Do low-priced stocks drive long-term contrarian performance on the London Stock Exchange?

Yuliang Wu*, Youwei Li and Philip Hamill

This version 12/09/2011

Abstract

This paper investigates whether long-term contrarian performance on the UK market is driven by low-priced stocks. We find that contrarian performance at low, middle, low price levels is positive. On the Fama-French risk adjusted basis, we find both low-priced and middle-priced losers have significantly positive returns. When we adjust returns by market and liquidity risk, only middle-priced losers maintain their positive returns. Our results reveal that low-priced stocks are not fully responsible for contrarian performance. Our empirical evidence is generally consistent with the overreaction hypothesis and behavioural models of value investing.

Key words: contrarian performance, London Stock Exchange, price level

JEL Classification: G12, G14

*Corresponding author. Yuliang Wu and Youwei Li are from School of Management, Queen's University Belfast, 25 University Square, Belfast, BT7 1NN. Phillip Hamill is from the Ulster Business School, the University of Ulster, Cromore Road, Coleraine, Northern Ireland, BT52 1SA. All correspondence should be directed to: y.wu@qub.ac.uk. Tel. 028-90973279, Fax 028-90975156. Acknowledgement: The authors are grateful to Michael Moore and Donald McKillop for their helpful comments. We also thank two anonymous referees for their constructive comments. Hamill gratefully acknowledges financial support from the University of Ulster's accounting and financial services strategic research fund.

1. Introduction

Since the DeBondt and Thaler's (1985) finding of past losers outperforming past winners, long term contrarian performance has been reported across both developed and developing markets (Clare and Thomas, 1995; Dissanaike, 1997; Wongchoti and Pyun, 2005; Antoniou et al., 2005; Chou et al., 2007; McInish et al., 2008; Wu and Li, 2011). While the existence of contrarian performance is generally accepted, explaining the cause of and identifying the source of contrarian performance have been more controversial. DeBondt and Thaler (1985) and Daniel et al. (1998) propose the overreaction hypothesis for the long term contrarian performance. In their views, when a stock has experienced a string of good news or a period of growth, investors may incorrectly believe that growth will continue and pushes the stock's price higher than it is justified by the news. The stock price later reverses when investors realise that mistakes were made. Fama and French (1993; 1996) disagree with the overreaction hypothesis and contend that the outperformance of losers over winners is due to high distress costs in loser stocks. Consistent with the Fama and French's view, Conrad and Kaul (1993) and Ball et. al, (1995) identify low-priced stocks as the main source of contrarian performance, since many losers are in the low price category with a high distress cost relative to winners. This debate is centred on whether low-priced stocks are solely responsible for contrarian performance and whether contrarian performance is a mispricing effect or a reflection of the risk-return paradigm. This paper contributes to this debate by investigating whether contrarian performance is driven by low-priced stocks on the London Stock Exchange (*LSE*). The *LSE* is one of most important capital markets in the world outside U.S., and provides an alternative institutional setting which is dominated by many small and low-priced stocks[1].

Stock price itself should not affect stock performance in a frictionless market (Weld, et al, 2009). However, recent theoretical and empirical literature suggests that stock price in a market with frictions is likely used by investors to make investment decisions which in turn may affect stock return. Barberis and Shliefer (2003) develop a model where investors categorize risky assets into

[1] With approximately 3,000 *LSE* listed stocks, the FTSE 100 index, which includes 100 largest UK domestic stocks by market capitalisation, represents 84.35% (as at 30 June 20011) of market capitalisation in the *LSE*. Further information on the FTSE family of indices can be found at www.ftse.com.

different investment styles and move funds among these styles depending on their relative performance which generates co-movement in returns unrelated to co-movement in cash-flows. In their analysis they discuss price-dependent styles where price is the characteristic defining the styles such as value and small stock investing. Consistent with the model of Barberis and Shliefer (2003), Green and Hwang (2009) and Greenwood (2008) find that investors categorize stocks based on price and this behaviour is not explained by firm fundamentals. These studies suggest that contrarian performance potentially comes from stocks in a certain price range. Since stock price is positively correlated with institutional ownership (Kumar and Lee, 2006) and firm size (Green and Hwang, 2009), and negatively with transaction costs (Weld et al. 2009), low-priced stocks can be intuitively considered as a main source for long term contrarian performance. In addition, low-priced stocks contain a large amount of distress costs relative to high- or middle-priced stocks (Loughran and Ritter 1996). Therefore, it is important to examine whether risk alone can explain away contrarian performance particularly generated by low-priced stocks.

Our preliminary results show that overall contrarian performance measured by buying 5-year losers and selling 5-year winners is significantly positive and it is mainly driven by positive loser returns. To find out the source of contrarian performance we further break down overall contrarian performance at high, middle, and low price levels. In the cross-sectional analysis, we find that contrarian performance at each price level is positive, although contrarian performance at the high price level is weakly significant. This evidence suggests that contrarian performance is less dependent on price and is not from low-priced stocks alone. When we use the Fama-French (1993) three-factor model to obtain risk adjusted returns, only contrarian performance at the middle price level remains significantly positive. Furthermore, low-priced loser and middle-priced loser portfolios have significant positive returns. Finally, we use the liquidity augmented CAPM model (Liu, 2006) to obtain risk adjusted returns. We find that positive returns of low-priced losers disappear and that positive returns of middle-priced losers still persist, implying that liquidity risk plays an important role in explaining low-priced stocks' contrarian performance. Overall, our results reveal that contrarian performance is not solely driven by low-priced stocks. In fact, both liquid risk and distress risk have some power in explaining contrarian performance generated by low-priced stocks. However, contrarian performance generated by

middle-priced stocks persists after controlling for the two risks. These results imply that contrarian performance is more likely to be a mispricing effect supporting the overreaction hypothesis. Our results are also consistent with the value style investing model of Barberis and Shliefer (2003) in which investors choose liquid value stocks rather than illiquid value stocks to exploit contrarian performance.

The rest of the paper is organized as follows: Section 2 reviews the literature. The hypotheses are developed in section 3, while section 4 outlines the sample and the methodology. Section 5 reports the empirical results. Finally, section 6 provides our conclusions.

2. Literature Review

While the outperformance of loser stocks relative to winner stocks is generally accepted, explanations for this anomaly have been divided in two strands, a mispricing effect or the risk-return trade-off. Daniel et al. (1998), Barberis et al. (1998) and Hong and Stein (1999, 2000) invoke psychological evidence to motivate a price overreaction hypothesis in line with a general prediction of the behavioural decision theory of Kahneman and Tversky (1982). According to these views, a mispricing effect emanates from investors overreacting to market news in the short-term. When they correct their prior mistakes, price reverts to fundamental value over the long term. However, Lo and MacKinlay (1990) report that stock returns have positive cross-correlations which can likely reconcile with negative autocorrelations in individual stock return. They contend that contrarian profits are not driven by investor overreaction alone. Fama and French (1993; 1996) instead argue that long-term contrarian performance can be accommodated in the risk return paradigm, reflecting that losers are riskier than winners in terms of distress risk. Consistent with this, Fama and French (1995) show that a high book-to-market equity ratio, as a proxy for distress cost, predicts poor future earnings. Zhang's (2005) model supports Fama and French's conclusions providing an analytical framework where value stocks' additional riskiness emanates from their inability to scale down capital investment during market downturns. Furthermore, Fama (1998), Fama and French (2006) and LaPorta (1996) claim that long-term contrarian performance is the result of a mis-measured relationship between risk and return. In contrast, Daniel and Titman (1997) and Lakonishok et al. (1994) find that value stocks outperform growth stocks because of investors over-estimating future growth rates of growth

stocks relative to value stocks. Therefore, it is still controversial in the literature whether the value factor in the Fama and French (1993) model is a mispricing effect or a proxy for risk. Liu (2006) develops the liquidity augmented CAPM model in which liquidity risk is modeled in addition to market risk. Liu (2006) contend that positive returns of losers are potentially attributable to a high liquidity risk which is compensated for investors holding illiquid loser stocks.

In the literature, there are also some studies showing that the main source of contrarian performance may persist at certain price range. Conrad and Kaul (1993) argue that the bid-ask spread is high in low-priced stocks and that long-term contrarian performance is a low-price effect. However, Loughran and Ritter (1996) find that after controlling for bid-ask spread and survivorship bias contrarian performance persists. Recent empirical evidence reveals that investor behaviour is also sensitive to price and in turn may affect stock return. Barberis and Shleifer (2003) provide a theoretical framework for understanding investment styles. In their model investors simplify their investment decisions by grouping assets into styles rather than across individual stocks, and allocate funds into style categories which generate co-movement. Small stocks and value stocks which are relatively low-priced are two typical styles which they include in the price dependent category. Green and Hwang (2009) support Barberis and Shleifer's (2003) theoretical framework by providing empirical evidence that investors categorise stocks by price. They find that comovement between similarly priced stocks cannot be explained by market frictions and firm fundamentals, while price based portfolios explain variation in stock-level returns. Dyl and Elliott (2006), Gompers and Metrick (2001) and Kumar and Lee (2006) document a positive correlation between stock price and institutional ownership, suggesting that institutional (individual) investors might prefer high (low)-priced stocks. Collectively, these papers suggest that contrarian performance is more likely to persist in small, value, and relatively low-priced stocks.

The ability of the January effect to explain contrarian performance has also been investigated. Zarowin (1990) documents that return reversals can be attributed to the superior positive performance of small firms in January, whereas Grinblatt and Moskowitz (2004) find that consistent losers experience significantly positive returns in January which they attribute to tax-

loss selling at the tax year end. George and Hwang (2007) provide a unified tax explanation for both loser and winner reversals. They show that winner reversals are driven by investors' incentive to delay capital-gain tax payments, while loser reversals are caused by tax-loss selling at the tax year end[2]. These papers support the view that strategic tax planning can help explain contrarian performance.

In the context of the UK market, Clare and Thomas (1995) investigate contrarian performance for a sample of 1000 UK stocks and the potential for profit from implementing a contrarian investment strategy from 1955 to 1990. They support the overreaction hypothesis, but attribute their findings to a size effect. Dissanaike (1997, 1999) employs a sample of *FTSE* 500 firms from 1975-1991 and confirms investor overreaction not driven by a size effect. Antoniou et al. (2006) use weekly data of 1645 *LSE* stocks and find that contrarian performance exists in the UK market where large capitalization stocks are the main driving force for contrarian performance. Wu and Li (2011) use constituent stocks in *FTSE* All Share Index from 1979 to 2009 in the UK and investigate whether delaying capital gain tax payment can explain winner reversals. They find that growth stocks rather than stocks with a large amount of capital gains drive winner reversals over the long term.

In the literature, it remains unclear whether low-priced stocks are the main driving force for contrarian performance. This is the main focus of the paper. The *LSE* is an important capital market in the world, and it provides an alternative institutional setting to investigate the contribution of low-priced stocks to contrarian performance. As at the end of June 2011, the FTSE 250 index, which is comprised of 250 largest UK domestic firms by market capitalisation, represented 96% of total market capitalisation, implying the remaining 4% of market value for a vast majority of the number of listed firms. Our investigation of *LSE* listed stocks can offer new insights into the debate between mispricing or risk based explanations for contrarian performance.

3. Hypothesis Development

[2] The tax related explanations for reversals is modeled on the ground that general tax law settings have limited abilities to recognize capital loss. If an investor incurs any capital loss in previous tax year, the amount of loss has a "carry-over" feature which can offset current or future capital gains. However, if an investor realizes capital gains, one would be immediately liable to pay capital gain taxes.

3.1 Standard contrarian performance hypothesis

We begin our empirical investigation by considering the standard long term contrarian hypothesis. This hypothesis maintains that past performance can predict future returns. Winners and losers are defined as top and bottom 30% stocks according to their past 5-year performance, respectively. DeBondt and Thaler (1985) first find that losers with past low returns subsequently outperform winners with past high returns over next 3-5 years. This return reversal pattern can potentially generate a long term contrarian investment strategy from buying losers and selling winners. This strategy also suggests that the return spread (denoted as **S0)** between loser and winners should be significantly positive. This approach has been widely used in the literature to evaluate long term contrarian performance (George and Hwang, 2007; Ginblatt and Moskowitz, 2004). Therefore, our first testable hypothesis is that:

> ***H_{1a}*:** The return spread between loser and winner portfolios is significantly positive over a 5-year period.

A large amount of empirical evidence across different countries shows that positive returns of losers drive the documented long term contrarian performance, for example, in the U.S. (DeBondt and Thaler, 1985 and Ginblatt and Moskowitz, 2004) and in the Japanese market (Chou et al., 2007). In line with previous studies, we thereby hypothesize that:

> ***H_{1b}*:** Losers have significantly positive returns over a 5-year period.

3.2 Price independence contrarian performance hypothesis

If overall contrarian performance and loser performance is positive, it is worthwhile to investigate whether these phenomenon prevail in differently priced stocks or only in low-priced stocks. This is the key focus of the paper. Low-priced stocks are those with high transaction costs (Weld et al. 2009) which potentially make them sluggish to absorb new information. Lakonishok et al., (1992), Gompers and Metrick (2001) and Kumar and Lee (2006) find that low-priced stocks have low institutional ownerships and they are more preferable for individual investors. While institutional investors are traditionally viewed as inform traders, individuals are noise traders, suggesting that contrarian performance should be eliminated more quickly in high-priced

stocks than in low-priced stocks (Kaniel et al. 2008). Thus, these papers imply that contrarian performance can be price dependent and more pronounced in low-priced stock. Low-priced stocks are also small firms with a high bid-ask spread, which can largely bias returns (Conrad and Kaul, 1993 and Ball et al. 1995). However, Loughran and Ritter (1996) find that after control for bid-ask spreads and survivorship bias contrarian performance still prevails in U.S. markets. In addition, Loughran and Ritter (1996) show that price alone has no prediction power for stock future returns. Liu (2006) contend that illiquid stocks identified by a composite measure of non trading days and turnover ratio may have higher returns for losers which drive long term contrarian performance. Given a positive relationship between liquidity and price (Weld et al. 2009), low-priced stocks also seem to have a higher liquidity risk which is a more likely contributor to contrarian performance. However, Wongchoti and Pyun (2005) find that contrarian performance survives in non S&P500 stocks only with high trading volume. This evidence can be hardly reconciled with general liquidity based explanations.

DeBondt and Thaler (1985) attribute long term contrarian performance to investor overreaction to stock past performance. This view is challenged by Fama and French (1993; 1996) who argue that long term contrarian performance falls into the traditional risk-return paradigm. Since losers have a higher distress cost than winners, losers should earn a higher return. However, there is an intense debate on whether the value factor is a proxy for distress cost or for mispricing (Lakonishok et al. 1994 and Daniel and Titman, 1997), which reflects investors overreact to firm fundamentals such as earning announcements. We maintain that if long term contrarian performance is attributable to risk, such performance should completely disappear after risk adjustments. Otherwise, long term contrarian performance is more likely a mispricing effect.

[Insert Table 1 Here]

The difference between U.S. and U.K. markets also makes investigating low-priced stocks more relevant. Most of U.S. studies on return anomalies exclude stocks with price less than $5 (e.g. Jagadeesh and Titman, 2001 and Green and Hwang, 2009). Weld et al. (2009) find that U.S. stocks on average are constantly priced at $35 since the Great Depression, but not for other countries including U.K. Table 1 shows that the averaged stock price in U.K. is well below the U.S. threshold of $5, while in fact the averaged U.K. stock are priced at £1.44 roughly equivalent

to $2.30[3]. Mean (median) stock prices for high and low-priced stocks are £5.20 (5.16) and £0.36 (0.33), respectively. Consistent with previous literature, low-priced stocks are small firms, generally low beta risk, and heavily characterized as value firms. The cross-sectional and time-series mean value of BV/MV for low-priced stocks is 115%, which is substantially higher than middle-priced stocks with 1.07% and high-priced stocks with 0.68%. Since Fama and French (1993; 1996) interpret BV/MV as a proxy for distress cost, a high BV/MV ratio in low-priced stocks indicates that low-priced stocks might have a higher distress risk than the other two types of stocks. If contrarian performance is related to price and risk, it should be presumably stronger in low-priced stocks. However, if contrarian performance is a mispricing effect due to investor overreaction, it should be also observable in high- and middle-priced stocks.

In summary, we maintain two competing hypotheses.

> $\boldsymbol{H_{2a}}$: Contrarian performance prevails in high-, middle-, and low-priced stocks over the long term.
>
> $\boldsymbol{H_{2b}}$: Contrarian performance exists only in low-priced stocks over the long term.

To investigate $\boldsymbol{H_{2a}}$ and $\boldsymbol{H_{2b}}$, we rank all sample stocks according to their prices by a cut-off rate of 30% for example the top 30%, the middle 40% and the bottom 30% of stocks, in a given month. Thus, six priced level based contrarian portfolios are constructed upon three price portfolios interacting with winner and loser portfolios. For a given price level (e.g. high, middle, low), there are price level based loser and winner portfolios and their return difference as our measurement for contrarian performance (**S**). We denote **S1**, **S2** and **S3** for the contrarian performance at the high, middle and low price level, respectively. Finally, we also evaluate individual returns for the six price level based contrarian portfolios to identify the main source of contrarian performance.

4. Sample, Variable Definitions and Methodology

4.1. Sample

[3] At the time of writing, 1£ is approximately equal to 1.6 US$.

The sample of stocks is based on the constituents of the *FTSE*-All Share Index from January 1970 to December 2009 and the constituents of *FTSE*-All Small Index from January 2000 to December 2009[4]. The monthly price, return series and market capitalisation of each stock are extracted from the Thomson Reuters Datastream. We include only UK stocks which are quoted in the British Sterling on the *LSE*. We exclude unit trusts, close-end, and open-end funds in the sample. Our sample dataset contains 1745 sample stocks and 462,263 firm-month observations. To control sample selection bias, we set dead firms' the last trading month return as -100% and as missing values in the following months. This coding rule reflects the UK firm insolvency process in which stocks of such firms become worthless (Liu, 2008; Taffler et al. 2004; Franks et al., 1996[5]). We denote the price on the last trading day of month t as P_t, and its monthly price history as P_{t-1}, P_{t-2}…, P_{t-60}. In this paper, we use past 5-year return to sort sample stocks in a given month t . A stock at least has a series of 24 monthly returns to be included in the sample[6]. The dataset is unbalanced in each calendar month, meaning that the number of observations varies when we run calendar time based Fama-MacBeth (1973) regressions. With a 60-month test period, the first cross-sectional regression starts from January 1975, while the last regression ends in December 2009. There are 526 stocks in January 1975 and 1073 stocks in December 2009.

4.2 Variables

[4] The *FTSE* All Small Index is a family index of the *FTSE* Small Cap Index, the *FTSE* Fledging Index and the *FTSE* All Small Sector Indices. The constituent list of the *FTSE* All Small Index provided by the Datastream starts from January 2000. While the *FTSE* All Share Index represents approximately 98% of the UK's market capitalizations, the remaining 2% of captialisations is captured by the *FTSE* All Small Index.

[5] According to Franks et al., (1996), Chapter 11 in the U.S. insolvency code allows the debtor to retain control of bankrupted firms, while in the UK receivership gives control rights to a particular secured creditor, who has no duty to take account of the interests of other junior creditors. Therefore, UK investors are unlikely to get any residual assets from bankrupted firms.

[6] If a stock has a monthly return series less than 60 and greater or equal to 24, the stock is held in the benchmark portfolio, which is neither a winner nor a loser portfolio, until its last trading month. We are grateful for an anonymous referee for making this suggestion.

(i) Past performance measure (*5-year winner* or *loser*): this measure is simply the stock's return over the portfolio formation period, $\frac{P_{t-j} - P_{t-j-60}}{P_{t-j-60}} (\ j = 1,2,3...60)$. The subscript *j* is the number of rolling back windows. The subscript *t* denotes month *t*. Both *5-year winner* and *5-year loser* are dummy variables. If a stock is ranked in the top (bottom) 30% of all stocks in terms of past 5-year return, *5-year winner* (*5-year loser*) is equal to 1 and 0 otherwise at a given month *t-j*.

(ii) Six price level based contrarian portfolios: *HP_Winner*, *MP_Winner*, *LP_Winner*, *HP_ Loser*, *MP_Loser*, and *LP_Loser*. We use two sorts, past 5-year return and price levels, to build six price level based contrarian portfolios. We rank all sample stock prices in each month at a high, middle, low price level by a 30% cut-off rate. *HP*, *MP* and *LP* stand for stock price in the top 30%, middle 40%, and bottom 30% of all sample stocks. Then, we intersect price levels with past performance to formulate six dummy variables, which represent six portfolios. For example, *HP_Winner* is a dummy variable. It equals to one if a stock is in the top 30% past performance group and also at the top 30% of all sample stock prices, and zero otherwise. The remaining five dummies are constructed in a same manner.

(iii) Momentum controls (the 52 Week high price): To control for the momentum effect, we use dummies of $52wkhW_{i,t-j}$ and $52wkhL_{i,t-j}$ which are the highest and lowest price levels in the 52 weeks. Following George and Hwang (2004), we set $52wkhW_{i,t-j}$ ($52wkhL_{i,t-j}$) to one if $\frac{P_{i,t-j}}{high_{i,t-j}}$ is ranked among the top (bottom) 30% of all stocks in month *t-j*, and zero otherwise. Here, $P_{i,t-j}$ is the price stock *i* at the end of month *t-j* and $high_{i,t-j}$ is the highest month-end price of stock *i* during the 12-month period that ends on the last day of the month *t-j* . George and Hwang (2004) find the 52-week high measure is more able to capture short-term momentum than the past performance measure based on the fixed (e.g. 6-month returns) window used by Jegadeesh and Titman (1993)[7]. Furthermore, George and Hwang claim that the 52-week high measure is not subject to long-term reversals.

[7] In addition, George and Hwang (2004) find that the 52-week high measure is superior to Moskowitz and Grinblatt (1999) who argue that momentum in individual stock returns is driven by momentum in industry returns.

4.3 Empirical model

Following George and Hwang (2004, 2007) and Grinblatt and Moskowitz (2004), we use the Fama and MacBeth (1973) regressions to estimate abnormal returns for each portfolio. If an investor forms portfolios of winners and losers every month and hold these portfolios for the next *T* months, the return earned in a given month *t* is the equal-weighted average of the returns to T portfolios, each formed in one of the past *T* months *t-j* (for *j=1,...,T* and *T=1,.. 60*). The denotation *j* is a subscript of the number of rolling back months. The contribution of the portfolio formed in month *t-j* to the month *t* return can be obtained by estimating the following cross-sectional regression.

$$R_{it} = b_{0jt} + b_{1jt} R_{i,t-1} + b_{2jt} size_{i,t-1} + b_{3jt} 52wkhWinner_{i,t-j} + b_{4jt} 52wkhLoser_{i,t-j} + b_{5jt} 5yearWinner_{i,t-j} + b_{6jt} 5yearLoser_{i,t-j} + e_{ijt} \quad (1)$$

where R_{it} is the return to stock *i* in month *t*. $Size_{i,t-1}$ is market capitalisation in a logarithm form for stock *i* and at month *t-1*. $R_{i,t-1}$ is stock *i*'s return at month *t-1* . Both $Size_{i,t-1}$ and $R_{i,t-1}$ are included in the regression as deviations from cross sectional means at month *t-1*. The intercept b_{0jt} is the risk neutral portfolio's return which has been taken out by the effects of average size, bid-ask bounce, and momentum. We run this regression 60 times (*j=1,2,…60*) for each calendar month *t* from January 1975 to December 2009. The sum of $b_{0jt} + b_{5jt}$ is the month-*t* return to a portfolio formed in month *t-j* that is long in winner stocks. Consequently, b_{5jt} can be viewed as an average return in excess of b_{0jt} by taking a long position in winners *j* months ago. The coefficient difference between b_{6jt} and b_{5jt} in Eq(1) is an average contrarian performance generated by taking a long position in losers and a short position in winners. Given our prior in the standard contrarian hypothesis **(H_{1a}** and **H_{1b}),** we expect (b_{6jt} - b_{5jt}) to be positive. The averaged return for 5-year winners over the 60-month holding period at month *t* can be computed as $S_{5t} = \frac{1}{60}\sum_{j=1}^{60} b_{5jt}$ .Then, the time series mean, $\overline{S_5}$, is an excess return for past winners relative to stocks which are neither winners nor losers. The coefficients on other variables can

be computed and interpreted in a same way. The time series means ($\overline{S_5}$) of the month-by-month estimates and their *t*-statistics are reported in the tables.

We extend our model in Eq (1) to compare returns for six price level based portfolios on a head to head basis. We use following model to test our price independent contrarian hypothesis (**H_{2a}** and **H_{2b}**).

$$R_{it} = b_{0jt} + b_{1jt}R_{i,t-1} + b_{2jt}size_{i,t-1} + b_{3jt}52wkhW_{i,t-j} + b_{4jt}52wkhL_{i,t-j} + b_{5jt}HP\_Winner_{i,t-j} + b_{6jt}MP\_Winner_{i,t-j} + b_7 LP\_Winner_{i,t-j} + b_{8jt}HP\_Loser_{i,t-j} + b_{9jt}MP\_Loser_{i,t-j} + b_{10jt}LP\_Loser_{i,t-j} + e_{ijt} \quad (2)$$

Each coefficient on the six portfolios is a return relative to stocks which are neither 5-year winners nor 5-year losers. Therefore, we implicitly set stocks that have not experienced extreme price changes over a 5-year period as a benchmark group. The coefficient difference ($b_8 - b_5$) is the contrarian performance at the high price level denoting as **S1**. ($b_9 - b_6$) is the contrarian performance at the middle price level defined as **S2**. Finally, ($b_{10} - b_7$) is the contrarian performance at the low price level defines as **S3**. According to **H_{2a}**, we expect that **S1**, **S2**, and **S3** are jointly positive. For **H_{2b}**, we expect that only **S3** is significantly positive.

Risk-adjusted abnormal returns for each portfolio in Eq (1) and (2) are obtained by using the Fama-French (1993) three-factor model[8] and the liquid augmented CAPM model[9] (Liu, 2006)

[8] The book to mark ratio reported in the Datastream starts from June 1979. Our risk-adjusted returns are correspondently calculated from July 1979 to December 2009.

[9] The Liu's (2006) liquidity augmented CAPM model is $R_i = a_i + b_i(R_m - R_f) + s_i LIQ_t + e_i$. LIQ is a liquidity factor, which is measured by the return difference between low liquid stocks and high liquid stocks according *LM12* in month *t*. We use a 30% cutoff rate to sort *LM12* in a given month. The top 30% of stocks in terms of *LM12* is low liquid stocks, while the bottom 30% of stocks is high liquid stocks. *LM12* is a liquidity measure and is defined as ($LM12 = \left[Number \text{ of Zero daily volumes in prior 12 months} + \frac{1/(12\text{-month turnover})}{11{,}000} \right] \times \frac{21 \times 12}{NoTD}$). *12-month turnover* is turnover over the prior 12 months, calculated as the sum of daily turnover over the prior 12 months. Daily turnover is the ratio of the number of shares traded on a day to the number of shares outstanding at the end of the day. *NoTD* is the total number of trading days in the market over the prior 12 months. The value of 11,000 is

over the holding period. For example, in Eq(1) the time series of S_{5t} is individually regressed on the Fama-French (1993) three factors. The intercept (alpha) of the regressions is risk-adjusted abnormal returns for 5-year winner portfolio. In addition, we also regress ($b_{10} - b_7$) on the Fama-French (1993) three factors to obtain risk-adjusted contrarian performance at the low price level. We apply the liquidity augment CAPM model (Liu, 2006) in a same way as the Fama-French three factor model to obtain risk adjusted returns. While there are two portfolios and one spread of contrarian performance in Eq (1), Eq (2) can generate returns of six portfolios and three spreads. To examine the joint significance of returns on relevant portfolios, we employ the *GRS* test developed by Gibbons et al. (1989) with the null hypothesis that risk-adjusted returns on the portfolios are jointly equal to zero[10]. More specifically, the *GRS* test evaluates the joint significance of the two portfolios' returns, which are obtained from Eq(1). It also tests the joint significance of the three spreads and six portfolios' returns, which are obtained from Eq (2).

5. Empirical Results

5.1 Summary statistics

Table 2 reports summary statistics for winner and loser portfolios. Panel A is for the whole sample period, while Panel B and Panel C are for January 1975 to December 1991 and for January 1992 to December 2009, respectively.

[Insert Table 2 here]

Given a 30% cut-off rate of past 5-year performance, 5-year winner and loser portfolio on average include 213 and 214 stocks in each month (column (1)). Across price levels, low-priced stocks account for 13% and 58% in 5-year winner and loser portfolios, respectively (column 2). The equivalent percentages of high-priced stocks are 49% and 11%, and 38% and 31% for middle-priced stocks. This evidence shows that high-priced stocks constitute the largest number

---

chosen because of ($0 < \frac{1/(12 - month\,\text{turnover})}{11{,}000} < 1$) for all sample stocks. We obtain the liquid premium from the low liquid portfolio and the high liquid portfolio on a monthly basis starting from October 1986.

[10] The *GRS* test is basically a *F*-statistics test on risk-adjusted returns of portfolios. Fama and French (2006) also use the *GRS* test to evaluate whether the value premium varies with firm size.

of stocks in 5-year winner portfolios, while low-priced stocks dominate 5-year loser portfolios. The figures reported from columns (3) to (7) are monthly averages of cross-sectional means in each month over 420 months from January 1975[11] to December 2009. Averaged returns over past five years are 323% for winners and -31% for losers (Column 3). The average price of 5-year winner portfolio is £3.75 and £1.06 for 5-year loser (Column 4). For a given price level, averaged prices of winners are consistently higher than those of losers, e.g. high-priced winners (£6.18) > high-priced losers (£4.52). Column (6) reports relative prices to stocks' 5-year highs. This measure indicates how far a stock's current price is away from its 5-year highest price. While 5-year winners are closer to their 5-year highs (-26%), 5-year losers are at -56% below their 5-year highs on average. Consistent with the past 5-year performance measure (column (3)), low priced losers and high priced winners are extreme losers and winners in terms of their 5-year highs (-63% against -20%), respectively. In column (7), we find that 5-year winners are large stocks (£1,129m) whereas 5-year losers are small stocks (£316m). However, when we compare firm size across price levels we find that high price winners (£1,887m) are a similar size to high-price losers (£1,794m), and middle-price losers (£428m) are slightly larger than middle-priced winners (£374m). Both low priced winners (£56m) and losers (£43m) are small firms of a similar size.

Panel B and Panel C separate the whole sample period into two sub-periods. Comparing the number of stocks in column (1) for each sub-period, in the latter period the average number of stocks has increased. The number of stocks in 5-year winner portfolio increases from 164 to 258 whereas for losers from 165 to 259. Consequently, the weights of high-priced 5-year winners and low priced losers increase from 42% to 53% and from 50% to 64%, respectively, between the two sub periods. In column (3), we find that past 5-year returns of 5-year winners and losers have been reduced in half in the latter period. However, firm size of both 5-year winners and 5-year losers has increased in the latter period. Finally, consistent with the evidence in the whole sample period, middle priced losers are larger than middle priced winners in two sub-periods.

5.2. Standard contrarian performance hypothesis

[11] The first month for the 5-year performance measure is available from January 1975 onwards, because the dataset starts from January 1970.

We first estimate Eq (1) to test the standard contrarian-hypothesis $\mathbf{H_{1a}}$ and $\mathbf{H_{1b}}$. Table 3 reports the results for five individual annual holding periods (column (1) to (10)) and for a five-year period (column (11) and (12)). We report results including all calendar months and excluding both January and April in each observation window. This approach reflects the tax settings in which the UK personal tax year ends in April. George and Hwang (2007) and Ginblatt and Moskowitz (2004) contend that return reversals are influenced by tax year ends. The last row of Table 3 reports the average number of stocks to run cross-sectional regressions in each calendar month.

[Insert Table 3 here]

The key variables of interest reported in Table 3 are 5-*year winner* and *5-year loser*. Consistent with our hypothesis ($\mathbf{H_{1b}}$), 5-year losers earn a significantly positive return of 0.17% per month with *t*-statistic 2.98 over a 5-year period. Excluding both January and April, 5-year losers have a return of 0.14 % with *t*-statistic 2.43. However, 5-year winners have an insignificantly negative return of -0.04% per month over a 5-year period. Returns for 5-year losers in the first four holding periods from columns (1) to (8) are significantly positive (except for column (2)) regardless of the two calendar months of January and April. Returns of winners outside January and April are generally smaller than those including the two calendar months. One typical example is in the second holding period (column (3) and (4)). Including all calendar months, winners earn an insignificant return of -0.09% per month, while outside January and April they have a significant return of -0.11% per month. This evidence suggests that the January-April effect appears to magnify winner reversals. However, loser returns outside January and April are generally equal or greater than those including all calendar months. For example, in the first year holding period (column (1) and (2), loser returns become insignificantly positive outside January and April, implying that the calendar effect mitigates loser return reversals.

At the bottom of Table 3, we report results of contrarian performance measured by the spread between buying 5-year losers and selling 5-year winners (S_0). In a 5-year period (column (12)), 5-year losers outperform 5-year winners by 0.20% per month after controlling for January and April. In each sub-period window, the spread is significantly positive in windows (13, 24), (25, 36) and (37, 48). Overall, consistent with the hypothesis $\mathbf{H_{1a}}$, the evidence here supports the

existence of long term contrarian performance on the *LSE*. Comparing our results with those in U.S. studies, the magnitude of reversals (0.20% per month) is similar to the finding of Jegadeesh and Titman (2001) (e.g. 0.29% per month). However, 0.20% per month is smaller than, the finding of DeBondt and Thaler (1985) 0.51% per month. The large difference of magnitude in the two countries may be attributable to a more extreme cut-off rate used by DeBondt and Thaler (1985), as they include only the top and bottom 50 NYSE stocks against ours the top and bottom 30% of all sample stocks in terms of past performance.

The remaining variables in Table 3 are controls for short-term anomalies in the cross-sectional regressions: momentum variable (*52wkh winner* and *52wkh loser*), microstructure effects ($R_{i,t-1}$), and size ($size_{i,t-1}$). For the first holding period (1, 12) the average return on momentum winners (52wkh winner) is significantly positive at 0.22% per month while it is -0.78% per month for momentum losers (52wkh loser). In the (1, 60) holding period momentum winners and losers earn significant returns of 0.06% and -0.19%, respectively. Consistent with the findings of George and Hwang (2004), momentum winners and losers do not reverse their returns in the long term. Our proxy to control for microstructure effects ($R_{i,t-1}$) is significantly negatively correlated with monthly returns when we include all calendar months. However, when we exclude January and April, the coefficient becomes weakly significant or insignificant. The findings of negative autocorrelations between current and previous month return is generally consistent with the finding of Jegadeesh and Titman (1995). Finally, the estimate of $size_{i,t-1}$ is insignificantly different from zero in the cross-sectional regressions.

5.3 The price-independence contrarian performance hypothesis

In this section, we further formulate price level based winner and loser portfolios to examine whether contrarian performance is different at each price level. There are three winner portfolios: high-priced (*HP_winner*), middle-priced (*MP_winner*) and low-priced (*LP_winner*), and similarly three loser portfolios.

[Insert Table 4 here]

The results are reported in Table 4. Over a 5-year period low priced winners experience significantly negative return of -0.18% (*t*-statistic -1.76) for all calendar months and -0.24% (*t*-statistic -2.22) per month outside January and April (Columns (11) and (12)); Irrespective of April and January, returns for both middle priced and high priced winners are insignificant in the 5-year holding period and across the five sub periods. In contrast, low-priced winners have significantly negative returns in four out of the five holding periods: including (13, 24), (25, 36), (37, 48) and (49, 60). In these four holding periods when April and January are excluded the returns are still significantly negative, and consistently more negative, than the results for all calendar months. For example, the monthly return in the holding period (13, 24) falls from -0.18% to -0.27%. It therefore appears that low priced stocks play an important role in winner reversals after accounting for the January-April effect.

Among losers, only middle-priced losers earn a significant return of 0.20% over a 5-year period (column (11)). When April and January are excluded the return of middle-priced losers is 0.16 % per month. Both of the returns of middle-priced losers are statistically significant at less than 1% level. Across sub-period windows, middle priced losers start to have a positive return from the first year (1, 12) (column (1)) and this trend ends in the fourth year (column (7)). Returns for middle priced losers are slightly reduced when excluding January and April. This evidence is consistent across sub periods and over a 5-year period. For example, in column (7) and (8), a positive return 0.17% per month becomes insignificant at 0.10% outside January and April. For the other two loser portfolios, high-priced and low-priced losers have no significant return over a 5-year period (column (11) and (12)). In each sub-period window, low-priced losers have weakly significant returns in the second (13, 24) and the third (25, 26) period at 0.16% per month and 0.15% per month, respectively. High-priced losers have significant returns only in the fourth and fifth period at 0.33% and 0.26% per month, respectively. In sum, these results show that over a 5-year period middle-priced losers are mainly responsible for losers' contrarian performance.

The three spreads are reported in Panel B. The first spread **S1** is for the high-price (*HP_loser* minus *HP_winner*), the second spread **S2** is for the middle-price (*MP_loser* minus *MP_winner*), and **S3** captures the low-price level (*LP_loser* minus *LP_winner*). All three spreads are significantly positive at 0.17% (*t*-statistic 1.68), 0.21% (*t*-statistic 2.91), and 0.26 (*t*-statistic 2.32)

for all calendar months over a 5-year period. Excluding April and January they are 0.17% (*t*-statistic 1.41), 0.22% (*t*-statistic 2.78), and 0.29% (*t*-statistic 2.34) for **S1**, **S2**, and **S3**, respectively. We also undertake three pair-wise mean tests between **S1**, **S2**, and **S3** for the 60-month return to examine whether contrarian performance differs across three price levels. None of test statistics is significant, suggesting that contrarian performance between losers and winners at each price level is insignificantly different to each other. Consistent with our hypothesis $\boldsymbol{H_{2a}}$, contrarian performance is less likely dependent on stock price. Inconsistent with $\boldsymbol{H_{2b}}$, contrarian performance is not fully generated from low-priced stocks.

5.4 Fama-French Risk-adjusted Returns

In this section, we investigate whether contrarian performance can be maintained after the Fama-French (FF) (1993) risk adjustments. Panel A in Table 5 reports risk-adjusted returns for overall 5-year winners and losers. Panel B shows returns for six price-based winner and loser portfolios. Panel C reports three spreads (**S1**, **S2**, and **S3**) based on price levels.

[Insert Table 5 about here]

Columns (11) and (12) in Panel A show that risk-adjusted returns for 5-year winners are insignificant over a 5-year period, while 5-year losers have a significantly positive return of 0.15% per month in all calendar months and 0.13% per month outside January and April. The *GRS* test in column (11) and (12) rejects the null hypothesis that returns for 5-year winners and losers[12] are jointly equal to zero at less than 1% level. Across sub-periods, 5-year winners only have a significant return of -0.10% in one observation window (e.g. the fifth year (49, 60)) outside January and April in column (10)). However, risk-adjusted returns for 5-year losers are still significant in observation windows from (13, 24) to (49, 60) (except column (4)) in which the *GRS* test rejects the null hypothesis of joint zero returns for 5-year winners and losers at less than 5% level. Risk-adjusted contrarian performance between 5-year winners and losers (**S0**) is

[12] In unreported results, 5-year winners have significantly negative loadings on the size and value factor and a significantly positive loading on the market factor, implying that 5-year winners are large, growth and high market risk stocks. 5-year losers only have a significantly positive loading on the value factor and insignificantly loadings on the market and size factor, suggesting that 5-year losers are value stocks. These results are available upon request from authors.

significantly positive from the second to the fifth year and also over a 5-year period (column (11) and (12)). The overall contrarian performance is mainly driven by 5-year losers across each observation window except for column (10). Our results reveal that on a FF risk adjusted basis, the positive performance of losers still persists, and thereby support $\mathbf{H_{1a}}$ and $\mathbf{H_{1b}}$.

Panel B shows risk-adjusted returns for six price level based contrarian portfolios. None of winner portfolios at three price levels has significant contrarian performance either over a 5-year period or in each sub period except for middle-priced winners in column (10) and high-priced winner in column (3). However, middle- and low-priced losers have significant returns of 0.17% per month and 0.15% per month, respectively, at less than 5% level. Furthermore, the *GRS* test in column (11) and (12) rejects the null hypothesis that the six portfolios jointly have an equal zero return with *p*-values of 0.01 and 0.02, respectively. Comparing with our cross-sectional analysis in Table 4, the FF model fully explains away negative returns of low-priced winners, while positive returns of middle- and low-priced losers persist. These results imply that the FF model is more powerful in explaining winners' contrarian performance than losers'. The January-April effect is not as strong as those in the cross-sectional analysis. For example, outside January and April low-priced losers have a return of 0.18% per month, which is slightly higher than 0.15% per month including all calendar months.

Column (11) in Panel C reveals that over a 5-year period only is **S2** significantly positive at 0.15% per month outside January and April. Once again, the *GRS* test in column (11) and (12) rejects the null hypothesis that **S1**, **S2** and **S3** are jointly equal to zero with *p*-values of 0.03 and 0.04, respectively. This result suggests that contrarian performance prevails in middle-priced stocks. Across each sub period, the *GRS* test cannot reject the null hypothesis that the three spreads are jointly equal to zero in the first two periods (column (1) to (4)).

Our analysis based on the FF framework reveals that middle-priced losers are potentially responsible for the overall contrarian performance on the UK market. The result is inconsistent with the hypothesis ($\mathbf{H_{2b}}$) that contrarian performance should persist only in low-priced stocks.

5.5 Liquidity Augmented CAPM adjusted returns

Our main findings in previous section show that contrarian performance is driven by low-priced and middle-priced stocks and thereby, it is interesting to see whether contrarian performance from those stocks can survive after adjusting the liquidity risk. Liu (2006) contends that contrarian performance is potentially driven by a high liquidity risk in loser stocks. We therefore investigate whether our previous findings are robust with respect to the Liu's (2006) liquidit-augmented CAPM model[13]. Our findings from this analysis are reported in Table 6 for the sample period of October 1986 to December 2009 (279 months), since the trading volume data in Datastream starts from October 1985.

[Insert Table 6 here]

In a 5-year period (column (11) in Panel A), 5-year losers have a significantly positive return of 0.14% per month at less than 5% level, while the average return for 5-year winners is insignificantly negative. When we exclude returns in January and April (column (12)), 5-year losers still maintain a positive return of 0.13%. In addition, the *GRS* test in column (11) and (12) rejects the null hypothesis that returns on the two portfolios jointly equal to zero. These results are generally consistent with those in the FF model. In each sub-period, there are 7 observation windows with significant returns for 5-year losers, while in Table 5 (FF) the number is 6. **S0** in Table 6 shows that losers outperform winners by 0.18% per month over a 5-year period (column 11) and 0.19% outside January and April. Therefore, risk adjusted overall contrarian performance by the Liu's model provides similar results to that from the FF model. Once again, these results are consistent with our hypotheses $\mathbf{H_{1a}}$ and $\mathbf{H_{1b}}$.

Column (11) in Panel B reveals that among the six price level based contrarian portfolios, only middle-priced losers have a significantly positive return of 0.16% per month in all calendar months and 0.14% outside January and April over a 5-year period. In each sub-period, middle-priced losers maintain significant returns from the second year (e.g. 0.19% per month in column (3)) until the fifth year. From column (3), the *GRS* test rejects the null hypothesis that the six portfolios have jointly equal return to zero at less than 5% level. Neither low-priced winners nor low-priced losers have significant returns over a 5-year period regardless of January and April.

[13] We are grateful to an anonymous referee for making this suggestion.

This result contrasts with the finding of significantly positive returns of low-priced losers in Table 5, suggesting that the liquidity augmented CAPM model (Liu, 2006) is more able to explain contrarian performance of low-priced stocks than the FF model. Among the three spreads, only **S2** remains significantly positive over a 5-year period (column (11)) and outside April and January. The only difference between the two risk-adjusted frameworks is that the *GRS* test statistic for the three spreads outside January and April is significant at a 9% level in Panel C column (12) Table 6.

Overall, this analysis shows that the significant positive performance of low-priced losers can be explained by the liquidity augmented CAPM model (Liu, 2006). However, positive returns of middle-priced losers persist after we control for liquidity and market risk. Therefore, middle-priced losers[14] are more likely to be the main driving force for contrarian performance. In FF factor loadings for the 60-month return, both middle-priced and low-priced losers[15] have significantly positive loadings on the value factor, suggesting that both of them have a strong value feature. However, the impact of the value feature in middle-priced losers is largely offset by impacts of the size and the market factor (both of their loadings are significantly negative). This evidence possibly implies that the value factor has limited power in explaining contrarian performance of middle-priced stocks. Also, the liquidity factor loading of the 60-month return for low-priced losers is significantly positive, while middle-priced losers have an insignificantly negative loading on the liquidity factor, implying that middle-priced losers are as liquid as the risk-neutral benchmark portfolio. These results are consistent with the theoretical prediction of value investing (Barberis and Shliefer, 2003) that investors are more likely to choose liquid value stocks rather than illiquid value stocks to exploit contrarian performance.

6. Conclusions

This paper investigates whether long-term contrarian performance is driven by low-priced stocks on the *LSE* from 1970 to 2009. Low-priced stocks have unique characteristics relative to middle-

[14] Although our results show that middle-priced losers have significant returns on a risk-adjusted basis, the magnitude of this return (e.g. 0.17% per month) may reflect a part of the averaged bid-ask spread in middle-priced stocks.

[15] These results are available upon request.

and high-priced stocks: they are smaller, have higher book to market equity ratios, and have higher liquidity risk. These attributes of low-priced stocks have long been argued to explain the long term return anomaly of losers outperforming winners. The *LSE* is dominated by many small and low-priced stocks, thereby making it more relevant to investigate whether contrarian performance is clustered only in low-priced stocks on the *LSE*. This paper also contributes to the debate on contrarian performance whether it is a mispricing effect or a reflection of the risk-return paradigm.

In both the cross-sectional and the time-series analysis, we find that 5-year losers outperform 5-year winners over the long term. Overall contrarian performance is mainly driven by positive loser returns. This result supports the standard contrarian performance hypothesis and is also consistent with the previous literature. To break down contrarian performance at each price level, we construct six portfolios which are paired with past performance and three price levels. In the cross-section analysis, we find that contrarian performance at the high, middle, and low price level are all positive. When we use the Fama-French (1996) three-factor model to obtain risk-adjusted returns, we find that middle-priced and low-priced losers have significantly positive returns. This evidence reveals that contrarian performance is not clustered only in low-priced stocks. Finally, we employ the liquidity augmented CAPM model (Liu, 2006) to examine whether positive returns of losers compensate investors for bearing a higher liquidity risk. We find that after controlling for market and liquidity risk positive returns of low-priced losers disappear. This evidence is consistent with the Liu's argument for contrarian performance. In contrast, contrarian performance at the middle price level and positive returns of middle-priced losers persist, suggesting that middle-priced losers are potentially the main driving force for contrarian performance in the UK market. This result further confirms that low-priced stocks are not responsible for long term contrarian performance on a risk adjusted basis.

In conclusion, our findings suggest that long term contrarian performance is less likely a reflection of the risk-return paradigm. Both the Fama-French (1993) and the liquidity augmented CAPM (Liu, 2006) model cannot fully explain contrarian performance. Our results are more consistent with the overreaction hypothesis (DeBondt and Thaler 1985). This investor irrational behaviour may generate the predictability of past performance for future stock return. The

evidence of contrarian performance of middle-priced stocks may also be line with the theoretical model of style investing (Barberis and Shliefer, 2003), suggesting that as a value investing style investors are more likely to choose liquid value stocks rather than illiquid value stocks to exploit contrarian performance.

References

Antoniou, A, Galariotis, E.C. and Spyrou, S. I. 2005. Contrarian profits and the overreaction hypothesis: the case of the Athens stock exchange, *European Financial Management* 11, 71-98

Antoniou, A, Galariotis, E.C. and Spyrou, S. I. 2006. Short-term contrarian strategies in the London Stock Exchange: are they profitable? Which factors affect them?, *Journal of Business Finance and Accounting*, 33, 839-867

Ball, R., Kothari, S.P. and Shanken, J. 1995. Problems in measuring portfolio performance: An application to contrarian investment strategies, *Journal of Financial Economics* 38, 79-107

Barberis, N. and Shleifer, A. 2003. Style investing, *Journal of Financial Economics* 68, 161-199

Chou, P.H., Wei, K.C. J. and Chung, H. 2007. Sources of contrarian profits in the Japanese stock market, *Journal of Empirical Finance* 14, 261-286

Clare, A., and Thomas. S. 1995. The overreaction hypothesis and the UK stock market. *Journal of Business Finance and Accounting* 22, 961-72.

Conrad, J., and Kaul. G. 1993. Long-term overreaction or biases in computed returns? *Journal of Finance* 48, 39-63.

Daniel, K. and Titman, S. 1997. Evidence on the characteristics of cross sectional variation in stock returns, *Journal of Finance* 52, 1-33

Daniel, K., Hirshleifer, D., Subrahmanyam, A. 1998 Investor psychology and security market under- and overreactions, *Journal of Finance*, 53, 1839–85.

DeBondt, W., and Thaler, R. 1985. Does the stock market overreact? *Journal of Finance* 40, 793-805.

Dissanaike, G. 1997. Do stock market investors overreact? *Journal of Business Finance and Accounting* 24, 27-49

Dissanaike, G. 1999. Long-term stock price reversals in the UK: evidence from regression tests, *British Accounting Review* 31, 373-385

Dyl, E. A. and Elliott, W. B. 2006. The share price puzzle, *Journal of Business*, 79, 2045-2066

Fama, E. 1998. Market efficiency, long-terms, and behavioural finance. *Journal of Financial Economics* 49, 283-306

Fama, E. and French, K. R. 1993. Common risk factors in the returns on stocks and bonds. *Journal of Financial Economics* 33, 3-56.

Fama, E. and French, K. R.. 1995. Size and book-to-market factors in earnings and returns, *Journal of Finance*, 50, 131-155

Fama, E. and French, K. R., 1996. Multifactor explanations of asset pricing anomalies. *Journal of Finance* 51, 55–84.

Fama, E. and French, K. R., 2006. The value premium and CAPM, *Journal of Finance*, 61, 2163-2185

Fama, E., and MacBeth, J. 1973. Risk, return and equilibrium: Empirical tests. *Journal of Political Economy* 81, 607-36.

Franks, J.R., Nyborg, K.G. and Torous, W. N. 1996. A comparison of US, UK, and German insolvency codes, *Financial Management*, 25, 86-101

George, T., and Hwang, C. 2004. The 52-week high and momentum investing. *Journal of Finance* 59, 2145-2176.

George, T., and Hwang, C. 2007. Long-tem return reversals: Overreaction or Taxes? *Journal of Finance* 62, 2866-2896.

Gibbons, M., Stephen, R., A. Ross and Shanken, J. 1989 A test of the efficiency of a given portfolio, *Econometrica*, 57, 1121-1152

Gompers, P.A. and Metrick, A. 2001, Institutional investors and equity prices, *Quarterly Journal of Economics*, 116, 229-259

Green, T. C. and Hwang, B. H. 2009, Price-based return comovement, *Journal of Financial Economics*, 93, 37-50

Greenwood, R., 2008. Excess comovement: evidence from cross-sectional variation in Nikkei 225 weights, *Review of Financial Studies*, 21, 1153-1186

Grinblatt, M., and Moskowitz. T. 2004. Predicting stock price movements from past returns: the role of consistency and tax loss selling. *Journal of Financial Economics* 71, 541-79.

Hong, H., and Stein, J. 1999. A unified theory of underreaction, momentum trading and overreaction in asset markets. *Journal of Finance* 54, 2143-2184.

Hong, H., T. Lim, and Stein J. 2000. Bad news travels slowly: Size analyst coverage, and the profitability of momentum strategies. *Journal of Finance* 54, 265-295.

Jegadeesh, N., and Titman, S. 1993. Returns to buying winners and selling losers: Implications for market efficiency. *Journal of Finance* 48, 65-91.

Jegadeesh, N., and Titman, S., 1995. Short-horizon return reversals and bid-ask spread. *Journal of Financial Intermediation* 4, 116-132

Jegadeesh, N., and S. Titman. 2001, Profitability of momentum strategies: An evaluation of alternative explanations, *Journal of Finance* 56, 699-718.

Kahneman, D., and Tversky, A., 1982 *Intuitive predictions: biases and corrective procedures. Reprinted in Kahneman, Slovic, and Tversky, Judgement under Uncertainty: Heuristics and Biases*. Cambridge University Press, Cambridge, England.

Kaniel, R., Saar, G. and Titman, S. 2008. Individual investor trading and stock returns, *Journal of Finance*, 63, 273-310

Kumar, A., and Lee, C.M.C., 2006. Retail investor sentiment and return comovement, Journal of Finance, 61, 2451-2486

Lakonishok, J., Shleifer, A. and Vishny, R.W. 1992. The impact of institutional trading on stock price, *Journal of Financial Economics*, 32, 23-43

Lakonishok, J., Shleifer, A. and Vishny, R.W. 1994 Contrarian investment, extrapolation and risk, *Journal of Finance* 49, 1541-1578

LaPorta, R., 1996. Expectations and the cross-section of stock returns, *Journal of Finance*, 51, 1715-1752

Liu, W. 2006. Liquidity-augmented capital asset pricing model, *Journal of Financial Economics*, 82, 631-671

Liu, W. 2008. Liquidity-augmented CAPM over 1926 to 1963, Social Science Research Net working paper, http://ssrn.com/abstract=968007

Lo, A. W. and MacKinlay A. C. 1990. When are contrarian profits due to stock market overreaction? *Review of Financial Studies*, 3, 175-205

Loughran, T. and Ritter J. 1996. Long-term market overreaction: the effect of low-priced stocks, *Journal of Finance* 51, 1959-1970

McInish, T. H., Ding, D. K. and Pyun, C. S. 2008. Short-horizon contrarian and momentum strategies in Asian markets: An integrated analysis, *International Review of Financial Analysis* 17, 312-329

Moskowitz, T., and Grinblatt. M., 1999 Do industries explain momentum? *Journal of Finance*, 54, 1249-90.

Taffler, J. R., Jeffery, L. and Kausar. A. 2004. In denial? Stock market underreaction to going-concern audit report disclosures, *Journal of Accounting and Economics*, 38, 263-296

Weld, W. C., Thaler, R. H. and Benartzi, S. 2009. The nominal share price puzzle, *Journal of Economic Perspectives*, 23, 121-142

Wongchoti, U. and Pyun, C. 2005. Risk-adjusted long-term contrarian profits: Evidence from non-S&P500 high-volume stocks, *The Financial Review* 40, 335-359

Wu, Y. and Li, Y. 2011, Long-term return reversals-value and growth or tax? UK evidence, *Journal of International Financial Institutions, Markets and Money*, 3478-368

Zarowin, P. 1990. Size, seasonality and stock market overreaction. *Journal of Financial and Quantitative Analysis* 25, 113-125

Zhang, L., 2005, The value premium, *Journal of Finance* 60, 67-103.

Table 1 Overall stock characteristic on the London Stock Exchange

	(1)	(2)	(3)	(4)
stocks	Price (£)	Size(£1 million)	β	BV/MV (%)
High-priced stocks	5.20 (5.16)	1869.88 (1316.08)	0.96(0.95)	0.68 (0.54)
Middle-priced stocks	1.44 (1.49)	369.56 (295.41)	0.89(0.88)	1.07(0.96)
Low-priced stocks	0.36 (0.33)	39.92 (38.35)	0.82(0.78)	115 (82)

Note: The dataset is from July 1979 to December 2009, including constituent stocks of the FTSE All-Share Index and the FTSE All-Small Index in the London Stock Exchange (*LSE*). All sample stocks are sorted by their prices in each month. The top 30% of stocks in terms of price is defined as high-priced stocks, while the bottom 30% of stocks is defined as low-priced stocks. The middle 40% of stocks is defined as middle-priced stocks. Price is in unit of British pound. Size is total market value in millions. BV/MV is the ratio of book value equity to market value equity. The numbers in column (1), (2) and (4) are the time-series average of cross-section averages in each month. The numbers in bracket in column (1), (2) and (4) are median values of time-series averages for each portfolio. β is the market risk. We estimate each portfolio's β in each month from past 60-month return observations. The numbers in column (3) are the time-series average of β values for each portfolio. The numbers in bracket in column (3) are median values of time-series β values for each portfolio.

Table 2 Descriptive statistics

	(1) No. of stocks	(2) Percentage	(3) Past 5-year Return	(4) Price (£)	(5) 5-year high price	(6) Mean price relative to 5-year high	(7) Market Cap. (£m)
Panel A: the whole sample period from January 1975 to December 2009							
5-year winner	213	100%	323%	3.75	5.73	-26%	1129
HP Winner	105	49%	341%	6.18	8.73	-20%	1887
MP winner	81	38%	321%	1.66	3.33	-31%	374
LP winner	27	13%	270%	0.48	1.21	-34%	56
5-year loser	214	100%	-31%	1.06	2.96	-56%	316
HP Loser	24	11%	-13%	4.52	8.55	-39%	1794
MP Loser	66	31%	-22%	1.37	3.90	-50%	428
LP Loser	124	58%	-40%	0.34	1.65	-63%	43
Panel B: the sub sample period from January 1975 to December 1991							
5-year winner	164	100%	411%	2.47	3.91	-29%	242
HP Winner	69	42%	427%	4.40	6.30	-21%	157
MP winner	69	42%	421%	1.34	2.67	-33%	102
LP winner	27	16%	343%	0.49	1.14	-37%	28
5-year loser	165	100%	0%	1.26	2.41	-44%	182
HP Loser	27	16%	16%	3.82	6.09	-30%	270
MP Loser	57	34%	7%	1.25	2.52	-40%	177
LP Loser	82	50%	-10%	0.37	1.08	-52%	31
Panel C: the sub sample period from January 1992 to December 2009							
5-year winner	258	100%	242%	4.93	7.41	-23%	1942
HP Winner	138	53%	261%	7.81	10.96	-19%	3200
MP winner	93	36%	229%	1.93	3.94	-29%	623
LP winner	27	11%	203%	0.47	1.27	-31%	82
5-year loser	259	100%	-59%	0.88	3.46	-67%	439
HP Loser	22	9%	-40%	5.17	10.83	-47%	3109
MP Loser	74	28%	-49%	1.48	5.17	-59%	658
LP Loser	164	64%	-66%	0.30	2.17	-73%	56

The dataset is from January 1970 to December 2009, including constituent stocks of the FTSE All-Share Index and the FTSE All-Small Index in the London Stock Exchange (*LSE*). The statistics are the time-series averages of cross-sectional means in each month. No. of stocks (column 1) is the average number of stocks in each portfolio across each calendar month from January 1975 to December 2009. Percentage (column 2) is the weight of stocks in price level based contrarian portfolio to stocks in related contrarian portfolio, e.g. winners or losers. Past 5-year return (column 3) is measured by $\left(\frac{P_t - P_{t-60}}{P_{t-60}}\right)$ (in percentage) in each month *t*. P_t is month *t*'s price and P_{t-60} is the past 60-month price, which is ends at *t*. Price (column 4) is quoted in the British Pence at the end of each month. 5-year high price (column 5) is the highest month end price during past 5 years which end at month *t*. The mean price relative to 5-year high (column 6) is calculated as $\left(\frac{P_t - P_{5yearhigh}}{P_{5yearhigh}}\right)$. Market capitalisation (column 7) is measured millions of British pound in month *t*. 5-year winner (loser) is defined as past 5-year performance $\left(\frac{P_t - P_{t-60}}{P_{t-60}}\right)$ in the top (bottom) 30% of all stocks during past 60-month at month *t*. *HP*, *MP*, and *LP* are defined as price at the three levels, the top 30%, middle 40%, and bottom 30% of all stocks, in month *t*, respectively. HP winner (loser), MP winner (loser), and LP winner (loser) are intersections between past 5-year performance and price levels.

Table 3 Performance of overall 5-year winner and loser

	(1) Monthly Return (1,12)	(2) Monthly Return (1,12) Jan & Apr Excl.	(3) Monthly Return (13,24)	(4) Monthly Return (13,24) Jan & Apr Excl.	(5) Monthly Return (25,36)	(6) Monthly Return (25,36) Jan & Apr Excl.	(7) Monthly Return (37,48)	(8) Monthly Return (37,48) Jan & Apr Excl.	(9) Monthly Return (49,60)	(10) Monthly Return (49,60) Jan & Apr Excl.	(11) Monthly Return (1,60)	(12) Monthly Return (1,60)Jan & Apr Excl.
Intercept	1.21	1.03	0.95	0.72	0.89	0.62	0.93	0.70	0.96	0.72	1.01	0.87
	(3.81)	(1.98)	(2.87)	(2.01)	(3.01)	(1.86)	(3.51)	(1.78)	(3.06)	(1.91)	(4.56)	(2.01)
$R_{i,t-1}$	-1.35	-1.24	-1.11	-0.84	-0.92	-0.61	-1.23	-0.67	-1.13	-0.77	-1.08	-0.98
	(-3.01)	(-1.54)	(-2.38)	(-1.46)	(-2.25)	(-1.89)	(-2.28)	(-1.82)	(-2.45)	(-1.49)	(-2.13)	(-1.63)
$Size_{i,t-1}$	-0.02	-0.02	0.02	0.03	0.03	0.04	0.03	0.04	0.03	0.04	0.02	0.03
	(-0.53)	(-0.85)	(0.41)	(0.74)	(0.83)	(1.23)	(0.36)	(0.89)	(0.82)	(1.04)	(0.55)	(0.79)
52wkh Winner	0.22	0.31	0.04	0.11	0.00	0.05	0.04	0.07	0.00	0.04	0.06	0.11
	(3.86)	(5.82)	(0.98)	(2.73)	(0.58)	(1.31)	(0.26)	(1.74)	(-0.37)	(-0.42)	(1.97)	(3.53)
52wkh Loser	-0.78	-0.95	-0.16	-0.29	-0.03	-0.12	0.01	-0.02	0.05	0.03	-0.17	-0.27
	(-8.29)	(-9.28)	(-2.50)	(-4.42)	(-0.68)	(-1.82)	(0.25)	(-0.42)	(1.27)	(0.58)	(-4.35)	(-6.48)
5-year Winner	-0.05	-0.04	-0.09	-0.11	-0.05	-0.07	0.01	-0.04	-0.02	-0.03	-0.04	-0.06
	(-1.00)	(-0.78)	(-1.51)	(-2.00)	(-0.82)	(-1.32)	(0.17)	(-0.47)	(-0.36)	(-0.54)	(-0.92)	(-1.30)
5-year Loser	0.10	0.05	0.21	0.18	0.22	0.20	0.19	0.19	0.09	0.09	0.17	0.14
	(1.80)	(1.32)	(3.02)	(2.46)	(3.17)	(2.64)	(2.75)	(2.53)	(0.97)	(1.35)	(2.98)	(2.43)
Contrarian	0.15	0.07	0.30	0.29	0.26	0.29	0.18	0.23	0.09	0.13	0.21	0.20
Performance(**S0**)	(1.74)	(1.43)	(3.17)	(2.98)	(2.98)	(3.20)	(2.24)	(2.82)	(0.97)	(1.70)	(3.15)	(2.87)
Avg. obs	827	827	793	793	761	761	730	730	715	715	763	763

We estimate the following cross-sectional regression on a monthly basis between January 1975 and December 2009, $60(j=1,2...60)$

$$R_{it} = b_{0jt} + b_{1jt}R_{i,t-1} + b_{2jt}size_{i,t-1} + b_{3jt}52wkhWinner_{i,t-j} + b_{4jt}52wkhLoser_{i,t-j} + b_{5jt}5yearWinner_{i,t-j} + b_{6jt}5yearLoser_{i,t-j} + e_{ijt}$$

R_{it} is the return to stock i in month t. R_{it-1} and $size_{i,t-1}$ are the return and natural logarithm of market capitalisation of stock i in month $t-1$ net of the month $t-1$ cross-sectional mean and $52wkhWinner_{i,t-j}$ ($52wkhLoser_{i,t-j}$) is the 52 week high winner (loser) dummy that takes the value of one if the 52-week high measure for stock i is ranked in the top (bottom) 30% in month $t-j$, and zero otherwise. The 52-week high measure in month $t-j$ is the ratio of the price level in month $t-j$ to the maximum price achieved in months $t-j-12$ to $t-j$. 5-year winner (5-year loser) are defined as performance ($(P_{t-j} - P_{t-j-60}) / P_{t-j-60}$) in the top (bottom) 30% of all stocks during past 60 months at month *t-j*. Contrarian performance is measured by buying 5-year losers and selling 5-year winners (e.g. $b_6 - b_5$) in month $t-j$. The coefficient estimates of a given independent variable are averaged over $j=1,2,...12$ for column labelled (1, 12), $j=13,14,..24$ for columns labelled (13, 24),…, $j=1,2,...60$ for columns labelled (1,60). The numbers reported in the table are the time-

series of averages of these averages in percent per month. Average observations for each calendar month based on cross-sectional regressions are reported in the last row. The accompanying *t*-statistics are calculated from the time series.

Table 4 Price-level based winners and losers

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	Monthly Return (1,12)	Monthly Return (1,12) Jan & Apr Excl.	Monthly Return (13,24)	Monthly Return (13,24) Jan & Apr Excl.	Monthly Return (25,36)	Monthly Return (25,36) Jan & Apr Excl.	Monthly Return (37,48)	Monthly Return (37,48) Jan & Apr Excl.	Monthly Return (49,60)	Monthly Return (49,60) Jan & Apr Excl.	Monthly Return (1,60)	Monthly Return (1,60)Jan & Apr Excl.
						Panel A						
HP_Winner	0.00	0.10	-0.12	-0.13	-0.05	-0.04	0.06	0.04	-0.02	-0.04	-0.03	-0.00
	(0.06)	(1.33)	(-1.69)	(-1.68)	(-0.68)	(-0.39)	(0.87)	(0.55)	(-0.01)	(-0.57)	(-0.58)	(-0.15)
MP_Winner	-0.06	-0.09	-0.03	-0.10	-0.00	-0.07	0.05	-0.00	-0.02	-0.06	-0.01	-0.07
	(-0.94)	(-1.29)	(-0.26)	(-1.21)	(-0.44)	(-0.84)	(0.66)	(-0.53)	(-0.28)	(-0.80)	(-0.18)	(-1.26)
LP_Winner	-0.02	0.00	-0.18	-0.27	-0.20	-0.31	-0.26	-0.36	-0.22	-0.30	-0.18	-0.24
	(-0.18)	(0.23)	(-1.48)	(-2.00)	(-1.59)	(-1.96)	(-1.90)	(-2.43)	(-1.58)	(-1.98)	(-1.76)	(-2.22)
HP_Loser	0.14	0.22	-0.05	-0.01	0.03	0.04	0.33	0.33	0.26	0.24	0.14	0.15
	(0.97)	(1.40)	(-0.32)	(-0.08)	(0.22)	(0.27)	(2.11)	(2.07)	(1.88)	(1.52)	(1.41)	(1.43)
MP_Loser	0.13	0.09	0.30	0.24	0.29	0.25	0.17	0.10	0.09	0.01	0.20	0.16
	(1.89)	(1.52)	(3.77)	(2.82)	(3.71)	(3.05)	(2.10)	(1.36)	(1.16)	(0.12)	(3.31)	(2.54)
LP_Loser	0.05	-0.10	0.16	0.12	0.15	0.14	0.10	0.11	-0.02	-0.03	0.09	0.05
	(0.53)	(-1.00)	(1.69)	(1.14)	(1.64)	(1.40)	(1.03)	(1.05)	(-0.34)	(-0.32)	(1.25)	(0.67)
Avg. obs	827	827	793	793	761	761	730	730	715	715	763	763
						Panel B						
S1	0.15	0.12	0.07	0.09	0.08	0.07	0.27	0.29	0.28	0.28	0.17	0.17
	(0.92)	(0.66)	(0.39)	(0.50)	(0.50)	(0.41)	(2.17)	(1.94)	(1.88)	(1.66)	(1.68)	(1.41)
S2	0.19	0.15	0.33	0.29	0.30	0.28	0.12	0.12	0.12	0.11	0.21	0.22
	(1.88)	(1.65)	(3.22)	(2.57)	(2.94)	(2.52)	(1.19)	(1.08)	(1.29)	(1.13)	(2.91)	(2.78)
S3	0.07	-0.10	0.35	0.37	0.35	0.46	0.36	0.47	0.19	0.26	0.26	0.29
	(0.48)	(-0.63)	(2.37)	(2.26)	(2.26)	(2.66)	(2.34)	(2.80)	(1.19)	(1.50)	(2.32)	(2.34)

We estimate the following cross-sectional regression on a monthly basis between January 1975 and December 2009, $60(j=1,2...60)$

$$R_{it} = b_{ojt} + b_{1jt}R_{i,t-1} + b_{2jt}Size_{i,t-1} + b_{3jt}52wkhW_{i,t-j} + b_{4jt}52wkhL_{i,t-j} + b_{5jt}HP\_5yearWinner_{i,t-j} + b_{6jt}MP\_5yearWinner_{i,t-j} +$$
$$b_{7jt}LP\_5yearWinner_{t-j} + b_{8jt}HP\_5yearLoser_{i,t-j} + b_{9jt}MP\_5yearLoser_{i,t-j} + b_{10jt}LP\_5yearLoser_{i,t-j} + e_{ijt}$$

R_{it} is the return to stock i in month t. R_{it-1} and $size_{i,t-1}$ are the return and natural logarithm of market capitalisation of stock i in month $t-1$ net of the month $t-1$ cross-sectional mean and $52wkhWinner_{i,t-j}$ ($52wkhLoser_{i,t-j}$) is the 52 week high winner (loser) dummy that takes the value of one if the 52-week high measure for stock i is ranked in the top (bottom) 30% in month $t-j$, and zero otherwise. The 52-week high measure in month $t-j$ is the ratio of the price level in month $t-j$ to the maximum price achieved in months $t-j-12$ to $t-j$. 5-year winner (5-year loser) are defined as performance ($(P_{t-j} - P_{t-j-60}) / P_{t-j-60}$) in the top (bottom) 30% of all stocks during past 60 months at month *t-j*. *HP*, *MP*, and *LP* are dummies defined as a the three price levels, the top 30%, middle 40%, and bottom 30% of all stocks, in month *t-j*, respectively. *HP_winner* (*loser*),

MP_winner (*loser*), and *LP_ winner* (*loser*) are intersections between past 5-year performance groups and price levels. S1, S2, and S3 are defined as $(b_8 - b_5)$, $(b_9 - b_4)$ and $(b_{10} - b_7)$, respectively. The coefficient estimates of a given independent variable are averaged over $j = 1,2,...12$ for column labelled (1, 12), $j = 13,14,..24$ for columns labelled (13, 24),…, $j = 1,2,...60$ for columns labelled (1,60). The numbers reported in the table are the time-series of averages of these averages in percent per month. Results of control variables are omitted. Average observations for each calendar month based on cross-sectional regressions are reported in the last row in Panel A. The accompanying *t*-statistics are calculated from the time series.

Table 5 Fama-French risk-adjusted returns

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	Monthly Return (1,12)	Monthly Return (1,12) Jan & Apr Excl.	Monthly Return (13,24)	Monthly Return (13,24) Jan & Apr Excl.	Monthly Return (25,36)	Monthly Return (25,36) Jan & Apr Excl.	Monthly Return (37,48)	Monthly Return (37,48) Jan & Apr Excl.	Monthly Return (49,60)	Monthly Return (49,60) Jan & Apr Excl.	Monthly Return (1,60)	Monthly Return (1,60)Jan & Apr Excl.
						Panel A						
5-year Winner	-0.02	-0.02	-0.08	-0.08	-0.06	-0.04	-0.04	-0.05	-0.08	-0.10	-0.05	-0.05
	(-0.44)	(-0.29)	(-1.32)	(-1.32)	(-1.01)	(-0.60)	(-0.69)	(-0.74)	(-1.32)	(-1.66)	(-1.12)	(-0.99)
5-year Loser	0.08	0.02	0.13	0.09	0.17	0.17	0.19	0.24	0.11	0.14	0.15	0.13
	(0.94)	(0.24)	(1.96)	(1.18)	(2.29)	(2.14)	(2.64)	(2.93)	(1.68)	(1.93)	(2.42)	(2.15)
GRS Test	0.75	0.09	3.11	1.62	4.13	3.63	5.77	6.46	3.67	5.04	6.78	5.34
p-value	0.47	0.95	0.04	0.19	0.01	0.02	0.00	0.00	0.03	0.01	0.00	0.00
Contrarian	0.09	0.04	0.20	0.16	0.22	0.21	0.23	0.28	0.19	0.24	0.20	0.18
Performance (**S0**)	(1.04)	(0.37)	(2.14)	(1.72)	(2.44)	(2.16)	(2.95)	(3.17)	(2.33)	(2.73)	(2.90)	(2.58)
obs	366	306	366	306	366	306	366	306	366	306	366	306
						Panel B						
HP_Winner	-0.05	0.03	-0.15	-0.12	-0.08	-0.03	0.04	0.04	-0.05	-0.07	-0.06	-0.04
	(-0.76)	(0.45)	(-1.99)	(-1.45)	(-1.13)	(-0.48)	(0.55)	(0.51)	(-0.71)	(-0.95)	(-1.11)	(-0.51)
MP_Winner	0.03	0.45	0.01	-0.04	-0.00	-0.03	-0.01	-0.06	-0.07	-0.14	-0.02	-0.06
	(0.45)	(0.55)	(0.06)	(-0.53)	(-0.02)	(-0.43)	(-0.30)	(-0.61)	(-0.94)	(-1.67)	(-0.33)	(-1.00)
LP_Winner	0.22	0.30	0.04	0.03	0.02	0.00	-0.12	-0.11	-0.14	-0.20	0.00	0.04
	(1.83)	(2.17)	(0.29)	(0.09)	(0.18)	(0.03)	(-0.88)	(-0.68)	(-0.97)	(-1.23)	(0.03)	(0.02)
HP_Loser	0.02	0.02	-0.17	-0.01	0.00	0.02	0.30	0.30	0.17	0.09	0.06	0.06
	(0.16)	(0.12)	(-0.99)	(-0.09)	(0.03)	(0.16)	(1.84)	(1.65)	(1.11)	(0.89)	(0.56)	(0.52)
MP_Loser	0.04	0.00	0.19	0.14	018	0.15	0.15	0.14	0.16	0.14	0.17	0.13
	(0.50)	(0.02)	(2.31)	(1.88)	(2.15)	(1.91)	(1.89)	(1.69)	(1.98)	(1.83)	(2.33)	(1.98)
LP_Loser	0.12	0.02	0.16	0.14	0.21	0.26	0.22	0.32	0.06	0.15	0.15	0.18
	(1.27)	(0.07)	(1.59)	(1.27)	(2.16)	(2.46)	(2.37)	(3.14)	(0.73)	(1.51)	(2.11)	(2.15)
GRS Test	1.38	1.42	2.59	1.78	2.00	1.83	3.24	2.64	1.86	1.83	3.20	2.97
p-value	0.21	0.20	0.01	0.10	0.07	0.08	0.01	0.02	0.10	0.10	0.01	0.02

Table 5 continued

	(1) Monthly Return (1,12)	(2) Monthly Return (1,12) Jan & Apr Excl.	(3) Monthly Return (13,24)	(4) Monthly Return (13,24) Jan & Apr Excl.	(5) Monthly Return (25,36)	(6) Monthly Return (25,36) Jan & Apr Excl.	(7) Monthly Return (37,48)	(8) Monthly Return (37,48) Jan & Apr Excl.	(9) Monthly Return (49,60)	(10) Monthly Return (49,60) Jan & Apr Excl.	(11) Monthly Return (1,60)	(12) Monthly Return (1,60)Jan & Apr Excl.
						Panel C						
S1	0.07	0.02	-0.03	-0.02	0.07	0.03	0.26	0.26	0.22	0.16	0.12	0.09
	(0.41)	(0.11)	(-0.14)	(-0.08)	(0.46)	(0.18)	(1.52)	(1.38)	(1.31)	(0.84)	(1.00)	(0.70)
S2	0.06	0.03	0.18	0.15	0.19	0.16	0.17	0.15	0.22	0.20	0.19	0.15
	(0.65)	(0.28)	(1.89)	(1.65)	(2.01)	(1.83)	(1.87)	(1.68)	(2.27)	(1.96)	(2.42)	(2.09)
S3	-0.10	-0.29	0.12	0.11	0.18	0.26	0.34	0.43	0.20	0.35	0.15	0.17
	(-0.66)	(-1.79)	(0.77)	(0.63)	(1.11)	(1.39)	(2.17)	(2.43)	(1.25)	(1.91)	(1.27)	(1.29)
GRS Test	0.34	0.72	1.68	1.09	1.96	1.83	3.35	3.41	3.24	3.25	2.72	2.52
p -value	0.79	0.54	0.11	0.35	0.05	0.08	0.01	0.01	0.02	0.02	0.03	0.04
obs	366	306	366	306	366	306	366	306	366	306	366	306

We estimate the following cross-sectional regression on a monthly basis between July 1979 and December 2009, $60(j=1,2...60)$ for Panel A.

$$R_{it} = b_{0jt} + b_{1jt}R_{i,t-1} + b_{2jt}size_{i,t-1} + b_{3jt}52wkhWinner_{i,t-j} + b_{4jt}52wkhLoser_{i,t-j} + b_{5jt}5yearWinner_{i,t-j} + b_{6jt}5yearLoser_{i,t-j} + e_{ijt} \quad (1)$$

We also estimate the following equation for Panel B.

$$R_{it} = b_{ojt} + b_{1jt}R_{i,t-1} + b_{2jt}Size_{i,t-1} + b_{3jt}52wkhW_{i,t-j} + b_{4jt}52wkhL_{i,t-j} + b_{5jt}HP\_5yearWinner_{i,t-j} + b_{6jt}MP\_5yearWinner_{i,t-j} + b_{7jt}LP\_5yearWinner_{t-j} + b_{8jt}HP\_5yearLoser_{i,t-j} + b_{9jt}MP\_5yearLoser_{i,t-j} + b_{10jt}LP\_5yearLoser_{i,t-j} + e_{ijt} \quad (2)$$

R_{it} is the return to stock i in month t. R_{it-1} and $size_{i,t-1}$ are the return and natural logarithm of market capitalisation of stock i in month $t-1$ net of the month $t-1$ cross-sectional mean and $52wkhWinner_{i,t-j}$ ($52wkhLoser_{i,t-j}$) is the 52 week high winner (loser) dummy that takes the value of one if the 52-week high measure for stock i is ranked in the top (bottom) 30% in month $t-j$, and zero otherwise. The 52-week high measure in month $t-j$ is the ratio of the price level in month $t-j$ to the maximum price achieved in months $t-j-12$ to $t-j$. 5-year winner (5-year loser) are defined as performance ($(P_{t-j}-P_{t-j-60})/P_{t-j-60}$) in the top (bottom) 30% of all stocks during past 60 months at month *t-j*. *HP*, *MP*, and *LP* are dummies defined as a the three price levels, the top 30%, middle 40%, and bottom 30% of all stocks, in month *t-j*, respectively. *HP_winner* (*loser*), *MP_winner* (*loser*), and *LP_ winner* (*loser*) are intersections between past 5-year performance groups and price levels. Contrarian performance (S0) in Panel A is measured by buying 5-year losers and selling 5-year winners as (b_6-b_5) in Eq(1). S1, S2, and S3 in Panel C are defined as (b_8-b_5), (b_9-b_4) and $(b_{10}-b_7)$ in Eq (2), respectively. The

coefficient estimates of a given independent variable are averaged over $j = 1,2,...12$ for column labelled (1, 12), $j = 13,14,..24$ for columns labelled (13, 24),…, $j = 1,2,...60$ for columns labelled (1,60). The numbers reported in the table are the time-series of averages of these averages in percent per month. . To obtain risk-adjusted returns, we further run times-series of averages (one for each average), which are computed from the cross-sectional regression, on the Fama-French (1996) three-factor model. The intercepts of each average is reported in the table. Factor loadings are omitted for brevity. The *GRS* test is the *F*-statistic testing the hypothesis that the intercepts in the regressions for relevant portfolios (e.g. two portfolios in Panel A, six portfolios in Panel B, and three spreads in Panel C) are jointly equal to zero. The total number of months is also reported for the time-series regressions.

Table 6 Liquidity adjusted returns

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	Monthly Return (1,12)	Monthly Return (1,12) Jan & Apr Excl.	Monthly Return (13,24)	Monthly Return (13,24) Jan & Apr Excl.	Monthly Return (25,36)	Monthly Return (25,36) Jan & Apr Excl.	Monthly Return (37,48)	Monthly Return (37,48) Jan & Apr Excl.	Monthly Return (49,60)	Monthly Return (49,60) Jan & Apr Excl.	Monthly Return (1,60)	Monthly Return (1,60)Jan & Apr Excl.
						Panel A						
5-year Winner	-0.00	0.05	-0.04	-0.04	-0.05	-0.05	-0.03	-0.06	-0.08	-0.10	-0.04	-0.05
	(-0.07)	(0.72)	(-0.52)	(-0.59)	(-0.64)	(-0.67)	(-0.47)	(-0.79)	(-1.32)	(-1.66)	(-0.72)	(-0.78)
5-year Loser	0.02	-0.04	0.14	0.11	0.21	0.18	0.19	0.16	0.11	0.15	0.14	0.13
	(0.17)	(-0.42)	(1.86)	(1.63)	(2.13)	(1.89)	(1.98)	(1.91)	(1.33)	(1.78)	(1.99)	(1.92)
GRS Test	0.45	0.09	2.37	1.51	4.95	6.00	5.77	6.74	4.32	6.05	6.04	4.93
p-value	0.67	0.95	0.09	0.22	0.01	0.00	0.00	0.00	0.01	0.00	0.00	0.01
Contrarian	0.02	0.09	0.18	0.15	0.22	0.25	0.19	0.24	0.17	0.21	0.18	0.19
Performance (**S0**)	(0.17)	(0.87)	(1.73)	(1.60)	(2.13)	(2.33)	(2.01)	(2.45)	(1.83)	(2.19)	(2.39)	(2.36)
obs	279	233	279	233	279	233	279	233	279	233	279	233
						Panel B						
HP_Winner	-0.04	0.06	-0.11	-0.11	-0.05	-0.05	0.07	0.05	-0.04	-0.08	-0.03	-0.02
	(-0.44)	(0.63)	(-1.29)	(-1.15)	(-0.51)	(-0.49)	(0.91)	(0.52)	(-0.50)	(-0.97)	(-0.35)	(-0.37)
MP_Winner	0.00	-0.02	0.06	0.00	0.02	-0.03	-0.02	-0.07	-0.08	-0.16	-0.00	-0.03
	(0.01)	(-0.23)	(0.68)	(-0.04)	(0.26)	(-0.28)	(-0.23)	(-0.72)	(-0.96)	(-1.82)	(-0.07)	(-0.72)
LP_Winner	0.27	0.30	0.16	0.14	0.07	0.04	-0.05	-0.05	-0.08	-0.15	0.07	0.06
	(1.88)	(1.96)	(1.07)	(0.81)	(0.40)	(0.17)	(-0.32)	(-0.25)	(-0.46)	(-0.79)	(0.57)	(0.43)
HP_Loser	-0.07	0.02	-0.29	-0.25	-0.14	-0.12	0.26	0.26	0.16	0.08	-0.01	0.00
	(-0.32)	(0.12)	(-1.25)	(-0.99)	(-0.69)	(-0.57)	(1.27)	(1.10)	(0.82)	(0.36)	(-0.08)	(1.00)
MP_Loser	-0.01	-0.07	0.19	0.15	0.22	0.20	0.16	0.17	0.19	0.17	0.16	0.14
	(-0.10)	(-0.56)	(2.11)	(1.78)	(2.10)	(2.01)	(1.79)	(1.80)	(2.34)	(1.93)	(2.08)	(1.93)
LP_Loser	-0.01	-0.15	0.11	0.08	0.20	0.24	0.20	0.32	0.02	0.09	0.10	0.12
	(-0.11)	(-1.18)	(0.95)	(0.61)	(1.85)	(1.96)	(1.94)	(2.17)	(0.25)	(0.96)	(1.27)	(1.25)
GRS Test	1.59	1.83	3.29	2.39	2.69	2.71	2.72	3.37	2.13	2.24	2.58	2.83
p-value	0.14	0.09	0.00	0.02	0.01	0.01	0.01	0.01	0.04	0.03	0.05	0.04
obs	279	233	279	233	279	233	279	233	279	233	279	233

Table 6 continued

	(1)	(2) Monthly Return (1,12) Jan & Apr Excl.	(3)	(4) Monthly Return (13,24) Jan & Apr Excl.	(5)	(6) Monthly Return (25,36) Jan & Apr Excl.	(7)	(8) Monthly Return (37,48) Jan & Apr Excl.	(9)	(10) Monthly Return (49,60) Jan & Apr Excl.	(11)	(12) Monthly Return (1,60)Jan & Apr Excl.
	Monthly Return (1,12)		Monthly Return (13,24)		Monthly Return (25,36)		Monthly Return (37,48)		Monthly Return (49,60)		Monthly Return (1,60)	
						Panel C						
S1	-0.03	0.03	-0.17	-0.02	-0.09	-0.08	0.19	0.26	0.20	0.16	0.02	0.03
	(-0.22)	(-0.13)	(-0.69)	(-0.08)	(-0.42)	(0.32)	(0.88)	(1.38)	(0.96)	(0.84)	(0.14)	(0.15)
S2	-0.01	-0.06	0.13	0.11	0.19	0.17	0.19	0.20	0.27	0.25	0.17	0.16
	(-0.09)	(-0.45)	(1.79)	(1.56)	(2.01)	(1.89)	(2.03)	(1.88)	(2.52)	(2.42)	(2.00)	(1.94)
S3	-0.29	-0.50	-0.05	-0.06	0.13	0.26	0.26	0.37	0.11	0.26	0.03	0.06
	(-1.50)	(-2.51)	(-0.29)	(-0.28)	(0.68)	(1.41)	(2.00)	(2.43)	(1.25)	(1.24)	(0.22)	(0.34)
GRS Test	1.70	2.78	1.53	1.05	2.15	2.16	3.50	3.28	4.05	4.01	2.60	2.01
p -value	0.16	0.04	0.20	0.36	0.08	0.08	0.02	0.02	0.00	0.00	0.04	0.09
obs	279	233	279	233	279	233	279	233	279	233	279	233

We estimate the following cross-sectional regression on a monthly basis between October 1986 to December 2009, $60(j=1,2...60)$ for Panel A.

$$R_{it} = b_{0jt} + b_{1jt}R_{i,t-1} + b_{2jt}size_{i,t-1} + b_{3jt}52wkhWinner_{i,t-j} + b_{4jt}52wkhLoser_{i,t-j} + b_{5jt}5yearWinner_{i,t-j} + b_{6jt}5yearLoser_{i,t-j} + e_{ijt}$$

We also estimate the following equation for Panel B.

$$R_{it} = b_{ojt} + b_{1jt}R_{i,t-1} + b_{2jt}Size_{i,t-1} + b_{3jt}52wkhW_{i,t-j} + b_{4jt}52wkhL_{i,t-j} + b_{5jt}HP\_5yearWinner_{i,t-j} + b_{6jt}MP\_5yearWinner_{i,t-j} +$$
$$b_{7jt}LP\_5yearWinner_{t-j} + b_{8jt}HP\_5yearLoser_{i,t-j} + b_{9jt}MP\_5yearLoser_{i,t-j} + b_{10jt}LP\_5yearLoser_{i,t-j} + e_{ijt}$$

R_{it} is the return to stock i in month t. R_{it-1} and $size_{i,t-1}$ are the return and natural logarithm of market capitalisation of stock i in month $t-1$ net of the month $t-1$ cross-sectional mean and $52wkhWinner_{i,t-j}$ ($52wkhLoser_{i,t-j}$) is the 52 week high winner (loser) dummy that takes the value of one if the 52-week high measure for stock i is ranked in the top (bottom) 30% in month $t-j$, and zero otherwise. The 52-week high measure in month $t-j$ is the ratio of the price level in month $t-j$ to the maximum price achieved in months $t-j-12$ to $t-j$. 5-year winner (5-year loser) are defined as performance ($(P_{t-j} - P_{t-j-60}) / P_{t-j-60}$) in the top (bottom) 30% of all stocks during past 60 months at month *t-j*. *HP*, *MP*, and *LP* are dummies defined as a the three price levels, the top 30%, middle 40%, and bottom 30% of all stocks, in month *t-j*, respectively. *HP_winner* (*loser*), *MP_winner* (*loser*), and *LP_ winner* (*loser*) are intersections between past 5-year performance groups and price levels. S1, S2, and S3 are defined as $(b_8 - b_5)$, $(b_9 - b_4)$ and

$(b_{10} - b_7)$, respectively. The coefficient estimates of a given independent variable are averaged over $j = 1,2,...12$ for column labelled (1, 12), $j = 13,14,..24$ for columns labelled (13, 24),…, $j = 1,2,...60$ for columns labelled (1,60). We take the time-series of averages of these averages in percent per month. To obtain risk-adjusted returns, we further run times-series of averages (one for each average), which are computed from the cross-sectional regression, on the Liu's (1996) liquidity augmented CAPM model ($R_i = a_i + b_i(R_m - R_f) + s_i LIQ_t + e_i$). LIQ is a liquidity factor, which is measured by the return difference between low liquid stocks and high liquid stocks according *LM12* in month *t*. We use a 30% cutoff rate to sort *LM12* in a given month. The top 30% of stocks in terms of *LM12* is low liquid stocks, while the bottom 30% of stocks is high liquid stocks. *LM12* is a liquidity measure and is defined as ($LM12 = \left[Number \text{ of Zero daily volumes in prior 12 months} + \frac{1/(12\text{-month turnover})}{11{,}000} \right] \times \frac{21 \times 12}{NoTD}$). *12-month turnover* is turnover over the prior 12 months, calculated as the sum of daily turnover over the prior 12 months. Daily turnover is the ratio of the number of shares traded on a day to the number of shares outstanding at the end of the day. *NoTD* is the total number of trading days in the market over the prior 12 months. The value of 11,000 is chosen because of ($0 < \frac{1/(12 - month \text{ turnover})}{11{,}000} < 1$) for all sample stocks. We obtain the liquid premium from the low liquid portfolio and the high liquid portfolio on a monthly basis starting from October 1986. The intercept in the liquidity augmented CAPM (Liu, 2006) model is the risk-adjusted return for each portfolio. Factor loadings are omitted for brevity. The *GRS* test is the *F*-statistic testing the hypothesis that the intercepts in the regressions for relevant portfolios (e.g. two portfolios in Panel A, six portfolios in Panel B, and three spreads in Panel C) are jointly equal to zero. The total number of months is also reported for the time-series regressions.