

Post-earnings-announcement drift anomaly: The role of operating and non-operating income in the Taiwanese stock market

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Abstract

This paper examines the relationship between unexpected earnings components (i.e., unexpected operating and non-operating income) and post-earnings-announcement drift to determine whether both components contribute to the mispricing phenomenon. I find that both operating and non-operating income surprises explain the market's underweighting of earnings surprises. However, the contribution of operating income surprises is significantly higher than non-operating income surprises. While the mispricing of components appears to be captured by post-earnings-announcement drift, the speed of price responses to unexpected non-operating income is faster than for unexpected operating income. Moreover, unexpected operating and non-operating income mispricing are distinct mispricing phenomena, and a joint hedge portfolio trading strategy generates excess abnormal returns when based only on an unexpected operating or non-operating strategy.

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1 Introduction

Accounting principles indicate how to measure and when to report the effect of economic events on the income statement. Reporting a firm's profitability to

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stakeholders at periodic intervals is central to financial accounting. Reported earnings alone may not communicate all the information in accounting data needed to evaluate a firm's profitability. The principles presume that the classification scheme is informative enough about differences in the underlying economic events and can represent a wide variety of economic events in order to enhance the usefulness of an income statement. The accounting profession requires that firms disaggregate reported earnings into operating income (captures the results of the firm's ongoing operations that will likely recur in the future) and non-operating income (not part of ongoing operations and therefore less likely to affect the firm's performance in future periods).² However, despite the significant attention investors pay to firms' income statements, most academic studies contend that investors fail to fully incorporate the implications of earnings and its components into stock prices in a timely fashion.

Post-earnings-announcement drift, first observed by Ball and Brown (1968) in the United States, is the tendency for subsequent abnormal returns to move in the direction of an earnings surprise for months after earnings are announced. This predictability of abnormal stock returns after earnings-announcements has attracted numerous and substantial research studies that found that post-earnings-announcement drift is a robust phenomenon in the United States and many other countries. Why the post-earnings-announcement drift anomaly has been documented consistently and globally until now remains a puzzle for researchers. One of the main explanations is that information processing biases exist as a result of a delayed price response.³ Bernard and Thomas (1989, 1990) indicates that immediate responses to earnings-announcements are not complete and post-earnings-announcement drift is due to delayed reaction to the information in earnings-announcements. Ball and Bartov (1996) show that investors underreact to the magnitude of earnings surprises, and their underreaction is corrected at future earnings-announcements.

The purpose of this paper is to investigate whether the patterns of investors underreacting to the surprises are different across earnings, operating income, and non-operating income. To some extent, the aggregated mispricing in response to unexpected operating and non-operating income appears to be closely linked to mispricing due to unexpected earnings. Since managers can use operating, non-operating income or both to affect the sign (positive or negative) and magnitude of an earnings surprise, the market may underreact to unexpected

² Textbooks, practicing CPAs and financial analysts often suggest that certain components or subtotals on the income statement provide more information than others regarding firm profitability.

³ A large body of literature attempts to explain the drift; some explanations involve price momentum (Chordia and Shivakumar, 2006), disclosure risk (Shin, 2005), arbitrage risk (Mendenhall, 2004), information uncertainty (Francis et al., 2007), liquidity (Chordia, et al., 2009), etc.

operating and non-operating income occurring on the same time horizon, as well as to unexpected earnings. A key question is whether the two components represent a form of mispricing distinct from post-earnings-announcement drift.

Using a sample of 1,271 Taiwanese listed firms (21,787 firm-quarters from 2012 to 2016), my results provide evidence of significant, subsequent abnormal returns associated with all of the quarterly unexpected earnings, operating and non-operating income. More importantly, combining the unexpected earnings strategy with unexpected operating or non-operating income strategies decreases the magnitude of abnormal returns that can be earned, indicating that both the mispricing of operating and non-operating income are part of the post-earnings-announcement drift. Furthermore, my results show that the contribution of operating income surprises to the earnings-based anomaly is significantly higher than of non-operating income surprises. However, a joint strategy of surprising operating and non-operating income increases the magnitude of excess returns that can be earned. This result implies that investor misperception of reported earnings disaggregated into operating and non-operating income is more pronounced than of aggregated earnings. In addition, this paper provides results that demonstrate larger price response delays for operating income than for non-operating income. Nevertheless, price response speed is similar for earnings and operating income, but faster price response for non-operating income. Therefore, the results imply that stock prices do not reflect operating and non-operating income in the same, timely fashion.

My findings contribute to the literature in two ways. First, this paper shows that investors underreact to the information in operating and non-operating income surprises and correct them at different speeds. This evidence complements the delayed price response literature that reports different price response patterns across operating and non-operating income. Second, my results support the notion that subtotals on the income statement provide more incremental information than earnings per share. Prior studies focus on the market reaction to different components of earnings (e.g., Ohlson and Penman, 1992), and on the usefulness of current financial reporting numbers for future earnings predictions (e.g., Finger, 1994). I add to these lines of research by suggesting that both operating and non-operating income surprises are associated with post-earnings-announcement drift.

The next section of this study is a brief review of previous research on pricing earnings components. Section 3 describes the data and methodology. Section 4 outlines the tests and the results of my empirical findings. Section 5 provides a conclusion.

2 Literature Review

Many studies focus on the information content of earnings components to examine

the market reaction to different components of earnings. Gonedes (1975) indicates that the market pricing of unusual earnings components is more influenced by the sign (positive or negative) rather than the classification. Bowen (1981) shows that investors put more value per dollar on operating components rather than on non-operating ones. However, Bao and Bao (2004) show that the non-operating income of Taiwanese firms has almost the same relevant value as their operating income, suggesting that country-level institutional factors may affect the weight placed by investors on earnings components. Strong and Walker (1993) show that partitioning earnings into ordinary earnings, exceptional earnings, and extraordinary items increases the association between abnormal returns and earnings. Ohlson and Penman (1992) show that market reactions to earnings components are divergent over short time horizons but are similar over longer horizons. In sum, these studies suggest that the components provide different information for market pricing. In this study, I test whether the surprised earnings components contribute differently to the post-earnings-announcement drift anomaly.

In addition, a large body of research focuses on examining market pricing based on the different persistence properties of earnings components (e.g., Sloan, 1996; Hui et al., 2016).⁴ These studies document that investors fail to distinguish the different levels of persistence between earnings components leading to the subsequent abnormal return due to market mispricing. The previous literature proposes an explanation of investor fixation for the market mispricing of earnings components (e.g., Xie, 2001; Harris et al., 2016). That is, investors fixate on reported earnings and thus fail to incorporate information from the components of current earnings. However, it is still unclear whether investor fixation on earnings can fully explain the mispricing anomalies of earnings components (e.g., Dechow et al., 2008; 2011). This paper adds to the literature by examining the contribution of operating and non-operating income surprises on the mispricing of earnings surprises.

3 Sample Selection and Methodology

3.1 Sample selection

I retrieved my sample data from the *Taiwan Economic Journal* (TEJ) and included all firms publicly listed on the Taiwan Stock Exchange and Taipei Exchange. My sample spans the period from 2012 to 2016, since annual financial reports must be published after the end of each fiscal year and includes the four months before

⁴ Sloan (1996) studies the market mispricing on different levels of persistence between accruals and cash flows. Hui et al. (2016) focus on pricing based on the persistence of industry-wide and firm-specific earnings, cash flows, and accruals.

2012 and the three months after the start of 2012.

The initial sample consists of all firm-quarters over the sample period. I exclude the financial industry and firms with insufficient data to compute financial and return variables. The final sample contains 21,787 firm-quarters for 1,271 Taiwanese listed firms.

3.2 Hedge portfolio approach

I first used a hedged portfolio approach to document that there is market mispricing on unexpected earnings and its components (i.e., unexpected operating and non-operating income, in the corresponding period of the following quarter). The portfolio approach has the advantage that it addresses a potential, nonlinear relationship between financial performance and stock returns (Fama, 1998; Mitchell and Stafford, 2000; Levi, 2008).

When constructing a portfolio based on the magnitude of unexpected earnings, operating income, or non-operating incomes, the hedged portfolio takes a long position in the highest unexpected earnings component decile, and a short position in the lowest unexpected earnings component decile; this generates positive future returns. These results demonstrate the mispricing of unexpected earnings components. I accumulated these returns over three different holding periods: (1, 5), (1, 21), and (1, second day before quarter $t+1$'s earnings-announcement). I compared the mean size-adjusted returns for different holding horizons between the hedge strategies of earnings components.⁵

3.3 Regression test

Next, I applied a regression approach that can be used to examine the association between the unexpected earnings components and stock returns after controlling for correlated, omitted variables for stock returns. The following two regressions form the basis of the cross-sectionals:

$$BHARQ_{i,t+1} (BHARN_{i,t+1}) = \alpha_0 + \alpha_1 UE_{i,t} + \alpha_2 SIZE_{i,t} + \alpha_3 BETA_{i,t} + \alpha_4 BTM_{i,t} + \alpha_5 MOM_{i,t} + \epsilon_{i,t+1} \quad (1)$$

$$BHARQ_{i,t+1} (BHARN_{i,t+1}) = \beta_0 + \beta_1 UOI_{i,t} + \beta_2 UNOI_{i,t} + \beta_3 SIZE_{i,t} + \beta_4 BETA_{i,t} + \beta_5 BTM_{i,t} + \beta_6 MOM_{i,t} + \epsilon_{i,t+1} \quad (2)$$

where $BHARQ$ represents the size-adjusted, buy-and-hold returns for the period beginning on the day after quarter t 's earnings-announcement and ending on the

⁵ In accordance with prior research (e.g. Bernard and Thomas 1990; Sloan 1996), I used size-adjusted returns. In this paper, size-adjusted buy-and-hold return is the raw, buy-and-hold return of the firm minus the mean buy-and-hold return of an equally weighted portfolio of firms listed on the Taiwan Stock Exchange or Taipei Exchange in the same size decile over the same holding period.

second day before quarter $t+1$'s earnings-announcement date. *BHARN* is the 5-day (*BHAR5*) or 21-day (*BHAR21*) size-adjusted, buy-and-hold returns after quarter t 's earnings-announcement. Consistent with many prior studies (e.g., Livnat et al., 2006), I estimated earnings surprised using a time-series, rolling, seasonal random walk model. I defined the earnings surprise (*UE*) as earnings per share for quarter t , minus earnings per share for quarter $t-4$, scaled by stock price per share at the end of quarter t . Then, I included the unexpected earnings components variables (*UOI*, and *UNOI*) to investigate the association between earnings components and subsequent stock returns. This tells me something about the way earnings are capitalized into prices. If the market correctly prices the information in historical earnings, then the coefficients on earnings components variables should be insignificant. Unexpected operating income (*UOI*) is calculated as operating income per share for quarter t minus operating income per share for quarter $t-4$, scaled by the price per share at the end of quarter t . Unexpected non-operating income for quarter (*UNOI*) is calculated as non-operating income per share for quarter t minus non-operating income per share for quarter $t-4$, scaled by the price per share at the end of quarter t . Non-operating income is calculated as earnings per share minus operating income.

These analyses control for a set of variables that prior literature shows to be associated with subsequent stock returns. Specifically, I control for firm size (*SIZE*), beta (*BETA*), book-to-market ratio (*BTM*), and momentum (*MOM*) because prior studies have demonstrated that they are associated with future stock returns (Carhart, 1997; Shivakumar, 2006).

4 Empirical Results

Table 1 provides statistics for the final sample based on the decile portfolios formed by quarterly ranking firms on the magnitude of the earnings surprises. Panel A reports the portfolio mean values for the magnitudes of unexpected earnings (*UE*) and its two components (*UOI* and *UNOI*). The mean value of unexpected operating income (non-operating income) falls from -0.050 (-0.031) for the lowest unexpected earnings portfolio, to 0.050 (0.037) for the highest unexpected earnings portfolio. The unexpected earnings trading strategy predicts positive (negative) excess returns for firms in the most positive (negative) *UE* decile. Thus, firms with large positive (negative) unexpected operating or non-operating income that also belong to the most positive (negative) unexpected earnings portfolio may tend to generate expected partial abnormal returns belong to the unexpected earnings hedge strategy.

Table 1: Mean values of variables by assigning deciles based on the magnitude of unexpected earnings (N = 21,787)

	Mean	Quarterly portfolio unexpected earnings ranking									
		Lowest	2	3	4	5	6	7	8	9	Highest
Panel A: Components of unexpected earnings											
<i>UE</i>	0.001	-0.082	-0.022	-0.011	-0.005	-0.001	0.002	0.006	0.012	0.023	0.087
<i>UOI</i>	0.000	-0.050	-0.018	-0.009	-0.004	-0.000	0.002	0.006	0.010	0.018	0.050
<i>UNOI</i>	0.000	-0.031	-0.004	-0.003	-0.002	-0.001	0.000	0.000	0.001	0.005	0.037
Panel B: Control variables											
<i>SIZE</i>	6.542	6.405	6.466	6.571	6.626	6.680	6.669	6.606	6.541	6.464	6.395
<i>BETA</i>	0.761	0.786	0.781	0.748	0.734	0.737	0.748	0.751	0.775	0.777	0.768
<i>BTM</i>	1.044	0.905	1.018	1.050	1.098	1.140	1.113	1.092	1.071	1.032	0.924
<i>MOM</i>	0.088	-0.052	-0.027	0.013	0.036	0.060	0.085	0.115	0.153	0.206	0.294

Notes: *UE* is unexpected earnings for quarter t , which is calculated as earnings per share for quarter t minus earnings per share for quarter $t-4$, scaled by the price per share at the end of quarter t . *UOI* is unexpected operating income for quarter t , which is calculated as operating income per share for quarter t minus operating income per share for quarter $t-4$, scaled by the price per share at the end of quarter t . *UNOI* is unexpected non-operating income for quarter t , which is calculated as non-operating income per share for quarter t minus non-operating income per share for quarter $t-4$, scaled by the price per share at the end of quarter t . *SIZE* is the log of the market value at the end of quarter t . *BETA* is the beta from the market model at the end of quarter t . *BTM* is the book-to-market ratio at the end of quarter t . *MOM* is the stock return from twelve to two months prior to the earnings-announcement month.

Panel B provides statistics on four risk proxies associated with future stock returns. An inverted, U-shaped relationship in the portfolio indicates an extreme portfolio containing smaller *SIZE* and lower *BTM*. A U-shaped relationship in the portfolio indicates an extreme portfolio containing higher *BETA*. Those results show that extreme portfolios are more risky. Across the unexpected earnings portfolios, the mean values of the *MOM* range from -0.052 to 0.294. This reveals a positive relationship between unexpected earnings and stock momentum.

Prior studies have documented that a positive relationship exists between standardized unexpected earnings and future stock returns (e.g., Bernard and Thomas, 1990). I sorted firm-quarters into deciles based on the levels of each unexpected earnings components for the previous quarter. Then, I calculated mean size-adjusted returns following the portfolio formation for each earnings components. Table 2 compares the mean size-adjusted returns for different periods following the prior year's earnings-announcement for each unexpected earnings components. I accumulated these returns over three holding periods: 5-days, 21-days, and one quarter.

Panel A of Table 2 provides the results for the unexpected earnings (*UE*) portfolio. On average, a firm-quarter in the lowest (highest) unexpected earnings decile experiences a downward (upward) price drift of -3.0 (5.0)% during the quarter

after the prior quarter's earnings-announcement. The quarterly hedged portfolio return (taking a long position for the highest *UE* decile and a short position for the lowest *UE* decile) is 8.0% (0.030 + 0.050). For the dissemination of current earnings information regarding stock prices, the 5-day (21-day) hedged portfolio returns are 4.0% (5.2%), which is 49.5% (64.9%) of the quarterly hedged portfolio return. Panel B of Table 2 shows that the quarterly hedged portfolio returns of the unexpected operating income (*UOI*) portfolio is 7.3% (0.028 + 0.045). In addition, the 5-day (21-day) hedges portfolio returns are 3.2% (4.6%), which is 43.0% (62.3%) of the quarterly hedged portfolio return. The unexpected operating income (*UOI*) portfolio presents a slightly smaller hedged return and similar price response speed compared to the unexpected earnings (*UE*) portfolio.

Table 2: Mean values across various portfolios based on the magnitude of unexpected earnings (*UE*), unexpected operating income (*UOI*), and unexpected non-operating income (*UNOI*) (N = 21,787)

Panel A: Mean returns across various portfolios based on the magnitude of <i>UE</i>					
<i>UE</i> portfolio	<i>N</i>	<i>UE</i>	<i>BHAR5</i>	<i>BHAR21</i>	<i>BHARQ</i>
Lowest	2,169	-0.082	-0.019	-0.022	-0.030
2	2,181	-0.022	-0.012	-0.022	-0.029
3	2,177	-0.011	-0.008	-0.017	-0.025
4	2,180	-0.005	-0.005	-0.009	-0.011
5	2,181	-0.001	-0.002	-0.004	-0.006
6	2,176	0.002	0.001	0.000	0.002
7	2,178	0.006	0.004	0.005	0.010
8	2,179	0.012	0.006	0.012	0.023
9	2,179	0.023	0.014	0.021	0.029
Highest	2,187	0.087	0.021	0.030	0.050
Highest - Lowest			0.040	0.052	0.080
% of 1-Year Return			49.5%	64.9%	100.0%
Panel B: Mean returns across various portfolios based on the magnitude of <i>UOI</i>					
<i>UOI</i> portfolio	<i>N</i>	<i>UOI</i>	<i>BHAR5</i>	<i>BHAR21</i>	<i>BHARQ</i>
Lowest	2,169	-0.068	-0.016	-0.020	-0.028
2	2,181	-0.021	-0.007	-0.013	-0.019
3	2,177	-0.010	-0.005	-0.013	-0.018
4	2,180	-0.005	-0.004	-0.008	-0.009
5	2,181	-0.001	-0.003	-0.005	-0.008
6	2,176	0.002	0.002	0.003	0.005
7	2,178	0.006	0.004	0.005	0.009
8	2,179	0.012	0.003	0.006	0.011
9	2,179	0.022	0.009	0.014	0.026
Highest	2,187	0.067	0.016	0.026	0.045
Highest - Lowest			0.032	0.046	0.073
% of 1-Year Return			43.0%	62.3%	100.0%

Panel C: Mean returns across various portfolios based on the magnitude of *UNOI*

<i>UNOI</i> portfolio	<i>N</i>	<i>UNOI</i>	<i>BHAR5</i>	<i>BHAR21</i>	<i>BHARQ</i>
Lowest	2,169	-0.056	-0.007	-0.006	0.003
2	2,181	-0.013	-0.006	-0.007	-0.006
3	2,177	-0.006	0.001	-0.001	0.003
4	2,180	-0.003	0.000	-0.001	-0.002
5	2,181	-0.001	0.001	0.001	0.004
6	2,176	0.001	-0.001	-0.004	-0.007
7	2,178	0.003	0.000	0.002	0.001
8	2,179	0.006	0.001	-0.001	-0.002
9	2,179	0.012	0.001	0.000	0.000
Highest	2,187	0.061	0.009	0.012	0.020
Highest - Lowest			0.015	0.019	0.017
% of 1-Year Return			90.6%	110.3%	100.0%

Notes: *BHAR5* (*BHAR21*) is the 5-day (21-day), size-adjusted, buy-and-hold returns after quarter *t*'s earnings-announcement. *BHARQ* is the size-adjusted buy-and-hold return for the period beginning on the day after quarter *t*'s earnings-announcement and ending on the second day before quarter *t+1*'s earnings-announcement date. See the Table 1 for definitions of the other variables.

Panel C of Table 2 shows that the quarterly hedged portfolio returns of the unexpected non-operating income (*UNOI*) portfolio is 1.7% (-0.003 + 0.020). The 5-day (21-day) hedged portfolio returns are 1.5% (1.9%), which is 90.6% (110.3%) of the quarterly hedged portfolio returns. Compared to the unexpected earnings (*UE*) portfolio, the unexpected non-operating income (*UNOI*) portfolio shows a significantly smaller hedge return, but a faster price response. In sum, the delayed market response is smaller and faster for unexpected non-operating income (*UNOI*) than for unexpected operating income (*UOI*).

So far the unexpected earnings, operating and non-operating income strategies have been independently examined. If the market's mispricing of unexpected operating or non-operating income is part of the post-earnings-announcement drift, then it should be possible to form trading strategies that capitalize on an unexpected earnings strategy with operating or non-operating income strategies that yield smaller hedge returns than the unexpected earnings strategy in Panel A of Table 2.

Table 3 shows a contingency table of abnormal returns earned from portfolios constructed by grouping together firms according to all of the unexpected earnings, operating and non-operating income. The numbers of firm-quarters in each cell are reported in parentheses. To simplify, quintiles 2-4 have been condensed into a single cell, while the extreme quintiles (1 and 5) are presented separately. Panel A of Table 3 presents the results of a joint strategy formed by unexpected earnings (*UE*) and unexpected operating income (*UOI*). A hedged portfolio strategy formed by taking a long position in *UE5/UOI5* firms and a short position in *UE1/UOI1* firms will earn an abnormal return of 7.7% (0.045+0.032) for one quarter, slightly

smaller than the unexpected earnings strategy (8.0%). Panel B of Table 3 presents the results of a joint strategy constructed by unexpected earnings (*UE*) and unexpected non-operating income (*UNOI*). A hedged portfolio strategy formed by the extreme quintiles will earn an abnormal return of 6.3% (0.038+0.025) for one quarter, smaller than the unexpected earnings strategy (8.0%). These results imply that the price response to unexpected earnings has incorporated the information of unexpected operating and non-operating income. In addition, both unexpected operating and non-operating income could result in the post-earnings-announcement drift phenomenon.

Table 3: Double portfolio sorting (N = 21,787)

Panel A: Double portfolio sorting based upon unexpected earnings (*UE*) and unexpected operating income (*UOI*)

		<i>UE</i> quintile			
		<i>UOI1</i>	<i>UOI2-4</i>	<i>UOI5</i>	
<i>UOI</i> quintile	<i>UNOI1</i>	-0.032 (3004)	-0.014 (1124)	0.044 (222)	-0.024 (4350)
	<i>UNOI2-4</i>	-0.025 (1126)	-0.002 (10841)	0.022 (1104)	-0.002 (13071)
	<i>UNOI5</i>	-0.020 (220)	0.019 (1106)	0.045 (3040)	0.035 (4366)
		-0.030 (4350)	-0.001 (13071)	0.040 (4366)	

Panel B: Double portfolio sorting based upon unexpected earnings (*UE*) and unexpected non-operating income (*UNOI*)

		<i>UE</i> quintile			
		<i>UOI1</i>	<i>UOI2-4</i>	<i>UOI5</i>	
<i>UNOI</i> quintile	<i>UNOI1</i>	-0.025 (1768)	-0.001 (1782)	0.049 (800)	-0.002 (4350)
	<i>UNOI2-4</i>	-0.033 (1730)	-0.001 (9614)	0.037 (1727)	-0.001 (13071)
	<i>UNOI5</i>	-0.031 (852)	0.000 (1675)	0.038 (1839)	0.010 (4366)
		-0.030 (4350)	-0.001 (13071)	0.040 (4366)	

Panel C: Double portfolio sorting based upon unexpected operating income (*UOI*) and unexpected non-operating income (*UNOI*)

		<i>UOI</i> quintile			
		<i>UOI1</i>	<i>UOI2-4</i>	<i>UOI5</i>	
<i>UNOI</i> quintile	<i>UNOI1</i>	-0.031 (607)	-0.019 (1938)	0.027 (1805)	-0.002 (4350)
	<i>UNOI2-4</i>	-0.032 (1911)	-0.002 (9295)	0.037 (1865)	-0.001 (13071)
	<i>UNOI5</i>	-0.013 (1832)	0.015 (1838)	0.055 (696)	0.010 (4366)
		-0.024 (4350)	-0.002 (13071)	0.035 (4366)	

Notes: *BHAR5* (*BHAR21*) is the 5-day (21-day), size-adjusted, buy-and-hold returns after quarter *t*'s earnings-announcement. *BHARQ* is the size-adjusted buy-and-hold return for the period beginning on the day after quarter *t*'s earnings-announcement and ending on the second day before quarter *t+1*'s earnings-announcement date. See Table 1 for definitions of the other variables. The number of observations per cell is reported in parentheses.

Furthermore, I constructed a contingency table of abnormal returns earned from portfolios by grouping firms according to unexpected operating and non-operating income in Panel C of Table 3. In this matrix, a hedged portfolio strategy formed by the extreme quintiles will earn an abnormal return of 8.6% (0.055+0.031) for one quarter, larger than that of individual an unexpected operating income strategy (7.3%) or an unexpected non-operating income strategy (1.7%). This result confirms that the market's mispricing of unexpected operating and non-operating income is distinct from each other.

Table 4 reports the results of pooled cross-sectional regressions (Panel A) and decile rank regressions (Panel B).⁶ I regressed future returns on explanatory variables that might affect the magnitude of the delayed price response. The dependent variables are the 5-day (*BHAR5*), 21-day (*BHAR21*), and single-quarter (*BHARQ*), size-adjusted, buy-and-hold returns following the prior quarter's earnings-announcement date. Consistent with the post-earnings-announcement drift literature, the coefficients on *UE* are positive and significant. Investors underestimate the standardized earnings surprise for the subsequent quarter's earnings, resulting in higher future returns for firms with higher unexpected earnings.

⁶ Decile rank regression alleviates problems associated with extreme values that are not representative of the population or are measured with error.

Table 4: Regression results of abnormal returns across various holding periods (N = 21,787)

Panel A: Actual values						
Variable	<i>BHAR5</i>	<i>BHAR21</i>	<i>BHARQ</i>	<i>BHAR5</i>	<i>BHAR21</i>	<i>BHARQ</i>
Con.	-0.012 (-2.93) ^{***}	-0.026 (-3.65) ^{***}	-0.053 (-4.42) ^{***}	-0.012 (-3.04) ^{***}	-0.027 (-3.74) ^{***}	-0.054 (-4.49) ^{***}
<i>UE</i>	0.219 (25.05) ^{***}	0.313 (19.70) ^{***}	0.472 (17.67) ^{***}			
<i>UOI</i>				0.257 (23.12) ^{***}	0.386 (19.14) ^{***}	0.593 (17.49) ^{***}
<i>UNOI</i>				0.214 (15.93) ^{***}	0.291 (11.95) ^{***}	0.396 (9.67) ^{***}
<i>SIZE</i>	0.001 (1.96) ^{**}	0.002 (2.12) ^{**}	0.005 (2.87) ^{***}	0.001 (2.05) ^{**}	0.002 (2.19) ^{**}	0.005 (2.93) ^{***}
<i>BETA</i>	-0.002 (-2.32) ^{**}	0.004 (2.82) ^{***}	-0.002 (-0.76)	-0.002 (-2.18) ^{**}	0.004 (2.96) ^{***}	-0.001 (-0.62)
<i>BTM</i>	0.005 (6.84) ^{***}	0.007 (5.47) ^{***}	0.018 (9.10) ^{***}	0.005 (6.88) ^{***}	0.007 (5.49) ^{***}	0.018 (9.13) ^{***}
<i>MOM</i>	0.003 (3.34) ^{***}	0.001 (0.83)	0.003 (1.29)	0.003 (2.87) ^{***}	0.000 (0.28)	0.002 (0.73)
Adj. R^2	0.032	0.020	0.018	0.033	0.021	0.020
Difference in sensitivity between <i>UOI</i> and <i>UNOI</i>				0.043 ^{***}	0.095 ^{***}	0.197 ^{***}
Panel B: Decile ranking values						
Variable	<i>BHAR5</i>	<i>BHAR21</i>	<i>BHARQ</i>	<i>BHAR5</i>	<i>BHAR21</i>	<i>BHARQ</i>
Con.	-0.025 (-14.84) ^{***}	-0.039 (-12.35) ^{***}	-0.059 (-10.50) ^{***}	-0.037 (-18.67) ^{***}	-0.056 (-15.28) ^{***}	-0.078 (-12.19) ^{***}
<i>UE</i>	0.039 (29.35) ^{***}	0.059 (24.06) ^{***}	0.088 (20.45) ^{***}			
<i>UOI</i>				0.035 (24.65) ^{***}	0.056 (21.37) ^{***}	0.085 (18.49) ^{***}
<i>UNOI</i>				0.023 (16.77) ^{***}	0.032 (12.52) ^{***}	0.037 (8.48) ^{***}
<i>SIZE</i>	0.001 (0.90)	0.003 (1.13)	0.001 (0.14)	0.001 (0.95)	0.003 (1.20)	0.001 (0.20)
<i>BETA</i>	-0.002 (-1.53)	0.006 (2.43) ^{**}	0.001 (0.22)	-0.002 (-1.43)	0.006 (2.47) ^{**}	0.001 (0.24)
<i>BTM</i>	0.006 (4.60) ^{***}	0.006 (2.46) ^{**}	0.021 (4.68) ^{***}	0.007 (4.72) ^{**}	0.006 (2.50) ^{**}	0.021 (4.67) ^{***}
<i>MOM</i>	0.002 (1.27)	-0.004 (-1.48)	-0.002 (-0.41)	0.003 (2.38) ^{**}	-0.002 (-0.94)	-0.001 (-0.16)
Adj. R^2	0.042	0.027	0.021	0.035	0.023	0.018
Difference in sensitivity between <i>UOI</i> and <i>UNOI</i>				0.012 ^{***}	0.024 ^{***}	0.048 ^{***}

Notes: *BHAR5* (*BHAR21*) is the 5-day (21-day), size-adjusted, buy-and-hold returns after quarter t 's earnings-announcement. *BHARQ* is the size-adjusted buy-and-hold return for the period

beginning on the day after quarter t 's earnings-announcement and ending on the second day before quarter $t+1$'s earnings-announcement date. In Panel A, all variables are winsorized at the 1% and 99% levels. In Panel B, the decile ranks for each variable (ranked 1, 2, ..., 10) are calculated for each sample quarter. ***, **, * represent significance at the 1%, 5%, and 10% levels, respectively. Two-tailed t-values are reported in parentheses.

Investors may have different reactions to different components of unexpected earnings. Thus, I tested whether stock prices equally reflect both the unexpected operating and non-operating components of the one-quarter-ahead unexpected earnings. The regression coefficients on both the unexpected operating income (*UOI*) and the unexpected non-operating income (*UNOI*) are positive and significant, so the market underestimates both operating and non-operating income surprises. However, the coefficients on *UOI* are much higher than the coefficients on *UNOI*, suggesting that the market appears to underprice unexpected operating income to a greater extent than it underprices unexpected non-operating income. Together, these results imply that both the unexpected operating and non-operating income contribute to the post-earnings-announcement drift and the unexpected operating income plays a more significant role in the market anomaly than unexpected non-operating income.

5 Conclusions

Previous studies argue that the market systematically underestimates the persistence of earnings surprises resulting from the post-earnings-announcement drift anomaly (e.g., Ball and Bartov, 1996). This paper examined the relationship between unexpected earnings components (unexpected operating and non-operating income) and post-earnings-announcement drift to see if both components contribute to the mispricing phenomenon. Specifically, if earnings surprises are associated with the permanent components of earnings, the market may only underreact to operating income surprises rather than to non-operating income surprises, the transitory components of earnings. The evidence provided in this paper shows that both the operating and non-operating income surprises are associated with the post-earnings-announcement drift. However, the contribution of operating income surprises is significantly higher than non-operating income surprises.

While the both the operating and non-operating income surprises explain the market's underweighting of earnings surprises, the speed of price responses to non-operating income is faster than to operating income. For instance, my results show that the markets reflect 90.6% (110.3%) subsequent quarter abnormal returns in a 5-day (21-day) window for unexpected non-operating income compared to 43.0% (62.3%) subsequent quarter abnormal returns in a 5-day (21-day) window for unexpected operating income. Furthermore, this paper provides evidence that unexpected operating and non-operating income appear to

capture different mispricing phenomenon by combining the operating-based strategy with the non-operating-based strategy. This joint strategy of operating and non-operating income surprises increases the magnitude of excess returns that can be earned by individual strategies.

References

- [1] Ball, R. and Bartov, E., How Naive is the Stock Market's Use of Earnings Information? *Journal of Accounting and Economics*, 21(3), 1996, pp. 319-337.
- [2] Ball, R. and Brown, P., An Empirical Evaluation of Accounting Income Numbers. *Journal of Accounting Research*, 6(2), 1968, pp. 159-178.
- [3] Bao, B.H., Bao, D.H., Value Relevance of Operating Income versus Non-operating Income in the Taiwan Stock Exchange. *Advances in International Accounting*, 17(1), 2004, pp. 103-117.
- [4] Bernard, V.L., and Thomas, J.K., Post-Earnings-Announcement Drift: Delayed Price Response or Risk Premium? *Journal of Accounting Research*, 27, 1989, pp. 1-36.
- [5] Bernard, V. L., and Thomas, J. K., Evidence that Stock Prices Do Not Fully Reflect the Implications of Current Earnings for Future Earnings. *Journal of Accounting and Economics*, 13(4), 1990, pp. 305-340.
- [6] Bowen, R., The Valuation of Earnings Components in the Electric Utility Industry. *The Accounting Review*, 56 (1), 1981, pp. 1-22.
- [7] Carhart, M.M., On Persistence in Mutual Fund Performance. *Journal of Finance*, 52(1), 1997, pp. 57-82.
- [8] Chordia, T., and Shivakumar, L., Earnings and Price Momentum. *Journal of Financial Economics*, 80(3), 2006, pp. 627-656.
- [9] Chordia, T., Goyal, A., Sadka, G., Sadka, R., and Shivakumar, L., Liquidity and the Post-Earnings-Announcement Drift. *Financial Analysts Journal*, 65(4), 2009, pp. 18-32.
- [10] Dechow, P.M., Ge, W., Larson, C.R., and Sloan, R.G., Predicting Material Accounting Misstatements. *Contemporary Accounting Research*, 28(1), 2011, pp. 17-82.
- [11] Dechow, P.M., Richardson, S.A., Sloan, R.G., The Persistence and Pricing of the Cash Component of Earnings. *Journal of Accounting Research*. 46(3), 2008, pp. 537-566.
- [12] Fama, E.F., Market Efficiency, Long-Term Returns, and Behavioral Finance. *Journal of Financial Economics*, 49(3), 1998, pp. 283-306.
- [13] Finger, C., The Ability of Earnings to Predict Future Earnings and Cash Flow. *Journal of Accounting Research*, 32(2), 1994, pp. 210-223.
- [14] Francis, J., LaFond, R., Olsson, P., and Schipper, K., Information Uncertainty and the Post-Earnings-Announcement Drift. *Journal of Business Finance and Accounting*, 34(3-4), 2007, pp. 403-433.

- [15] Gonedes, N.J., Efficient Capital Markets and External Accounting. *The Accounting Review*, 47(1), 1972, pp. 11-21.
- [16] Hui, K.W., Nelson, K.K., and Yeung, P.E., On the Persistence and Pricing of Industry-Wide and Firm-Specific Earnings, Cash Flows, and Accruals. *Journal of Accounting and Economics*. 61(1), 2016, pp. 185-202.
- [17] Levi, S., Voluntary Disclosure of Accruals in Earnings Press Releases and the Pricing of Accruals. *Review of Accounting Studies*, 13(1), 2008, pp. 1-21.
- [18] Mendenhall, R., Arbitrage Risk and Post-Earnings-Announcement Drift. *Journal of Business*, 77(4), 2004, pp. 875-894.
- [19] Mitchell, M.L., and Stafford, E., Managerial Decisions and Long-Term Stock Price Performance. *Journal of Business*, 73(3), 2000, pp. 287-329.
- [20] Ohlson, J.A., and Penman, S.H., Disaggregated Accounting Data as explanatory Variables for Returns. *Journal of Accounting, Auditing and Finance*, 7(4), 1992, pp. 553-573.
- [21] Shin, H.S., Disclosure Risk and Price Drift. *Journal of Accounting Research*, 44(2), 2005, pp. 351-379.
- [22] Shivakumar, L., Accruals, Cash Flows and the Post-Earnings-Announcement Drift. *Journal of Business Finance and Accounting*, 33(1-2), 2006, pp. 1-25.
- [23] Sloan, R.G., Do Stock Prices Fully Reflect Information in Accruals and Cash Flows About Future Earnings? *The Accounting Review*, 71(3), 1996, pp. 289–315.
- [24] Strong, N., and M. Walker., The Explanatory Power of Earnings for Stock Returns. *The Accounting Review*, 68 (2), 1993, pp. 385-399.
- [25] Xie, H., The Mispricing of Abnormal Accruals. *The Accounting Review*, 76(3), 2001, pp. 357-373.