.0035*	-0.0023	0.0011	0.0041	0.0030*
	(1.773)	(1.779)	(-0.983)	(1.758)	(1.753)	(-0.982)	(0.366)	(1.301)	(1.649)
D_PostCLNY	0.0118***	0.0066**	-0.0052***	0.0056**	0.0038	-0.0018	0.0118***	0.0066**	-0.0052***
	(4.226)	(2.251)	(-2.617)	(2.087)	(0.964)	(-0.725)	(4.223)	(2.249)	(-2.615)
D_PostCLNY* D_DecrdM1B*D_MFH1				0.0217**	0.0077	-0.0140***			
				(2.291)	(1.019)	(-2.646)			
D_PostCLNY* D_DecrdM1B*D_MFH2				0.0134*	0.0065	-0.0069			
				(1.736)	(0.794)	(-1.343)			
D_PostCLNY* D_DecrdM1B*D_MFH3				0.0111	0.0061	-0.0049			
				(1.345)	(0.733)	(-0.872)			
D_PreCLNY* D_DecrdM1B*D_MFH1							0.0108	-0.0032	-0.014*
							(0.952)	(-0.624)	(-1.720)
D_PreCLNY* D_DecrdM1B*D_MFH2							0.0092	0.0007	-0.0086
							(0.872)	(0.136)	(-1.108)
D_PreCLNY* D_DecrdM1B*D_MFH3							0.01	-0.0006	-0.0106
							(0.927)	(-0.108)	(-1.427)
Adjust R^2	0.0037	0.0003	0.0040	0.0047	0.0020	0.0051	0.0038	0.0014	0.0082

Table 6 continues

Table 6 (continued)

Models:	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Dependent Variables:	G1	G4	G4－G1	G1	G4	G4－G1	G1	G4	G4－G1
Panel B: With control variables									
D_MarDec	-0.0002	0.0010**	0.0012**	-0.0003	0.001***	0.0013**	-0.0004	0.0009***	0.0013**
	(-0.3772)	(2.628)	(2.423)	(-0.836)	(2.896)	(2.467)	(-0.960)	(2.747)	(2.464)
D_PreCLNY	0.0028*	0.0002	-0.0026	0.0008	-0.0008	-0.0016	0.0008	-0.0008	-0.0017
	(1.634)	(0.178)	(-1.376)	(0.697)	(-0.909)	(-0.939)	(0.667)	(-0.963)	(-0.945)
D_PostCLNY	0.0076***	0.0040***	-0.0035*	0.0005	0.0004	-0.00002	-0.002	0.0003	0.0023
	(4.044)	(3.674)	(-1.626)	(0.357)	(0.411)	(-0.011)	(-1.537)	(0.230)	(1.000)
D_PostCLNY* D_DecrdM1B*D_MFH1							0.0124***	0.0011	-0.0113**
							(2.675)	(0.488)	(-2.139)
D_PostCLNY* D_DecrdM1B*D_MFH2							0.0041	-0.0001	-0.0041
							(1.249)	(-0.017)	(-0.675)
D_PostCLNY* D_DecrdM1B*D_MFH3							0.0017	-0.0005	-0.0022
							(0.509)	(-0.121)	(-0.341)
MKT	0.0104***	0.0075***	-0.0029***	0.0118***	0.0082***	-0.0036***	0.0118***	0.0082***	-0.0036***
	(53.112)	(43.126)	(-14.148)	(74.800)	(50.344)	(-17.097)	(75.150)	(50.304)	(-17.105)
HML	0.0016***	0.0032***	0.0016***	0.0001	0.0024***	0.0023***	0.0001	0.0024***	0.0023***
	4.043	(14.933)	(-4.002)	(0.295)	(11.258)	(6.425)	(0.270)	(11.277)	(6.421)
SMB				0.0089***	0.0045***	-0.0044***	0.0088***	0.0045***	-0.0043***
				(29.192)	(17.624)	(-10.805)	(28.941)	(17.543)	(-10.690)
Adjust R^2	0.7346	0.7602	0.1613	0.8512	0.8132	0.2395	0.8516	0.8129	0.2399

Notes: This table reports results for regression of returns on equal-weighted quartile paper-gain portfolios in Panel A and B as described in the below:

Panel A: $R_{t+1} = b_0 \times D\_MarDec_{t+1} + b_1 \times D\_PreCLNY_{t+1} + b_2 \times D\_PostCLNY_{t+1} + b_3 \times D\_PostCLNY_{t+1} \times D\_DecrdM1B_t \times D\_MFH1_t$

$+ b_4 \times D\_PostCLNY_{t+1} \times D\_DecrdM1B_t \times D\_MFH2_t + b_5 \times D\_PostCLNY_{t+1} \times D\_DecrdM1B_t \times D\_MFH3_t$

$+ b_6 \times MKT_{t+1} + b_7 \times HML_{t+1} + b_8 \times SMB_{t+1} + e_t$,

Panel B: $R_{t+1} = b_0 \times D\_MarDec_{t+1} + b_1 \times D\_PreCLNY_{t+1} + b_2 \times D\_PostCLNY_{t+1} + b_3 \times D\_PostCLNY_{t+1} \times (1 - D\_DecrdM1B_t) \times D\_MFH1_t$

$$+ b_4 \times D\_PostCLNY_{t+1} \times (1 - D\_DecrdM1B_t) \times D\_MFH2_t + b_5 \times D\_PostCLNY_{t+1} \times (1 - D\_DecrdM1B_t) \times D\_MFH3_t$$

$$+ b_6 \times MKT_{t+1} + b_7 \times HML_{t+1} + b_8 \times SMB_{t+1} + e_t ,$$

where R_{t+1} is the excess return for the portfolios G1, G4, or G4 − G1 at week t+1 throughout an entire year. D_MarDec_{t+1}, $D\_PreCLNY_{t+1}$, and $D\_PostCLNY_{t+1}$ are indicators (for week t+1) of the sub-period of March-December, the pre-CLNY period in January-February, and the post-CLNY period in January-February, respectively. $M1B_t$ is the lagged change in M1B at week t. A lagged change in M1B is computed by subtracting the change of M1B at the end of the same calendar-month of the prior year from the change of M1B at the end of the calendar month m – 1 of the current year (where month-m is the month in which the portfolio formation week ends), scaling the difference of changes according to the change at the end of the calendar month of prior year. We use the mean lagged change in M1B to partition the whole sample period into the decreased-M1B and increased-M1B periods. $D\_DecrdM1B_t$ is a dummy variable with a value of one when week-t is classified as in the decreased M1B period and a value of zero otherwise. D_MFH1_t, D_MFH2_t, and D_MFH3_t are indicators of portfolios formed at the end of week t as having low, medium, and high mutual fund ownership, respectively. MKT_{t+1}, HML_{t+1}, and SMB_{t+1} are the three risk factors defined in the study by Fama & French (1993). In the setting of the Taiwanese stock market, these factors are: (1) the returns on the Taiwan Stock Exchange Capitalization Weighted Stock Index in excess of risk-free returns (proxy by the one-month demand deposit rate of the First Commercial Bank), (2) the value-firm premium controlled for size effect, and (3) the size premium, respectively. Data in parentheses are t-values estimated by Newey–West standard errors with correction for heteroskedasticity and autocorrelation.

***, **, and * denote significance at 1%, 5%, and 10% levels, respectively.

Data source: this research

3.4 Regression of individual stock returns

In addition to the portfolio approach in prior sections, here we perform a regression analysis to assess the robustness of the results for the portfolio approach.

We use the regression equation below. The returns on individual stocks over each of the three sub-periods represent the dependent variable, and the independent variables include factors relevant to our hypotheses and control variables.

$$r_{i,t+1} = b_0 + b_1 \times g_{i,t} + b_2 \times g_{i,t} \times (-M1B_t) + b_3 \times g_{i,t} \times (-M1B_t) \times D\_MFH1_{i,t}$$

$$+ b_4 \times g_{i,t} \times (-M1B_t) \times D\_MFH2_{i,t} + b_5 \times g_{i,t} \times (-M1B_t) \times D\_MFH3_{i,t}$$

$$+ b_6 \times Size_{i,t} + b_7 \times Beta_{i,t} + b_8 \times V_{i,t} + e_{i,t+1} \tag{7}$$

Here, $r_{i,t+1}$ is the return for individual stock *i* at week *t*+1. $Size_{i,t}$ is the natural logarithm of market capitalization for stock *i* at the end of week *t*. $Beta_{i,t}$ is *beta* for stock *i* estimated using the market model. $V_{i,t}$ is the average weekly turnover ratio for stock *i* over the prior 52 weeks, i.e., weeks (*t*-51: *t*). All other variables are defined as in equations (4) and (5).

We use *Beta* and *Size* as explanatory factors because evidence for the money supply and mutual fund holding effects reveal a comparably more significant role for the two factors relative to the value-firm premium (see Table 4 and Panel B in Table 6). In addition, Grinblatt & Han (2005) report an impact of the turnover ratio on the disposition effect. Thus, we add the turnover ratio as the third control variable in the regression.

Overall, the regression results support our hypotheses. First, the significant negative regression coefficient for $g \times (-M1B)$ (i.e., -0.3162) in model (1) indicates that, over the post-CLNY period and given the level of paper gains (*g*), larger decreases in the lagged change in money supply produce larger incremental reversals in stock prices (and are indicative of a larger incremental reverse disposition effect prior to holding weeks). In contrast, the money supply induced price reversals is absent over the pre-CLNY and March-December periods because the regression coefficient counterparts are positive for the two periods, that is, 0.0714 and 0.0574, respectively, in models (3) and (5). Second, over the post-CLNY period, a significant negative regression coefficient only occurs for the term $g \times (-M1B) \times D\_MFH1$ and $g \times (-M1B) \times D\_MFH2$, not for the counterpart term relative to D_MFH3. This fact confirms the results of the portfolio analysis in Table 5, revealing that a high proportion of mutual fund holdings are an offsetting force for the reverse disposition effect and thereby for the subsequent reversal of stock prices. Note that capital gains (g) alone exhibit a significantly negative regression coefficient during both the pre- and post-CLNY periods even the equations control for the money supply and mutual fund holdings. Specifically, in models (2) and (4), the regression coefficients for paper gains are -0.0193 and -0.0279 for the pre- and post-CLNY periods, respectively. This evidence implies the existence of a reverse disposition effect that cannot be explained by the money supply or mutual fund holdings examined in this study. Possible rationales include that (1) other measures are better proxies for the phenomena of resetting loser reference prices, strong liquidity demands, and/or trading activities of mutual funds, or (2) there are other sources triggering a reverse disposition effect in addition to that mentioned in this study. However, over the post-CLNY period, the magnitude of the unknown reverse disposition effect appears to be far less than the magnitude of the effect associated with the money supply and mutual fund holdings; the magnitude of the regression coefficients for g alone is only one fifteenth of the magnitude of the regression coefficient for the interaction term of $g \times (-M1B) \times D\_MFH1$ (i.e., -0.0193 vs. -0.3109 in model (2)). Finally, the aforementioned regression findings are significant after controlling for variables in size, beta, and turnover, as shown in Panel B.

Table 7
Regression of Individual Stock Returns by Sub-Periods

	The Post-CLNY Period		The Pre-CLNY Period		The March-December Period	
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
Panel A: Without control variables						
Intercept	0.0073***	0.0073***	0.0026***	0.0027***	0.0023***	0.0023***
	(11.011)	(10.98)	(3.715)	(3.834)	(8.862)	(8.878)
g	-0.0192***	-0.0193***	-0.0279***	-0.0279***	0.0118***	0.0118***
	(-5.068)	(-5.088)	(-8.014)	(-8.036)	(5.741)	(5.751)
g *(-M1B)	-0.3162***		0.0714		0.0574***	
	(-6.485)		(1.531)		(2.905)	
g *(-M1B)*D_MFH1		-0.3109***		-0.0099		0.0577***
		(-5.051)		(-0.164)		(2.759)
g *(-M1B)*D_MFH2		-0.3423***		0.1098**		0.0533**
		(-6.223)		(2.237)		(2.498)
g *(-M1B)*D_MFH3		0.0649		0.1968		0.1471***
		(0.450)		(1.523)		(3.021)
Adjust R^2	0.0100	0.0104	0.0195	0.0200	0.0015	0.0016
Panel B: With control variables						
Intercept	0.0150***	0.0149***	0.0058*	0.0056*	0.0068***	0.0068***
	(4.608)	(4.583)	(1.781)	(1.711)	(6.213)	(6.204)
g	-0.0173***	-0.0174***	-0.0274***	-0.0275***	0.0130***	0.0130***
	(-4.457)	(-4.476)	(-7.669)	(-7.702)	(6.163)	(6.167)
g *(-M1B)	-0.3033***		0.0720		0.0617***	
	(-6.312)		(1.525)		(3.12)	
g *(-M1B)*D_MFH1		-0.3006***		-0.0074		0.0605***
		(-4.935)		(-0.122)		(2.892)
g *(-M1B)*D_MFH2		-0.3259***		0.1126**		0.0593***
		(-5.996)		(2.262)		(2.779)
g *(-M1B)*D_MFH3		0.0389		0.1417		0.1273***
		(0.265)		(1.081)		(2.605)
Size	-0.0012***	-0.0012***	-0.0003	-0.0003	-0.0005***	-0.0005***
	(-3.413)	(-3.416)	(-0.806)	(-0.715)	(-3.769)	(-3.774)
Beta	0.0050***	0.0050***	0.0019**	0.0019**	0.0010***	0.0010***
	(6.208)	(6.141)	(2.236)	(2.233)	(3.379)	(3.374)
V	-0.0327	-0.0278	-0.0667***	-0.0662***	-0.0383***	-0.0376***
	(-1.412)	(-1.187)	(-2.829)	(-2.785)	(-5.239)	(-5.13)
Adjust R^2	0.0142	0.0145	0.0207	0.0210	0.0021	0.0021

Notes: This table reports results for regression of individual stock returns in each of the three sub-periods. The regression equation is in the below.

$$r_{i,t+1} = b_0 + b_1 \times g_{i,t} + b_2 \times g_{i,t} \times (-M1B_t) + b_3 \times g_{i,t} \times (-M1B_t) \times D\_MFH1_{i,t}$$

$$+ b_4 \times g_{i,t} \times (-M1B_t) \times D\_MFH2_{i,t} + b_5 \times g_{i,t} \times (-M1B_t) \times D\_MFH3_{i,t}$$

$$+ b_6 \times Size_{i,t} + b_7 \times Beta_{i,t} + b_8 \times V_{i,t} + e_{i,t+1}$$

Where $r_{\mathrm{i},t+1}$ is the return for individual stock i at week t+1. $g_{i,t}$ is the paper gain for stock i in week t. $M1\mathrm{B}_t$ is the lagged change in M1B, at week t, computed by subtracting the change of M1B at the end of the same calendar-month of the prior year from the change of M1B at the end of the calendar month m – 1 of the current year (where month-m is the month in which the portfolio formation week ends), scaling the difference of changes according to the change at the end of the calendar month of prior year. D_MFH1_t, D_MFH2_t, and D_MFH3_t are indicators of portfolios formed at the end of week t as having low, medium, and high mutual fund ownership, respectively. $Size_{i,t}$ is the natural logarithm of market capitalization for stock i at the end of week t. $Beta_{i,t}$ is *beta* for stock i estimated using the market model. $V_{i,t}$ is the average weekly turnover ratio for stock i over the prior 52 weeks, i.e., weeks (t-51: t). All other variables are defined as in equations (4) and (5). Data in parentheses are t-values estimated by Newey-West standard errors with correction for heteroskedasticity and autocorrelation.
***, **, and * denote significance at 1%, 5%, and 10% levels, respectively.

Data source: this research

Notably, during the period of March-December, a prevalent continuation of stock prices occurs, implying that a disposition effect occurs prior to holding weeks in this period. It appears that the strength of the continuation increases with the level of the lagged change in M1B but is significant across all levels of mutual fund holdings. We, however, did not explore these phenomena further because they are related to the disposition effect, which is beyond the scope of this study.

4. CONCLUSION

The CLNY traditionally symbolizes a fresh start, including for investment performance. Therefore, we hypothesize that in the times *prior to* the holding weeks of the post-CLNY period in January and February, Taiwanese investors are willing to sell losers to reset losers' reference prices so as to increase possibilities of realize gains *after* the CLNY. This is a source of the reverse disposition effect as suggested by Ingersoll & Jin (2013). Moreover, we assume that CLNY-related increases of liquidity demands trigger increases of sales of stocks. Based on the methodology developed by Grinblatt & Han (2005), the reverse disposition effect in prior periods predicts a stronger subsequent rebound of prices of paper-losing stocks than prices of paper-winning stocks. Consequently, in the subsequent period (or the post-CLNY period in this study), the arbitrage strategy of longing winners and shorting losers is expected to generate a negative return with the primary driving force of a price reversal of losers. Consistent with this prediction, the empirical evidence in this study reveals a significantly negative arbitrage return during the post-CLNY period. Most importantly, the negative arbitrage return is attributed substantially more to the significant price reversals of losers than to the price dynamics of winners. In contrast, weak negative and positive arbitrage returns are exhibited during the pre-CLNY (in January-February) and March-December periods, respectively. This pattern implies that a weak reverse disposition and strong disposition effects, respectively, occur in the time prior to the holding weeks in each period.

Furthermore, we use the lagged change in M1B as a proxy for the necessity to sell stocks to meet the CLNY-related increases of liquidity demands. Accordingly, a reverse relationship is expected between the lagged change in M1B and the magnitude of the negative arbitrage return. Additionally, we conjecture that due to portfolio pumping, mutual funds are more prone to purchase than to sell stocks that are heavily held and thereby create an offset force for the selling force relative to the reverse disposition effect. Elaborating on these hypotheses, the evidence indicates that a significantly negative arbitrage return occurs during the post-CLNY period when there is a decreased lagged change in M1B and for stocks with low or medium levels of mutual fund holdings. Additionally, the conditional results survive tests of the three risk factors from the study by Fama & French (1993). Moreover, in addition to a portfolio approach, we also implement a regression analysis to check robustness of the evidence concerned. The results of the regression for individual stock returns are generally consistent with the results of the portfolio approach.

It should be noted that small stocks sometimes play a role in the reverse disposition effect. Recall that this paper assumes that the motivations for selling at a loss are, among others, to reset the reference prices of losers prior to the CLNY and/or to avoid financial risk during the longest national holiday. The extant literature shows that small firms are normally disproportionally held by retail investors who are reported to engage in trading behaviors such as over-trading. Accordingly, it is plausible that retail investors holding small stocks over-trade and are thereby prone to resetting reference prices of paper losers prior to the CLNY to realize future gains, and/or to avoid financial risk during the CLNY because small stocks are normally riskier than large stocks are. In the existing empirical literature on size effects, half of the high performance observed in small stocks occurs in January.[11] Hence, the reverse disposition effect in this paper offers a potential explanation for the January size effect.

Note that, even after controlling for the suggested explanatory factors, there is a relatively small but significant reverse disposition effect remains prior to the pre- and post-CLNY periods. Therefore, we cannot exclude either the possibility that a reverse disposition effect is driven by factors other than those considered in this study or the possibility that there are other variables better than those used in this study in proxy for the reverse disposition effect described.

The explanation for the Taiwanese reverse disposition effect is distinct from those proposed for other countries in the existing literature. The seasonal impact of the CLNY on the market may extend to other stock markets that are also affected by the CLNY. The issues warranting future research include the seasonal disposition effect and the unknown reverse disposition effect.

[11] See, for example, Keim (1983), Reinganum (1983), Roll (1983), Rogalski & Tinic (1986), Krueger & Johnson (1991), Tong (1992), and Elfakhani & Zaher (1998).

References

Abidin, S., Banchit, A., Sun, S., and Tian, Z., 2012, "Chinese New Year Effects on Stock Returns: Evidence from Asia-Pacific Stock Markets." Working Paper, University of Waikato.

Ahmad, Z. and Hussain, S., 2001, "KLSE Long Run Overreaction and the Chinese New Year Effect," **Journal of Business Finance and Accounting**, Vol. 1, No. 1-2, 63-108.

Ariff, M., Chung, T. F., and Shamsher, M., 2012, "Money Supply, Interest Rate, Liquidity and Share Prices: A Test of Their Linkage," **Global Finance Journal**, Vol. 23, No. 3, 202-220.

Barber, B. M. and Odean, T., 2013, "Chapter 22-The Behavior of Individual Investors," **Handbook of Economics of Finance**, Vol. 2, No. 2, 1533-1570.

Barber, B. M., Lee, Y. T., Liu, Y. J., and Odean, T., 2007, "Is the Aggregate Investor Reluctant to Realize Losses? Evidence from Taiwan," **European Financial Management**, Vol. 13, No. 3, 423-447.

Barberis, N. and Xiong, W., 2009, "What Drives the Disposition Effect? An Analysis of a Long-Standing Preference-Based Explanation," **Journal of Finance**, Vol. 64, No. 2, 751-784.

Ben-David, I. and Hirshleifer, D., 2011, "Beyond the Disposition Effect: Do Investors Really Like Realizing Gains More than Losses?" Working Paper, Ohio State University.

Bermanke, B. and Blinder, A., 1992, "The Federal Funds Rate and the Channels of Monetary Transmission," **American Economic Reviews**, Vol. 82, No. 4, 901-921.

Bhootra, A. and Hur, J., 2012, "On the Relationship between Concentration of Prospect Theory/Mental Accounting Investors, Cointegration, and Momentum," **Journal of Banking and Finance**, Vol. 36, No. 5, 1266-1275.

Blume, M. and Stambaugh, R., 1983, "Biases in Computed Returns: An Application to the Size Effect," **Journal of Financial Economics**, Vol. 12, No. 3, 387-404.

Brown, P., Chappel, N., Da Silva Rosa, R., and Walter, T., 2006, "The Reach of the Disposition Effect: Large Sample Evidence Across Investor Classes," **International Review of Finance**, Vol. 6, No. 1-2, 43-78.

Cadsby, C. B. and Ratner, M., 1992, "Turn-of-the-month and Pre-Holiday Effects in Sock Returns," **Journal of Banking and Finance**, Vol. 16, No. 3, 497-509.

Carhart, M. M., Kaniel, R., Musto, D. K., and Reed, A. V., 2002, "Leaning for the Tape: Evidence of Gaming Behavior in Equity Mutual Funds," **Journal of Finance**, Vol. 57, No. 2, 661-693.

Chen, G. M., Kim, K., Nofsinger, J., and Rui, O., 2007, "Trading Performance, Disposition

Effect, Overconfidence, Representativeness Bias, and Experience of Emerging Market Investors," **Journal of Behavioral Decision Making**, Vol. 451, No. 4, 425-451.

Chen, T. C. and Chien, C. C., 2011, "Size Effect in January and Cultural Influences in an Emerging Stock Market: The Perspective of Behavioral Finance," **Pacific-Basin Finance Journal**, Vol. 19, No. 2, 208-229.

Cheng, T. Y., Lee, C. I., and Lin, C. H., 2013, "An Examination of the Relationship between the Disposition Effect and Gender, Age, the Trade Security, and Bull-bear Market Conditions," **Journal of Empirical Finance**, Vol. 21, No. 1, 195-213.

Chien, C. C. and Chen, T. C., 2007, "The Impact of Lunar New Year on the January Anomaly in Taiwan's Stock Market," **Applied Economics Letters**, Vol. 14, No. 14, 1075-1077.

Chien, C. C. and Chen, T. C., 2008, "Can the January Anomaly in Taiwan's Stock Market be Explained by the Prospect Theory?" **Quantitative Finance**, Vol. 8, No. 4, 335-339.

Chui, A. C. W., Titman, S., and Wei, K. C. J., 2003, "Momentum, Legal Systems and Ownership Structure: An Analysis of Asian Stock Markets." Working Paper, University of Texas at Austin.

Chui, A. C. W., Titman, S., and Wei, K. C. J., 2010, "Individualism and Momentum around the World," **Journal of Finance**, Vol. 65, No. 1, 361-392.

Cici, G., 2012, "The Prevalence of the Disposition Effect in Mutual Funds' Trades," **Journal of Financial and Quantitative Analysis**, Vol. 47, No. 4, 795-820.

Claessens, S., Dasgupta, S., and Glen, J., 1995, "Return Behaviour in Emerging Stock Markets," **World Bank Economic Review**, Vol. 9, No. 1, 131-151.

Coval, J. D. and Shumway, T., 2005, "Do Behavioral Biases Affect Prices?" **Journal of Finance**, Vol. 60, No. 1, 1-34.

Elfakhani, S. and Zaher, T., 1998, "Differential Information Hypothesis, Firm Neglect and the Small Firm Size Effect," **Journal of Financial and Strategic Decisions**, Vol. 11, No. 1, 29-40.

Fama, F. and French, K., 1993, "Common Risk Factors in the Returns on Stocks and Bonds," **Journal of Financial Economics**, Vol. 33, No. 1, 3-56.

Feng, L. and Seasholes, M. S., 2005, "Do Investor Sophistication and Trading Experience Eliminate Behavioral Biases in Financial Markets?" **Review of Finance**, Vol. 9, No. 3, 305-351.

Frazzini, A., 2006, "The Disposition Effect and Underreactioin to News," **Journal of Finance**, Vol. 61, No. 4, 2017-2046.

Gao, L. and Kling, G., 2005, "Calendar Effects in Chinese Stock Market," **Annuals of Economics and Finance**, Vol. 6, No. 1, 75-88.

Genesove, D. and Mayer, C., 2001, "Loss Aversion and Seller Behavior: Evidence from the

Housing Market," **Quarterly Journal of Economics**, Vol. 116, No. 4, 1233-1260.

Gordon, D. B. and Leeper, E. M., 1994, "The Dynamic Impacts of Monetary Policy: An Exercise in Tentative Identification," **Journal of Political Economics**, Vol. 102, No. 6, 1228-1247.

Grinblatt, M. and Han, B., 2005, "Prospect Theory, Mental Accounting, and Momentum," **Journal of Financial Economics**, Vol. 78, No. 2, 311-339.

Grinblatt, M. and Keloharju, M., 2001, "What Makes Investors Trade?" **Journal of Finance**, Vol. 56, No. 2, 589-616.

Heath, C., Huddart, S., and Lang, M., 1999, "Psychological Factors and Stock Option Exercise," **Quarterly Journal of Economics**, Vol. 114, No. 2, 601-627.

Ho, Y., 1983, "Money Supply and Equity Prices: An Empirical Note on Far Eastern Countries," **Economic Letters**, Vol. 11, No. 1-2, 161-165.

Ho, Y. K., 1990, "Stock Return Seasonalities in Asia Pacific Markets," **Journal of International Financial Management and Accounting**, Vol. 2, No. 1, 47-77.

Hu, G., McLean, R. D., Pontiff, J., and Wang, Q., 2014, "The Year-End Trading Activities of Institutional Investors: Evidence from Daily Trades," **Review of Financial Studies**, Vol. 27, No. 5, 1593-1614.

Ingersoll, J. E. and Jin, L. J., 2013, "Realization Utility with Reference-Dependent Preferences," **Review of Financial Studies**, Vol. 26, No. 3, 723-767.

Kao, C. W. and Wan, J. Y., 2012, "An Investigation of the Short Term Interest Rate Indicators: Evidence from Taiwan," **Taiwan Journal of Applied Economics**, Vol. 92, No. 3, 23-36.

Keim, D. B., 1983, "Size-related Anomalies and Stock Return Seasonality: Further Empirical Evidence," **Journal of Financial Economics**, Vol. 12, No. 1, 12-32.

Kraus, A., Wei, K. C. J., and Yang, Z., 2009, "Determinants of Disposition and Reverse Disposition Effect," http://ssrn.com/abstract=1369114, accessed on December 12, 2014.

Krueger, T. M. and Johnson, K. H., 1991, "An Analysis of Anomaly Sensitivity to Market Conditions Using Linear and Nonlinear Techniques," **Quarterly Journal of Business and Economics**, Vol. 30, No. 1, 3-27.

Kumar, A. and Lee, C. M. C., 2006, "Retail Investor Sentiment and Return Comovements," **Journal of Finance**, Vol. 61, No. 5, 2451-2486.

Kuo, M. H., 2008, "How to Measure the Disposition Effect?" Working Paper, Shih Hsin University.

Kwon, C. S. and Shin, T. S., 1999, "Cointegration and Causality between Macroeconomic Variables and Stock Market Returns," **Global Finance Journal**, Vol. 10, No. 1, 71-81.

Lastrapes, W. D., 1993, "An Empirical Analysis of Stock Prices and Interest Rate Dynamics: The Role of Money." Working Paper, University of Georgia.

Lastrapes, W. D., 1998, "International Evidence on Equity Prices, Interest Rates and Money," **Journal of International Money and Finance**, Vol. 17, No. 3, 377-406.

Li, Y. and Yang, L., 2013, "Prospect Theory, the Disposition Effect, and Asset Prices," **Journal of Financial Economics**, Vol. 107, No. 3, 715-739.

McGuinness, P. B. and Harris, D. F., 2011, "Comparison of the 'Turn-of-the-month' and Lunar New Year Return Effects in Three Chinese markets: Hong Kong, Shanghai and Shenzhen," **Applied Financial Economics**, Vol. 21, No. 13, 917-929.

McGuinness, P. B., 2005, "A Re-Examination of the Holiday Effect in Stock Returns: The Case of Hong Kong," **Applied Financial Economics**, Vol. 15, No. 16, 1107-1123.

Mougoue, M., 1996, "Seasonalities in the Taiwanese Stock Market," **American Business Review**, Vol. 14, No. 2, 73-79.

Ng, L. and Wang, Q., 2004, "Institutional Trading and the Turn-of-the-year Effect," **Journal of Financial Economics**, Vol. 74, No. 2, 343-366.

Odean, T., 1998, "Are Investors Reluctant to Realize Their Losses?" **Journal of Finance**, Vol. 53, No. 5, 1775-1798.

Ong, L., 2006, "Seasonalities in China's Stock Markets: Cultural or Structural?" Working Paper, International Monetary Fund.

Reinganum, M. R., 1983, "The Anomalous Stock Market Behavior of Small Firms in January: Empirical Tests for Tax-loss-selling Effects," **Journal of Financial Economics**, Vol. 12, No. 1, 89-104.

Rogalski, R. J. and Tinic, S. M., 1986, "The January Size Effect: Anomaly or Risk Mismeasurement?" **Financial Analysts Journal**, Vol. 42, No. 6, 63-70.

Roll, R., 1983, "Vas ist Das? The Turn-of-the-year Effect and the Return Premia of Small Firms," **Journal of Portfolio Management**, Vol. 9, No. 2, 18-28.

Shapira, Z. and Venezia, I., 2001, "Patterns of Behavior of Professionally Managed and Independent Investors," **Journal of Banking and Finance**, Vol. 25, No. 8, 1573-1587.

Shefrin, H. and Statman, M., 1985, "The Disposition to Sell Winners too Early and Ride Losers too Long: Theory and Evidence," **Journal of Finance**, Vol. 40, No. 3, 777-790.

Talpsepp, T., 2011, "Reverse Disposition Effect of Foreign Investors," **Journal of Behavioral Finance**, Vol. 12, No. 4, 183-200.

Tong, W. H. S., 1992, "An Analysis of the January Effect of United States, Taiwan and South Korean Stock Markets," **Asia Pacific Journal of Management**, Vol. 9, No. 2, 189-207.

Wong, P. L., Neoh, S. K., Lee, H. K., and Thong, S. T., 1990, "Seasonality in the Malaysian Stock Market," **Asia Pacific Journal of Management**, Vol. 7, No. 2, 43-62.

Wu, Y., 2001, "Exchange Rates, Stock Prices, and Money Markets: Evidence from Singapore," **Journal of Asian Economics**, Vol. 12, No. 3, 445-458.

Yen, G. and Shyy, G., 1993, “Chinese New Year Effect in Asian Stock Markets,” **NTU Management Review**, Vol. 4, No. 1, 417-436.

Yen, G., Lee, C. F., Chen, C. L., and Lin, W. C., 2001, “On the Chinese Lunar New Year Effect in Six Asian Stock Markets: An Empirical Analysis (1991-2000),” **Review of Pacific Basin Financial Markets and Policies**, Vol. 4, No. 1, 436-478.

About the Authors

Hsiao-Peng Fu

Hsiao-Peng Fu is an assistant professor in Department of Finance at Providence University. Her research interests focus on behavioral finance relative to market anomalies. She has presented her papers at several international conferences on finance and published in international journals such as Applied Economics Letters.

E-mail: hspefu@pu.edu.tw

Shu-Fan Hsieh

Shu-Fan Hsieh is an associate professor in Department of Money and Banking at National Kaohsiung First University of Science and Technology. Her research focus is on market microstructure and behavioral finance. She has published her research in journals such as International Review of Economics & Finance and International Review of Financial Analysis.

E-mail: shufan@nkfust.edu.tw