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Disaggregated Earnings Components as Explanatory Variables for Returns: The Case of Long Return Intervals

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ABSTRACT

This study provides the evidence in Taiwan that the association between earnings and returns increases as the return interval expands, indicating that the "measurement errors" in earnings could be minimized or even eliminated over long periods of time. Further decomposition of the "bottom line" earnings into different components enhances the explanatory power of the model, implying that the analysis looking into the components of earnings is worthwhile. When earnings are decomposed into operating cash flows and accounting accruals, all their coefficients are significant, no matter short-term or long-term intervals. It shows that investors pay significant attention to cash flow information as well as accounting accrual information. When the accounting accruals are further divided into nondiscretionary accruals and discretionary accruals, the coefficients of discretionary accruals stand still as positive even in the long return intervals (e.g., ten-year return intervals), revealing that the discretionary accruals are not transitory in nature. The findings are robust to different assumptions of interest rates, different measures of cash flows and discretionary accruals, and dropping of outliers. Similar tests could be done for other stock markets to check the robustness of the model. And the traditional "association studies" could be reworked using long-term intervals to see if the short-term association studies' findings still hold.

Keywords: *Aggregated earnings, Earnings components, Returns, Operating cash flows, Accruals.*

Data availability: *This study uses data from the Taiwan Economic Journal (TEJ).*

1. INTRODUCTION

This study focuses on the long-term association between aggregated earnings and stock returns, especially on the disaggregated earnings components as explanatory variables for stock returns. Easton, Harris and Ohlson (1992) suggest that expanding the interval over which earnings are determined likely reduces "measurement errors" in (aggregated) earnings and, thus, tends to increase the contemporaneous association between earnings and returns. The results confirm the hypothesis and show that, for ten-, five-, two-, and one-year return periods, the market and earnings variables have R^2s of 63%, 33%, 15%, and 5%, respectively. In their conclusion, Easton et al. (1992) suggest that aggregated earnings may be decomposed into items, such as operating profit, depreciation, and tax expense, etc. to test whether investors price earnings components differently. Ohlson and Penman (1992) further decompose aggregated earnings into components in two ways: (1) Earnings before depreciation, depreciation, and dividends, and (2) Gross margin, operating expenses, depreciation and amortization, tax expenses, other income items, extraordinary items, and dividends. They find that the components of earnings show different magnitudes of coefficients in the shorter return intervals, but the differences shrink as the return intervals lengthen. As to the explanatory power of different return intervals, the results are similar to those of Easton et al. (1992). That is, the longer the interval over which earnings are aggregated, the higher the association between stock returns and earnings. Following this line of literature, this study first disaggregates earnings into operating cash flows (CFO) and accruals (ACC). And the accruals are further divided into nondiscretionary accruals (NDA) and discretionary accruals (DA) to test if the discretionary accruals are perceived by investors to be more transitory. This paper contributes to the accounting and finance literature in that it is the first paper that tests the long-term behavior of operating cash flows and accruals, especially for nondiscretionary accruals and discretionary accruals.

The rest of the paper is organized as follows. Section 2 discusses the specifications of models and variables. Section 3 describes the data and sample selection. Section 4 reports the empirical results. Section 5 does the sensitivity analyses and the last section concludes.

2. MODEL AND VARIABLE SPECIFICATIONS

Following Easton et al. (1992), we aggregate returns over periods as follows:

$$y_T \equiv \left[P_T + FVS(d_1,\ldots,d_T) - P_0 \right] / P_0 \quad (1)$$

where

$$FVS(d_1,...,d_T) \equiv d_1\left(R_F^{T-1}\right) + d_2\left(R_F^{T-2}\right) + \cdots + d_{T-1}\left(R_F\right) + d_T$$
$$\equiv FVS_T \quad (2)$$

P_t = the firm's market value at date t,

d_t = dividends paid at date t,

R_F = one plus the risk-free rate of return.

To be consistent with the market return, also following Easton et al. (1992), we construct the aggregated earnings as follows:

$$Z_T \equiv \left[AX_T + FVF(d_1,\ldots,d_T) \right] / P_0 \quad (3)$$

where

$$AX_T \equiv \sum_{t=1}^{T} X_t \quad (4)$$

X_t = earnings for the (t-1, t) time period.

and

$$FVF(d_1,...,d_T) \equiv d_1\left(R_F^{T-1} - 1\right) + d_2\left(R_F^{T-2} - 1\right) + \cdots + d_{T-1}\left(R_F - 1\right) \equiv FVF_T \quad (5)$$

The basic cross-sectional regression model is expressed as:

$$y_{jT} = \alpha_T + \beta_{1T}\left(AX_{jT}/P_{j0}\right) + \beta_{2T}\left(FVF_{jT}/P_{j0}\right) + \varepsilon_{jT} \quad (6)$$

Where j denotes firm j and ε_{jT} is a random disturbance term. Easton et al. (1992) and Ohlson and Penman (1992) show that the explanatory power of aggregated earnings for returns increases as the aggregated interval increases. This study replicates the above regression using a moving window approach as adopted by Ohlson and Penman (1992). To illustrate, consider model (6) for 10-year windows, we first estimate model (6) for the 1984-93 period, and then for the 1985-94 period. The process continues moving forward till the (last) window of 1994-2003 and yields a total of 11 regressions of model (6). We then calculate the arithmetic means of variable coefficients, t-statistics, and model R^2s for these 10-year windows. A similar procedure applies to the estimation of shorter windows. Of course, the number of estimated regressions increases as the length of the window decreases.

Considering the decomposition of earnings, we first decompose earnings into net operating income ($NOPI_{jT}$), other revenues and expenses ($OTHRNE_{jT}$), tax expenses (TAX_{jT}), and extraordinary items and all others (EXI_{jT}). All these items sum up to net income (AX_{jT}). That is:

$$AX_{jT} = NOPI_{jT} + OTHRNE_{jT} - TAX_{jT} + EXI_{jT} \tag{7}$$

where

$NOPI_{jT}$ = j firm's net operating income (gross margin -operating expenses),
$OTRNE_{jT}$ = j firm's other revenues and expenses,
TAX_{jT} = j firm's tax expenses,
EXI_{jT} = j firm's extraordinary items, gains or losses on discontinued operations, and cumulative effects of accounting changes.

Theoretically, $NOPI_{jT}$, $OTRNE_{jT}$, TAX_{jT}, and EXI_{jT} have the same magnitude of coefficients with AX_{jT}, that is, β_{1T} in Eq. (6), with an exception that TAX_{jT} has an opposite sign (i.e., negative). As T increases, Easton et al. (1992, 125) point out that β_{1T} has a theoretical benchmark of 1. In the empirical work, because TAX_{jT} have positive numbers in the database, we multiply TAX_{jT} by (-1) to reach TAX^{N}_{jT} and expect its sign to be positive (same as other variables) for the convenience of comparison. And Eq. (6) can be revised as:

$$\begin{aligned} y_{jT} = {} & \alpha_T + \beta_{1T}\left(NOPI_{jT}/P_{j0}\right) + \beta_{2T}\left(OTRNE_{jT}/P_{j0}\right) + \beta_{3T}\left(TAX^{N}_{jT}/P_{j0}\right) + \beta_{4T}\left(EXI_{jT}/P_{j0}\right) \\ & + \beta_{5T}\left(FVF_{jT}/P_{j0}\right) + \varepsilon_{jT} \end{aligned} \tag{8}$$

In the same token, if one decomposes earnings into cash flows and accruals, their coefficients would have the same magnitude and sign (that is, positive), at least in the long run, because every dollar of earnings will reach the market eventually. But in the short run, naïve investors may overreact or underreact to some kinds of information. Sloan (1996) investigates whether stock prices fully reflect information in cash flows and accruals about future earnings. The results show that stock prices act as if investors fail to reflect different properties of the cash flow and accrual components of current earnings. Desai, Rajgopal and Venkatachalam (2004) suggest that cash flows are more persistent and less subject to manipulation than accruals. Sloan (1996) and Desai et al. (2004) document that the portfolios using accrual information earn abnormal returns up to two years. This study extends extant literature by testing the valuation implications of cash flow and accruals information in longer return intervals (i.e., five- and ten-year return intervals).

We begin the test for cash flows and accruals with the finance view. The finance literature often measures operating cash flows as earnings plus depreciation.

Though this may commit measurement errors of operating cash flows, we document the test for the reference of finance literature. And the test model is:

$$y_{jT} = \alpha_T + \beta_{1T}\left(EBDA_{jT} / P_{j0}\right) + \beta_{2T}\left(DEAM_{jT} / P_{j0}\right) + \beta_{3T}\left(FVF_{jT} / P_{j0}\right) + \varepsilon_{jT} \quad (9)$$

where

$EBDA_{jT}$ = j firm's earnings before depreciation and amortization (earnings + depreciation and amortization),

$DEAM_{jT}$ = j firm's depreciation and amortization.

In an accounting sense and in contrast to the finance view, earnings can be divided into operating cash flows and accruals. And Eq. (9) can be revised as:

$$y_{jT} = \alpha_T + \beta_{1T}\left(CFO_{jT} / P_{j0}\right) + \beta_{2T}\left(ACC_{jT} / P_{j0}\right) + \beta_{3T}\left(FVF_{jT} / P_{j0}\right) + \varepsilon_{jT} \quad (10)$$

where

CFO_{jT} = j firm's operating cash flows (net operating income－ accounting accruals)[1],

ACC_{jT} = j firm's accounting accruals, as calculated in Eq.(11).

$$ACC_{jT} = \left(\Delta CA_{jT} - \Delta Cash_{jT}\right) - \left(\Delta CL_{jT} - \Delta STD_{jT} - \Delta TP_{jT}\right) - DEAM_{jT} \quad (11)$$

where

ΔCA_{jT} = j firm's change in current assets,

$\Delta Cash_{jT}$ = j firm's changes in cash and cash equivalents,

ΔCL_{jT} = j firm's changes in current liabilities,

ΔSTD_{jT} = j firm's changes in current maturity of long-term debts,

ΔTP_{jT} = j firm's changes in income taxes payable,

$DEAM_{jT}$ = j firm's depreciation and amortization.

Recent research further decomposes accruals (ACC) into nondiscretionary accruals (NDA) and discretionary accruals (DA) [To name a few, Healy (1985), DeAngelo (1986), Jones (1991), Cahan (1992), DeFond and Jiambalvo (1994), Holthausen, Larker and Sloan (1995), Dechow, Sloan and Sweeney (1995), Subramanyam (1996), Teoh, Wong and Rao (1998), Kasznik (1999), Guidry, Leone and Rock （1999）, Shivakumar (2000), Calegari (2000), DeFond and Park (2001), etc.]. Discretionary accruals are supposed to have a reversing nature. DeFond and Park (2001) document that market participants anticipate the reversing implications of abnormal accruals but they do not fully impound the pricing implications of

[1] After 1990, the listed companies in Taiwan were required to submit statements of cash flows to the Taiwanese SEC. In addition to the calculated operating cash flows, we also use the operating cash flows extracted from the statements of cash flows whenever available as a sensitivity analysis.

abnormal accruals[2]. Teoh et al. (1998) test the opportunistic behavior of initial public offering (IPO) firms and show that IPO firms have high issue-year earnings and abnormal accruals, followed by poor long-run earnings and negative abnormal accruals, indicating the reversing nature of abnormal accruals (discretionary accruals). Are discretionary accruals (DA) transitory in the long run? Are cash flows (CFO) more persistent than nondiscretionary accruals (NDA) and discretionary accruals (DA)? This study tests both the short- and long-term behavior of them. Again, we predict that the explanatory power of the models increases as the interval length expands.

We use the cross-sectional version of modified Jones (1991) model, as shown in Kasznik (1999) and Guidry et al. (1999), to estimate nondiscretionary and discretionary accruals for firms in similar industries every year:

$$\left(ACC_{jt}/ASSET_{jt-1}\right)=\alpha_{0t}\left(1/ASSET_{jt-1}\right)+\alpha_{1t}\left(\Delta REV_{jt}/ASSET_{jt-1}-\Delta REC_{jt}/ASSET_{jt-1}\right) + \alpha_{2t}\left(PPE_{jt}/ASSET_{jt-1}\right)+\varepsilon_{jt} \quad (12)$$

where

$ASSET_{jt-1}$ = j firm's total assets at the end of year t-1,

ΔREV_{jt} = j firm's revenues in year t less revenues in year t-1,

ΔREC_{jt} = j firm's net receivables in year t less net receivables in year t-1,

PPE_{jt} = j firm's gross property plant and equipment in year t,

α_{0t}, α_{1t}, α_{2t} = the industry's cross-sectional parameters.

Nondiscretionary accruals (NDA) are the expected value of Eq. (12), and discretionary accruals (DA) are the residuals (ε_{jt}) of the above regression, which represent the portion of total accruals that are not explained by normal operating activities. The variables in Eq. (12) are deflated by the lag total assets, and so are the nondiscretionary accruals and the discretionary accruals. However, to be consistent with other variables, the nondiscretionary accruals and the discretionary accruals are adjusted from ratios to dollar amounts, that is, NDA_{jT} equals the expected value of Eq. (12) multiplied by $ASSET_{jt-1}$ and DA_{jT} equals the residual of Eq. (12) multiplied by $ASSET_{jt-1}$. And Eq. (10) can be revised as:

$$y_{jT}=\alpha_T+\beta_{1T}\left(CFO_{jT}/P_{j0}\right)+\beta_{2T}\left(NDA_{jT}/P_{j0}\right)+\beta_{3T}\left(DA_{jT}/P_{j0}\right)+\beta_{4T}\left(FVF_{jT}/P_{j0}\right)+\varepsilon_{jT} \quad (13)$$

where

NDA_{jT} = j firm's nondiscretionary accruals, calculated as the expected value of Eq. (12) but adjusted to dollar amount,

DA_{jT} = j firm's discretionary accruals, calculated as the residual of Eq. (12) but adjusted to dollar amount.

2 Researchers use discretionary accruals and abnormal accruals interchangeably.

3. DATA AND SAMPLE SELECTION

The sample consists of firms listed on Taiwan Stock Exchanges (TSE) and Over-the-Counter (OTC) markets except for the financial and banking companies. To be qualified as a sample, firms must have financial and stock price data available for at least ten consecutive years. The sample spans 1984 through 2003, with the lag information required for 1983. All financial and stock price data are extracted from Taiwan Economic Journal database.

Table 1 summarizes the sample selection procedures. There are 228 firms with observations over 10 years from 1984 to 2003. Because we estimate discretionary accruals using cross-sectional version of the modified Jones (1991) model, we delete 23 firms with which their industries have less than ten firms and cannot be merged with other similar industries. Furthermore, we delete 2 firms with missing data in some variables. The final sample results in 203 firms.

Table 2 presents the descriptive statistics for stock prices, dividends, and other financial variables. All variables are on a per share basis. Table 3 shows Pearson correlation (on the upper diagonal) and Spearman correlation (on the lower diagonal) of the variables. The variable correlation is not a serious problem. The variables that would be put in the same regression and have correlations over 0.60 include NOPI and TAX ($\rho = 0.66$), CFO and ACCT ($\rho = -0.86$), and CFO and DA ($\rho = -0.79$). But the models used in this study have their theoretical foundation, so we choose the do-nothing approach as supported by Kennedy (1992). By doing this, the empirical results should be interpreted with caution, because when a dominant variable is already in the regression, the related high correlated variable may turn to an opposite sign or become insignificant.

TABLE 1 Sample Selection

Firms with observations over 10 years from 1984 to 2003	228
Firms in industries with fewer than 10 firms and can not be merged with similar industries	(23)
Firms with missing data in some variables	(2)
Total sample firms	203

TABLE 2 Descriptive Statistics

		P_{it}		d_{it}		$NOPI_{it}$		$OTRNE_{it}$		TAX_{it}	
Year	Obs.	Mean	Std.	Mean	Std.	Mean	Std.	Mean	Std.	Mean	Std.
Full	3070	37.473	42.384	0.278	0.624	1.021	1.623	0.065	1.585	0.152	0.313
1984	62	17.495	8.151	0.564	0.589	2.413	1.700	-0.775	1.496	0.340	0.361
1985	65	19.897	9.507	0.421	0.553	1.460	1.829	-0.406	2.129	0.270	0.278
1986	70	37.044	16.745	0.539	0.617	2.342	2.024	-0.226	1.183	0.370	0.337
1987	74	64.782	48.174	0.633	0.759	2.442	1.997	0.733	2.377	0.454	0.349
1988	81	118.971	118.78	0.898	2.446	2.279	2.597	1.055	5.091	0.337	0.420
1989	99	112.439	84.358	0.354	0.600	1.679	2.297	0.704	1.904	0.324	0.357
1990	118	67.337	45.764	0.344	0.580	1.366	1.892	-0.019	1.166	0.193	0.245
1991	132	53.617	30.011	0.293	0.517	1.374	1.638	-0.055	0.862	0.259	0.329
1992	160	43.119	23.532	0.302	0.526	1.187	1.671	0.007	1.109	0.202	0.293
1993	188	45.794	22.752	0.258	0.496	1.289	1.704	0.164	0.942	0.208	0.289
1994	201	41.322	20.437	0.235	0.438	1.498	1.519	0.321	0.900	0.216	0.276
1995	201	32.688	15.096	0.236	0.451	1.288	1.943	-0.056	0.821	0.050	0.385
1996	202	43.802	26.564	0.145	0.375	0.804	1.289	0.322	0.840	0.118	0.307
1997	203	41.358	33.158	0.111	0.289	0.863	1.142	0.554	1.169	0.104	0.285
1998	202	29.604	26.406	0.167	0.341	0.620	1.238	-0.163	1.683	0.054	0.299
1999	203	26.136	33.834	0.207	0.375	0.551	1.012	0.048	1.275	0.063	0.239
2000	203	14.087	19.656	0.200	0.377	0.437	1.073	-0.001	1.743	0.071	0.273
2001	201	14.053	15.373	0.197	0.384	0.178	0.938	-0.340	1.303	0.056	0.259
2002	203	10.171	11.248	0.261	0.464	0.367	1.059	-0.430	1.505	0.076	0.229
2003	202	13.975	12.553	0.335	0.546	0.423	0.991	0.038	1.247	0.082	0.233

TABLE 2 Descriptive Statistics (Continued)

		EXI_{jt}		X_{jt}		$EBDA_{jt}$		$DEAM_{jt}$		CFO_{jt}	
Year	Obs.	Mean	Std.	Mean	Std.	Mean	Std.	Mean	Std.	Mean	Std.
Full	3070	-0.001	0.274	0.925	2.163	1.727	2.337	0.802	0.569	1.533	3.146
1984	62	-0.022	0.181	1.275	2.125	2.447	2.233	1.171	0.911	3.767	2.788
1985	65	0.043	0.365	0.720	2.098	1.942	2.679	1.222	0.950	0.940	10.051
1986	70	-0.046	0.213	1.643	2.004	2.826	2.460	1.183	0.792	2.497	2.850
1987	74	-0.002	0.403	2.613	2.916	3.841	3.183	1.227	0.821	3.052	3.491
1988	81	0.085	0.718	3.082	5.294	4.213	5.437	1.129	0.692	3.451	4.408
1989	99	0.066	0.406	2.091	2.309	3.133	2.554	1.040	0.588	1.974	5.848
1990	118	0.035	0.389	1.162	2.009	2.170	2.159	1.007	0.599	1.714	3.019
1991	132	0.009	0.400	1.068	1.774	2.066	1.896	0.997	0.544	2.135	2.912
1992	160	-0.001	0.113	0.991	1.851	1.925	1.939	0.934	0.513	2.065	2.892
1993	188	-0.002	0.037	1.242	1.607	2.145	1.711	0.901	0.496	1.885	3.019
1994	201	-0.051	0.596	1.552	1.625	2.416	1.753	0.863	0.511	1.571	2.762
1995	201	0.000	0.082	1.181	1.823	1.974	2.027	0.792	0.474	1.411	2.697
1996	202	-0.016	0.161	0.991	1.324	1.733	1.461	0.741	0.446	1.047	2.258
1997	203	0.002	0.047	1.315	1.558	1.999	1.640	0.684	0.409	1.030	3.242
1998	202	-0.013	0.215	0.388	2.209	1.014	2.283	0.625	0.385	1.584	2.203
1999	203	-0.006	0.183	0.529	1.736	1.133	1.827	0.602	0.391	1.017	1.720
2000	203	0.000	0.074	0.363	2.132	0.976	2.224	0.612	0.446	1.459	2.145
2001	201	-0.007	0.093	0.225	1.760	0.401	1.800	0.626	0.526	1.061	1.742
2002	203	-0.007	0.100	0.147	2.042	0.494	2.057	0.641	0.533	0.875	1.754
2003	202	0.002	0.144	0.382	1.704	0.981	1.764	0.599	0.486	0.658	1.658

TABLE 2 Descriptive Statistics (Continued)

		ACC_{jt}		NDA_{jt}		DA_{jt}	
Year	Obs.	Mean	Std.	Mean	Std.	Mean	Std.
Full	3070	-0.512	-0.570	-0.570	-0.570	-0.570	-0.570
1984	62	-1.354	2.509	-1.158	1.478	-0.196	2.078
1985	65	0.520	9.295	-0.700	0.994	1.220	9.251
1986	70	-0.155	2.744	-0.466	0.966	0.311	2.653
1987	74	-0.610	2.981	-0.996	1.317	0.386	2.959
1988	81	-1.172	4.440	-1.105	1.576	-0.067	4.280
1989	99	-0.294	5.243	-0.446	2.980	0.152	4.625
1990	118	-0.347	2.605	-0.678	1.405	0.331	2.354
1991	132	-0.761	2.548	-0.654	1.192	-0.107	2.306
1992	160	-0.878	2.861	-0.819	1.255	-0.059	2.735
1993	188	-0.596	2.739	-0.735	0.907	0.139	2.574
1994	201	-0.073	2.431	-0.249	1.140	0.176	2.218
1995	201	-0.122	2.767	-0.205	1.109	0.083	2.651
1996	202	-0.243	2.156	-0.307	0.583	0.064	2.105
1997	203	-0.167	3.193	-0.163	1.247	-0.004	3.103
1998	202	-0.965	2.147	-0.894	0.954	-0.070	2.052
1999	203	-0.466	1.751	-0.583	0.577	0.117	1.620
2000	203	-1.022	2.121	-0.837	0.913	-0.185	2.024
2001	201	-0.883	1.759	-0.817	0.862	-0.066	1.627
2002	203	-0.509	1.883	-0.404	0.724	-0.105	1.739
2003	202	-0.235	1.641	-0.268	0.561	0.034	1.554

P_{jt} : j firm's price on the first trading day four months after the fiscal year end of t, d_{jt}: j firm's dividends paid in year t, $NOPI_{jt}$: j firm's net operating income (gross margin — operating expenses), $OTRNE_{jt}$: j firm's other revenues and expenses, TAX_{jt}: j firm's tax expenses, EXI_{jt}: j firm's extraordinary items and all others, X_{jt}: j firm's after taxes earings, $EBDA_{jt}$: j firm's earnings before depreciation and amortization, $DEAM_{jt}$: j firm's depreciation and amortization, CFO_{jt}: j firm's operating cash flows (net operating income — accounting accruals), ACC_{jt}: j firm's accounting accruals calculated using Eq. (11), NDA_{jt}: j firm's nondiscretionary accruals calculated as the expected value of Eq. (12), DA_{jt}: j firm's discretionary accruals calculated as the residual of Eq. (12). All variables are on a per share basis.

The risk-free rates are used in calculating the two dividend adjustment components (FVS_{jT} and FVF_{jT}). We only report the empirical results using R_F =1.10. However, we also use R_F =1.00, R_F =1.05, and R_F =1.15 for sensitivity analyses.

4. EMPIRICAL RESULTS

4.1 REGRESSION RESULTS: AGGREGATED EARNINGS

Table 4 shows the regression results for the "bottom line" figures (AX_{jT}). Similar to the findings of Easton et al. (1992) and Ohlson and Penman (1992), the R^2s increase as the return windows extend. That is, the average R^2s for one-, two-, five-, and ten-year return periods are 3.4%, 14.6%, 32.9%, and 35.1%, respectively.

The coefficients of AX_{jT} are also increasingly more significant as the return windows lengthen. The average t-statistics for one-, two-, five-,and ten-year return intervals are 1.52, 3.43, 8.42, and 9.03, respectively. When examining the short-term returns-earnings relations, researchers are often confused with why the earnings coefficients are small or insignificant. This study confirms those findings and points out that the length of return interval matters.

TABLE 3 Variable Correlations

	P_{jt}	d_{jt}	$NOPI_{jt}$	$OTRNE_{jt}$	TAX_{jt}	EXI_{jt}	X_{jt}	$EBDA_{jt}$	$DEAM_{jt}$	CFO_{jt}	ACC_{jt}	NDA_{jt}	DA_{jt}
P_{jt}	**1.00**	0.19	0.40	0.36	0.38	0.06	0.53	0.54	0.23	0.16	0.05	0.03	0.05
d_{jt}	0.19	**1.00**	0.38	0.41	0.42	0.01	0.52	0.51	0.11	0.18	0.02	0.01	0.02
$NOPI_{jt}$	0.51	0.42	**1.00**	0.02	0.66	0.05	0.68	0.71	0.32	0.39	0.13	0.06	0.12
$OTRNE_{jt}$	0.37	0.28	0.09	**1.00**	0.20	-0.02	0.72	0.66	-0.04	-0.12	0.14	0.09	0.11
TAX_{jt}	0.42	0.43	0.65	0.27	**1.00**	-0.03	0.49	0.50	0.17	0.27	0.07	0.07	0.05
EXI_{jt}	0.02	0.00	0.01	0.00	-0.03	**1.00**	0.15	0.13	-0.02	0.02	0.01	-0.08	0.04
X_{jt}	0.62	0.48	0.80	0.55	0.49	0.06	**1.00**	0.97	0.19	0.20	0.16	0.08	0.14
$EBDA_{jt}$	0.63	0.45	0.81	0.46	0.50	0.06	0.95	**1.00**	0.42	0.26	0.12	0.01	0.12
$DEAM_{jt}$	0.29	0.11	0.34	-0.10	0.17	0.00	0.22	0.47	**1.00**	0.28	-0.12	-0.27	-0.02
CFO_{jt}	0.26	0.23	0.46	-0.08	0.27	-0.02	0.32	0.39	0.39	**1.00**	-0.86	-0.28	-0.79
ACC_{jt}	0.05	0.05	0.15	0.15	0.07	0.03	0.19	0.11	-0.22	-0.75	**1.00**	0.33	0.68
NDA_{jt}	0.04	0.05	0.09	0.16	0.07	0.01	0.13	0.03	-0.31	-0.23	0.33	**1.00**	-0.07
DA_{jt}	0.05	0.02	0.11	0.08	0.05	0.02	0.13	0.10	-0.08	-0.66	0.85	-0.10	**1.00**

a.Pearson correlation is on the upper diagonal, and Spearman correlation on the lower diagonal.
b.See Table 2 for variable definitions.

TABLE 4 Regression Results: Aggregated Earnings

$$y_{jT} = \alpha_T + \beta_{1T}\left(AX_{jT}/P_{j0}\right) + \beta_{2T}\left(FVF_{jT}/P_{j0}\right) + \varepsilon_{jT}$$

Window	Interval	$\bar{\hat{\alpha}}$	$\bar{t}(\hat{\alpha})$	$\hat{\beta}_1$	$\bar{t}(\hat{\beta}_1)$	$\hat{\beta}_2$	$\bar{t}(\hat{\beta}_2)$	$\bar{R}^2$
1	20	0.071	-2.91	1.129	1.52			0.034
2	19	0.143	-6.81	1.363	3.43	4.995	0.76	0.146
5	16	0.548	-12.20	1.364	8.42	-6.493	-0.31	0.329
10	11	-0.093	-14.92	1.187	9.03	-2.111	0.91	0.351

Variable definitions for y_{jT}, AX_{jT}, and FVF_{jT} refer to Eqs. (1), (4), and (5), respectively.

4.2 REGRESSION RESULTS: DISAGGREGATION OF EARNINGS INTO NET OPERATING INCOME, OTHER REVENUES AND EXPENSES, INCOME TAX EXPENSES, AND EXTRAORDINARY ITEMS AND OTHERS

When earnings are further decomposed into net operating income ($NOPI_{jT}$), other revenues and expenses ($OTRNE_{jT}$), income tax expenses (TAX_{jT}), and extraordinary items and others (EXI_{jT}), the relative R^2s compared to those in Table 4 are higher. The average R^2s for one-, two-, five-, and ten-year return periods are

14.1%, 22.2%, 38.7%, and 60.5%, respectively. This comparison implies that further decomposition of earnings offers useful information to the market. Even though the explanatory power of the models increases, the coefficients of $NOPI_{jT}$, $OTRNE_{jT}$, and EXI_{jT} show anomalies. That is, $OTRNE_{jT}$ and EXI_{jT} become more positive in the long run (i.e., in the ten-year window), whereas $NOPI_{jT}$ turns out to be negative (but the average t-statistic is still significantly positive)[3]. This finding is contrary to the intuition. As we see the descriptive statistics in Table 2, $NOPI_{jT}$ still constitutes the major part of X_{jT} relative to the magnitude of $OTRNE_{jT}$ and EXI_{jT}. But why the variances of $OTRNE_{jT}$ and EXI_{jT} can explain most of the stock returns needs further investigation. Looking into the regressions of ten-year windows, only 2 out of 11 regressions show negative coefficients of $NOPI_{jT}$. They are the windows beginning with 1988 and 1989, in which the stock prices jump to a rocket high because of Hon-yan Investment Company's scandal. Deleting these two windows from the regressions (not tabulated) shows a result consistent with the intuition. That is, the average coefficients of $NOPI_{jT}$, $OTRNE_{jT}$, and EXI_{jT} are 0.886, 0.503, and 1.170; and their average t-statistics are 4.37, 3.63, and 1.26, respectively.

4.3 REGRESSION RESULTS: DISAGGREGATION OF EARNINGS INTO EARNINGS BEFORE DEPRECIATION AND AMORTIZATION AND DEPRECIATION AND AMORTIZATION EXPENSES

In testing the finance view of treating earnings before depreciation and amortization as the proxy of cash flows, earnings are decomposed into earnings before depreciation and amortization ($EBDA_{jT}$) and depreciation and amortization expenses ($DEAM_{jT}$). The results are shown in Table 6. Comparing the explanatory power of models, the relative average R^2s shown in Table 6 are greater than those in Table 4, but less than those in Table 5, indicating that further decomposition of earnings is the right way to go but one must be cautious in choosing appropriate models.

As shown in Table 6, the coefficients of $EBDA_{jT}$ are significant in all return intervals, even in the short-term return intervals (i.e., one-year), and the coefficients of $DEAM_{jT}$ become insignificant as the return intervals lengthen. These results are different from those in Table 7 where earnings are decomposed into operating cash flows (CFO_{jT}) and accruals (ACC_{jT}). Whereas the coefficients of $DEAM_{jT}$ in Table 6 become insignificant as the return intervals lengthen, those of ACC_{jT} in

[3] The reason why the coefficient of $NOPI_{jT}$ is negative and the related t-statistic is positive is that they are averaged over moving windows. For example, in the ten-year return window, the coefficient of $NOPI_{jT}$ and the related t-statistic are the arithmetic means of 11 regression results.

Table 7 are significant in all return intervals. Because $EBDA_{jT}$ and $DEAM_{jT}$ are only rough estimates of operating cash flows and accruals, we would recommend choosing the model used in Table 7.

TABLE 5 Regression Results: Disaggregation of Earnings into Net Operating Income, Other Revenues and Expenses, Income Tax Expenses, and Extraordinary Items and Others

$$y_{jT} = \alpha_T + \beta_{1T}\left(NOPI_{jT}/P_{j0}\right) + \beta_{2T}\left(OTRNE_{jT}/P_{j0}\right) + \beta_{3T}\left(TAX^N_{jT}/P_{j0}\right) + \beta_{4T}\left(EXI_{jT}/P_{j0}\right) + \beta_{5T}\left(FVF_{jT}/P_{j0}\right) + \varepsilon_{jT}$$

Window	Interval	$\bar{\hat{\alpha}}$	$\bar{t}(\hat{\alpha})$	$\bar{\hat{\beta}}_1$	$\bar{t}(\hat{\beta}_1)$	$\bar{\hat{\beta}}_2$	$\bar{t}(\hat{\beta}_2)$	$\bar{\hat{\beta}}_3$	$\bar{t}(\hat{\beta}_3)$	$\bar{\hat{\beta}}_4$	$\bar{t}(\hat{\beta}_4)$	$\bar{\hat{\beta}}_5$	$\bar{t}(\hat{\beta}_5)$	$\bar{R}^2$
1	20	0.046	-3.27	1.157	1.70	1.573	1.04	4.840	0.01	9.174	0.71			0.141
2	19	0.179	-6.86	1.359	2.74	1.788	2.20	3.454	0.21	-0.007	-0.04	-3.748	0.30	0.222
5	16	0.546	-12.6	1.182	3.17	1.170	3.60	0.290	-0.75	-0.698	-0.24	-5.731	-1.04	0.387
10	11	-0.209	-15.2	-0.057	3.69	1.902	4.93	-3.470	0.08	4.742	2.25	-0.807	0.87	0.605

Variable definitions for y_{jT} and FVF_{jT} refer to Eqs. (1) and (5), respectively. Other variables refer to Table 2.

TABLE 6 Regression Results: Disaggregation of Earnings into Earnings before Depreciation and Amortization and Depreciation and Amortization Expenses

$$y_{jT} = \alpha_T + \beta_{1T}\left(EBDA_{jT}/P_{j0}\right) + \beta_{2T}\left(DEAM_{jT}/P_{j0}\right) + \beta_{3T}\left(FVF_{jT}/P_{j0}\right) + \varepsilon_{jT}$$

Window	Interval	$\bar{\hat{\alpha}}$	$\bar{t}(\hat{\alpha})$	$\bar{\hat{\beta}}_1$	$\bar{t}(\hat{\beta}_1)$	$\bar{\hat{\beta}}_2$	$\bar{t}(\hat{\beta}_2)$	$\bar{\hat{\beta}}_3$	$\bar{t}(\hat{\beta}_3)$	$\bar{R}^2$
1	20	-0.076	-3.60	1.418	2.04	4.746	1.92			0.089
2	19	-0.019	-6.65	1.298	3.81	1.573	1.69	12.130	0.79	0.209
5	16	0.501	-10.7	1.354	8.21	-0.392	0.25	-7.688	-0.36	0.367
10	11	-0.856	-13.4	0.739	6.89	3.419	0.60	0.450	1.10	0.439

Variable definitions for y_{jT} and FVF_{jT} refer to Eqs. (1) and (5), respectively. Other variables refer to Table 2.

4.4 REGRESSION RESULTS: DISAGGREGATION OF EARNINGS INTO OPERATING CASH FLOWS AND ACCRUALS

Accountants estimate operating cash flows (CFO_{jT}) and accruals (ACC_{jT}) using Eq. (11) in contrast to the finance view. Using Eq. (10), the regression results are shown in Table 7. The explanatory power of the model is similar to that in Table 6. The coefficients of CFO_{jT} and ACC_{jT} are all positive and increasingly larger as the return interval lengthens. Sloan (1996) and Desai et al. (2004) suggest that the portfolios using accrual information earn abnormal returns up to two years. The results in Table 7 confirm their findings and suggest that the phenomenon may extend to longer return intervals (i.e., the return intervals of five and ten years). The results also indicate that the market appears to recognize both the cash flow and accounting accrual information.

We also test whether the coefficients of CFO_{jT} (β_{1T}) are greater than those of ACC_{jT} (β_{2T}) and the results show no consistent pattern. That is, β_{1T} are greater than β_{2T} in some return intervals, whereas in other return intervals a reverse relationship occurs. Because they both are significantly positive in all return intervals, investors should not ignore them.

TABLE 7 Regression Results: Disaggregation of Earnings into Operating Cash Flows and Accruals

$$y_{jT} = \alpha_T + \beta_{1T}\left(CFO_{jT}/P_{j0}\right) + \beta_{2T}\left(ACC_{jT}/P_{j0}\right) + \beta_{3T}\left(FVF_{jT}/P_{j0}\right) + \varepsilon_{jT}$$

Window	Interval	$\bar{\hat{\alpha}}$	$\bar{t}(\hat{\alpha})$	$\bar{\hat{\beta}}_1$	$\bar{t}(\hat{\beta}_1)$	$\bar{\hat{\beta}}_2$	$\bar{t}(\hat{\beta}_2)$	$\bar{\hat{\beta}}_3$	$\bar{t}(\hat{\beta}_3)$	$\bar{R}^2$	$\beta_{1T}>\beta_{2T}$	$\beta_{1T}<\beta_{2T}$
1	20	0.076	-2.67	0.398	1.67	0.826	1.74			0.107	10 (4)[#]	10 (2)[#]
2	19	0.131	-5.93	1.059	3.03	1.315	3.07	24.607	0.54	0.155	8 (4)	11 (2)
5	16	0.573	-10.7	1.259	6.25	1.650	6.29	-2.522	0.20	0.279	4 (3)	12 (8)
10	11	-0.442	-12.8	2.186	7.80	2.603	7.90	-0.512	1.00	0.509	6 (3)	5 (3)

a. [#] The number in the parenthesis indicates the count of intervals out of the intervals compared (shown on the left of the parenthesis) that the comparison of β' s is significant for at least 10% level.

b. Variable definitions for y_{jT} and FVF_{jT} refer to Eqs. (1) and (5), respectively. Other variables refer to Table 2.

4.5 REGRESSION RESULTS: DISAGGREGATION OF EARNINGS INTO OPERATING CASH FLOWS, NONDISCRETIONARY ACCRUALS, AND DISCRETIONARY ACCRUALS

Table 8 presents the regression results for further decomposition of accruals into *nondiscretionary* accruals (NDA_{jT}) and discretionary accruals (DA_{jT}). The coefficients of CFO_{jT} (β_{1T}), NDA_{jT} (β_{2T}), and DA_{jT} (β_{3T}) are all positive and increasingly more significant as the return interval lengthens, showing that the information of NDA_{jT} and DA_{jT} matters even in the long return intervals. The discretionary accruals (DA_{jT}) are supposed to be more transitory in nature and tend to reverse in the long run, but the empirical findings in Table 8 do not confirm this intuitive prediction. The tests of $\beta_{1T} > \beta_{2T}$, $\beta_{1T} > \beta_{3T}$, and $\beta_{2T} > \beta_{3T}$ show no persistent pattern. The coefficients of NDA_{jT} (β_{2T}) and DA_{jT} (β_{3T}) stand still as positive and, except for the one-year intervals, they are significant even in the long return intervals. Sloan (1996) and Desai et al. (2004) only test for accounting accruals (ACC_{jT}) for up to two years and show that the portfolios using accounting accruals earn abnormal returns. This study further decomposes accounting accruals (ACC_{jT}) into nondiscretionary accruals (NDA_{jT}) and discretionary accruals (DA_{jT}) and extends the return intervals to five and ten years. The findings show that the information in NDA_{jT} and DA_{jT} does not fade in the long return intervals.

TABLE 8 Regression Results: Disaggregation of Earnings into Operating Cash Flows, Nondiscretionary Accruals, and Discretionary Accruals (Using Modified-Jones Model)

$$y_{jT} = \alpha_T + \beta_{1T}\left(CFO_{jT}/P_{j0}\right) + \beta_{2T}\left(NDA_{jT}/P_{j0}\right) + \beta_{3T}\left(DA_{jT}/P_{j0}\right) + \beta_{4T}\left(FVF_{jT}/P_{j0}\right) + \varepsilon_{jT}$$

Window	Interval	$\bar{\hat{\alpha}}$	$\bar{t}(\hat{\alpha})$	$\bar{\hat{\beta}}_1$	$\bar{t}(\hat{\beta}_1)$	$\bar{\hat{\beta}}_2$	$\bar{t}(\hat{\beta}_2)$	$\bar{\hat{\beta}}_3$	$\bar{t}(\hat{\beta}_3)$	$\bar{\hat{\beta}}_4$	$\bar{t}(\hat{\beta}_4)$	$\bar{R}^2$	$\beta_{1T}>\beta_{2T}$	$\beta_{1T}<\beta_{2T}$	$\beta_{1T}>\beta_{3T}$	$\beta_{1T}<\beta_{3T}$	$\beta_{2T}>\beta_{3T}$	$\beta_{2T}<\beta_{3T}$
1	20	0.056	-2.80	0.539	2.11	1.359	1.27	0.721	1.60			0.146	13 (8)#	7 (3)#	10 (6)#	10 (4)#	6 (3)#	14 (6)#
2	19	0.140	-5.63	0.960	3.14	1.686	2.37	1.021	2.65	27.628	0.64	0.189	8 (4)	11 (5)	10 (7)	9 (4)	10 (6)	9 (5)
5	16	0.558	-10.1	1.311	5.32	1.808	4.14	1.675	4.33	-2.369	0.17	0.293	4 (2)	12 (5)	5 (1)	11 (5)	9 (4)	7 (3)
10	11	0.313	-12.2	2.607	6.51	2.367	5.57	0.342	4.94	0.643	1.25	0.546	4 (3)	7 (3)	5 (3)	6 (4)	4 (3)	7 (3)

a.# The number in the parenthesis indicates the count of intervals out of the intervals compared (shown on the left of the parenthesis) that the comparison of β' s is significant for at least 10% level.

b. Variable definitions for y_{jT} and FVF_{jT} refer to Eqs. (1) and (5), respectively. Other variables refer to Table 2.

5. SENSITIVITY ANALYSIS

5.1 TESTS FOR DIFFERENT RISK-FREE RATES

In addition to the risk-free rate of 1.10, we also test the influence of different risk-free rates on the explanatory power of each model. The results are shown in Table 9. Obviously, when risk-free rates go up, by including the dividend adjustment components (FVS_{jT} and FVF_{jT}) in the model, the explanatory power of the model increases, especially for the long-term intervals. In the extreme case, when dropping the FVF_{jT} in the right hand side of the model (and FVF_{jT} on the left hand side is adjusted accordingly), which is equivalent to using $R_F = 1.00$, the resulting $\overline{R}^2$s are the least among others, indicating that we cannot ignore the dividend adjustment components (FVS_{jT} and FVF_{jT}) when modeling returns and earnings relation, especially for long-term periods.

TABLE 9 Tests for Different Risk-free Rates

Window	Interval	$\overline{R}^2$ R_F=1.00	R_F=1.05	R_F=1.10	R_F=1.15
Panel A: $y_{jT} = \alpha_T + \beta_{1T}(AX_{jT}/P_{j0}) + \beta_{2T}(FVF_{jT}/P_{j0}) + \varepsilon_{jT}$					
1	20	0.034	0.034	0.034	0.034
2	19	0.124	0.146	0.146	0.147
5	16	0.298	0.327	0.329	0.332
10	11	0.326	0.341	0.351	0.367
Panel B: $y_{jT} = \alpha_T + \beta_{1T}(NOPI_{jT}/P_{j0}) + \beta_{2T}(OTRNE_{jT}/P_{j0}) + \beta_{3T}(TAX^N_{jT}/P_{j0}) + \beta_{4T}(EXI_{jT}/P_{j0})$ $+ \beta_{5T}(FVF_{jT}/P_{j0}) + \varepsilon_{jT}$					
1	20	0.141	0.141	0.141	0.141
2	19	0.211	0.221	0.222	0.222
5	16	0.371	0.385	0.387	0.390
10	11	0.582	0.595	0.605	0.620
Panel C: $y_{jT} = \alpha_T + \beta_{1T}(EBDA_{jT}/P_{j0}) + \beta_{2T}(DEAM_{jT}/P_{j0}) + \beta_{3T}(FVF_{jT}/P_{j0}) + \varepsilon_{jT}$					
1	20	0.089	0.089	0.089	0.089
2	19	0.190	0.209	0.209	0.210
5	16	0.340	0.345	0.367	0.369
10	11	0.417	0.430	0.439	0.454
Panel D: $y_{jT} = \alpha_T + \beta_{1T}(CFO_{jT}/P_{j0}) + \beta_{2T}(ACC_{jT}/P_{j0}) + \beta_{3T}(FVF_{jT}/P_{j0}) + \varepsilon_{jT}$					
1	20	0.107	0.107	0.107	0.107
2	19	0.140	0.154	0.155	0.155
5	16	0.266	0.277	0.279	0.282
10	11	0.476	0.498	0.509	0.527
Panel E: $y_{jT} = \alpha_T + \beta_{1T}(CFO_{jT}/P_{j0}) + \beta_{2T}(NDA_{jT}/P_{j0}) + \beta_{3T}(DA_{jT}/P_{j0}) + \beta_{4T}(FVF_{jT}/P_{j0}) + \varepsilon_{jT}$					
1	20	0.146	0.146	0.146	0.146
2	19	0.174	0.188	0.189	0.189
5	16	0.280	0.291	0.293	0.296
10	11	0.516	0.534	0.546	0.562

Variable definitions for y_{jT} and FVF_{jT} refer to Eqs. (1) and (5), respectively. Other variables refer to Table 2.

5.2 SUBSTITUTING OPREATING CASH FLOWS EXTRACTED FROM THE STATEMENT OF CASH FLOWS FOR ESTIMATING OPEREATING CASH FLOWS

According to the Statement of Financial Accounting Standards No. 17 (1989), listed companies in Taiwan were required to summit statements of cash flows to the Securities and Futures Exchanges Commission after the fiscal year 1990. We thereby replace the estimated operating cash flows with reported operating cash flows after 1990. The results, shown in Table 10, are similar to those in Tables 7 and 8.

5.3 THE INFLUENCE OF THE SHARP RISE AND FALL OF THE TAIWANESE STOCK MARKET IN 1990

Taiwanese stock market experienced a sharp rise and fall in 1990. We then delete the intervals that begin with 1990 and rerun the tests. The results are shown in Table 11. Comparing Panels A through E to Tables 4 through 8, each model's coefficients and explanatory power are similar relatively, indicating that the major findings in Tables 4 to 8 are robust to the influence of outliers.

5.4 DISAGGREGATION OF EARNINGS INTO OPERATING CASH FLOWS, AND DISCRETIONARY ACCRUALS USING PERFORMANCE-MATCHED MODIFIED-JONES MODEL

Kothari, Leone and Wasley (2005) argue that the traditional discretionary accrual models (e.g., Jones and modified-Jones models) might be misspecified when applied to samples of firms with extreme performance and suggest that performance-matched discretionary accrual measures be used when the implied earnings management does not vary with performance to enhance the reliability of the test. We recalculate nondiscretionary accruals (NDA) and discretionary accruals (DA) using Kothari et al. (2005) version of performance-matched modified-Jones model:

$$\left(ACC_{jt}/ASSET_{jt-1}\right)=\alpha_{ot}+\alpha_{1t}\left(1/ASSET_{jt-1}\right)+\alpha_{2t}\left(\Delta REV_{jt}/ASSET_{jt-1}-\Delta REC_{jt}/ASSET_{jt-1}\right)$$
$$+\alpha_{3t}\left(PPE_{jt}/ASSET_{jt-1}\right)+\alpha_{4t}ROA_{jt}+\varepsilon_{jt} \quad (14)$$

where

ROA_{jt} = j firm's net income of year t divided by $ASSET_{jt-1}$.

TABLE 10 Substituting Operating Cash Flows Extracted from Statements of Cash Flows for Estimated Operating Cash Flows after 1990

Panel A: $y_{jT} = \alpha_T + \beta_{1T}\left(CFO_{jT}/P_{j0}\right) + \beta_{2T}\left(ACC_{jT}/P_{j0}\right) + \beta_{3T}\left(FVF_{jT}/P_{j0}\right) + \varepsilon_{jT}$

Window	Interval	$\bar{\hat{\alpha}}$	$\bar{t}(\hat{\alpha})$	$\bar{\hat{\beta}}_1$	$\bar{t}(\hat{\beta}_1)$	$\bar{\hat{\beta}}_2$	$\bar{t}(\hat{\beta}_2)$	$\bar{\hat{\beta}}_3$	$\bar{t}(\hat{\beta}_3)$	$\bar{R}^2$
1	20	0.053	-3.30	1.256	2.11	0.336	1.27			0.107
2	19	0.115	-6.81	1.208	3.31	0.867	2.35	17.300	0.40	0.172
5	16	0.556	-12.5	1.325	6.73	1.349	5.10	-3.515	-0.07	0.294
10	11	-0.472	-13.9	2.204	8.14	2.780	8.81	-0.290	1.01	0.488

Panel B: $y_{jT} = \alpha_T + \beta_{1T}\left(CFO_{jT}/P_{j0}\right) + \beta_{2T}\left(NDA_{jT}/P_{j0}\right) + \beta_{3T}\left(DA_{jT}/P_{j0}\right)$
$+ \beta_{4T}\left(FVF_{jT}/P_{j0}\right) + \varepsilon_{jT}$

Window	Interval	$\bar{\hat{\alpha}}$	$\bar{t}(\hat{\alpha})$	$\bar{\hat{\beta}}_1$	$\bar{t}(\hat{\beta}_1)$	$\bar{\hat{\beta}}_2$	$\bar{t}(\hat{\beta}_2)$	$\bar{\hat{\beta}}_3$	$\bar{t}(\hat{\beta}_3)$	$\bar{\hat{\beta}}_4$	$\bar{t}(\hat{\beta}_4)$	$\bar{R}^2$
1	20	0.017	-3.73	1.679	2.72	0.386	0.70	0.728	1.48			0.148
2	19	0.113	-6.85	1.176	3.60	1.226	1.60	0.705	2.21	19.428	0.51	0.213
5	16	0.528	-12.0	1.384	6.33	1.307	2.99	1.456	3.85	-3.335	-0.09	0.302
10	11	0.533	-14.3	2.034	7.00	2.267	3.37	0.863	8.17	0.740	1.35	0.528

Variable definitions for y_{jT} and FVF_{jT} refer to Eqs. (1) and (5), respectively. Other variables refer to Table 2.

TABLE 11 Deleting Outliers of Sharp Rise and Fall in 1990 Stock Market

Panel A: $y_{jT} = \alpha_T + \beta_{1T}\left(AX_{jT}/P_{j0}\right) + \beta_{2T}\left(FVF_{jT}/P_{j0}\right) + \varepsilon_{jT}$

Window	Interval	$\bar{\hat{\alpha}}$	$\bar{t}(\hat{\alpha})$	$\bar{\hat{\beta}}_1$	$\bar{t}(\hat{\beta}_1)$	$\bar{\hat{\beta}}_2$	$\bar{t}(\hat{\beta}_2)$	$\bar{R}^2$
1	19	0.096	-1.55	1.144	1.40			0.031
2	18	0.181	-5.21	1.461	3.73	0.813	0.59	0.148
5	15	0.631	-11.3	1.352	8.20	-7.243	0.27	0.310
10	10	-0.021	-15.3	1.195	9.27	-2.259	1.03	0.359

Panel B: $y_{jT} = \alpha_T + \beta_{1T}\left(NOPI_{jT}/P_{j0}\right) + \beta_{2T}\left(OTRNE_{jT}/P_{j0}\right) + \beta_{3T}\left(TAX_{jT}^{N}/P_{j0}\right) + \beta_{4T}\left(EXI_{jT}/P_{j0}\right) + \beta_{5T}\left(FVF_{jT}/P_{j0}\right) + \varepsilon_{jT}$

Window	Interval	$\bar{\hat{\alpha}}$	$\bar{t}(\hat{\alpha})$	$\bar{\hat{\beta}}_1$	$\bar{t}(\hat{\beta}_1)$	$\bar{\hat{\beta}}_2$	$\bar{t}(\hat{\beta}_2)$	$\bar{\hat{\beta}}_3$	$\bar{t}(\hat{\beta}_3)$	$\bar{\hat{\beta}}_4$	$\bar{t}(\hat{\beta}_4)$	$\bar{\hat{\beta}}_5$	$\bar{t}(\hat{\beta}_5)$	$\bar{R}^2$
1	19	0.072	-2.12	1.008	1.60	1.499	0.96	4.742	-0.03	9.611	0.59			0.140
2	18	0.020	-5.42	1.388	2.83	1.885	2.32	3.810	0.25	0.025	-0.26	-5.683	0.25	0.225
5	15	0.624	-12.1	1.281	3.42	1.435	4.17	0.380	-0.47	-1.471	-0.71	-7.340	-0.16	0.370
10	10	-0.138	-15.4	-0.224	3.87	1.978	5.30	-2.112	0.46	4.745	2.33	-0.062	1.25	0.623

Panel C: $y_{jT} = \alpha_T + \beta_{1T}\left(EBDA_{jT}/P_{j0}\right) + \beta_{2T}\left(DEAM_{jT}/P_{j0}\right) + \beta_{3T}\left(FVF_{jT}/P_{j0}\right) + \varepsilon_{jT}$

Window	Interval	$\bar{\hat{\alpha}}$	$\bar{t}(\hat{\alpha})$	$\bar{\hat{\beta}}_1$	$\bar{t}(\hat{\beta}_1)$	$\bar{\hat{\beta}}_2$	$\bar{t}(\hat{\beta}_2)$	$\bar{\hat{\beta}}_3$	$\bar{t}(\hat{\beta}_3)$	$\bar{\hat{\beta}}_4$	$\bar{t}(\hat{\beta}_4)$	$\bar{\hat{\beta}}_5$	$\bar{t}(\hat{\beta}_5)$	$\bar{R}^2$
1	19	-0.055	-2.72	1.456	1.99	4.817	1.92							0.087
2	18	0.012	-5.52	1.395	4.14	1.539	1.64	9.059	0.66					0.213
5	15	0.589	-9.94	1.346	7.93	-0.528	0.10	-8.111	0.24					0.347
10	10	-0.837	-13.5	0.746	7.23	3.511	0.39	-0.340	1.28					0.448

Panel D: $y_{jT} = \alpha_T + \beta_{1T}\left(CFO_{jT}/P_{j0}\right) + \beta_{2T}\left(ACC_{jT}/P_{j0}\right) + \beta_{3T}\left(FVF_{jT}/P_{j0}\right) + \varepsilon_{jT}$

Window	Interval	$\bar{\hat{\alpha}}$	$\bar{t}(\hat{\alpha})$	$\bar{\hat{\beta}}_1$	$\bar{t}(\hat{\beta}_1)$	$\bar{\hat{\beta}}_2$	$\bar{t}(\hat{\beta}_2)$	$\bar{\hat{\beta}}_3$	$\bar{t}(\hat{\beta}_3)$	$\bar{\hat{\beta}}_4$	$\bar{t}(\hat{\beta}_4)$	$\bar{\hat{\beta}}_5$	$\bar{t}(\hat{\beta}_5)$	$\bar{R}^2$
1	19	0.104	-1.45	0.240	1.52	0.721	1.66							0.106
2	18	0.170	-4.49	1.071	3.11	1.341	3.16	23.243	0.46					0.159
5	15	0.653	-10.3	1.213	6.53	1.492	6.30	-3.174	0.65					0.274
10	10	-0.374	-12.6	2.008	8.14	2.761	8.57	0.109	1.37					0.521

Panel E: $y_{jT} = \alpha_T + \beta_{1T}\left(CFO_{jT}/P_{j0}\right) + \beta_{2T}\left(NDA_{jT}/P_{j0}\right) + \beta_{3T}\left(DA_{jT}/P_{j0}\right) + \beta_{4T}\left(FVF_{jT}/P_{j0}\right) + \varepsilon_{jT}$

Window	Interval	$\bar{\hat{\alpha}}$	$\bar{t}(\hat{\alpha})$	$\bar{\hat{\beta}}_1$	$\bar{t}(\hat{\beta}_1)$	$\bar{\hat{\beta}}_2$	$\bar{t}(\hat{\beta}_2)$	$\bar{\hat{\beta}}_3$	$\bar{t}(\hat{\beta}_3)$	$\bar{\hat{\beta}}_4$	$\bar{t}(\hat{\beta}_4)$	$\bar{\hat{\beta}}_5$	$\bar{t}(\hat{\beta}_5)$	$\bar{R}^2$
1	19	0.083	-1.61	0.395	2.00	1.333	1.25	0.607	1.51					0.147
2	18	0.180	-4.19	0.971	3.23	1.770	2.48	1.017	2.70	26.177	0.56			0.193
5	15	0.641	-9.64	1.247	5.49	1.742	4.13	1.444	4.15	-2.866	0.70			0.286
10	10	0.437	-11.4	2.505	8.01	2.232	4.06	0.564	4.97	1.155	1.71			0.450

Variable definitions for y_{jT} and FVF_{jT} refer to Eqs. (1) and (5), respectively. Other variables refer to Table 2.

Nondiscretionary accruals (NDA) are the expected value of Eq. (14), and discretionary accruals (DA) are the residuals (ε_{jt}) of the above regression. The feature of Eq. (14), compared to Eq. (12), is that it adds a constant term to control for heteroskedasticity and size and ROA_{jt} to control for performance. We run Eqs. (14) and (13) as a sensitivity check. Similar results (shown in Table 12) with those using the modified-Jones model (shown in Table 8) have been found. That is, the coefficients of CFO_{jT} (β_{1T}) are all significantly positive. The coefficients of NDA_{jT} (β_{2T}) and DA_{jT} (β_{3T}) stand still as positive and, except for some one-year intervals, they are significant even in the long return intervals. And the tests of $\beta_{1T} > \beta_{2T}$, $\beta_{1T} > \beta_{3T}$, and $\beta_{2T} > \beta_{3T}$ also show no persistent pattern.

6. CONCLUDING REMARKS

Researchers are often puzzled by the low explanatory power of earnings for returns. This study shows the evidence in Taiwan that the explanatory power of earnings for returns can be greatly enhanced by extending the return window. The result is very similar to that of the U.S. as shown in Easton et al. (1992) and Ohlson and Penman (1992). If this is the case for the U.S. and Taiwan, we conjecture that it might be held for Japan, Korea, Australia, European countries, and others. Further studies could replicate for other stock markets to check the robustness of the model.

Given that the earnings-returns relation could be enhanced by extending the return window, the traditional “association study” normally using one year as return window could be reworked accordingly. By extending the return window, the explanatory power of models increases. Some variables become more significant and others may turn insignificant. Therefore, researchers could identify the long-term relation of earnings and returns, either confirm the traditional association study’s results or find a new insight over the traditional view. There is a new way for researchers to go.

This study also documents that decomposition of earnings into different components, i.e., net operating income, other revenues and expenses, extraordinary items, operating cash flows, nondiscretionary accruals, and discretionary accruals, etc. enhances the explanatory power of the model, no matter short- or long-term windows. This implies that the analysis looking into the components of earnings is worthwhile.

TABLE 12 Regression Results: Disaggregation of Earnings into Operating Cash Flows, Nondiscretionary Accruals, and Discretionary Accruals (Using Performance-matched Modified-Jones Model)

$$y_{jT} = \alpha_T + \beta_{1T}\left(CFO_{jT}/P_{j0}\right) + \beta_{2T}\left(NDA_{jT}/P_{j0}\right) + \beta_{3T}\left(DA_{jT}/P_{j0}\right) + \beta_{4T}\left(FVF_{jT}/P_{j0}\right) + \varepsilon_{jT}$$

Window	Interval	$\bar{\hat{\alpha}}$	$\bar{t}(\hat{\alpha})$	$\bar{\hat{\beta}}_1$	$\bar{t}(\hat{\beta}_1)$	$\bar{\hat{\beta}}_2$	$\bar{t}(\hat{\beta}_2)$	$\bar{\hat{\beta}}_3$	$\bar{t}(\hat{\beta}_3)$	$\bar{\hat{\beta}}_4$	$\bar{t}(\hat{\beta}_4)$	$\bar{R}^2$	$\beta_{1T} > \beta_{2T}$	$\beta_{1T} < \beta_{2T}$	$\beta_{1T} > \beta_{3T}$	$\beta_{1T} < \beta_{3T}$	$\beta_{2T} > \beta_{3T}$	$\beta_{2T} < \beta_{3T}$
1	20	0.076	-2.76	0.342	2.08	1.123	1.86	0.496	1.55			0.146	12 (7)#	8 (2)#	12 (3)#	8 (3)#	8 (3)#	12 (7)#
2	19	0.150	-5.68	0.969	3.14	1.179	2.80	1.218	2.62	26.145	0.58	0.192	9 (6)	10 (6)	10 (5)	9 (4)	9 (5)	10 (7)
5	16	0.545	-10.1	1.235	5.70	1.316	3.98	1.757	4.54	-1.713	0.36	0.291	5 (3)	11 (3)	5 (1)	12 (6)	7 (2)	9 (3)
10	11	0.476	-12.5	2.249	7.59	2.654	4.66	0.821	7.22	0.468	1.26	0.526	6 (5)	5 (2)	4 (2)	7 (3)	4 (0)	7 (5)

a.# The number in the parenthesis indicates the count of intervals out of the intervals compared (shown on the left of the parenthesis) that the comparison of β' s is significant for at least 10% level.

b. Variable definitions for y_{jT} and FVF_{jT} refer to Eqs. (1) and (5), respectively. Other variables refer to Table 2.

On the decomposition of earnings, this study first explores the long-term reaction of cash flows and accounting accruals to returns. The results show that the cash flow and accounting accrual information remains significant in all return windows, indicating that investors pay attention to the cash flow as well as accounting accrual information. Further disaggregating accounting accruals into nondiscretionary and discretionary accruals shows new insight. The discretionary accruals are supposed to be more transitory in nature and tend to reverse in the long run, but the empirical findings do not confirm this intuitive prediction. The coefficients of nondiscretionary and discretionary accruals stand still as positive and, except for the one-year interval, they are significant even in the long return intervals, indicating that both discretionary and nondiscretionary accruals are value relevant in the long return intervals.

The findings of this study are robust to different assumptions of interest rates (i.e., 0%, 5%, 10%, or 15%), different measures of cash flows and discretionary accruals, and dropping of outliers. Overall, aggregating earnings over long periods of time can minimize or even eliminate the "measurement errors" in earnings and their components. A study of the long-term association between earnings and returns has the potential to inform researchers and investors about measurement errors in earnings.

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