Seasonality, monetary supply, and Taiwanese momentum

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For the Taiwanese stock market, evidence from the present study documents significant reversal in January-February, but strong momentum in March-December when there are increases of lagged M1B. Moreover, the M1B-induced momentum manifests only over economic expansion, rather than recessionary periods. Both the reversal and the momentum can be partly explained by unrealized capital gains, implying the disposition effect to some extent driving both phenomena since Grinblatt and Han (2005) used unrealized capital gains as a proxy for the disposition effect. We further find the reversal primarily occurring in January, implying reverse disposition trading occurring before the beginning of a year. As there is no capital gain taxes levied in Taiwan, the reverse disposition trading cannot be related to tax-loss selling as in U.S. Furthermore, time-varying market risk exposure cannot explain the reversal in most cases. For the March-December momentum, apart from unrealized capital gains, the CAPM and the Fama-French 3-factor models can each to some extent explain the momentum.

JEL Classifications: G10, G11, G19
Keywords: Price momentum; Reversal; Disposition effect; Emerging stock market

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1. Introduction

Following the discovery of price momentum by Jegadeesh and Titman (1993) that in the U.S. stock market returns over the past three to twelve months continue their directions in future parallel windows, this phenomenon has been found to be pervasive in global markets. A crucial exception, however, is that the effect is generally weak in Asian markets, including Taiwan. Moreover, rationales for the weak momentum remain inconclusive. Specifically, Chui *et al*. (2010) contended that the cultural factor of collectivism attenuating overconfidence thereby hindered momentum in Asia. Fu and Wood (2010) reported negative momentum over January and February, but strong positive momentum during March-August. Since Cooper *et al*. (2004) and Asem and Tian (2010) detected correlation between market states and U.S. momentum, the relationship has been investigated in Asian markets. Some Asian studies found strong momentum after market continuation in Japan (Hanauer, 2014), Korea (Hanauer, 2014), and Taiwan (Lin *et al*., 2016), as in the U.S.; whereas others documented mixed results in Japan (Asem and Tian, 2010) and China (Cheema and Nartea, 2017). In Japan, Asem and Tian (2010) uncovered reversal after up-market continuation but momentum after down-market continuation. Cheema and Nartea (2017) reported Chinese momentum after continuation of only down markets, but not of up markets.

We here use seasonality to explain the weak Taiwanese momentum and, more importantly, further explore the role of unrealized capital gains in introducing it. This sheds new light on the seasonality of negative momentum, whose role has not been previously documented. In addition, this paper considers the impact of change in lagged M1B on seasonally positive momentum. The lagged M1B is a country-specific macroeconomic factor, whose impact has also not been noted.

For the driving forces of price momentum in the U. S. and international settings, studies have proposed behavioral explanations such as Daniel *et al*.'s (1998) overconfidence and

biased self-attribution (e.g., Cooper *et al*., 2004; Lin *et al.*, 2016), the disposition effect (e.g., Grinblatt and Han, 2005; Shumway and Wu, 2007), and the anchoring effect (Hur and Singh, 2019). Conversely, others contended rational reasons, including cross-sectional variation of mean returns (Conrad and Kaul, 1998), macroeconomic cycle (Chordia and Shivakumar, 2002), and investor clienteles (Chui *et al*., 2022). Among behavioral interpretations, the disposition effect has been found to be capable of explaining U.S. momentum (Shumway and Wu, 2007; Birru, 2015; Hur and Singh, 2019; Ahmed and Doukas, 2021), Note that Grinblatt and Han (2005) use unrealized capital gains to proxy for the disposition effect, confirming this capability. For the Taiwanese stock market, Fu and Wood (2010) uncovered negative momentum over January and February, but did not formally present a rationale. We extend their findings, proposing that the disposition propensity plays a role in triggering the negative momentum, and also exploring the potential driving forces of the potential momentum over the remaining calendar months. Considering rational explanations for momentum, Chordia and Shivakumar (2002) found a strong relationship between lagged macroeconomic factors and the U.S. momentum. Moreover, they showed that momentum in the U.S. manifested only in expansionary periods, rather than contractionary ones. Anecdotally, Taiwan practitioners believe there is a positive relationship between change in lagged M1B and expected stock returns. The M1B change is a proxy for change in monetary supply for the stock market, where M1B is composed of currency and various deposits (including check, demand, and saving deposits). Taken together, we propose that the Taiwanese momentum over March through December is strong only over periods with increases in lagged M1B rather than periods with decreases, and also only evident over expansionary rather than recessionary periods, as in the U.S. stock market. Finally, we conjecture that both the negative momentum, or reversal, over January-February and the positive momentum over March-December can be explained to some extent by unrealized capital gains as a proxy for the disposition propensity, as suggested by

Grinblatt and Han (2005). The hypotheses are summarized below.

H1. Rather than momentum, reversal emerges in January and February.

H2. In March through December, momentum manifests only over periods with increases in lagged M1B, rather than periods with decreases in lagged M1B.

H3. March-December momentum occurs only over expansionary periods, rather than recessionary ones.

H4. Both the January-February reversal and March-December momentum can be partially explained by unrealized capital gains.

This paper's contributions to the momentum literature are as follows. It sheds new light on the Taiwanese momentum phenomenon by exploring possible rationales of seasonally negative momentum and observing under what conditions seasonally positive momentum manifests. Fu and Wood (2010) reported negative momentum in January and February. They, however, do not consider the driving forces. We extend that research by discovering the role of the unrealized capital gains in triggering the negative momentum. We further uncover significant positive momentum over March-December when the lagged M1B increases or when the increases are accompanied by expansionary macroeconomic condition. Moreover, we again demonstrate the role of unrealized capital gains in introducing the positive momentum.

Note that we find hybrid driving forces for the pronounced momentum over March-December. It is generated by not only rational factors associated with change in lagged monetary supply and macroeconomic cycles, but also by the behavioral factor of the disposition propensity proxy by unrealized capital gains. Prior Taiwanese studies of the association between macroeconomic factors and momentum found mixed results; some report lack of such an association (e.g., Lin *et al*., 2016), whereas others documented a correlation between momentum performance and macroeconomic cycles (e.g., Hao *et al*., 2016). The current study clarifies that relationship. Furthermore, Chordia and Shivakumar (2002) use the lagged

macroeconomic variables of market dividend yield, default spread, term spread, and yield on three-month T-bills, demonstrating their ability in explaining the U.S. momentum. We find the explanatory power of a distinct macroeconomic factor, i.e., change in the lagged M1B, which has not been previously considered for the Taiwanese stock market or other markets.

The following section reviews the related literature. Section 3 describes the data and methodology. Section 4 documents empirical results. Section 5 concludes.

2. Literature Review

2.1 Momentum in Taiwan

Early studies generally reported an absence of momentum in Taiwan (e.g., Rouwenhorst,1999; Hameed and Kusnadi, 2002; Chui *et al*., 2003, 2010; Griffin *et al*., 2005). More recent studies, in contrast, reported significant Taiwanese momentum under certain conditions. Specifically, Du *et al*. (2009) and Lin *et al*. (2016) documented strong Taiwanese momentum under market continuation, rather than market transition. Fu and Wood (2010) found strong momentum over April through August. For the 1970s, Hao *et al*. (2016) reported pronounced hedge-portfolio returns for investment strategies of longing stocks that had recently reached prices of the 52-week high and shorting those that had reached them longer ago, but over 1982-2012 significant returns only emerged for momentum strategies of buying stocks with prices close to their 52-week high and selling those with prices far from the 52-week high. Yang *et al*. (2018) documented profits for momentum strategies of purchasing stocks with upward continuing overreaction and selling those that were downward. Removing stocks with extreme absolute strength, Lin *et al*. (2020) found that filtered momentum strategies are significantly profitable. Bui *et al*. (2023) reported apparent improvement of momentum profits when machine-learning methods are adopted. George *et al*. (2023) uncovered pronounced momentum after dropping February. In brief, empirical evidence for Taiwanese momentum concurred that there was weak momentum except under certain conditions.

2.2 Negative Momentum in the U.S. and Taiwan

In the U.S., generally two strains of research reported negative momentum. The traditional negative momentum occurs in January, when past losers strongly rebound after heavy tax-loss selling in December (Grinblatt and Han, 2005). Recently, another significant negative momentum has been discovered. Daniel and Moskowitz (2016) reported momentum crashes, or negative returns for momentum strategies, following dramatic declines of market returns and accompanied by a market rebound. They attributed this to high betas of losers. Some subsequent research, however, have proposed alternative rationales, including investor crowding (Baltas, 2019), market liquidity (Butt and Virk, 2022), positive feedback effect (Lou and Polk, 2022), and investor speculation for stocks with prices far from the 52-week high (Byun and Jeon, 2023).

In Taiwan, Du *et al*. (2009) found significant negative momentum following long-term lagged down markets. Fu and Wood (2010) discovered negative momentum over January through February.

3. Data and Methodology

The sample is composed of Taiwanese common stocks, excluding financial stocks, listed on the Taiwan Stock Exchange between July 1985 through December 2019. We use two criteria to filter out stocks: stocks with prices lower than New Taiwan Dollar 1 at the portfolio formation date or those with the formation month's turnover ratios at the 0.5% end of the overall distribution. All data was retrieved from the Taiwan Economic Journal. At the end of each month, portfolios are constructed as R1, R2, and R3 composed of the bottom 30%, middle 40%, and top 30% stocks with the lowest, medium, and highest past six-month cumulative abnormal returns in excess of market returns. The portfolios are held for three, six, nine, and twelve months, respectively, as customary for momentum studies. We skip one month between formation and holding periods to avoid the bid-ask spread. Moreover, to avoid overlapping

holding periods, we follow Jegadeesh and Titman's (1993) monthly rebalance approach in estimating holding returns. Specifically, for each calendar holding month-*t*, the holding return for the month is the average of returns of the Kth holding month (where K is the number of holding months) for portfolios constructed at the formation months of *t*–2–(K–1) to *t*–2. Accordingly, the first holding month for K=12 is January 1987 because our sample starts from July 1985. To make the number of holding months even, we truncate holding months earlier than January 1987 for momentum strategies with K smaller than twelve months. Portfolio holding returns are value-weighted returns of component stocks.

As mentioned earlier, Grinblatt and Han (2005) reported the ability of the disposition effect in explaining momentum. We follow their approach in estimating unrealized capital gains (or *g*) by equations (1) through (3), using it to proxy for the disposition tendency as they did. They asserted that investors with the disposition tendency sell winning stocks too quickly, yet hold onto losing stocks too long, prolonging the up/down trends of respective stock prices and thereby triggering price momentum.

$$PR_{it} = \frac{1}{k_{it}} \sum_{n=1}^{J} (V_{it-n} \prod_{\tau=1}^{n-1} [1 - V_{it-n+\tau}]) \times P_{it-n}, \tag{1}$$

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

$$g_{it} = \frac{P_{it} - PR_{it}}{P_{it}}, \tag{3}$$

where PR_{it} is reference price for stock *i* at the end of day *t*, estimated by average purchasing prices over the prior 130 days, where weights for daily purchasing prices represent the probability of not selling stock *i* till the end of day-*t*; V_{it} is daily turnover ratio of stock *i* at day *t* associated with the probability of selling out stock *i* at day-*t*; the reciprocal of *k* is added to make the sum of the probabilities of holding onto stock *i* equal to one; g_{it} is stock *i*'s unrealized capital gains at the end of day *t*; and P_{it} is stock *i*'s price at day *t* (Fu and Hsieh, 2024).

Table 1 documents summary statistics for the two windows of January-February and March-December. The statistics reveal two features of interest. Firstly, the mean and median monthly returns for individual stocks in January-February versus March-December are 3.773% and 1.242% versus 0.604% and –0.155%, show no indication of the January-February reversal and March-December momentum. Secondly, size and turnover over the two windows are identical. They, therefore, do not appear to be driving forces for the potential differential momentum performance of the two windows.

[Insert Table 1 here]

4. Empirical Results

4.1 Negative momentum in January through February

Consistent with H1, Panel A in Table 1 documents significant reversal during January-February, though there is no significant momentum or reversal around all calendar months. Panel B further reports that the reversal primarily falls in January, rather than in February where only weak reversal emerges. The weak February reversal consistent with that observed by George *et al*. (2023). Panel C reports weak momentum over the remaining ten calendar months.

[Insert Table 2 here]

Next, we use bi-variate portfolio analysis to investigate the role of unrealized capital gains and asset pricing factors in driving the reversal. At the end of each month, G-portfolios are formed based on unrealized capital gains of individual stocks, where G1, G2, and G3 portfolios consist of bottom 30%, middle 40%, and top 30% stocks with the lowest, medium, and highest unrealized capital gains, respectively. Within each G-portfolio, we further construct momentum portfolios of R1, R2, and R3, as described above. As shown in Panel A of Table 3, the January-February reversal disappears after conditioning on G1, diminishing on G2 and G3, respectively, confirming H4 that unrealized capital gains partially explain the reversal. Specifically, the winner-minus-loser portfolios with 3-month holding periods generate raw returns of –1.68%

(t-value of –2.43), which attenuate to –0.54%, –0.59%, and –0.85%, conditioned on G1, G2, and G3, respectively, with *t*-statistics of, –1.40, –2.08, and –2.37. The alpha of the Fama-French 3-factor model indicates robustness of statistical significance with clear reduction in magnitude. Portfolio results for 6-month holding is also consistent with H4, but the reversal disappears when conditioned on both G1 and G2, respectively, yet remains marginal significant on G3. In summary, unrealized capital gains explain the reversal to some extent, although the significance of its role varies across unrealized capital gains. The heterogeneity is contingent on portfolio holding periods.

[Insert Table 3 here]

Here, unrealized capital gains are proxy for the reverse disposition effect that losing stocks are sold out more quickly than winning stocks in the prior period, so the subsequent returns of the former outperform the latter and thereby the winner-minus-loser portfolios produce negative returns over the January-February window. One possible reason for the reverse disposition effect over January-February is that investors intend to have a clean slate before the new year, liquidating losing stocks more than winning ones prior to this time point. Note that in the U.S., the seasonal negative momentum in January is generally attributable to tax-loss selling in December (Grinblatt and Han, 2005). In Taiwan, however, no capital gain taxes are levied, so the rationale must be different from that of the U.S.

Next, Daniel and Moskowitz (2016) reported that the momentum crashes are induced by momentum portfolios' time-varying exposure to market risk. To test this explanation, we run the following equation for each single-variate R-portfolio or bi-variate G-R-portfolio across the January-February and March-December windows.

$$RPort_t = (b_0 JanFeb_t + b_1 MarDec_t) + (b_2 JanFeb_t + b_3 MarDec_t) \times RMkt_t + \varepsilon_t, \qquad (4)$$

where $RPort_t$ denotes portfolio returns in holding month *t*; $JanFeb_t$ and $MarDec_t$ are indicative variables with a value of one if month-*t* falls in the January-February or March-December

windows, and zero otherwise; $RMkt_t$ is market excess return in month-t.

Panels B and C of Table 3 report b_0 and b_1, respectively. Clearly, for K=3, alphas of the conditional CAPM model for $R3$–$R1$ retain their significance for raw returns, and returns controlled for G2 and G3, respectively. Results for the 6-month holding period are also robust, with the exception that G2-conditioned momentum deteriorates from a significant to an insignificant level. In brief, conditional exposure to market risk cannot explain the reversal in the majority cases.

Furthermore, Daniel and Moskowitz (2016) argued that, in momentum crashes, the losers are stocks with higher betas than winners, resulting in higher returns of the former than the latter (or the manifestation of negative momentum) when the market rebounds from negative to positive returns. We here test whether there exists significantly lower negative momentum in January-February than in March-December, even after taking into account potential differential risk exposure. We propose equation (5) below.

$$RPort_t = (b_0 + b_1 JanFeb_t) + (b_2 + b_3 JanFeb_t) \times RMkt_t + \varepsilon_t, \quad (5)$$

where definitions of all variables are the same as in equation (4). A negative b_1 denotes that the January-February window produces lower negative returns than the March-December window after taking into account time-varying risk exposure. A positive b_3 represents higher risk exposure in January-February than in March-December.

Panel A shows that b_0 is insignificant for all winners-minus-losers strategies, or performance of momentum over March-December is weak, consistent with the evidence in Panel C of Table 2. The risk-conditioned incremental returns of R3–R1 is clearly more negative in January-February than in March-December, as shown in Panel B, corroborating H1 and the results in Panels A and C in Table 1. Evidence in Panel D denotes that past losers (R1) bear significantly higher risk exposure in January-February than in March-December, but other stocks (R2 and R3) do not, similar to the findings in momentum crashes reported by Daniel and Moskowitz

(2016). The time-varying risk exposure, however, cannot completely subsume the significantly negative momentum in January-February, as Panel B shows.

[Insert Table 4 here]

4.2 March-December momentum under periods with increases/decreases in lagged M1B

Turning to the March-December window, recall that Panel B in Table 1 documents weak momentum. To test H2, we estimate change in the lagged M1B by difference of the M1B disclosed in the preceding month and that in the same month of the prior year, scaling the difference by the latter. We then categorize the top 30%, middle 40%, and lower 30% months with the biggest, medium, smallest increases of lagged M1B as the months with increases, neutral-change, and decreases of lagged M1B. Alternatively, we partition months on the basis of the exact sign of change in lagged M1B, so that months with a positive (negative) change in lagged M1B belong to the window with increases (decreases) of lagged M1B. Evidence of the Panels A and B of Table 5 document results for the two alternative definitions. Corroborating H2, significant momentum (i.e., significant R3–R1) emerges only in the window with an increase of lagged M1B, and merely weak momentum in those with a decrease of lagged M1B, irrespective of the definitions of change in the M1B.

[Insert Table 5 here]

4.3 March-December momentum under expansionary versus recessionary periods

Testing H3, we separate sample months into expansionary and recessionary periods based on the separation guidelines established by National Development Council of Executive Yuan, Republic of China. Panel B in Table 6 indicates that during March-December pronounced momentum occurs only when two conditions are simultaneously met: (1) the lagged M1B increases and (2) the economy is in expansion. This confirms H3, that momentum is strong only over expansionary rather than recessionary windows, which is in line with findings of Hao *et al*. (2016). Panels A and C in Table 6 reported weak positive or negative momentum over

either expansionary or recessionary periods either for all March-December or the March-December window with decreases of lagged M1B. The weak momentum over the two macroeconomic periods is similar to the empirical evidence of Lin *et al*. (2016).

[Insert Table 6 here]

Next, we investigate driving forces of the significant momentum related to money supply and macroeconomic conditions. Table 7 reveals that, for K=3, the significant momentum (or the significant R3–R1) deteriorates to an insignificant level, conditional on G1and G2, respectively, but retains significance on G3. These mixed results are consistent with H4, that unrealized capital gains partially explain the momentum. For the six-month holding period, only G1-conditioned evidence turns the strong momentum into weak, where the G2- and G3-conitioned results sustain their significance. In addition, the CAPM and Fama-French three-factor models both respectively attenuate the significant unconditioned momentum to insignificant level for K=3 and to a marginal significant level for K=6 (see the second and sixth columns). In sum, unrealized capital gains, market risk exposure, and Fama-French three factors respectively show some extent of or complete explanatory power for the March-December momentum.

[Insert Table 7 here]

4.4 Robustness check

To check robustness of the results for value-weighted portfolio returns above, here we equally weigh portfolio returns. Table 8 is the equal-weighted version of Table 3. Again, Panels A and B show pronounced negative unconditional and conditional returns over January-February, similar to the value-weighted results in Table 3. However, significant alphas in March-December for K=6 are documented in Panel C, stronger than those in Table 3 that only insignificant alphas are revealed.

[Insert Table 8 here]

For the impact of unrealized capital gains on the strong March-December momentum revealed in Table 7, in the unreported table, the equal-weighted raw returns on winner-minus-loser portfolios sustain its significance for K=6 and 9, of which the influence of unrealized capital gains is resemble that revealed n Table7

5. Conclusions

For the Taiwanese stock market, evidence from the present study documents significant reversal in January-February, but strong momentum in March-December when there are increases of lagged M1B. Moreover, the M1B-induced momentum manifests only over expansionary stages of economy, rather than recessionary stages. Both the reversal and the momentum can be partly explained by unrealized capital gains, implying the disposition propensity partially driving both phenomena since Grinblatt and Han (2005) used unrealized capital gains as a proxy for the disposition propensity. The explanatory power is heterogeneous across unrealized capital gains. We further find the reversal primarily occurring in January, rather than in February, implying the reversal being introduced by reverse disposition tendency before the beginning of a year. However, capital gain taxes are not levied in Taiwan, so the reverse disposition tendency cannot be related to tax-loss selling as in U.S. Furthermore, time-varying market risk exposure cannot explain the reversal in most cases. For the March-December momentum, apart from unrealized capital gains, the CAPM and the Fama-French 3-factor models can each partially (or completely in some cases) explain the momentum. As the research on negative momentum is limited, investigation of this aspect warrants future research.

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Table 1 Summary statistics over January-February versus March-December

	January-February					March-December				
	Mean	Std. dev.	Median	Max.	Min.	Mean	Std. dev.	Median	Max.	Min.
Panel A: Individual stocks										
Monthly Return (%)	3.773	15.005	1.242	374.761	-88.909	0.604	13.988	-0.155	801.639	-83.756
CAR over formation period (%)	2.654	27.803	0.348	783.331	-213.925	3.434	29.059	0.191	808.276	-196.017
Month-end size (In mil. NTD)	23,310	114,458	5,089	6,612,246	20	23,523	119,959	5,067	8,582,956	5
Monthly turnover (%)	18.396	21.381	11.247	277.855	0.000	18.229	21.272	11.102	314.393	0.000
Month-end g	-0.003	0.125	-0.001	1.587	-0.874	-0.038	0.142	-0.027	1.688	-0.919
Firm-months	36,891					189,222				
Panel B: Market-wide variables										
Monthly change in lagged M1B (%)	2.042	8.955	-0.086	48.917	-26.000	1.364	11.679	-0.097	232.429	-2.439
Number of months	84					422				

Notes: This table reports descriptive statistics for individual stocks in Panel A and market-wide variables in Panel B. The sample stocks are all non-financial common stocks listed on Taiwan Stock Exchange. Our observation months fall between January 1987 and December 2019, 506 months in total with 84 months falling in January-February and the remaining 422 months in March-December. In Panel A, monthly returns in percentage are individual stock returns. CAR in percentage over the formation period is cumulative returns of individual stocks in excess of market returns over the past six-months. Month-end size is in millions of New Taiwan Dollars is market capitalization of individual stocks at the end of each month. Monthly turnover in percentage is individual stocks' turnover estimated by number of shares traded in each month divided by the number of shares outstanding. Month-end *g* in percentage is the unrealized capital gain at end of each month estimated by equations (1) through (3), as described in the text. In Panel B, monthly change in lagged M1B in percentage is computed by subtracting the prior year M1B of the identical calendar month from that of the corresponding month of current year, scaled by the former.

Table 2 Seasonality of momentum

K	3	6	9	12	3	6	9	12
Panel A: January-December vs. January-February								
	January-December				January-February			
R1	1.39 ***	1.27 ***	1.23 ***	1.35 ***	4.57 ***	4.51 ***	4.43 ***	4.45 ***
	(3.09)	(2.93)	(2.86)	(3.13)	(3.98)	(4.00)	(4.08)	(4.19)
R2	1.28 ***	1.25 ***	1.25 ***	1.27 ***	3.40 ***	3.31 ***	3.34 ***	3.46 ***
	(3.30)	(3.22)	(3.21)	(3.25)	(3.49)	(3.51)	(3.57)	(3.65)
R3	1.27 ***	1.32 ***	1.30 ***	1.24 ***	2.89 ***	3.16 ***	3.30 ***	3.35 ***
	(2.91)	(3.03)	(3.01)	(2.89)	(3.08)	(3.27)	(3.30)	(3.34)
R3–R1	-0.11	0.05	0.07	-0.10	-1.68 **	-1.35 **	-1.13 *	-1.10 **
	(-0.42)	(0.24)	(0.37)	(-0.57)	(-2.43)	(-2.16)	(-1.95)	(-2.04)
Obs.	506				84			
Panel B: January or February								
	January				February			
R1	4.45 **	4.26 **	4.11 **	4.16 ***	4.68 ***	4.76 ***	4.75 ***	4.73 ***
	(2.43)	(2.44)	(2.50)	(2.59)	(3.33)	(3.29) ***	(3.31)	(3.37)
R2	3.01 **	2.87 **	2.92 **	3.00 **	3.78 ***	3.76	3.75 ***	3.91 ***
	(2.16)	(2.09)	(2.11)	(2.14)	(2.75)	(2.87) ***	(2.96)	(3.04)
R3	1.90	2.28	2.50 *	2.59 *	3.87 ***	4.04	4.10 ***	4.11 ***
	(1.41)	(1.59)	(1.69)	(1.75)	(2.99)	(3.11) ***	(3.04)	(3.02)
R3–R1	-2.56 **	-1.98 **	-1.61 *	-1.58 **	-0.80	-0.72	-0.64	-0.62
	(-2.19)	(-2.03)	(-1.89)	(-2.02)	(-1.10)	(-0.92)	(-0.82)	(-0.84)
Obs.	42				42			
Panel C: March-December								
	March-December							
R1	0.75	0.62	0.59	0.73				
	(1.56)	(1.35)	(1.28)	(1.57)				
R2	0.86 **	0.84 **	0.83 **	0.83 **				
	(2.05)	(1.98)	(1.96)	(1.96)				
R3	0.95 *	0.96 **	0.90 *	0.82 *				
	(1.95)	(1.97)	(1.89)	(1.74)				
R3–R1	0.20	0.33	0.31	0.09				
	(0.67)	(1.40)	(1.51)	(0.48)				
Obs.	422							

Notes: This table reports returns on portfolios. The observation period is 1978-2019. At the end of each month, stocks are categorized into low (R1), medium (R2), and high (R3) return portfolios; composed of the bottom 30%, middle 40%, and top 30% of stocks with the lowest, medium, and highest cumulative abnormal returns in excess of market returns, respectively. Portfolios were held for three, six, nine, and twelve months, respectively, with returns on portfolios being value-weighted returns on composite stocks. We follow Jegadeesh and Titman's (1993) monthly rebalance approach in estimation of holding-period returns. Superscripts *, **, and *** denote significant levels of 10%, 5%, and 1%, respectively.

Table 3 Momentum conditioned on unrealized capital gains and time-varying market risk

	K=3				K=6			
	Raw	G1	G2	G3	Raw	G1	G2	G3
Panel A: January-February returns								
R1	4.57 ***	2.95 ***	2.23 ***	2.16 ***	4.51 ***	6.03 ***	4.27 ***	3.95 ***
	(3.98)	(4.07)	(4.12)	(3.98)	(4.00)	(4.39)	(4.01)	(4.09)
R2	3.40 ***	2.43 ***	1.63 ***	1.25 ***	3.31 ***	4.84 ***	3.44 ***	2.47 ***
	(3.49)	(4.34)	(3.42)	(2.71)	(3.51)	(4.31)	(3.57)	(2.87)
R3	2.89 ***	2.41 ***	1.64 ***	1.31 ***	3.16 ***	4.99 ***	3.47 ***	3.05 ***
	(3.08)	(4.26)	(3.28)	(2.93)	(3.27)	(4.37)	(3.52)	(3.22)
R3–R1								
Raw return	-1.68 **	-0.54	-0.59 **	-0.85 **	-1.35 **	-1.04	-0.79	-0.90
	(-2.43)	(-1.40)	(-2.08)	(-2.37)	(-2.16)	(-1.54)	(-1.51)	(-1.61)
Alpha of FF 3-factor	-1.22 **	-0.07	-0.60 **	-0.90 **	-1.11 **	-0.49	-1.00 **	-1.21 **
	(-2.13)	(-0.25)	(-2.16)	(-2.75)	(-2.18)	(-0.96)	(-2.14)	(-2.58)
Panel B: January-February alpha (or b_0)								
R1	0.66 *	0.52	0.17	0.17	0.65 **	1.69 **	0.55 **	0.52 **
	(1.88)	(1.50)	(1.14)	(1.03)	(1.96)	(2.39)	(2.22)	(2.35)
R2	-0.04	0.17	-0.21 *	-0.54 ***	-0.08	0.55 **	0.05	-0.67 ***
	(-0.18)	(1.14)	(-1.71)	(-2.92)	(-0.41)	(2.22)	(0.21)	(-2.74)
R3	-0.41	0.28 *	-0.32 **	-0.39 ***	-0.29	1.02 ***	-0.06	-0.23
	(-1.43)	(1.82)	(-2.24)	(-2.83)	(-1.26)	(2.90)	(-0.22)	(-0.83)
R3–R1	-1.07 **	-0.23	-0.49 **	-0.56 **	-0.94 **	-0.67	-0.61	-0.75 *
	(-2.14)	(-0.70)	(-2.01)	(-2.42)	(-1.97)	(-0.99)	(-1.50)	(-1.86)
Panel C: March-December alpha (or b_1)								
R1	-0.04	-0.33 **	-0.25 ***	-0.18 **	-0.16	-0.41 *	-0.19	0.01
	(-0.22)	(-2.34)	(-2.75)	(-2.12)	(-1.01)	(-1.72)	(-1.20)	(0.06)
R2	0.10	-0.24 **	-0.17 ***	0.03	0.07	-0.08	0.06	0.30 **
	(0.88)	(-2.48)	(-2.63)	(0.39)	(0.65)	(-0.46)	(0.50)	(2.41)
R3	0.15	-0.43 ***	-0.23 ***	-0.06	0.15	-0.30	-0.04	0.24
	(0.84)	(-4.35)	(-2.89)	(-0.49)	(1.00)	(-1.73)	(-0.31)	(1.14)
R3–R1	0.19	-0.10	0.02	0.12	0.31	0.11	0.15	0.23
	(0.65)	(-0.75)	(0.17)	(0.91)	(1.32)	(0.54)	(0.79)	(1.03)
Panel D: January-February beta of excess market returns (or b_2)								
R1	1.17 ***	0.68 ***	0.55 ***	0.53 ***	1.16 ***	1.31 ***	1.11 ***	1.01 ***
	(13.45)	(12.10)	(13.62)	(10.62)	(14.02)	(12.25)	(14.16)	(17.85)
R2	1.01 ***	0.56 ***	0.48 ***	0.47 ***	1.00 ***	1.15 ***	1.00 ***	0.91 ***
	(17.59)	(15.41)	(15.30)	(30.48)	(21.51)	(18.79)	(17.59)	(46.57)
R3	0.97 ***	0.58 ***	0.52 ***	0.44 ***	1.02 ***	1.19 ***	1.05 ***	0.96 ***
	(17.64)	(13.38)	(16.12)	(10.44)	(17.78)	(16.16)	(19.23)	(12.34)
R3–R1	-0.20	-0.10 *	-0.03	-0.10	-0.14	-0.12	-0.06	-0.05
	(-1.54)	(-1.70)	(-0.62)	(-1.34)	(-1.10)	(-1.04)	(-0.58)	(-0.42)

(*To be continued*)

(*Continued*)

Panel E: March-December beta of excess market returns (or b_3)																				
R1	1.00	***	0.52	***	0.48	***	0.48	***	0.97	***	1.01	***	0.95	***	0.95	***				
	(29.13)		(20.97)		(29.93)		(24.94)		(31.21)		(25.04)		(31.22)		(25.21)					
R2	0.92	***	0.52	***	0.47	***	0.49	***	0.93	***	1.05	***	0.93	***	0.97	***				
	(45.22)		(25.61)		(43.17)		(43.98)		(49.49)		(27.40)		(44.41)		(53.44)					
R3	1.03	***	0.53	***	0.51	***	0.51	***	1.03	***	1.07	***	1.03	***	1.02	***				
	(31.27)		(37.46)		(43.52)		(16.42)		(28.72)		(35.24)		(43.39)		(16.39)					
R3–R1	0.02		0.01		0.03		0.04		0.06		0.06	**	0.08	**	0.07	*				
	(0.42)		(0.46)		(1.31)		(1.39)		(1.55)		(2.15)		(2.55)		(1.79)					

Notes: This table reports bi-variate portfolio results in Panel A over the observation period of 1978-2019. At the end of each month, G-portfolios are formed based on unrealized capital gains of individual stocks, where G1, G2, and G3 portfolios consist of top 30%, middle 40%, and bottom 30% stocks with the lowest, medium, and highest unrealized capital gains, respectively. Within each G-portfolio, momentum portfolios R1, R2, and R3 are constructed for the bottom 30%, middle 40%, and top 30% stocks with the highest, medium, and lowest returns over the past six months. Panels B through E reveal regression results for the following equation:

$$RPort_t = (b_0 JanFeb_t + b_1 MarDec_t) + (b_2 JanFeb_t + b_3 MarDec_t) \times RMkt_t + \varepsilon_t,$$

where $RPort_t$ denotes portfolio returns in holding month t; $JanFeb_t$ and $MarDec_t$ are indicative variables with a value of one if month-t falls in the January-February and March-December windows, respectively, and zero otherwise; $RMkt_t$ is market excess return in month-t. The Newey-West (1987) heteroskedasticity and autocorrelation consistent covariance matrix is used. Superscripts *, **, and *** denote significant levels of 10%, 5%, and 1%, respectively.

Table 4 Incremental risk analysis of momentum conditioned on unrealized capital gains

	K=3				K=6			
	Raw	G1	G2	G3	Raw	G1	G2	G3
Panel A: March-December Returns (or b_0)								
R1	-0.04	-0.33 **	-0.25 ***	-0.18 **	-0.16	-0.41 *	-0.19	0.01
	(-0.22)	(-2.34)	(-2.75)	(-2.12)	(-1.01)	(-1.72)	(-1.20)	(0.06)
R2	0.10	-0.25 ***	-0.17 **	0.03	0.07	-0.19	0.06	0.30
	(0.88)	(-2.75)	(-2.63)	(0.39)	(0.65)	(-1.20)	(0.50)	(2.41) **
R3	0.15	-0.43 ***	-0.23 ***	-0.06	0.15	-0.30 *	-0.04	0.24
	(0.84)	(-4.35)	(-2.89)	(-0.49)	(1.00)	(-1.73)	(-0.31)	(1.14)
R3–R1	0.19	-0.10	0.02	0.12	0.31	0.11	0.15	0.23
	(0.65)	(-0.75)	(0.17)	(0.91)	(1.32)	(0.54)	(0.79)	(1.03)
Panel B: Incremental returns over January-February (or b_1)								
R1	0.70 *	0.85 ***	0.42 **	0.34 *	0.81 **	2.10 ***	0.75 **	0.51 *
	(1.76)	(2.27)	(2.44)	(1.89)	(2.19)	(2.80)	(2.55)	(1.93)
R2	-0.14	0.59 ***	-0.04	-0.57 ***	-0.15	1.08 **	-0.01	-0.97 ***
	(-0.58)	(2.95)	(-0.29)	(-2.82)	(-0.67)	(2.54)	(-0.03)	(-3.47)
R3	-0.55 *	0.71 ***	-0.09	-0.33 *	-0.44	1.32 ***	-0.02	-0.47
	(-1.70)	(3.85)	(-0.54)	(-1.80)	(-1.58)	(3.36)	(-0.06)	(-1.34)
R3–R1	-1.25 **	-0.14	-0.51 *	-0.68 ***	-1.25 **	-0.78	-0.76 *	-0.99 **
	(-2.27)	(-0.39)	(-1.90)	(-2.57)	(-2.38)	(-1.11)	(-1.71)	(-2.13)
Panel C: Beta of excess market returns over March-December (or b_2)								
R1	1.00 ***	0.52 ***	0.48 ***	0.48 ***	0.97 ***	1.01 ***	0.95 ***	0.95 ***
	(29.13)	(20.97)	(29.93)	(24.94)	(31.21)	(25.04)	(31.22)	(25.21)
R2	0.92 ***	0.52 ***	0.47 ***	0.49 ***	0.93 ***	1.05 ***	0.93	0.97 ***
	(45.22)	(25.61)	(43.17)	(43.98)	(49.49)	(27.40)	(44.41)	(53.44)
R3	1.03 ***	0.53 ***	0.51 ***	0.51 ***	1.03 ***	1.07 ***	1.03	1.02 ***
	(31.27)	(37.46)	(43.52)	(16.42)	(28.72)	(35.24)	(43.39)	(16.39)
R3–R1	0.02	0.01	0.03	0.04	0.06	0.06 **	0.08	0.07 *
	(0.42)	(0.46)	(1.31)	(1.39)	(1.55)	(2.15)	(2.55)	(1.79)
Panel D: Incremental beta of excess market returns over January-February (or b_3)								
R1	0.17 *	0.16 ***	0.07 *	0.06	0.19 **	0.31 ***	0.16 *	0.06
	(1.80)	(2.61)	(1.68)	(1.09)	(2.12)	(2.67)	(1.91)	(0.95)
R2	0.10	0.04	0.02	-0.02	0.07	0.10	0.07	-0.05 **
	(1.57)	(0.92)	(0.48)	(-0.94)	(1.43)	(1.45)	(1.17)	(-1.97)
R3	-0.06	0.05	0.01	-0.08	-0.01	0.12	0.02	-0.06
	(-0.91)	(1.06)	(0.41)	(-1.47)	(-0.22)	(1.58)	(0.33)	(-0.57)
R3–R1	-0.23	-0.11 *	-0.06	-0.14 *	-0.20	-0.18	-0.14	-0.12
	(-1.58)	(-1.76)	(-1.07)	(-1.73)	(-1.54)	(-1.48)	(-1.29)	(-0.98)

Notes: This table reports regression results by portfolios for the following equation:

$$RPort_t = (b_0 + b_1 JanFeb_t) + (b_2 + b_3 JanFeb_t) \times RMkt_t + \varepsilon_t,$$

where $RPort_t$ denotes portfolio returns in holding month t; $JanFeb_t$ and $MarDec_t$ are indicative variables with a value of one if month-t falls in the January-February and March-December windows, respectively, and zero otherwise; $RMkt_t$ is market excess return in month-t. The observation period is 1978-2019. The Newey-West (1987) heteroskedasticity and autocorrelation consistent covariance matrix is used. Superscripts *, **, and *** denote significant levels of 10%, 5%, and

1%, respectively.

Table 5 March-December momentum over periods with increases vs. decreases of lagged M1B

	Increases of lagged M1B				Decreases of lagged M1B			
K	3	6	9	12	3	6	9	12
Panel A: Partition at 30%: 40%: 30% of months based on magnitudes of change in lagged M1B								
R1	1.04	1.00	1.04	1.21	-1.08	-1.35	-1.49 *	-1.39
	(1.42)	(1.37)	(1.44)	(1.64)	(-1.13)	(-1.50)	(-1.74)	(-1.63)
R2	1.33 **	1.30 *	1.36 **	1.35 **	-1.33 *	-1.25 *	-1.25	-1.21
	(2.01)	(1.95)	(2.02)	(2.00)	(-1.74)	(-1.68)	(-1.63)	(-1.57)
R3	2.09 **	2.00 **	1.81 **	1.67 *	-1.63 **	-1.45	-1.41	-1.48
	(2.40)	(2.42)	(2.31)	(2.21)	(-1.98)	(-1.66)	(-1.56)	(-1.62)
R3–R1	1.05 *	1.00 **	0.76 **	0.46	-0.55	-0.10	0.08	-0.09
	(1.77)	(2.04)	(1.96)	(1.44)	(-0.98)	(-0.22)	(0.21)	(-0.24)
Obs.	126				126			
Panel B: Partition by positive vs. negative change in lagged M1B								
R1	1.32 **	1.26 **	1.29 **	1.47 **	0.30	0.10	0.02	0.13
	(2.15)	(2.10)	(2.15)	(2.38)	(0.41)	(0.15)	(0.03)	(0.19)
R2	1.62 ***	1.57 ***	1.62 ***	1.60 ***	0.25	0.25	0.19	0.21
	(2.94)	(2.84)	(2.91)	(2.88)	(0.40)	(0.40)	(0.30)	(0.33)
R3	2.04 ***	2.05 ***	1.92 ***	1.84 ***	0.07	0.07	0.07	0.00
	(2.85)	(2.93)	(2.89)	(2.86)	(0.11)	(0.10)	(0.11)	(-0.00)
R3–R1	0.72	0.79 **	0.63 **	0.37	-0.23	-0.04	0.06	-0.13
	(1.59)	(2.13)	(2.14)	(1.52)	(-0.60)	(-0.12)	(0.19)	(-0.47)
Obs.	189				233			

Notes: This table reports portfolio returns over the windows with increases versus decreases in lagged M1B. We compute change in the lagged M1B by difference of the M1B disclosed in the preceding month and that in the same month of the prior year, scaling the difference by the latter. In Panel A, we then categorize the top 30%, middle 40%, and bottom 30% months with the biggest, medium, and smallest increases of lagged M1B as the months with increases, neutral-change, and decreases of lagged M1B. Alternatively, in Panel B, we partition months in the basis of the exact sign of change in lagged M1B; months with a positive (negative) change in lagged M1B belong to the window with increases (decreases) of lagged M1B. The observation period is 1978-2019. Superscripts *, **, and *** denote significant levels of 10%, 5%, and 1%, respectively.

Table 6 March-December momentum over different macroeconomic periods

	Expansion				Recession			
K	3	6	9	12	3	6	9	12
Panel A: All months over March-December								
R1	2.11 ***	1.99 ***	1.97 ***	2.13 ***	-2.39 ***	-2.56 ***	-2.63 ***	-2.53 ***
	(3.53)	(3.51)	(3.46)	(3.68)	(-3.26)	(-3.60)	(-3.83)	(-3.72)
R2	2.15 ***	2.08 ***	2.09 ***	2.08 ***	-2.13 ***	-2.04 ***	-2.10 ***	-2.06 ***
	(4.14)	(3.92)	(3.97)	(3.94)	(-3.35)	(-3.32)	(-3.34)	(-3.25)
R3	2.40 ***	2.36 ***	2.26 ***	2.18 ***	-2.42 ***	-2.31 ***	-2.25 ***	-2.34 ***
	(3.89)	(3.92)	(3.84)	(3.77)	(-3.60)	(-3.22)	(-3.06)	(-3.18)
R3–R1	0.29	0.37	0.28	0.05	-0.03	0.25	0.38	0.19
	(0.80)	(1.27)	(1.14)	(0.22)	(-0.06)	(0.60)	(1.03)	(0.55)
Obs.	295				127			
Panel B: Top 30% months with the highest increases of lagged M1B								
R1	1.20	1.21	1.27	1.45 *	-0.34	-0.83	-0.97	-0.86
	(1.50)	(1.52)	(1.61)	(1.79)	(-0.22)	(-0.55)	(-0.75)	(-0.73)
R2	1.49 **	1.48 **	1.55 **	1.55 **	-0.12	-0.32	-0.35	-0.39
	(2.06)	(2.03)	(2.10)	(2.09)	(-0.11)	(-0.29)	(-0.32)	(-0.36)
R3	2.46 ***	2.27 **	2.02 **	1.88 **	-1.09	-0.30	-0.10	-0.16
	(2.57)	(2.49)	(2.36)	(2.27)	(-0.90)	(-0.24)	(-0.08)	(-0.12)
R3–R1	1.25 *	1.05 **	0.75 *	0.43	-0.75	0.53	0.87	0.70
	(1.93)	(1.96)	(1.75)	(1.23)	(-0.80)	(0.62)	(1.50)	(1.50)
Obs.	113				13			
Panel C: Bottom 30% months with the lowest decreases of lagged M1B								
R	1.81	1.53	1.30	1.45	-3.54 ***	-3.80 ***	-3.88 ***	-3.81 ***
	(1.28)	(1.20)	(1.09)	(1.23)	(-2.88)	(-3.19)	(-3.37)	(-3.36)
R2	1.29	1.14	1.26	1.28	-3.58 ***	-3.30 ***	-3.39 ***	-3.34 ***
	(1.30)	(1.16)	(1.25)	(1.27)	(-3.34)	(-3.18)	(-3.18)	(-3.10)
R3	0.88	1.19	1.21	1.15	-3.77 ***	-3.71 ***	-3.65 ***	-3.72 ***
	(0.80)	(1.05)	(1.02)	(0.94)	(-3.26)	(-2.97)	(-2.85)	(-2.91)
R3–R1	-0.93	-0.33	-0.09	-0.30	-0.23	0.09	0.23	0.09
	(-1.19)	(-0.58)	(-0.19)	(-0.67)	(-0.28)	(0.13)	(0.36)	(0.15)
Obs.	58				68			

Notes: This table reports portfolio returns over expansionary and recessionary periods, respectively. Sample months are divided into two periods, based on the guidelines set up by National Development Council of Executive Yuan, Republic of China. We also categorize months based on change in lagged M1B. We compute change in the lagged M1B by difference of the M1B disclosed in the preceding month and that in the same month of the prior year, scaled the difference by the latter. In Panel A, we then categorize the top 30%, middle 40%, and lower 30% months with the biggest, medium, smallest increases of lagged M1B as the months with increases, neutral-change, and decreases of lagged M1B. The observation months are January 1978 through December 2019. Superscripts *, **, and *** denote significance levels of 10%, 5%, and 1%, respectively.

Table 7 March-December momentum conditioned on unrealized capital gains

	K=3								K=6							
	Raw		G1		G2		G3		Raw		G1		G2		G3	
R1	1.20		0.70		0.53		0.94	**	1.21		1.27		1.01		1.85	**
	(1.50)		(1.39)		(1.44)		(2.47)		(1.52)		(1.39)		(1.37)		(2.41)	
R2	1.49	**	0.56		0.66	*	1.23	***	1.48	**	1.36	*	1.46	**	2.10	***
	(2.06)		(1.41)		(1.90)		(2.95)		(2.03)		(1.66)		(2.04)		(2.57)	
R3	2.46	***	0.83	*	0.96	**	1.46	***	2.27	**	1.59	*	1.84	**	2.92	***
	(2.57)		(1.82)		(2.17)		(2.91)		(2.49)		(1.81)		(2.19)		(3.01)	
R3–R1																
Raw return	1.25	*	0.13		0.43		0.53	*	1.05	**	0.32		0.83	*	1.07	**
	(1.93)		(0.47)		(1.58)		(1.83)		(1.96)		(0.75)		(1.91)		(2.19)	
CAPM alpha	0.90		0.13		0.24		0.31		0.77	*	0.24		0.55		0.74	
	(1.59)		(0.67)		(1.08)		(1.14)		(1.65)		(0.77)		(1.44)		(1.57)	
FF 3-factor alpha	0.89		0.13		0.22		0.30		0.74	*	0.21		0.50		0.73	*
	(1.60)		(0.63)		(1.01)		(1.15)		(1.74)		(0.64)		(1.38)		(1.71)	

Notes: This table reports portfolio returns for the top 30% months with the highest increases in M1B over the expansionary periods. Definitions of expansionary and recessionary periods are based on the guidelines from the National Development Council of Executive Yuan, Republic of China. We compute change in the lagged M1B by difference of the M1B disclosed in the preceding month and that in the same calendar month of the prior year, scaled the difference by the latter. We then categorize the top 30%, middle 40%, and lowest 30% months with the largest, medium, and smallest increases of lagged M1B as the months with increases, neutral-change, and decreases of lagged M1B. The observation months are between January 1978 and December 2019. Superscripts *, **, and *** denote significance levels of 10%, 5%, and 1%, respectively.

Table 8 Equal-weighted portfolio returns over January-February conditioned on unrealized capital gains

	K=3				K=6			
	Raw	G1	G2	G3	Raw	G1	G2	G3
Panel A: January-February returns								
R1	6.01 ***	4.72 ***	3.55 ***	3.08 ***	5.90 ***	7.07 ***	5.20 ***	4.47 ***
	(4.96)	(4.94)	(4.95)	(4.78)	(5.07)	(5.05)	(5.02)	(4.85)
R2	4.47 ***	4.03 ***	2.89 ***	2.33 ***	4.47 ***	5.92 ***	4.40 ***	3.60 ***
	(4.72)	(5.19)	(4.65)	(4.11)	(4.71)	(5.19)	(4.67)	(4.25)
R3	3.94 ***	3.61 ***	2.86 ***	2.31 ***	4.12 ***	5.51 ***	4.36 ***	3.66 ***
	(4.25)	(4.83)	(4.36)	(3.77)	(4.29)	(4.77)	(4.39)	(3.89)
R3–R1								
Raw return	-2.08 ***	-1.11 **	-0.69 **	-0.77 **	-1.78 ***	-1.56 **	-0.85 **	-0.81 *
	(-3.22)	(-2.24)	(-2.31)	(-2.36)	(-3.13)	(-2.27)	(-2.00)	(-1.85)
Alpha of FF 3-factor	-1.06 **	-0.52	-0.43	-0.66 **	-1.08 **	-0.98 *	-0.64 **	-0.85 **
	(-1.97)	(-1.19)	(-1.56)	(-2.28)	(-2.32)	(-1.70)	(-1.93)	(-2.59)
Panel B: January-February alpha (or b_0)								
**	2.05 ***	1.75 ***	0.96 ***	0.74 ***	2.09 **	2.90 ***	1.62 ***	1.22 **
	(3.23)	(2.70)	(3.21)	(2.74)	(3.25)	(2.99)	(3.82)	(3.51)
R2	1.10 ***	0.96 ***	0.57 ***	0.19	1.09 ***	1.62 ***	1.07 ***	0.56 **
	(3.65)	(3.21)	(2.71)	(0.91)	(3.58)	(3.82)	(3.41)	(2.07)
R3	0.71 **	0.96 ***	0.43 **	0.14	0.30	1.64 ***	0.86 ***	0.47
	(2.11)	(3.74)	(2.10)	(0.54)	(1.64)	(3.71)	(2.85)	(1.22)
R3–R1	-1.34 **	-0.78	-0.53 *	-0.60 *	-1.33 **	-1.26 *	-0.76 *	-0.75 *
	(-2.40)	(-1.46)	(-1.76)	(-1.89)	(-2.40)	(-1.69)	(-1.83)	(-1.82)
Panel C: March-December alpha (or b_1)								
R1	-0.17	-0.37 **	-0.21	-0.01	-0.21	-0.45	-0.17	0.13
	(-0.70)	(-1.99)	(-1.55)	(-0.09)	(-0.89)	(-1.63)	(-0.86)	(0.70)
R2	0.10	-0.32 **	-0.04	0.19	0.11	-0.24	0.17	0.44 ***
	(0.56)	(-2.19)	(-0.36)	(1.64)	(0.65)	(-1.08)	(0.97)	(2.76)
R3	0.27	-0.26 *	-0.05	0.17	0.30	-0.14	0.16	0.51 ***
	(1.39)	(-1.76)	(-0.38)	(1.20)	(1.64)	(-0.64)	(0.90)	(2.39)
R3–R1	0.43 *	0.11	0.16	0.19	0.51 **	0.31 *	0.33 **	0.38 ***
	(1.88)	(0.81)	(1.35)	(1.41)	(2.45)	(1.65)	(2.11)	(2.11)

Notes: This table reports equal-weighted bi-variate portfolio results in Panel A over the observation period of 1978-2019. At the end of each month, G-portfolios are formed based on unrealized capital gains of individual stocks, where G1, G2, and G3 portfolios consist of top 30%, middle 40%, and bottom 30% stocks with the lowest, medium, and highest unrealized capital gains, respectively. Within each G-portfolio, momentum portfolios R1, R2, and R3 are constructed for the bottom 30%, middle 40%, and top 30% stocks with the highest, medium, and lowest returns over the past six months. Panels B through E reveal regression results for the following equation:

$$RPort_t = (b_0 JanFeb_t + b_1 MarDec_t) + (b_2 JanFeb_t + b_3 MarDec_t) \times RMkt_t + \varepsilon_t,$$

where $RPort_t$ denotes portfolio returns in holding month t; $JanFeb_t$ and $MarDec_t$ are indicative variables with a value of one if month-t falls in the January-February and March-December windows, respectively, and zero otherwise; $RMkt_t$ is market excess return in month-t. The Newey-West (1987) heteroskedasticity and autocorrelation consistent covariance matrix is used. Superscripts *, **, and *** denote significant levels of 10%, 5%, and 1%, respectively.