Current vs. Permanent Earnings for Estimating Alternative Dividend Payment Behavioral Model: Theory, Methods and Applications

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Abstract

Marsh and Merton (1987) and Garrett and Priestley (2000) have used aggregated permanent instead of current earnings to estimate aggregated dividend behavior models which was developed by Lintner (1956). Lee and Primeaux (1991) used permanent instead of current EPS to estimate Lintner's dividend payment behavior model for individual companies. Most recently, Lambrecht and Myer (2012) have theoretically shown that permanent, instead of current, EPS should be used to estimate the dividend payment behavior model for individual companies to avoid measurement error and misspecification of the model.

The main purposes of this paper are to: (1) theoretically explain why firms generally allocate permanent earnings and transitory earnings between dividends payments and retained earnings; (2) develop alternative methods for decomposing current earnings into permanent and transitory components; (3) empirically estimate alternative dividend payment behavior models by using two alternative permanent EPS estimates for both individual firms and pooled data; and (4) test Lambrecht and Myer's (2012) theoretically results related to alternative dividend payment behavior models. We find that the average long-term payout ratio is downward biased and the average estimated intercept is generally upward biased when current instead of permanent EPS are used. We also find that the combined model perform well to deal with both measurement errors and specification errors in describing the dividend payment behavior model.

Keywords: Current earnings; Current EPS; Permanent earnings; Permanent EPS; Dividend behavior models; Specification analysis; Partial adjustment coefficient; Long-term payout ratio

1. Introduction

Earnings of a firm are allocated to retained earnings or dividend payments by a financial decision. Retained earnings are internal sources of funds that provide additional financial capital for either the expansion of the firm or a financial reserve against future contingencies. Dividends are generally distributed to stockholders to satisfy their need for liquidity or other uses according to their preference functions. It is well-known that earnings of a firm can be classified into either permanent or transitory components. Permanent earning power creates the permanent component, and the transitory component is composed of income of a temporary nature. Modigliani and Miller (1958, 1961, l963, and 1966) have argued that a firm's market value is determined by its permanent (expected) earnings, not transitory components of income.

The transitory component of a firm's earnings originates from a temporary change in market conditions, a temporary change in accounting method, or any other nonpermanent change that would cause earnings to fluctuate over time. Lalané and Jones (1979) discuss the importance of unexpected earnings of firms as signaling information in financial management and investment analysis. However, to the best of our knowledge, no acceptable method for decomposing current earnings into permanent (expected) and transitory (unexpected) earnings has been previously developed.

In addition, forecasts of dividends are important to both security analysts and financial managers, and either conditional or unconditional methods are generally used to forecast dividend payments. The most popular conditional dividend-forecasting models are the partial-adjustment model developed by Lintner (1956) and the information content model discussed by Ang (1975); several others are also available.

Lintner (1956) uses survey data to develop the dividend payment behavior model describing how managers determine their dividend payment. Lee et al. (1987) use partial adjustment and adaptive expectation model to generalize Lintner's dividend behavior model. Since then, Lintner's model has been widely used in finance research, such as Marsh and Merton (1987), Lee and Primeaux (1991), Garrett and Priestley (2000), and Lambrecht and Myer (2012). Miller and Modigliani (1966) show that current earnings used to estimate cost of equity capital is subject to measurement error problem. Therefore, using current EPS to estimate Lintner's dividend behavior model might be also subject to measurement error problem.

Marsh and Merton (1987) have theoretically developed an aggregate dividend behavior model and empirically used S&P 500 index as proxy to measure aggregate permanent earnings. However, they did not explicitly develop a method estimate permanent earnings. Garrett and Priestley (2000) have generalized the Marsh and Merton model by including both the S&P 500 index and permanent earnings in their dividend payment behavior model. In addition, they proposed a common Kalman filter approach to estimate aggregate permanent earnings.

To the best of our knowledge, Lee and Primeaux (1991) is the first paper that empirically shows how current EPS can be decomposed into permanent and transitory EPS. In addition, they used permanent instead of current EPS to estimate Lintner's dividend payment behavior model for individual companies. Most recently, Lambrecht and Myer (2012) have theoretically shown that permanent instead of current EPS should be used to estimate the dividend payment behavior model for individual companies. They also provide specification analysis to show how the dividend payment behavior model can be misspecified if current EPS is applied.

The main purposes of this paper are to: (1) theoretically explain why firms generally allocate permanent earnings and transitory earnings between dividends payments and retained earnings; (2) develop alternative methods for decomposing current earnings and dividends into permanent and transitory components; (3) empirically estimate alternative dividend payment behavior models by using two alternative permanent EPS estimates for both individual firms and pooled data; and (4) test Lambrecht and Myer's (2012) theoretically results related to alternative dividend payment behavior models.

Section 1 is the introduction. Section 2 discusses theoretical determination of firm's permanent and transitory earnings and dividends. The relationship between accounting earnings and economic earnings is also discussed. Section 3 discusses alternative models for decomposing current earnings and dividends into permanent and transitory components, according to methods proposed by Darby (1972 and 1974), Lee and Primeaux (1991), and Garrett and Priestley (2000). In Section 4, empirical results of testing model discussed in Section 3 are revealed in therms of individual firms and pooled data. We also perform the empirical tests of Lambrecht and Myer's (2012) theoretical results of permanent EPS and their specification analysis of dividend payment behavior model in terms of current EPS. Section 5 provides a summary and some concluding remarks.

2. Theoretical determination of firm's permanent and transitory earnings and dividends

In the evolution of the consumption function, which is one of the key concepts in Keynesian economics, several important theories were developed to explain how consumers adjust consumption expenditures to accommodate changes in their levels of income. One of these theories is the permanent-income hypothesis developed by Friedman (1957).[1]

The permanent-income hypothesis shows that consumption is not a function of current income but a function of permanent income. Total income is composed of two components permanent income and transitory income. Transitory income is not fully anticipated and it may

[1] When Friedman received the Nobel prize in economics, this work was cited as one of his major contributions.

be positive or negative. That is, a prize would constitute a positive transitory income component while a loss of income from temporary illness or layoff would constitute a negative component of transitory income. Friedman explains that these transitory elements would not affect consumption expenditures.

The permanent-income hypothesis is applied to the finance theory, and a new theory of dividend payments by business can be developed. The income of interest here is the income of the business firm and dividends are analogous to consumer consumption expenditures.

The level of permanent income earned by a firm determines the permanent dividends it can pay out to stockholders. Permanent income is essentially an average of current and past earnings of the firm. Current income, therefore, can be divided into two components:

$$E = E^P + E^T \tag{1}$$

where E is the current income per share of the firm, E^P is the permanent income per share of the firm, and E^T is the transitory income per share of the firm.

Transitory income may be positive or negative, and current income will differ from permanent income by the amount of transitory income. A business earns transitory income, which is really unanticipated earnings, from windfall profits from any sources. For example, oil companies earn transitory income from the increased prices they received from selling products made from crude oil produced domestically. Firms incur negative transitory income if they experience an uninsured catastrophic event such as the destruction of a plant by a disaster of any kind or an unexpected strike by employees. The transitory components of income, positive and negative, should cancel out over the permanent-income time horizon. Transitory components, however, are always present during shorter time periods.

Eisner (1967 and 1978) developed a permanent-income theory for investment decisions. If firm investment essentially depends upon internal sources of funds, the nature of retained earnings is an important factor affecting the decision to undertake long-term or short-term investment.

Retained earnings can conceptually be decomposed into two components, permanent and transitory. Dividends can also be divided into two similar components:

$$D = D^P + D^T \tag{2}$$

where D is the current dividends per share paid by the firm, D^P is the permanent dividends per share paid by the firm, and D^T is the transitory dividends per share paid by the firm.

Permanent dividends are only one component of dividends, and total dividends may be larger than permanent dividends, depending upon the level of transitory dividends. Permanent dividends are dividends that the business firm systematically pays based on its permanent earnings, dividends paid out of transitory earnings would constitute extra dividends.

Weston et al. (2004) and others generally explain that a firm may have one of three dividend policies: (1) stable dollar amount per share, (2) constant payout ratio, or (3) a compromise—lower regular dividend, plus extras. No matter what policy is used, all income is either paid out in dividends or retained by the business in the form of retained earnings:

$$E - (D^P + D^T) - R = 0 \tag{3}$$

where R is the retained earnings per share of the firm.

Transitory dividends are paid from transitory income and are short-run in nature. They are part of the short-run measure of dividend yield. In contrast, permanent dividends are paid from permanent earnings, are long-run in nature, and constitute all of the long-run measure of dividend yield. Miller and Scholes (1982) have demonstrated that short-run and long-run dividend yield each have different implications in testing the effectiveness of alternative dividend policies on security rate of return determination. Our theoretical framework, decomposing income and dividend payout into permanent and transitory components, elaborates upon their theoretical justification of short- and long-run dividend yield measurements. Generally, transitory earnings are not used for payment of permanent dividends. However, transitory dividends can come from either transitory or permanent earnings.

Different sources of dividend payment (i.e., permanent or current income) may have different implications in determining a firm's dividend payment behavior. This condition provides the motivation for examining both permanent and current earnings per share for describing a firm's dividend payment behavior in the empirical section of this work. In the next section, we will discuss alternative methods for decomposing current EPS into permanent and transitory EPS components.

3. Alternative methods for decomposing current EPS into permanent- and transitory-EPS components

In this section, we will discuss four alternative methods to decompose current EPS into permanent-EPS and transitory-EPS components. These four methods are (1) Darby's (1974) method, (2) Lee and Primeaux's (1991) method, (3) Garrett and Priestley's (2000) Kalman filter method, and (4) Lambrecht and Myer's (2012) method.

3.1 Darby's (1974) method

We follow Darby's (1974) method to decompose current EPS into permanent- and transitory-EPS components. Theoretically, the relationship between current dividend and permanent earning can be defined as

$$D_{i,t} = \alpha + \beta E_{i,t}^{P} + \varepsilon_{i,t} \tag{4}$$

where $D_{i,t}$ and $E^P_{i,t}$ are current dividends and permanent earnings per share for i^{th} firm in period t respectively. In addition, $\varepsilon_{i,t}$ is a random variable with mean zero and variance σ^2_ε. Since $E^P_{i,t}$ is not directly observable, we assume that current expectations are derived by modifying permanent expectations in light of current experience. That is,

$$E^P_{i,t} = (1-\lambda_i)E_{i,t} + \lambda_i(1+C)E^P{}_{i,t-1}, \qquad 0 \le \lambda_i < 1 \tag{5}$$

where λ_i represents the weight used to calculate the permanent EPS and C represents the trend rate of EPS growth.

According to Darby (1974), the initial value of permanent EPS $E^P{}_{i,0}$ and trend rate C can be derived from estimating the EPS trend regression

$$ln\ E_{i,t} = a_1 + a_2 t + u_t \tag{6}$$

where u_t is the error term.

After a_1 and a_2 are estimated, $E^P{}_{i,0}$ and C can be defined as

$$E^P{}_{i,0} = e^{\hat{a}_1}, \qquad \log(1+C) = \hat{a}_2 \tag{7}$$

To estimate the optimal weights λ_i, we first substitute estimated $E^P{}_{i,0}$ and $C = e^{\hat{a}_2} - 1$ into Equation (5) to compute alternative $E^P{}_{i,t}$ series for λ_i=0, x, 2x, 3x, …, 1 where x is the interval of estimate for λ_i that either minimize sum of squared residuals or maximize adjusted R squared of Equation (4).

3.2 Lee and Primeaux's (1991) method

Fama and Babiak (1968), Kmenta (1986), and Lee et al. (1987) propose the adaptive-expectation model to determine the permanent EPS, $E^P{}_{i,t}$ as

$$E^P_{i,t} - E^P_{i,t-1} = (1-\lambda_i)(E_{i,t-1} - E^P{}_{i,t-1}) \tag{8}$$

Equation (8) can be rewritten as:

$$E_{i,t}^{P} = (1-\lambda_i)E_{i,t} + \lambda_i E^{P}{}_{i,t-1}, \qquad 0 \le \lambda_i < 1 \tag{9}$$

By Koyck transformation, Kmenta (1986) shows that equations (4) and (9) can derive:

$$D_{i,t} = \alpha_0 + \beta_0 E_{i,t} + \gamma D_{i,t-1} \tag{10}$$

where $\alpha_0 = \alpha(1-\lambda_i)$, $\beta_0 = \beta(1-\lambda_i)$, $\gamma = \lambda_i$. If λ_i approaches zero, then $E_{i,t}^{P} = E_{i,t}$. This implies that the permanent EPS is equivalent to the current EPS.

By comparing Equation (10) to Equation (5), it is obvious that Equation (5) is a reduced form of Equation (10) if C is equal to zero.

To empirically estimate the permanent EPS defined in Equation (9), we can run the regression and obtain the estimated λ_i which is equal to estimated γ. Using estimated λ_i, current EPS, and initial permanent EPS described in Darby's method in Section 3.1, we can estimate permanent EPS in period *t*.

3.3 Garrett and Priestley's (2000) Kalman filter method

Following Garrett and Priestley's (2000) method, we define the relationship among current EPS, $E_{i,t}$, permanent EPS, $E^{P}{}_{i,t}$, and transitory EPS, $E^{T}{}_{i,t}$ as follows:

$$E_{i,t} = E_{i,t}^{P} + E^{T}{}_{i,t} \tag{11}$$

To complete the model, we need to specify equation that governs the evolution of the u nobservable permanent EPS:

$$E_{i,t}^{P} = E_{i,t-1}^{P} + \beta_{t-1} + \upsilon_t \tag{12}$$

$$\beta_t = \beta_{t-1} + \eta_t \tag{13}$$

where the permanent EPS, $E^{P}{}_{i,t}$, evolves as a random walk with a changing trend, β_t. To extract a measure of permanent EPS, we treat measurement equation (11) and transition eq uations (12) and (13) as defining an unobserved components model and estimate it via th e Kalman filter.

3.4 Lambrecht and Myer's (2012) method

Using the joint determination of manager's rent and cash dividend payment to equity holders, Lambrecht and Myer (2012) derive a Lintner dividend payment behavior in terms of permanent income as:

$$d_t = a_0 + a_1 d_{t-1} + Y_t + e_t \,, \tag{14}$$

where d_t and d_{t-1} are total dividend payout at time *t* and *t-1* respectively; Y_t is the firm's permanent income at time *t*. Lambrecht and Myer (2012) argue that permanent income Y_t is not observable but theoretically could be estimated from current operating profit and the market's expectation of future profits.

They define permanent income Y_t as the rate of return on the sum of current income and the present value of all future income, net of debt service, but before rents. It is an annuity payment that, given expectations at time *t*, could be sustained forever. If the profit margin π_t follows the autoregressive process $\pi_t = \mu\pi_{t-1} + \eta_t$, then permanent income Y_t can be simplified as[2]:

$$Y_{i,t} = \frac{\rho_i}{1+\rho_i-\mu_i}(K_i^{\phi}\pi_{i,t} - (1+\rho_i-\mu_i)TD_{i,t-1}) \,, \tag{15}$$

where $K_i^{\phi}\pi_{i,t}$ is total operating income without corporate tax for i^{th} firm in period *t*; $TD_{i,t-1}$ is the total debt for i^{th} firm in period *t*-1; ρ_i is interest rate; and μ_i is the autoregression coefficient for operating income of the firm *i*. In the limiting case where π_t follows a random

2 See Appendix A for the detailed definition of permanent income and its related implications.

walk (μ = 1), permanent income approaches $K^{\varphi}\pi_t - \rho TD_{t-1}$, that is, current net income, measured before rents but after interest.

Lambrecht and Myer (2012) have briefly discussed how corporate tax can affect permanent income defined in equation (15), however, they did not develop a closed form solution for permanent income with corporate tax. Therefore, their permanent income defined in equation (15) does not exactly follow the concept of either economics or accounting.

Lambrecht and Myer (2012) claim that the Lintner model as traditionally estimated can be defined as

$$\Delta d_t = b_0 + b_1 TE_t + b_2 d_{t-1} + u_t \,, \tag{16}$$

where $\Delta d_t = d_t - d_{t-1}$; the current reported earnings is $TE_t \equiv p_t + \tau_t - \rho TD_{t-1}$; p_t and τ_t are permanent and transitory components respectively. ρTD_{t-1} is the component neither permanent nor transitory component of earnings. The coefficient b_2 on lagged payouts is interpreted as (the negative of) the speed of adjustment (SOA) and the coefficient b_1 on earnings as the product of the long-term payout ratio and the SOA.

Under their definition of TE_t, ρTD_{t-1} is the most important term in obtaining the true model as defined in equation (54).

According to Lambrecht and Myer (2012), the true model is:

$$\Delta d_t = \kappa + \frac{\rho\beta\alpha SOA}{1-\beta\mu} TE_t - SOA d_{t-1} - \frac{\rho\beta^2\mu\alpha SOA}{1-\beta\mu}\tau_t - \frac{\rho\beta(1-\mu)\alpha SOA}{1-\beta\mu} TD_{t-1} + e_t \tag{17}$$

where κ is the constant term of dividend behavior model, it is generally used to measure the degree of reluctance to cut dividend, α is defined as percentage of earnings paid as cash dividend, β =1/(1+ ρ).

Therefore, the estimates for the coefficients from equation (16) will be biased and inconsistent unless the omitted variables TD_{t-1} and τ_t are orthogonal to the included variables (Greene

(1993), p. 246). The omitted variables are likely to be correlated with the included variables, given the definition of the earnings variable TE_t and because d_{t-1} is linked with TD_{t-1} through the budget constraint. The variance of the estimates and of the error terms are also biased. Thus, the usual confidence interval and hypothesis testing procedures can give misleading conclusions about statistical significance.

In practice, however, the misspecification of the traditional Lintner model in equation (16) may not be all that severe. First, corporate earnings or cash flows are highly persistent for mature, stable companies with low earnings volatility (see Dichev and Tang (2009) and Frankel and Litov (2009)). As $\mu \rightarrow 1$ the term in TD_{t-1} in equation (18) vanishes and the omitted variable problem with respect to TD_{t-1} disappears. Second, the transitory income component τ_t may account for only a small part of the total earnings TE_t of a mature company. Thus, the correlation between τ_t and TE_t may be small too. In other words, current earnings TE_t may be highly correlated with permanent income when transitory income is small. Of course, TE_t becomes a noisy measure of permanent income when transitory income is volatile and important. The traditional Lintner regression equation (16) may therefore give quite different results from the model specified in equation (17).

If μ approaches to 1, then the problem associated with τ_t can be resolved by using Darby's approach to calculate permanent earnings. If μ does not approach to 1, then equation (17) can be modified as

$$\Delta d_t = b_0 + b_1 TE^P{}_t + b_2 d_{t-1} + b_3 \rho TD_{t-1} + u_t \,, \tag{18}$$

where $TE^P{}_t$ is the estimated permanent earnings in terms of equation (5).

Equation (18) is obtained by combining Lambrecht and Myer's (2012) theory and Darby's method of estimating permanent earnings. This specification solves both specification errors and the transitory components of earnings. This new specification is the most important contribution of this research.

Darby's method is relied upon optimal R-square searching for optimal λ_i, while Lee and Primeaux's method relies only regression coefficient estimates. Therefore, Lee and Primeaux's method is empirically easier to estimate permanent EPS. We will use both methods to estimate permanent EPS in the next section. Garrett and Priestley's (2000) Kalman filter method is relatively restrictive in estimating permanent EPS. Therefore, we will use only Darby's method, Lee and Primeaux's method, Lambrecht and Myer's method, and the new method by combining Darby's method and Lambrecht and Myer's method which is defined in equation (18) for empirical investigation in next section.

4. Empirical results in estimating two alternative dividend behavior models

In this section, we use EPS and DPS data of 608 firms from Compustat, which has at least 30 years consecutive data by 2011, to perform these empirical studies. The empirical studies include (1) Darby's method and Lee and Primeaux's method, (2) Lambrecht and Myer's method, and (3) combined model as defined in Equation (18). EPS, DPS, and payout ratio information for 608 firms are presented in Appendix C following the descending order of payout ratios.

In Appendix C, there are 605 firms with positive payout ratios which are smaller than one. The payout ratios of Weyerhaeuser Co and Rexam Plc are 1.0493 and 1.0205, respectively. The payout ratio for Weyerhaeuser Co is larger than one because of paying special dividend \$405 million in 2010. The earnings per shares for Rexam Plc are -0.83, -2.37, -0.85, and -0.29 in 1996, 2002, 2003, and 2009 respectively. However, this company paid dividends per shares 0.2799, 1.3482, 3.8125, and 3.3558 for these four years. This is the main reason that this company obtained an average payout ratio (1.0205) above one. The payout ratio of Dart Group Corp, which is listed in the last firm in appendix C, is -6.5141. The earnings per shares of Dart Group Corp are -10.96, -4.1, -39.57, -7.88, -8.73, -19.81 in 1987, 1993, 1994, 1995, 1996, and 1997, respectively. However, this company uses a constant dividend payout (0.1332) during 1972-1997. Therefore, the average EPS and DPS are -0.02 and 0.1303, respectively and average payout ratio for this company is -6.5141. It is worthwhile to know that this company bankrupts in 1998. The appendix C shows that average EPS, DPS, and payout ratio are 2.4290, 0.9159, and 0.3636, respectively. The standard deviation for EPS, DPS and payout ratio are 1.8977, 0.3768, and 0.0985, respectively. The skewness for EPS, DPS and payout ratio are 3.3799, 1.7729, and -17.2978, respectively. In addition, the kurtosis for EPS, DPS and payout ratio are 20.6265, 4.7306, and 380.6515, respectively. From these statistics of EPS, DPS and payout ratio, we conclude that the statistical distributions of these three variables are not normally distributed. Therefore, using the pooled data to perform regressions might result in problems with testing the significant estimated coefficients of regression. Hence, we believe that using individual firms' data to estimate dividend behavior model can give more information than pooled EPS and DPS data. Therefore, in this section, we use both individual firms' data and pooled data to perform empirical studies.

4.1 Darby's method and Lee and Primeaux's method

4.1.1 Results from 608 individual regressions

In this section, we will use current and permanent EPS measures to estimate following two alternative dividend payment behavior models as:

$$D_{i,t} = c_0 + c_1 E_{i,t} + c_2 D_{i,t-1} + u_{i,t} \tag{19a}$$

$$D_{i,t} = c_0 + c_1 E^P_{i,t} + c_2 D_{i,t-1} + u_{i,t} \quad (19b)$$

$$D_{i,t} = c'_0 + c'_1 E_{i,t} + c'_2 D_{i,t-1} + c_3 D_{i,t-2} + u'_{i,t} \quad (20a)$$

$$D_{i,t} = c'_0 + c'_1 E^P_{i,t} + c'_2 D_{i,t-1} + c_3 D_{i,t-2} + u'_{i,t} \quad (20b)$$

Following Equation (11), the current EPS, $E_{i,t}$, can be decomposed into permanent EPS, $E^P{}_{i,t}$, and transitory EPS, $E^T{}_{i,t}$. If we use Equation (19a) instead of Equation (19b) to estimate c_1, the estimated c_1 will be subject to errors-in-variable problem and the estimated c_1 will be downward biased. Following Lee and Chen (2013), we have analyzed the impact of this kind of errors-in-variable problem in appendix B in details. We now analyze the biased associated with estimated c_1 and c_2 as follows:

Case 1: Under the assumption that $COV(E^P_{i,t}, D_{i,t-1}) = 0$, we can follow equation (B10) in appendix B to obtain the biased associated with estimated c_1 and c_2 as follows:

$$\text{plim } \hat{c}_1 - c_1 = \frac{-c_1\sigma_1^2}{(\sigma^2_{E^P_{i,t}} + \sigma_1^2)} \quad \text{and} \quad \text{plim } \hat{c}_2 - c_2 = \frac{\sigma_1^2(\sigma_{D_{i,t}D_{i,t-1}} - c_2\sigma^2_{D_{i,t-1}})}{\sigma^2_{D_{i,t-1}}(\sigma^2_{E^P_{i,t}} + \sigma_1^2)} = 0 \quad (21a)$$

where σ_1^2 is the variance of $E^T_{i,t}$.

Case 2: Under the assumption that $COV(E^P_{i,t}, D_{i,t-1}) \neq 0$, we can follow equation (B.13) to obtain the biased associated with estimated c_1 and c_2 as follows:

$$\text{plim } \hat{c}_1 - c_1 = \frac{-c_1\sigma_1^2}{\sigma^2_{E^P_{i,t}} - b_{D_{i,t-1}E^P_{i,t}} + \sigma_1^2} \quad \text{and} \quad \text{plim } \hat{c}_2 - c_2 = c_1 b_{D_{i,t-1}E^P_{i,t}}\left(\frac{\sigma_1^2}{\sigma_1^2 + \sigma^2_{E^P_{i,t}}(1 - R^2_{E^P_{i,t}D_{i,t-1}})}\right) \quad (21b)$$

where $b_{D_{i,t-1}E^P_{i,t}}$ is the auxiliary regression coefficient of a regressing $D_{i,t-1}$ on $E^P_{i,t}$, and $R^2_{E^P_{i,t}D_{i,t-1}}$ is the correlation coefficient between $E^P_{i,t}$ and $D_{i,t-1}$.

Equations (21a) and (21b) imply that the estimated c_1 are downward biased. Therefore, the estimated intercept $\hat{c}_0$ as defined in Equation (21c) is upward biased.

$$\hat{c}_0 = \bar{D}_{i,t} - c_1\bar{E}_{i,t} - c_2\bar{D}_{i,t-1} \tag{21c}$$

Therefore, we need to deal with this kind of errors-in-variable problem.

First, we will use Darby's method to estimate permanent EPS as defined in Equations (4), (5), (6) and (7), and use Lee and Primeaux's method to estimate permanent EPS as defined in Equation (10). We then use DPS and both current EPS and permanent EPS to estimate equations (19a), (19b), (20a), and (20b). From the optimal search of λ_i by Darby's method, we estimate λ_i for 608 firms and found that there are 153 estimated λ_i equal to one and 45 estimated λ_i equal to zero. The estimated λ_i for other 410 firms are between 0 and 1. By using Lee and Primeaux's method, we find that there are 580 estimates of λ_i either larger than zero or less than one. The other 28 estimates of λ_i equal to zero.

From the regression results of Equations (19a) and (19b), we calculated the averages of the estimated intercept, the estimated c_1 and the estimated c_2 and their results are presented in columns 1, 2, and 3 of Table 1 (A). Similarly, the averages of the estimated intercept, the estimated c_1, the estimated c_2 and the estimated c_3 in Equations (20a) and (20b), can be found in columns 4, 5 and 6 of Table 1 (A). By comparing the average estimated c_1 of Equations (19a) and (19b) presented in Table 1 (A), we found that the average estimates of c_1 associated with permanent EPS calculated by both Darby's method and Lee and Primeaux's method are significantly higher than those estimates associated with current EPS. Miller and Modigliani (1966) have shown that there exists errors-in-variable problem if the current earnings instead of permanent earnings are used to estimate regression coefficient. Therefore, the regression coefficients associated with current EPS instead of permanent EPS are subject to errors-in-variable problem as presented in Equations (21a) and (21b). In addition, Almeida et al. (2010) have used investment equations to show how measurement error can affect the estimated regression coefficients for investment equations. Following the explanation in Equation (21c), we found that the average intercept from Equation (19a) is significantly larger than that of Equation (19b) by using Darby's method.

From columns 4, 5 and 6 of Table 1(A), we found that there are 9.7%, 10.86%, and 10.36% of estimated c_3 significantly different from zero at 5% significant level. This implies that there exists specification error in original Lintner model for some companies.

Table 1 (A). Individual Regression Results for Equations (19a), (19b), (20a) and (20b)

This table presents the summary of regression results for equations (19a), (19b), (20a) and (20b). For the time-series regression models (19a), (19b), (20a), and (20b), the dependent variable is the dividend per share $D_{i,t}$ for firm *i* at year *t*. Independent variables are the lag of dividend per share ($D_{i,t-1}$ and $D_{i,t-2}$), current earnings per share ($E_{i,t}$), and permanent earnings per share ($E^{P}{}_{i,t}$) for firm *i* at year *t*. The independent variable, permanent earnings per share calculated by Darby's method, is used in Equations (19b) and (20b). The independent variable, permanent earnings per share calculated by Lee and Primeaux's method, is used in Equations (19b)* and (20b)*. Coefficients presented are the cross-sectional averages of estimated coefficients of the time-series regressions. The cross-sectional standard deviations of estimated coefficients of the time-series regressions are in the parenthesis. The medians of estimated coefficients of the time-series regressions are also presented. Percentage numbers show the percentage of significant estimated coefficients of the time-series regressions at 95% significant level. For equations (19a) and (19b), the cross-sectional averages of partial adjustment coefficient and long-term payout are also presented. The cross-sectional averages of the number of observations and R-square for each model are presented at the bottom of table.

Dependent Variable	Eq. (19a) $D_{i,t}$	Eq. (19b) $D_{i,t}$	Eq. (19b)* $D_{i,t}$	Eq. (20a) $D_{i,t}$	Eq. (20b) $D_{i,t}$	Eq. (20b)* $D_{i,t}$
Intercept	0.1350	-0.0045	0.1354	0.1614	-0.0329	0.1158

	(0.3711)	(2.9668)	(0.5354)	(0.4362)	(3.1519)	(0.7489)
Median	0.0794	0.0503	0.1049	0.0975	0.0505	0.0970
	24.84%	36.35%	34.05%	23.68%	31.09%	28.62%
$E_{i,t}$	0.0977			0.0764		
	(0.1365)			(0.1108)		
Median	0.0719			0.0482		
	61.02%			52.96%		
$E^{P}_{i,t}$		0.2568	0.1215		0.2833	0.1286
		(2.2324)	(0.2947)		(2.4786)	(0.3860)
Median		0.1607	0.0829		0.1642	0.0847
		66.78%	48.85%		62.01%	47.53%
$D_{i,t-1}$	0.5764	0.4634	0.5420	0.6238	0.5364	0.5861
	(0.2566)	(0.2607)	(0.2638)	(0.3094)	(0.3090)	(0.3128)
Median	0.6253	0.5057	0.5797	0.6590	0.5659	0.6282
	87.99%	75.33%	82.07%	84.05%	73.85%	76.48%
$D_{i,t-2}$				-0.0027	-0.0879	-0.0377
				(0.3154)	(0.2198)	(0.3199)
Median				-0.0071	-0.0875	-0.0364
				9.70%	10.86%	10.36%
OBS	608	608	608	608	608	608
R^2	0.6580	0.6564	0.6349	0.6634	0.6713	0.6532

Table 1(B). Partial Adjustment Coefficient and Long-Term Payout Ratios

This table presents the summary of partial adjustment coefficient and long-term payout ratios for 608 firms. Each firm's partial adjustment coefficient is equal to one minus are the coefficient of the lag of dividend per share ($D_{i,t-1}$) in equations (19a), (19b), and (19b)*. In equation (19a), the long-term payout ratio of individual firm is equal to the coefficient of current earnings per share ($E_{i,t}$) divided by its partial adjustment coefficient. In equation (19b) and (19b)*, the long-term payout ratios of individual firm is equal to the coefficient of Darby's and Lee and Primeaux's permanent earnings per share ($E^{P}{}_{i,t}$) divided by their partial adjustment coefficient, respectively.

The coefficients presented are the cross-sectional averages of partial adjustment coefficients and long-term payout ratios for 608 firms. The cross-sectional standard deviations are in the parenthesis. The median, minimum, and maximum, skewness, kurtosis values of estimated coefficients are also presented. Trimmed mean is calculated by excluding 1% of sample's extreme value. That is, trimmed mean can be obtained by taking out 6 outliers of estimated coefficients and then calculating the average of the remaining estimated coefficients.

Variable	Eq. (19a)	Eq. (19b)	Eq. (19b)*
Partial adjustment coefficient	0.4236	0.5366	0.4580
	(0.2566)	(0.2607)	(0.2638)
Median	0.3757	0.4943	0.4203
Minimum	0.0015	-0.0004	-0.0977
Maximum	1.2607	1.2965	1.2110
Skewness	0.8207	0.5378	0.5757
Kurtosis	0.2156	-0.3007	-0.3615
Trimmed Mean	0.4218	0.5355	0.4571

Long-term payout	0.3115	-0.3547	0.4041
	(0.9007)	(19.9900)	2.3635
Median	0.2213	0.3243	0.2151
Minimum	-2.3394	-463.0488	-7.6691
Maximum	15.1902	50.2932	53.4270
Skewness	14.6148	-20.6990	19.1006
Kurtosis	238.3788	476.1219	421.5753
Trimmed Mean	0.2660	0.4603	0.3034

Table 1 (B) presents the distribution information of partial adjustment coefficients and long-term payout ratio for 608 firms. We found that these two parameters have a skewed distributed with 6 outliers. To deal with this problem, we calculate median and trimmed average for both average partial adjustment coefficients and long-term payout ratio.

The outliers of long-term payout ratios in equation (19b) are -463.0488, -101.9549, -70.1538, 43.4411, 48.6478, and 50.2931 for companies G & K Services Inc., Automatic Data Processing Inc., Stepan Co., Echlin Inc., Goodrich Corp., And Marathon Oil Corp., respectively.

Table 1(B) also indicates that the trimmed average of long-term payout ratios in terms of current EPS and permanent EPS calculated by Darby's method and Lee and Primeaux's method are 0.2600, 0.4603, and 0.3034, respectively. This implies that current EPS instead of permanent EPS is measured with error and estimated regression coefficient is downward biased. It is worthwhile to know that the average short-term payout ratio is 0.3636, which is presented in appendix C.

The averages of partial adjustment coefficients in terms of current EPS and permanent EPS calculated by Darby's method and Lee and Primeaux's are similar regardless whether regular mean, median, or trimmed mean are used.

Table 2. Alternative EPS and Payout Ratios

This table presents statistical analysis of λ_i and permanent EPS calculated by both Darby's and Lee and Primeaux's methods. The payout ratios calculated by current EPS and two alternatives permanent EPS are also presented in Table 2.

	EPS	Payout	EPS	λ_i	Payout	EPS	λ_i	Payout
	Original Data		Darby's method			Lee and Primeaux's method		
Mean	2.4290	0.3636	2.1867	0.6875	0.4244	2.3834	0.5795	0.3722
Median	2.2001	0.3644	1.9042	0.85	0.3975	2.1908	0.6243	0.3672
Minimum	-0.0200	-6.5141	0.4005	0	0.0140	-0.0337	0	-3.8642
Maximum	14.3671	1.0493	15.4233	1	1.3211	13.3135	0.9985	1.3380
Variance	1.8977	0.0985	1.7753	0.1142	0.0344	1.6071	0.0618	0.0521
Standard Deviation	1.3776	0.3139	1.3324	0.3379	0.1854	1.2677	0.2487	0.2282
Skewness	3.3799	-17.2978	4.1154	-0.8648	1.1500	2.9808	-0.6883	-10.2078
Kurtosis	20.6265	380.6515	29.2884	-0.6692	2.8760	17.1606	-0.1988	196.0971

Table 2 presents alternative statistical information of current and permanent EPS, payout ratio, and estimated λ_i by using either Darby's method or Lee and Primeaux's method. The average EPS from current earnings, permanent earnings by Darby's method, and permanent earnings by Lee and Primeaux's method are 2.4290, 2.1867, and 2.3834, respectively. The average payout ratios from current earnings, permanent earnings by Darby's method, and permanent earnings by Lee and Primeaux's method are 0.3636, 0.4244, and 0.3722, respectively. The average estimated λ_i by using Darby's and Lee and Primeaux's methods are 0.6875 and 0.5795, respectively. This implies that Lee and Primeaux's method for estimating permanent earnings weights more heavily on current earnings than those from Darby's method.

4.1.2 Results from pooled regression

Table 3 presents the results from pooled regression by using both current and permanent EPS calculated by Darby's method and Lee and Primeaux's method. We found that the results from pooled data are similar to the trimmed mean presented in Table 1(B). In other words, the estimated intercepts using two alternative permanent EPS measurement are smaller than that of using current EPS and the estimated c_1 in terms of permanent EPS is larger than that of using current EPS.

Table 3. Pooled Regression Results for Equations (19a), (19b), (20a) and (20b)

This table presents pooled regression results for equations (19a), (19b), (20a) and (20b). For the time-series regression models (19a), (19b), (20a), and (20b), the dependent variable is the dividend per share $D_{i,t}$ for firm *i* at year *t*. Independent variables are the lag of dividend per share ($D_{i,t-1}$ and $D_{i,t-2}$), current earnings per share ($E_{i,t}$), and permanent earnings per share ($E^{P}{}_{i,t}$) for firm *i* at year *t*. This table shows the coefficients and standard errors in the parenthesis. The independent variable, permanent earnings per share calculated by Darby's method, is used in Equations (19b) and (20b). The independent variable, permanent earnings per share calculated by Lee and Primeaux's method, is used in Equations (19b)* and (20b)*. ** denotes significant estimated coefficients at 99% significant level. In equations (19a) and (19b), the partial adjustment coefficient is equal to one minus are the coefficient of the lag of dividend per share ($D_{i,t-1}$). In equation (19a), the long-term payout ratio is equal to the coefficient of current earnings per share ($E_{i,t}$) divided by its partial adjustment coefficient. In equation

(19b), the long-term payout ratio is equal to the coefficient of permanent earnings per share ($E^P{}_{i,t}$) divided by its partial adjustment coefficient. The numbers of observations and R-square for each model are presented at the bottom of table.

Dependent Variable	Eq. (19a) $D_{i,t}$	Eq. (19b) $D_{i,t}$	Eq. (19b)* $D_{i,t}$	Eq. (20a) $D_{i,t}$	Eq. (20b) $D_{i,t}$	Eq. (20b)* $D_{i,t}$
Intercept	0.2188**	0.1304**	0.1305**	0.1380**	0.0619**	0.0688**
	(0.0077)	(0.0082)	(0.0083)	(0.0079)	(0.0084)	(0.0084)
$E_{i,t}$	0.0928**			0.0857**		
	(0.0020)			(0.0020)		
$E^P{}_{i,t}$		0.1699**	0.1516**		0.1671**	0.1422**
		(0.0032)	(0.0029)		(0.0036)	(0.0031)
$D_{i,t-1}$	0.5210**	0.4594**	0.4645**	0.3421**	0.3016**	0.3097**
	(0.0056)	(0.0060)	(0.0060)	(0.0067)	(0.0069)	(0.0069)
$D_{i,t-2}$				0.2903**	0.2457**	0.2529**
				(0.0068)	(0.0069)	(0.0069)
Partial adjustment coefficient	0.4790	0.5406	0.5355			
Long-term	0.1936	0.3143	0.2831			

payout

OBS	24432	24432	24432	23824	23824	23824
R^2	0.4453	0.4613	0.4597	0.4926	0.5017	0.4980

4.2 Lambrecht and Myer's method

Since ρ_i is not available for an individual firm, we use a limiting definition of Lambrecht and Myers' (2012) method (see equation (15)) to estimate permanent income and apply permanent income to test dividend payment behavior models. More specifically, we estimate the following four dividend payment behavior models:

$$d_{i,t} = a_0 + a_1 TE_{i,t} + a_2 d_{i,t-1} + e_{i,t} \tag{22a}$$

$$d_{i,t} = a_0 + a_1 Y_{i,t} + a_2 d_{i,t-1} + e_{i,t} \tag{22b}$$

$$d_{i,t} = a_0 + a_1 TE_{i,t} + a_2 d_{i,t-1} + a_3 d_{i,t-2} + e_{i,t} \tag{23a}$$

$$d_{i,t} = a_0 + a_1 Y_{i,t} + a_2 d_{i,t-1} + a_3 d_{i,t-2} + e_{i,t} \tag{23b}$$

where $d_{i,t}$ is total dividend payout for firm *i* at time *t*, $TE_{i,t}$ is net income for firm *i* at time *t*, and $Y_{i,t}$ is permanent income for firm *i* at time *t* defined as operating income subtracted by previous year interest expenses.

In addition, Lambrecht and Myers (2012) show that the Lintner model may be subject to the model misspecification. As indicated in Equation (17), the change of payout can be determined by the net income, the previous dividend payout, the transitory income and the previous debt outstanding. We therefore test the model misspecification by using Equation (24):

$$\triangle d_{i,t} = a_0 + a_1 TE_{i,t} + a_2 d_{i,t-1} + \rho a_3 TD_{i,t-1} \tag{24}$$

where is the interest expenses for firm *i* at time *t*. Empirical results are presented in Tables 4 as follows:

Table 4. Individual Regression Results for Equations (22a), (22b), (23a), (23b) and (24)

This table presents the summary of regression results for 5 regression models. For the time-series regression models (22a), (22b), (23a), and (23b), the dependent variable is the total dividend payout for firm *i* at year *t*. For the time-series regression model (24), the dependent variable is the change of total dividend payout for firm *i* at year *t*. Dependent variables are the lag of total dividend payouts ($d_{i,t-1}$ and $d_{i,t-2}$), net income ($TE_{i,t}$), permanent income ($Y_{i,t}$), and total interest payment for firm *i* at year *t*. Coefficients presented are the cross-sectional averages of estimated coefficients of the time-series regressions. The cross-sectional standard deviations of estimated coefficients of the time-series regressions are in the parenthesis. Percentage numbers show the percentage of significant estimated coefficients of the time-series regressions at 95% significant level. The cross-sectional averages of the number of observations and R-square for each model are also presented.

	Eq. (22a)	Eq. (22b)	Eq. (23a)	Eq. (23b)	Eq. (24)
Dependent Variable	$d_{i,t}$	$d_{i,t}$	$d_{i,t}$	$d_{i,t}$	$\triangle d_{i,t}$
Intercept	6.9795	5.9235	6.9220	5.4458	5.0467
	(47.6555)	(47.9125)	(54.1949)	(49.3600)	(40.7184)
Median	0.4616	0.1973	0.4125	0.2154	0.3310
	17.43%	14.71%	11.84%	11.57%	15.54%
$TE_{i,t}$	0.0548		0.0518		0.0483
	(0.1147)		(0.1281)		(0.1014)
Median	0.0256		0.0229		0.0248
	62.50%		58.39%		57.19%
$Y_{i,t}$		0.0489		0.0473	
		(0.0743)		(0.0881)	

Median		0.0310		0.0296	
		75.87%		71.40%	
$d_{i,t-1}$	0.8670	0.8201	1.0239	0.9482	-0.1583
	(0.2713)	(0.2801)	(0.5000)	(0.5078)	(0.3586)
Median	0.9314	0.8787	1.0996	1.0050	-0.0976
	94.90%	94.05%	91.94%	91.07%	39.83%
$d_{i,t-2}$			-0.1598	-0.1253	
			(0.4672)	(0.5891)	
Median			-0.1902	-0.1674	
			42.93%	32.73%	
$\rho_i TD_{i,t-1}$					0.0020
					(0.7949)
Median					0.0104
					25.45%
OBS	608	605	608	605	605
R^2	0.8764	0.8807	0.8837	0.8876	0.4040

Table 4 presents the summary of regression results for models (22a), (22b), (23a), (23b), and (24). Table 4 shows that the estimated regression coefficients associated with current income and permanent income are 62.50% and 75.87% significantly different from zero at 5% significant level, respectively. This table also shows that the average R-square of Eq. (22b) is higher than that of Eq. (22a). Similarly, the average R-square of Eq. (23b) is higher than that of Eq. (23a). Such results suggest that permanent earnings introduced by Lambrecht and Myers (2012) do improve the power of dividend behavior models. In addition, we find there are

25.45% of firms whose dividend payouts can be determined by their interest expenses. It indicates that there exists a specification error in Lintner's model in terms of current earnings.

The empirical results of Table 4 are based upon the measurement of the permanent income, $Y_{i,t}$, equals $K^{\varphi}\pi_t - \rho TD_{t-1}$. In this measurement, we assume that π_t follows a random walk (μ = 1). However, empirically we find that π_t does not follow random walk and μ is not equal to one. Therefore, our empirical work can only treat as a qualitative instead of quantitative results. Hence, it is not meaningful to quantitatively calculate the average partial adjustment coefficient and the average long-term payout ratio as we done in section 4.1.

4.3 Combined model

4.3.1 Results from 605 individual regressions

In this section, we will modify Equation (18) in terms of EPS and DPS as follows:

$$D_{i,t} = b_0 + b_1 E_{i,t} + b_2 D_{i,t-1} + b_3 I_{i,t-1} + u_{i,t} \tag{25a}$$

$$D_{i,t} = b_0 + b_1 E^P_{i,t} + b_2 D_{i,t-1} + b_3 I_{i,t-1} + u_{i,t} \tag{25b}$$

where $D_{i,t}$ and $D_{i,t-1}$ are dividend per share for firm i at time t and t-1, respectively; $E_{i,t}$ and $E^P{}_{i,t}$ are current and permanent EPS for firm i at time t ; $I_{i,t-1}$ is the interest expense per share firm i at time t-1. Please note that equations (25a) and (25b) are similar to equations (19a) and (19b). In other words, we add interest expense per share variable to Equations (19a) and (19b) to obtain equations (25a) and (25b). Since there are three firms, Rexam Plc., Telus Corp., and Warwick Valley Telephone Co., which do not have interest expense data, the total sample used in equation (25a) and (25b) contains 605 individual firms.

We also estimate combined model as present in equations (25a) and (25b) in Table 5. The empirical results of equation (25a) show that there are 52.23% estimated b_1, 85.29% estimated b_2, and 22.64% estimated b_3 significantly different from zero at 5% significant level, respectively. From empirical results of equation (25b) by using Darby's method, we found that there are 61.82% estimated b_1, 69.09% estimated b_2, and 21.16% estimated b_3 significantly different from zero at 5% significant level, respectively. From empirical results of equation (25b) by using Lee and Primeaux's method, we found that there are 49.09% estimated b_1, 75.70% estimated b_2, and 22.15% estimated b_3 significantly different from zero at 5% significant level, respectively. In addition, we found that the estimated b_1 from permanent EPS by using both Darby's and Lee and Primeaux's methods are larger than that of current EPS and the estimated intercepts using two alternative permanent EPS measurement are smaller than that of using current EPS. Finally, we found that about 22% firms with significant estimated b_3 for both equations (25a) and (25b).

Table 5. Individual Regression Results for Equations (25a) and (25b)

This table presents the summary of regression results for equations (25a) and (25b). For the time-series regression models (25a) and (25b), the dependent variable is the dividend per share $D_{i,t}$ for firm *i* at year *t*. Independent variables are the lag of dividend per share ($D_{i,t-1}$), current earnings per share ($E_{i,t}$), permanent earnings per share ($E^{P}{}_{i,t}$) and the lag of interest expense per share ($I_{i,t-1}$) for firm *i* at year *t*. The independent variables, permanent earnings per shares calculated by Darby's and Lee and Primeaux's methods, are used in Equations (25b) and (25b)*, respectively. Coefficients presented are the cross-sectional averages of estimated coefficients of the time-series regressions. The medians of estimated coefficients of the time-series regressions are also presented. The cross-sectional standard deviations of estimated coefficients of the time-series regressions are in the parenthesis. Percentage numbers show the percentage of significant estimated coefficients of the time-series regressions at 95% significant level. The cross-sectional averages of the number of observations and R-square for each model are presented at the bottom of table.

Dependent Variable	Eq. (25a) $D_{i,t}$	Eq. (25b) $D_{i,t}$	Eq. (25b)* $D_{i,t}$
Intercept	0.2024	0.0016	0.1561
	(0.3683)	(2.9797)	(0.5490)
Median	0.1231	0.0577	0.1198
	34.05%	32.89%	32.73%
$E_{i,t}$	0.0771		
	(0.1114)		
Median	0.0483		
	52.23%		
$E^{P}_{i,t}$		0.2699	0.1257
		(2.2572)	(0.2782)
Median		0.1692	0.0884
		61.82%	49.09%
$D_{i,t-1}$	0.5868	0.4467	0.5148
	(0.2936)	(0.2943)	(0.2915)
Median	0.6240	0.4723	0.5540
	85.29%	69.09%	75.70%
$I_{i,t-1}$	-0.0256	0.0102	0.0008
	(1.3754)	(1.1712)	(1.2813)
Median	-0.0215	-0.0189	-0.0197

	22.64%	21.16%	22.15%
OBS	605	605	605
R^2	0.6709	0.6789	0.6617

The empirical results presented in Table 5 can be used to test whether the companies' annual EPS is following the random walk or not. In addition, these results might also be used to test whether Lambrecht and Myers's budget constraint is held for individual firm or not. Equation (17) derived by Lambrecht and Myers (2012) is based upon the important budget constraint. Following their paper, we explicitly define the budget constraint as follows:

$$d_t + r_t = \pi_t(K) - \rho TD_{t-1} + (TD_t - TD_{t-1}) \tag{26}$$

where d_t is total dividend payout at time t, TD_t and TD_{t-1} is the total debt in period t and t-1, respectively; ρ is interest rate; r_t is managerial rents at time t; $\pi_t(K)$ is gross profit at time t.

If debt is kept constant ($\Delta TD = TD_t - TD_{t-1} = 0$), the equilibrium payout and managerial rent policies simply split net income, $\alpha(\pi_t(K) - \rho TD_{t-1})$ to payout and $(1-\alpha)(\pi_t(K) - \rho TD_{t-1})$ to managerial rents. With these policies, payouts and managerial rents follow net income, always in the ratio $\alpha/(1-\alpha)$. Because all future income will also be split in this ratio, outside equity, $S_t = \alpha(V_t(K) - (1+\rho)TD_{t-1})$, and the present value of managerial rents, $R_t = (1-\alpha)(V_t(K) - (1+\rho)TD_{t-1})$. Managers would of course like to reduce payouts and take more rents, but cannot do so without violating the capital market constraint. Managers pay out no more than necessary, so the capital market constraint pins down payouts, rents, and values exactly.

If the budget constraint does not hold, then the term associated with interest expense will not necessarily exist. Even if the budget constraint holds and the annual EPS follows a random walk, then the interest expense per share item will be dropped out. Our empirical test shows that almost all annual EPS for 605 firms do not follow a random walk. Therefore, the empirical results presented in Table 5 imply that there are only 22.64%, 21.16%, or 22.15% firms where budget constraints hold under the Lambrecht and Myers theoretical model.

Budget constraint presented in Equation (26) implies that only changes of debt are used to adjust the need of new funds. In other words, there exists no external equity issued for the need of investment expansion for a firm. Higgins (1977, 1981, 2008) have used similar budget constraint to calculate its sustainable growth rate. However, his budget constraint imposes the optimal debt asset ratio. Chen et al. (2013) and Lee et al. (2011) have expanded Higgins' budget constraint by allowing new equity issued as alternative source of funds. Therefore, it may be more realistic to generalize the equation (26) in terms of either Higgins' or Chen et al. (2013) budget constraints which have more explicitly taken the growth rate variable into the constraints.

4.3.2 Results from pooled regression

Using pooled data, we estimate both equations (25a) and (25b) and the empirical results are presented in Table 6. Table 6 shows us that the estimated b_0 and b_1 and b_2 are similar to those estimated without interest expense per share term which can be found in Table 3. However, it is worthwhile to know that the estimated coefficient associated with interest expense per share term is not significantly different from zero at a 5% significant level when the permanent EPS is used. This might imply that the permanent EPS not only can remove random fluctuation of EPS but can also remove parts of misspecification error which is shown by Lambrecht and Myers.

Table 6. Pooled Regression Results for Equations (25a) and (25b)

This table presents pooled regression results for equations (25a) and (25b). For the time-series regression models (25a) and (25b), the dependent variable is the dividend per share $D_{i,t}$ for firm *i* at year *t*. Independent variables are the lag of dividend per share ($D_{i,t-1}$), current earnings per share ($E_{i,t}$), permanent earnings per share ($E^{P}{}_{i,t}$) and the lag of interest expense per share ($I_{i,t-1}$) for firm *i* at year *t*. The independent variables, permanent earnings per shares calculated by Darby's and Lee and Primeaux's methods, are used in Equations (25b) and (25b)*, respectively. This table shows the coefficients and standard errors in the parenthesis. ** denotes significant estimated coefficients at 99% significant level. The numbers of observations and R-square for each model are presented at the bottom of table.

Dependent Variable	Eq. (25a) $D_{i,t}$	Eq. (25b) $D_{i,t}$	Eq. (25b)* $D_{i,t}$
Intercept	0.2009**	0.1363**	0.1329**
	(0.0082)	(0.0085)	(0.0084)
$E_{i,t}$	0.0920**		
	(0.0020)		
$E^{P}{}_{i,t}$		0.1713**	0.1526**
		(0.0033)	(0.0030)
$D_{i,t-1}$	0.5083**	0.4484**	0.4586**
	(0.0059)	(0.0001)	(0.0061)
$I_{i,t-1}$	0.0316**	-2.6E-06	-1.6E-06
	(0.0033)	(3.7E-06)	(3.6E-06)

OBS	24299	24299	24299
R^2	0.4431	0.4445	0.4564

5. Summary and concluding remarks

Based upon the theories and methods developed by Marsh and Merton (1987), Lee and Primeaux (1991), Garrett and Priestley (2000), and Lambrecht and Myers (2012), in this paper, we performed both theoretically analyses and empirical studies. We investigated how firms generally allocate permanent earnings and transitory earnings between dividend payments and retained earnings. Building on Friedman's permanent-income hypothesis, we first showed how current earnings can be decomposed into permanent and transitory components in terms of methods suggested by Darby (1972 and 1974). We then used both Darby's and Lee and Primeaux's methods to decompose current EPS into permanent and transitory components and performed empirical investigations. We found that the average long-term payout ratio is downward biased and the average estimated intercept is upward biased when current instead of permanent EPS are used. In addition, we used Lambrecht and Myers' permanent earnings measurement to estimate dividend behavior model. We found that their permanent earnings measurement performs better than the current earnings measurement. However, the permanent earnings measurements from Lambrecht and Myers' method are difficult to be empirically measured in terms of accounting data. Finally, we also empirically investigated the misspecification issue presented by Lambrecht and Myers and found that interest expense per share might be useful for estimating dividend behavior model for some firms.

Based upon the partial-adjusted model and the adaptive-expectation model, and the integration of these models, we theoretically developed and empirically investigated both current- and permanent-dividend payout behavioral models. We analyzed these two dividend behavior models by data of individual firms and pooled data. Empirical results show that it is better to use permanent EPS, instead of current EPS to estimate dividend behavioral models. If we use current EPS instead of permanent EPS, the estimated intercept will be upward biased and the long-term payout ratio will be underestimated.

In future research, we will first revise the permanent earnings measurement developed by Lambrecht and Myers to make it more plausible for using accounting data to conduct empirical studies for examining dividend behavior. Secondly, we will extend Marsh and Merton's (1987) and Garrett and Priestley's (2000) theories and models from aggregate dividend behavior models to individual dividend behavior models to test either the signaling theory hypothesis or the free cash flow hypothesis for individual firms.

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Appendix A. Detailed definition of permanent Income

In Equation (11) of Lambrecht and Myers (2012), they define permanent income as:

$$Y_t = \rho\beta\sum_{j=0}^{\infty}\beta^j\sum_{j=0}^{\infty}\beta^j E_t\left[K^{\phi}\pi_{t+j}\left(\eta_{t+j}\right)\right]\rho D_{t-1}\,. \tag{A1}$$

where ρ and β are interest rate and discount factor, respectively; $E_t[.]$ is the expectation operator; $K^{\phi}\pi_{t+j}$ is total net income without corporate tax in period *t+j*.

π_t is gross profit at time *t* that follows the AR(1) process $\pi_t = \mu\pi_{t-1} + \eta_t$ with $\mu \in [0,1]$. The shocks η_{t+j} (j=0, 1, …) are independently and identically normally distributed with zero mean and volatility σ_η.

Permanent income Y_t defined in equation (A1) is the rate of return on the sum of current income and the present value of all future income, net of debt service, but before rents. It is an annuity payment that, given expectations at time *t*, could be sustained forever. By using AR(1) process discussed in previous paragraph, Lambrecht and Myers claim that equation (15) can be derived from equation (A1).

This permanent income measurement defined in equation (A1) does not take into account a corporate tax. In addition, administration and sales expense were not explicitly considered. Since the budget constraint used to derive this permanent income measurement does not allow new equity, therefore, this kind of permanent income measurement has some limitations. In sum, the permanent income measure defined in either equation (15) or equation (A1) is not exactly followed the permanent income concept developed by Friedman (1957), Darby (1972, 1974), and Wang (2003).

Appendix B. Impacts of measurement errors on estimated regression coefficients

By using Lee and Chen (2013) notations and specification equations, suppose we have a trivariate structural relationship

$$W_i = \alpha + \beta U_i + \gamma V_i \tag{B1}$$

W_i, U_i, and V_i are unobserved, but we can observe $Z_i = W_i + \tau_i$, $X_i = U_i + \varepsilon_i$, and $Y_i = V_i + \eta_i$. U_i and V_i have a joint normal distribution with variances σ_U^2 and σ_V^2 and correlation coefficient ρ_{UV}. In the observed variables X, Y, and Z, the observed errors ε, η, and τ are independent normal variables with zero means and variance σ_1^2, σ_2^2, σ_3^2. X, Y, and Z have a multivariate normal distribution with parameters as follows:

(a) $m_1 = E(X)$

(b) $m_2 = E(Y)$

(c) $m_3 = \alpha + \beta m_1 + \gamma m_2$

(d) $m_{XX} = Var(X) = \sigma_U^2 + \sigma_1^2$

(e) $m_{YY} = Var(Y) = \sigma_V^2 + \sigma_2^2$ (B2)

(d) $m_{ZZ} = Var(Z) = \beta^2\sigma_U^2 + \gamma^2\sigma_V^2 + 2\beta\gamma\rho_{UV}\sigma_U\sigma_V + \sigma_3^2$

(f) $m_{XY} = \rho_{UV}\sigma_U\sigma_V$

(g) $m_{XZ} = \beta\sigma_U^2 + \gamma\rho_{UV}\sigma_U\sigma_V$

(h) $m_{YZ} = \beta\rho_{UV}\sigma_U\sigma_V + \gamma\sigma_V^2$.

The joint sufficient statistics of m_1, m_2, m_3, m_{XX}, m_{YY}, m_{ZZ}, m_{XY}, m_{XZ}, and m_{YZ} can be defined as

(a) $\bar{X} = \dfrac{\sum_{i=1}^{n} X_i}{n}$

(b) $\bar{Y} = \dfrac{\sum_{i=1}^{n} Y_i}{n}$

(c) $\bar{Z} = \dfrac{\sum_{i=1}^{n} Z_i}{n}$

(d) $S_{XX} = \dfrac{\sum_{i=1}^{n} \left(X_i - \bar{X} \right)^2}{n}$ (B3)

(e) $S_{YY} = \dfrac{\sum_{i=1}^{n} \left(Y_i - \bar{Y} \right)^2}{n}$

(f) $S_{ZZ} = \dfrac{\sum_{i=1}^{n} \left(Z_i - \bar{Z} \right)^2}{n}$

(g) $S_{XY} = \dfrac{\sum_{i=1}^{n} \left(X_i - \bar{X} \right)\left(Y_i - \bar{Y} \right)}{n}$

(h) $S_{XZ} = \dfrac{\sum_{i=1}^{n} \left(X_i - \bar{X} \right)\left(Z_i - \bar{Z} \right)}{n}$

(i) $S_{YZ} = \dfrac{\sum_{i=1}^{n} \left(Y_i - \bar{Y} \right)\left(Z_i - \bar{Z} \right)}{n}$.

From equations (B2) and (B3), we know that $\bar{X}$, $\bar{Y}$, $\bar{Z}$, S_{XX}, S_{YY}, S_{ZZ}, S_{XY}, S_{XZ}, and S_{YZ} are joint sufficient statistics of m_1, m_2, m_3, m_{XX}, m_{YY}, m_{ZZ}, m_{XY}, m_{XZ}, and m_{YZ}. If the former nine variables are jointly independent a set of maximum likelihood equations can be formulated as follows.

(a) $S_{XX} = \sigma_U^2 + \sigma_1^2$

(b) $S_{YY} = \sigma_V^2 + \sigma_2^2$

(c) $S_{ZZ} = \hat{\beta}^2 \sigma_U^2 + \hat{\gamma}^2 \sigma_V^2 + 2\hat{\beta}\hat{\gamma}\sigma_{UV} + \sigma_3^2$ (B4)

(d) $S_{XY} = \sigma_{UV}$

(e) $S_{XZ} = \hat{\beta}\sigma_U^2 + \hat{\gamma}\sigma_{UV}$

$(f)\ S_{YZ} = \hat{\beta}\sigma_{UV} + \hat{\gamma}\sigma_V^2$

Equations (B1), (B2), (B3), and (B4) will be used in determining effects of measurement errors on regression coefficients.

From Eq. (B4), the effects of measurement errors on the estimates of β and γ can be seen from the following:

$$\text{plim}\ \hat{\beta} = \frac{(\sigma_V^2 + \sigma_2^2)\sigma_{WV} - (\sigma_{WV}\sigma_{UV})}{(\sigma_U^2 + \sigma_1^2)(\sigma_V^2 + \sigma_2^2) - (\sigma_{WV})^2} \tag{B5}$$

$$\text{plim}\ \hat{\gamma} = \frac{(\sigma_V^2 + \sigma_1^2)\sigma_{WV} - (\sigma_{WV}\sigma_{UV})}{(\sigma_U^2 + \sigma_1^2)(\sigma_V^2 + \sigma_2^2) - (\sigma_{UV})^2} \tag{B6}$$

From both (B5) and (B6), the asymptotic biases of $\hat{\beta}$ and $\hat{\gamma}$ can be defined as:

$$\text{plim}\ \hat{\beta} - \beta = \frac{\sigma_{VW}\sigma_2^2 - \beta(\sigma_U^2\sigma_2^2 + \sigma_V^2\sigma_1^2 + \sigma_1^2\sigma_2^2)}{(\sigma_U^2\sigma_V^2 - \sigma_{VW}^2) + \sigma_U^2\sigma_2^2 + \sigma_V^2\sigma_1^2 + \sigma_1^2\sigma_2^2} \tag{B7}$$

$$\text{plim}\ \hat{\gamma} - \gamma = \frac{\sigma_{WV}\sigma_1^2 - \gamma(\sigma_U^2\sigma_2^2 + \sigma_V^2\sigma_1^2 + \sigma_1^2\sigma_2^2)}{(\sigma_U^2\sigma_V^2 - \sigma_{UV}^2) + \sigma_U^2\sigma_2^2 + \sigma_V^2\sigma_1^2 + \sigma_1^2\sigma_2^2} \tag{B8}$$

The direction of the biases of $\hat{\beta}$ and $\hat{\gamma}$ can be treated according to the following:

- Under the assumption that $Cov(UV) = 0$

(i) If $\sigma_1^2 = 0, \quad \sigma_2^2 > 0$,

(a) $\text{plim}\ \hat{\beta} - \beta = \dfrac{\sigma_2^2(\sigma_{WU} - \beta\sigma_U^2)}{\sigma_U^2(\sigma_V^2 + \sigma_2^2)} = 0$,

(b) $\text{plim}\ \hat{\gamma} - \gamma = \dfrac{-\gamma\sigma_U^2\sigma_2^2}{\sigma_U^2(\sigma_V^2 + \sigma_2^2)} = \dfrac{-\gamma\sigma_2^2}{(\sigma_V^2 + \sigma_2^2)}$. (B9)

Eq. (B9a) implies that $\hat{\beta}$ is an asymptotic unbiased estimator of β, while Eq. (B9b) implies that $\hat{\gamma}$ is downward biased estimator of γ.

(ii) If $\sigma_1^2 > 0, \quad \sigma_2^2 = 0$,

(a) $\text{plim}\ \hat{\beta} - \beta = \dfrac{-\beta\sigma_1^2}{(\sigma_U^2 + \sigma_1^2)}$,

(b) $\text{plim}\ \hat{\gamma} - \gamma = \dfrac{\sigma_1^2(\sigma_{WV} - \gamma\sigma_V^2)}{\sigma_V^2(\sigma_U^2 + \sigma_1^2)} = 0$. (B10)

In accordance with Eq. (B9), Eq. (B10) can be used to draw some meaningful conclusions about the biases of both $\hat{\beta}$ and $\hat{\gamma}$.

(iii) Finally, if $\sigma_1^2 > 0, \quad \sigma_2^2 > 0$,

(a) $\text{plim}\ \hat{\beta} - \beta = -\dfrac{\beta\sigma_1^2}{\sigma_U^2 + \sigma_1^2}$,

(b) $\text{plim}\ \hat{\gamma} - \gamma = -\dfrac{\gamma\sigma_2^2}{\sigma_V^2 + \sigma_2^2}$. (B11)

In this case, both $\hat{\beta}$ and $\hat{\gamma}$ are downward biased estimators of β and γ.

- Suppose that $Cov(UV) \neq 0$

(i) If $\sigma_1^2 = 0, \quad \sigma_2^2 > 0$,

(a) $\text{plim}\ \hat{\beta} - \beta = \gamma b_{VU}\left(\dfrac{\sigma_2^2}{\sigma_2^2 + \sigma_V^2(1 - R_{UV}^2)}\right)$,

(b) $\text{plim}\ \hat{\gamma} - \gamma = \dfrac{-\gamma\sigma_2^2}{\sigma_V^2 - b_{VU} + \sigma_2^2}$, (B12)

where b_{VU} is the auxiliary regression coefficient of a regressing V on U, and R_{UV}^2 is the correlation coefficient between U and V.

(B12a) implies that the direction of the bias of $\hat{\beta}$ depends upon the sign of both γ and b_{VU}; (B12b) implies that γ is a downward biased estimator of γ unless ($\sigma_V^2 - b_{VU} + \sigma_2^2$) is smaller than zero.

(ii) If $\sigma_1^2 > 0, \quad \sigma_2^2 = 0$,

(a) $\text{plim}\ \hat{\beta} - \beta = \dfrac{-\beta\sigma_1^2}{\sigma_U^2 - b_{UV} + \sigma_1^2}$,

(b) $$\text{plim}\ \hat{\gamma}-\gamma=\beta b_{UV}\left(\frac{\sigma_1^2}{\sigma_1^2+\sigma_U^2(1-R_{UV}^2)}\right), \qquad \text{(B13)}$$

where b_{UV} = the auxiliary regression coefficient of regressing U on V.

(iii) If $\sigma_1^2>0,\quad \sigma_2^2>0$,

(a) $$\text{plim}\ \hat{\beta}-\beta=\frac{\gamma b_{VU}-\dfrac{\beta}{\sigma_U^2}(\sigma_V^2\sigma_1^2+\sigma_1^2\sigma_2^2)}{\sigma_V^2-b_{UV}+\sigma_2^2+\dfrac{(\sigma_V^2\sigma_1^2+\sigma_1^2\sigma_2^2)}{\sigma_U^2}},$$

(b) $$\text{plim}\ \hat{\gamma}-\gamma=\frac{\beta b_{UV}-\dfrac{\gamma}{\sigma_V^2}(\sigma_U^2\sigma_2^2+\sigma_1^2\sigma_2^2)}{\sigma_U^2-b_{UV}+\sigma_1^2+\dfrac{\sigma_V^2\sigma_1^2+\sigma_1^2\sigma_2^2}{\sigma_V^2}}. \qquad \text{(B14)}$$

From (B14), we can see that the direction of the biases of both $\hat{\beta}$ and $\hat{\gamma}$ are ambiguous.

Appendix C. EPS, DPS, and payout ratio for 608 firms

Company	EPS	DPS	Payout ratio
WEYERHAEUSER CO	1.8281	1.9182	1.0493
REXAM PLC	0.7033	0.7177	1.0205
GENERAL MOTORS CO	3.2904	3.0041	0.9130
PENNZENERGY CO	2.1978	1.9520	0.8882
ENBRIDGE INC	2.6175	2.2439	0.8573
IMPERIAL CHEMICAL INDUSTRIES PLC	2.0892	1.7763	0.8502
NEWMONT MINING CORP	2.0498	1.5844	0.7730
POTLATCH CORP NEW	2.4045	1.8104	0.7529
THOMSON REUTERS CORP	0.8430	0.6328	0.7507
G T E CORP	2.8789	2.1105	0.7331
TASTY BAKING CO	0.7909	0.5737	0.7254
SOUTHERN NEW ENGLAND TELECOM	3.7937	2.6804	0.7065
WD 40 CO	1.8813	1.3226	0.7030
CHICAGO RIVET & MACH CO	1.8433	1.2807	0.6948
SPRINT NEXTEL CORP	1.6162	1.1128	0.6885
A T & T CORP	3.3605	2.2991	0.6842
TEXACO INC	3.9164	2.6687	0.6814
GRACE W R & CO DEL NEW	2.6294	1.7827	0.6780
SERVIDYNE INC	0.2868	0.1931	0.6732
SNYDERS LANCE INC	1.3684	0.9138	0.6678
EASTMAN KODAK CO	2.9343	1.9552	0.6663
B P PLC	3.2504	2.1088	0.6488
AVON PRODUCTS INC	2.3906	1.5341	0.6417
ALBERTO CULVER CO NEW	1.4772	0.9351	0.6330
SKYLINE CORP	0.9220	0.5832	0.6325
CHEMED CORP NEW	1.8529	1.1710	0.6320
TAMBRANDS INC	3.3763	2.1217	0.6284
LOUISIANA LAND &	1.7116	1.0755	0.6284

EXPLORATION CO			
TRUE NORTH COMMUNICATIONS INC	1.9754	1.2317	0.6235
THOMAS & BETTS CORP	2.3713	1.4757	0.6223
FRONTIER CORP	2.3231	1.4367	0.6184
MAYTAG CORP	2.0576	1.2677	0.6161
U S T INC	2.5000	1.5349	0.6139
WARNER LAMBERT CO	2.4624	1.4859	0.6035
JOSLYN CORP	2.1130	1.2741	0.6030
LAWTER INTERNATIONAL INC	0.7859	0.4714	0.5998
P M F G INC	0.8877	0.5314	0.5986
DUN & BRADSTREET CORP DEL NEW	2.7844	1.6614	0.5967
FLEMING COMPANIES INC	1.3131	0.7779	0.5924
WYETH	3.0332	1.7929	0.5911
RIO ALGOM MINES LTD	1.7808	1.0483	0.5887
ALLTEL CORP	2.2489	1.3191	0.5866
FINA INC	4.4227	2.5854	0.5846
BRISTOL MYERS SQUIBB CO	2.7614	1.6115	0.5836
QUAKER STATE CORP	1.2058	0.7024	0.5825
INCO LTD	1.9033	1.1069	0.5815
GENERAL DYNAMICS CORP	4.7283	2.7483	0.5812
FEDERAL MOGUL CORP	1.8853	1.0931	0.5798
WINN DIXIE STORES INC	2.4259	1.4047	0.5790
GLAXOSMITHKLINE PLC	1.4618	0.8453	0.5783
DOW JONES & CO INC	1.6414	0.9473	0.5772
MOORE WALLACE INC	1.8051	1.0398	0.5760
CURTISS WRIGHT CORP	2.7887	1.6032	0.5749
G A T X CORP	2.6064	1.4951	0.5736
MONEYGRAM INTERNATIONAL INC	1.7273	0.9819	0.5685

ATLANTIC RICHFIELD CO	5.7600	3.2516	0.5645
COCA COLA BOTTLING CO CONS	1.5403	0.8626	0.5601
COURTAULDS PLC	0.3780	0.2104	0.5566
GOODRICH CORP	2.4206	1.3324	0.5504
B C E INC	3.4605	1.8965	0.5480
RAYONIER INC NEW	2.5671	1.4014	0.5459
OLIN CORP	2.2860	1.2451	0.5447
C C H INC	1.6973	0.9234	0.5441
LILLY ELI & CO	3.0884	1.6768	0.5429
NATIONAL PRESTO INDS INC	4.0609	2.2036	0.5426
AMERICAN CYANAMID CO	2.8244	1.5315	0.5423
STURM RUGER & CO INC	2.2617	1.2239	0.5412
N L INDUSTRIES INC	1.6049	0.8682	0.5410
NALCO CHEMICAL CO	1.9924	1.0713	0.5377
TIME WARNER INC	1.9360	1.0365	0.5354
NORTH PITTSBURGH SYSTEMS INC	2.3774	1.2637	0.5316
XEROX CORP	3.6154	1.9065	0.5273
WACKENHUT CORP	1.0106	0.5316	0.5260
KELLOGG CO	2.3492	1.2353	0.5259
3M CO	4.2612	2.2393	0.5255
OUTBOARD MARINE CORP	1.5629	0.8209	0.5253
BEAM INC	4.1410	2.1662	0.5231
INTERNATIONAL PAPER CO	2.8700	1.5012	0.5231
INTERNATIONAL FLAVORS & FRAG INC	2.1183	1.0955	0.5171
GUARDSMAN PRODUCTS INC	0.8579	0.4429	0.5162
NOVA CHEMICALS CORP	0.8083	0.4170	0.5159
ALIANT COMMUNICATIONS INC	2.6455	1.3632	0.5153

BASSETT FURNITURE INDUSTRIES INC	1.9407	0.9992	0.5149
OFFICEMAX INC NEW	1.9137	0.9820	0.5132
ARMSTRONG HOLDINGS INC	2.2338	1.1409	0.5108
COCA COLA CO	2.8166	1.4373	0.5103
MCGRAW HILL COS INC	2.5002	1.2744	0.5097
MOBIL CORP	5.6085	2.8482	0.5078
DU PONT E I DE NEMOURS & CO	5.4174	2.7450	0.5067
MUELLER PAUL CO	3.1856	1.6141	0.5067
STANDARD REGISTER CO	1.8577	0.9410	0.5066
UNION CAMP CORP	3.5191	1.7794	0.5056
GOLDEN ENTERPRISES INC	0.6270	0.3167	0.5050
BETZDEARBORN INC	1.9506	0.9830	0.5039
FREEPORT MCMORAN INC	2.1176	1.0661	0.5035
GILLETTE CO	2.4198	1.2132	0.5014
BLOCK H & R INC	1.9894	0.9955	0.5004
OCCIDENTAL PETROLEUM CORP	2.9730	1.4862	0.4999
BESTFOODS	3.7511	1.8732	0.4994
CLOROX CO	2.3353	1.1620	0.4976
RHONE POULENC RORER INC	1.8354	0.9126	0.4972
HERCULES INC	2.7869	1.3825	0.4961
LUFKIN INDUSTRIES INC	6.3734	3.1593	0.4957
KONINKLIJKE PHILIPS ELEC N V	1.8128	0.8982	0.4955
WITCO CORP	2.6251	1.2967	0.4939
TIMKEN COMPANY	2.7931	1.3749	0.4922
GENUINE PARTS CO	2.2388	1.1019	0.4922
TELUS CORP	2.7542	1.3542	0.4917
LINCOLN ELECTRIC	9.3203	4.5808	0.4915
HOLDINGS INC			
GENERAL MILLS INC	2.9958	1.4666	0.4895
DELUXE CORP	2.3064	1.1266	0.4885
MERCK & CO INC NEW	3.4755	1.6972	0.4883
COVANTA ENERGY CORP	2.5877	1.2605	0.4871
GERBER PRODUCTS CO	2.5927	1.2617	0.4866
MCDERMOTT INTERNATIONAL INC	2.2614	1.1000	0.4864
GANNETT INC	2.1633	1.0512	0.4859
REYNOLDS METALS CO	2.6443	1.2836	0.4854
PHARMACIA CORP	4.5510	2.2065	0.4848
LONE STAR INDUSTRIES INC	2.6590	1.2869	0.4840
WELLCO ENTERPRISES INC	1.0457	0.5054	0.4833
SUREWEST COMMUNICATIONS	1.4568	0.7031	0.4826
COLGATE PALMOLIVE CO	2.5366	1.2230	0.4821
SAMES CORP	1.9100	0.9202	0.4818
DOW CHEMICAL CO	3.7966	1.8224	0.4800
CINCINNATI BELL INC NEW	3.1581	1.5121	0.4788
ESPEY MANUFACTURING & ELCTRS COR	1.4621	0.6992	0.4782
HICKORY TECH CORP	3.0095	1.4376	0.4777
BOWL AMERICA INC	0.9282	0.4432	0.4775
PHELPS DODGE CORP	5.4278	2.5872	0.4767
AMOCO CORP	5.3452	2.5470	0.4765
PFIZER INC	2.3843	1.1320	0.4748
DONNELLEY R R & SONS CO	1.8441	0.8741	0.4740
UNILEVER PLC	3.5507	1.6827	0.4739
EMERSON ELECTRIC CO	3.0286	1.4219	0.4695
T R W INC	3.7608	1.7632	0.4688

BRIGGS & STRATTON CORP	2.7541	1.2888	0.4680
NATIONAL SERVICE INDUSTRIES INC	2.0316	0.9502	0.4677
CHESAPEAKE CORP VA	2.1479	1.0016	0.4663
PHARMACIA & UPJOHN INC	2.9657	1.3780	0.4646
PROCTER & GAMBLE CO	4.0902	1.9005	0.4646
CARPENTER TECHNOLOGY CORP	3.2515	1.5100	0.4644
KERR MCGEE CORP	2.8410	1.3182	0.4640
BROWN SHOE CO INC NEW	2.3751	1.1011	0.4636
AEROQUIP VICKERS INC	2.7791	1.2840	0.4620
KROGER COMPANY	2.6903	1.2428	0.4620
KNAPE & VOGT MANUFACTURING CO	1.7766	0.8199	0.4615
INGERSOLL RAND PLC	3.2769	1.5103	0.4609
UNILEVER N V	6.8549	3.1517	0.4598
HUBBELL INC	2.8068	1.2875	0.4587
VULCAN INTERNATIONAL CORP	1.2687	0.5798	0.4570
AVERY DENNISON CORP	1.7728	0.8099	0.4568
SALIENT 3 COMMUNICATIONS INC	2.2555	1.0303	0.4568
CAMPBELL SOUP CO	2.5189	1.1500	0.4565
DOMINION TEXTILE LTD	1.2726	0.5800	0.4558
WRIGLEY WILLIAM JR CO	4.4873	2.0438	0.4555
LONGVIEW FIBRE CO	5.9690	2.7092	0.4539
EXXON MOBIL CORP	5.7540	2.6115	0.4538
FRIEDMAN INDUSTRIES INC	0.8190	0.3716	0.4537
HERSHEY CO	2.4530	1.1114	0.4531
BLAIR CORP	2.2326	1.0111	0.4529
PITNEY BOWES INC	2.4168	1.0941	0.4527

INTERNATIONAL MULTIFOODS CORP	2.4650	1.1144	0.4521
WOODHEAD INDUSTRIES INC	0.9318	0.4210	0.4518
ALTRIA GROUP INC	4.7865	2.1537	0.4499
HOMESTAKE MINING CO	1.2123	0.5452	0.4497
HEINZ H J CO	2.9502	1.3259	0.4494
KIMBERLY CLARK CORP	4.4500	1.9977	0.4489
SUNDSTRAND CORP	2.7809	1.2443	0.4474
ABITIBI CONSOLIDATED INC	1.2510	0.5595	0.4472
PENNEY J C CO INC	3.2683	1.4613	0.4471
MCKESSON H B O C INC	2.3373	1.0448	0.4470
SEARS ROEBUCK & CO	3.1981	1.4277	0.4464
CHEVRON CORP NEW	5.5898	2.4954	0.4464
GEORGIA PACIFIC CORP	2.3538	1.0504	0.4462
FOOT LOCKER INC	2.5685	1.1441	0.4454
MEADWESTVACO CORP	2.3265	1.0362	0.4454
HANNA M A CO DE	2.1487	0.9561	0.4450
SUNOCO INC	3.4877	1.5499	0.4444
ENESCO GROUP INC	2.6219	1.1643	0.4441
GENERAL ELECTRIC CO	3.5628	1.5821	0.4441
GORMAN RUPP CO	1.7089	0.7587	0.4440
HONEYWELL INTERNATIONAL INC	3.0808	1.3611	0.4418
ROYAL DUTCH PETROLEUM CO	8.4524	3.7332	0.4417
GARAN INC	2.3678	1.0455	0.4416
SPRINGS INDUSTRIES INC	2.5746	1.1354	0.4410
R P M INTERNATIONAL INC	1.0638	0.4689	0.4408
MILACRON INC	1.7380	0.7651	0.4402
A M P INC	2.1559	0.9462	0.4389
CHEMTURA CORP	1.3735	0.6023	0.4385
PRATT & LAMBERT	1.8613	0.8160	0.4384

UNITED INC			
LUKENS INC DE	2.1091	0.9220	0.4371
P P G INDUSTRIES INC	3.9091	1.7072	0.4367
POPE & TALBOT INC	1.5326	0.6664	0.4348
MARCUS CORP	1.1427	0.4955	0.4336
ARKANSAS BEST CORP DEL	0.9140	0.3953	0.4325
MALLINCKRODT INC NEW	3.2615	1.4060	0.4311
SUPERVALU INC	1.4922	0.6431	0.4310
C B S CORP	2.5566	1.1002	0.4303
S P X CORP	2.8147	1.2090	0.4295
CONSOLIDATED PAPERS INC	3.7724	1.6197	0.4293
VULCAN MATERIALS CO	3.7418	1.6059	0.4292
FEDERAL SIGNAL CORP	1.3832	0.5935	0.4291
GOODYEAR TIRE & RUBBER CO	2.7623	1.1849	0.4290
CHURCHILL DOWNS INC	3.5490	1.5186	0.4279
ANGELICA CORP	1.2422	0.5310	0.4275
ECHLIN INC	1.3366	0.5700	0.4265
SENSIENT TECHNOLOGIES CORP	1.9745	0.8390	0.4249
HARSCO CORP	2.6972	1.1416	0.4233
INTERNATIONAL BUSINESS MACHS COR	7.9610	3.3628	0.4224
TIMES MIRROR CO NEW	2.3384	0.9864	0.4218
DEXTER CORP	1.7712	0.7459	0.4211
ERICSSON L M TELEPHONE CO	2.1149	0.8889	0.4203
STANLEY BLACK & DECKER INC	2.4594	1.0311	0.4192
BRUNSWICK CORP	1.1472	0.4807	0.4190
BARNES GROUP INC	2.2872	0.9577	0.4187
KEWAUNEE SCIENTIFIC	0.9451	0.3932	0.4160

CORP			
SCHERING PLOUGH CORP	2.5168	1.0448	0.4151
NORFOLK SOUTHERN CORP	4.8251	2.0003	0.4146
INTERNATIONAL ALUMINUM CORP	1.8497	0.7665	0.4144
SNAP ON INC	2.2218	0.9198	0.4140
BLESSINGS CORP	1.4512	0.6007	0.4139
BROWN FORMAN CORP	2.8786	1.1911	0.4138
DANA HOLDING CORP	2.8242	1.1661	0.4129
TWIN DISC INC	1.8986	0.7830	0.4124
ALCAN INC	2.1169	0.8687	0.4104
NEWELL RUBBERMAID INC	1.5415	0.6325	0.4103
I T T CORP	3.1258	1.2796	0.4094
GENCORP INC	2.2339	0.9082	0.4065
KUBOTA CORP	1.6162	0.6562	0.4060
PENN VIRGINIA CORP	3.0980	1.2516	0.4040
GOULDS PUMPS INC	2.0306	0.8196	0.4036
MARSH SUPERMARKETS INC	1.0505	0.4227	0.4024
LOUISIANA PACIFIC CORP	1.5763	0.6336	0.4020
CONAGRA INC	1.8431	0.7399	0.4015
HANDLEMAN CO	1.4835	0.5935	0.4000
CUMMINS INC	3.2872	1.3130	0.3994
ABBOTT LABORATORIES	2.5606	1.0181	0.3976
CATERPILLAR INC	3.3917	1.3479	0.3974
SMUCKER J M CO	2.3951	0.9516	0.3973
CALIBER SYSTEM INC	2.2680	0.8990	0.3964
GENESIS WORLDWIDE INC	1.7586	0.6953	0.3954
SAVANNAH FOODS & INDUSTRIES INC	2.9056	1.1462	0.3945
UNITED STATES SHOE CORP	2.1310	0.8402	0.3943

TENNANT CO	2.0393	0.7993	0.3920
POLAROID CORP	1.7000	0.6653	0.3914
HILTON HOTELS CORP	2.3536	0.9201	0.3909
GRUMMAN CORP	2.3890	0.9337	0.3908
CASTLE A M & CO	1.8077	0.7057	0.3904
MACYS INC	3.2067	1.2512	0.3902
NASH FINCH COMPANY	2.1303	0.8297	0.3895
EASTERN CO	1.8702	0.7284	0.3895
WEIS MARKETS INC	2.2283	0.8675	0.3893
FLOWERS FOODS INC	1.3039	0.5072	0.3890
MAY DEPARTMENT STORES CO	3.3091	1.2868	0.3889
QUAKER OATS CO	3.1665	1.2296	0.3883
FOSTER WHEELER AG	1.6951	0.6582	0.3883
BAXTER INTERNATIONAL INC	1.5902	0.6169	0.3880
FERRO CORP	2.0320	0.7877	0.3876
UNIVERSAL CORPORATION	3.4365	1.3259	0.3858
DIEBOLD INC	2.2038	0.8493	0.3854
PEPSIAMERICAS INC NEW	2.2533	0.8665	0.3846
TEXTRON INC	3.1694	1.2187	0.3845
SCOTT PAPER CO	2.2688	0.8715	0.3841
CONOCOPHILLIPS	3.7772	1.4493	0.3837
ROLLINS INC	0.9864	0.3784	0.3837
ARVIN INDUSTRIES INC	1.9923	0.7634	0.3832
PEPSICO INC	2.6327	1.0072	0.3826
ENCANA CORP	2.4120	0.9214	0.3820
HANDY & HARMAN	1.4874	0.5677	0.3817
ROCKWELL AUTOMATION INC	3.1443	1.1982	0.3811
MARION MERRELL DOW INC	1.2747	0.4855	0.3809
LINDBERG CORP	0.9938	0.3784	0.3808

ROANOKE ELECTRIC STEEL CORP	1.9797	0.7538	0.3808
BAUSCH & LOMB INC	2.3069	0.8772	0.3803
TECUMSEH PRODUCTS CO	7.2580	2.7551	0.3796
VELCRO INDUSTRIES N V	2.2407	0.8488	0.3788
AMCAST INDUSTRIAL CORP	2.2197	0.8343	0.3759
OXFORD INDUSTRIES INC	1.6317	0.6133	0.3759
BADGER METER INC	1.5669	0.5876	0.3750
SEARS HOLDINGS CORP	2.3200	0.8695	0.3748
STRIDE RITE CORP	1.5433	0.5782	0.3746
UNITED TECHNOLOGIES CORP	4.2492	1.5892	0.3740
KYSOR INDUSTRIAL CORP DE	1.5783	0.5901	0.3739
UNITED STATES STEEL CORP NEW	3.4600	1.2910	0.3731
COOPER INDUSTRIES PLC	3.4150	1.2730	0.3728
STONE & WEBSTER INC	3.6697	1.3670	0.3725
BEMIS CO INC	2.4298	0.9046	0.3723
DI GIORGIO CORP	1.2227	0.4535	0.3709
WHIRLPOOL CORP	3.6573	1.3554	0.3706
JOHNSON & JOHNSON	3.3391	1.2370	0.3705
UNION PACIFIC CORP	3.9976	1.4787	0.3699
EMCO LTD	1.2640	0.4675	0.3699
BRENCO INC	1.0719	0.3956	0.3691
QUAKER CHEMICAL CORP	1.8208	0.6697	0.3678
ENNIS INC	1.5412	0.5663	0.3675
PENN ENGINEERING & MFG CORP	2.1746	0.7990	0.3674
FLEETWOOD ENTERPRISES INC	1.2860	0.4721	0.3671
MEAD CORP	2.8226	1.0360	0.3670
C S X CORP	3.5279	1.2926	0.3664

STARRETT L S CO	2.2072	0.8069	0.3656
HASTINGS MANUFACTURING CO	1.4691	0.5357	0.3646
OMNICOM GROUP INC	2.3829	0.8688	0.3646
ALCOA INC	3.5798	1.3048	0.3645
MASCO CORP	1.4129	0.5149	0.3644
FLEXSTEEL INDUSTRIES INC	1.2336	0.4495	0.3644
SONOCO PRODUCTS CO	2.4434	0.8889	0.3638
FORD MOTOR CO DEL	5.6620	2.0592	0.3637
WORTHINGTON INDUSTRIES INC	1.3064	0.4740	0.3628
WILEY JOHN & SONS INC	1.9973	0.7246	0.3628
ASARCO INC	2.7587	0.9979	0.3617
MARTIN MARIETTA CORP NEW	3.8269	1.3837	0.3616
DEERE & CO	3.6271	1.3105	0.3613
LUBRIZOL CORP	3.0186	1.0894	0.3609
MAPCO INC	2.8163	1.0152	0.3605
MODINE MANUFACTURING CO	2.7263	0.9811	0.3598
NORTHROP GRUMMAN CORP	3.8260	1.3731	0.3589
SCHAWK INC	0.6577	0.2357	0.3584
ECOLAB INC	1.6463	0.5892	0.3579
A B M INDUSTRIES INC	1.5860	0.5656	0.3566
V F CORP	3.5081	1.2470	0.3555
HONEYWELL INC	5.0125	1.7800	0.3551
LEE ENTERPRISES INC	1.8075	0.6400	0.3541
WETTERAU INC	1.7930	0.6341	0.3537
MANITOWOC CO INC	1.9133	0.6750	0.3528
HARLAND JOHN H CO	1.6208	0.5717	0.3527
CLARCOR INC	2.1400	0.7530	0.3519
SIEBERT FINANCIAL CORP	0.9191	0.3231	0.3515

HITACHI LIMITED	2.1526	0.7530	0.3498
MARATHON OIL CORP	3.5127	1.2278	0.3495
FEDERAL SCREW WKS	2.7365	0.9561	0.3494
AMPCO PITTSBURGH CORP	1.1924	0.4160	0.3489
MACMILLAN BLOEDEL LTD	1.3955	0.4860	0.3482
LANCASTER COLONY CORP	2.1375	0.7426	0.3474
AMERICAN BUSINESS PRODS INC GA	1.5313	0.5312	0.3469
UNITED INDUSTRIAL CORP	1.4455	0.5011	0.3467
ASHLAND INC NEW	3.7363	1.2946	0.3465
FEDERAL PAPER BOARD INC	2.7756	0.9592	0.3456
SUPERIOR UNIFORM GROUP INC	1.3300	0.4591	0.3452
RAVEN INDUSTRIES INC	1.3751	0.4742	0.3449
HALLIBURTON COMPANY	2.6857	0.9262	0.3449
PACCAR INC	5.3748	1.8527	0.3447
LIMITED BRANDS INC	1.5413	0.5312	0.3446
LONGS DRUG STORES INC	2.1048	0.7247	0.3443
ONEIDA LTD	1.6130	0.5549	0.3440
C B I INDUSTRIES INC	3.3988	1.1682	0.3437
WILLAMETTE INDUSTRIES INC	3.0783	1.0554	0.3428
BAKER HUGHES INC	1.5472	0.5289	0.3418
KENNAMETAL INC	2.4287	0.8282	0.3410
C V S CAREMARK CORP	2.5880	0.8823	0.3409
STANDEX INTERNATIONAL CORP	1.8985	0.6456	0.3401
ANHEUSER BUSCH COS INC	2.8284	0.9566	0.3382
KELLY SERVICES INC	2.0805	0.7023	0.3375

BLACK & DECKER CORP	1.9409	0.6545	0.3372
CORNING INC	3.8714	1.3049	0.3370
AMERON INTERNATIONAL CORP DEL	3.5293	1.1890	0.3369
BUTLER MANUFACTURING CO DE	2.6450	0.8885	0.3359
IKON OFFICE SOLUTIONS INC	1.9153	0.6428	0.3356
CARLYLE INDUSTRIES INC	1.2187	0.4089	0.3355
ELECTRONIC DATA SYS CORP NEW	1.6503	0.5528	0.3350
N C H CORP	2.8249	0.9461	0.3349
HILL ROM HOLDINGS INC	2.1951	0.7350	0.3348
CHAMPION INTERNATIONAL CORP	2.2051	0.7380	0.3347
DRESSER INDUSTRIES INC	2.5825	0.8618	0.3337
APPLERA CORP	1.3165	0.4392	0.3336
PITT DES MOINES INC	2.9909	0.9971	0.3334
MURPHY OIL CORP	2.8769	0.9568	0.3326
KELLWOOD COMPANY	2.0543	0.6820	0.3320
REYNOLDS & REYNOLDS CO	1.8778	0.6233	0.3319
CONSTAR INTERNATIONAL INC NEW	1.8253	0.6057	0.3318
C T S CORP	1.4677	0.4870	0.3318
CAROLINA FREIGHT CORP	1.2747	0.4220	0.3311
PULSE ELECTRONICS CORP	1.2926	0.4270	0.3304
ALICO INC	1.2578	0.4151	0.3300
CLIFFS NATURAL RESOURCES INC	4.4192	1.4543	0.3291
RESEARCH INC	0.9123	0.2995	0.3282
ROHM & HAAS CO	4.1020	1.3450	0.3279
MCCORMICK & CO INC	1.9843	0.6500	0.3276

GLATFELTER P H CO	2.6174	0.8553	0.3268
UNOCAL CORP	3.3820	1.1040	0.3264
TEXAS INSTRUMENTS INC	2.6226	0.8530	0.3252
GREY GLOBAL GROUP INC	7.7818	2.5256	0.3246
Y R C WORLDWIDE INC	2.0988	0.6803	0.3241
PERKINELMER INC	1.2435	0.4029	0.3240
JOHNSON CONTROLS INC	3.4451	1.1154	0.3238
LEGGETT & PLATT INC	1.6663	0.5387	0.3233
INTERPUBLIC GROUP COS INC	2.6687	0.8618	0.3229
SCHLUMBERGER LTD	2.9066	0.9365	0.3222
HARRIS CORP	2.5954	0.8335	0.3211
BRIDGFORD FOODS CORP	0.6023	0.1932	0.3208
ALBERTSONS INC	1.9968	0.6394	0.3202
AMETEK INC NEW	1.8592	0.5944	0.3197
CRANE CO	2.9520	0.9433	0.3195
UNIVAR CORP	1.5540	0.4960	0.3192
AMERICAN MAIZE PRODS CO	1.5556	0.4961	0.3189
SHERWIN WILLIAMS CO	3.1211	0.9937	0.3184
CALMAT CO	2.6650	0.8483	0.3183
LOCKHEED MARTIN CORP	4.6655	1.4770	0.3166
CORE INDUSTRIES INC	1.3761	0.4347	0.3159
KNIGHT RIDDER INC	2.8792	0.9081	0.3154
CON WAY INC	2.3073	0.7259	0.3146
KOLLMORGEN CORP	0.9335	0.2931	0.3140
DEAN FOODS CO	2.3313	0.7314	0.3137
MATTEL INC	1.1671	0.3661	0.3137
AMERICAN GREETINGS CORP	1.6226	0.5089	0.3136
RUBBERMAID INC	1.7181	0.5367	0.3124
O SULLIVAN CORP	1.3439	0.4192	0.3119
CORDANT TECHNOLOGIES INC	2.7068	0.8409	0.3107

PARKER HANNIFIN CORP	2.9837	0.9268	0.3106
RAYTHEON CO	3.9104	1.2146	0.3106
PREMIER INDUSTRIAL CORP	1.6544	0.5130	0.3101
VALSPAR CORP	1.4568	0.4507	0.3094
STANDARD MOTOR PRODUCTS INC	1.2109	0.3741	0.3089
GREAT NORTHERN NEKOOSA CORP	4.6923	1.4476	0.3085
REGAL BELOIT CORP	1.6186	0.4987	0.3081
PALL CORP	1.4568	0.4470	0.3068
SMITH A O CORP	2.3277	0.7135	0.3065
METHODE ELECTRONICS INC	0.6966	0.2131	0.3060
DOLE FOOD INC NEW	1.6069	0.4915	0.3058
CARLISLE COMPANIES	2.8640	0.8713	0.3042
PULASKI FURNITURE CORP	1.6240	0.4919	0.3029
BALL CORP	2.5113	0.7600	0.3026
LEARONAL INC	1.4447	0.4353	0.3013
LAWSON PRODUCTS INC	1.4305	0.4300	0.3006
STANDARD PRODUCTS CO	2.7506	0.8263	0.3004
GRACO INC	1.9968	0.5972	0.2990
BOEING CO	3.6459	1.0902	0.2990
RALSTON PURINA CO	2.6094	0.7800	0.2989
BALDOR ELECTRIC CO	1.3851	0.4116	0.2972
VILLAGE SUPER MARKET INC	2.1813	0.6478	0.2970
RYDER SYSTEMS INC	2.3212	0.6892	0.2969
HUNT CORP	1.1890	0.3529	0.2968
APPLIED INDUSTRIAL TECHS INC	2.1677	0.6409	0.2957
H N I CORP	1.7347	0.5127	0.2956
KAMAN CORP	1.7440	0.5146	0.2950

OHIO ART CO	1.0906	0.3203	0.2937
MAGNA INTERNATIONAL INC	3.0680	0.9010	0.2937
TELEFLEX INC	2.1546	0.6306	0.2927
DOMTAR INC	1.7595	0.5144	0.2923
CHURCH & DWIGHT INC	1.9126	0.5555	0.2905
CABOT CORP	2.8130	0.8157	0.2900
QUANEX CORP	2.5367	0.7353	0.2899
WEST PHARMACEUTICAL SERVICES INC	1.5165	0.4382	0.2890
TRINITY INDUSTRIES INC	1.8938	0.5465	0.2886
GIANT FOOD INC	2.5452	0.7341	0.2884
WALGREEN CO	2.1827	0.6288	0.2881
ALLIANCE ONE INTERNATIONAL INC	2.7500	0.7850	0.2855
HARCOURT GENERAL INC	1.9674	0.5608	0.2850
AIR PRODUCTS & CHEMICALS INC	3.1108	0.8866	0.2850
CARTER WALLACE INC	1.5206	0.4321	0.2842
HAVERTY FURNITURE COS INC	1.3445	0.3821	0.2842
GOODHEART WILLCOX INC	2.4671	0.7000	0.2837
TEKTRONIX INC	2.0470	0.5795	0.2831
RITE AID CORP	1.6887	0.4780	0.2831
FLOWSERVE CORP	2.3354	0.6606	0.2829
NACCO INDUSTRIES INC	3.4328	0.9701	0.2826
WOODWARD INC	12.0189	3.3700	0.2804
FLUOR CORP NEW	2.1162	0.5919	0.2797
NEW YORK TIMES CO	2.1436	0.5994	0.2796
GRAINGER W W INC	3.2007	0.8926	0.2789
NORDSON CORP	2.1639	0.6004	0.2774
OWENS & MINOR INC NEW	1.3859	0.3818	0.2755
BANDAG INC	3.4447	0.9488	0.2754

BECTON DICKINSON & CO	2.7480	0.7552	0.2748
KIMBALL INTERNATIONAL INC	2.1268	0.5843	0.2747
MEDIA GENERAL INC	2.3121	0.6339	0.2742
IMPERIAL OIL LTD	2.7651	0.7553	0.2731
AUTOMATIC DATA PROCESSING INC	1.9911	0.5410	0.2717
DOVER CORP	2.9127	0.7904	0.2714
MET PRO CORP	0.8377	0.2272	0.2712
STEPAN CO	2.4189	0.6549	0.2707
MACDERMID INC	1.6949	0.4577	0.2701
ILLINOIS TOOL WORKS INC	2.8676	0.7737	0.2698
BOB EVANS FARMS INC	1.4688	0.3957	0.2694
SEAGRAM LTD	3.4437	0.9260	0.2689
WALLACE COMPUTER SERVICES INC	2.1295	0.5664	0.2660
MOLSON COORS BREWING CO	2.1654	0.5747	0.2654
HORMEL FOODS CORP	2.5758	0.6833	0.2653
TARGET CORP	3.1654	0.8367	0.2643
TRANS LUX CORP	0.5265	0.1389	0.2638
MEREDITH CORP	2.7666	0.7298	0.2638
APOGEE ENTERPRISES INC	0.7708	0.2016	0.2615
CASCADE CORP	2.6393	0.6896	0.2613
DELTA AIR LINES INC	2.6118	0.6803	0.2605
CANADIAN PACIFIC RAILWAY LTD	2.8130	0.7300	0.2595
SEAWAY FOOD TOWN INC	1.7928	0.4615	0.2574
LA Z BOY INC	2.3243	0.5957	0.2563
JOY GLOBAL INC	2.5851	0.6594	0.2551
BANTA CORP	2.0394	0.5201	0.2550
COHU INC	0.8212	0.2086	0.2540
RUSSELL CORP	1.4947	0.3779	0.2528

COURIER CORP	1.7486	0.4417	0.2526
TIDEWATER INC	2.5485	0.6428	0.2522
TEXAS INDUSTRIES INC	2.1431	0.5397	0.2518
TECK RESOURCES LTD	1.1536	0.2898	0.2512
BAIRNCO CORP	1.3779	0.3453	0.2506
JORGENSEN EARLE M CO DE NEW	3.4458	0.8578	0.2489
WEYCO GROUP INC	3.2289	0.8034	0.2488
COOPER TIRE & RUBBER CO	1.8396	0.4577	0.2488
T D K CORP	2.2116	0.5501	0.2487
SONY CORP	1.0057	0.2501	0.2487
WASHINGTON POST CO	14.3671	3.5656	0.2482
BECKMAN COULTER INC	1.6713	0.4116	0.2463
CUBIC CORP	1.6085	0.3925	0.2440
BARD C R INC	2.0320	0.4951	0.2437
FULLER H B CO	1.8451	0.4494	0.2435
WENDYS INTERNATIONAL INC	1.0976	0.2668	0.2431
MITSUI & CO LTD	6.8629	1.6680	0.2430
GREIF INC	2.6358	0.6405	0.2430
SUPERIOR INDUSTRIES INTL INC	1.3535	0.3277	0.2421
AVNET INC	2.2024	0.5324	0.2417
FAMILY DOLLAR STORES INC	1.3566	0.3265	0.2407
COMMERCIAL INTERTECH CORP	2.5239	0.6064	0.2402
WACOAL HOLDINGS CORP	1.5532	0.3724	0.2397
FRANKLIN ELECTRIC INC	2.1174	0.5037	0.2379
SIFCO INDUSTRIES INC	1.0563	0.2509	0.2375
SCHULMAN A INC	1.8767	0.4433	0.2362
ROBBINS & MYERS INC	2.1030	0.4961	0.2359
MILLIPORE CORP	1.3730	0.3228	0.2351

FRISCHS RESTAURANTS INC	1.3584	0.3190	0.2348
MCDONNELL DOUGLAS CORP	5.1794	1.2126	0.2341
AMERICAN STORES CO NEW	2.8476	0.6655	0.2337
NEWMARKET CORP	3.8581	0.8886	0.2303
EDO CORP	1.0527	0.2422	0.2301
TYCO INTERNATIONAL LTD SWTZLND	1.9844	0.4560	0.2298
PEP BOYS MANNY MOE & JACK	1.8804	0.4318	0.2296
CANON INC	2.2080	0.5069	0.2296
MAKITA CORP	1.4286	0.3250	0.2275
WAUSAU PAPER CORP	1.5340	0.3482	0.2270
FARMER BROTHERS CO	5.2408	1.1865	0.2264
SYSCO CORP	1.7452	0.3946	0.2261
SERVICE CORP INTERNATIONAL	1.4043	0.3155	0.2247
DONALDSON INC	2.0112	0.4515	0.2245
BOWNE & CO INC	1.1956	0.2674	0.2236
MOTOROLA SOLUTIONS INC	2.8209	0.6304	0.2235
MINE SAFETY APPLIANCES CO	3.9163	0.8739	0.2231
T J X COMPANIES INC NEW	2.0726	0.4603	0.2221
RUBY TUESDAY INC	1.5098	0.3349	0.2219
DOUGLAS & LOMASON CO	1.8438	0.4080	0.2213
KYOCERA CORP	3.0711	0.6650	0.2165
MERCANTILE STORES INC	4.8994	1.0570	0.2157
MYERS INDUSTRIES INC	1.0405	0.2229	0.2143
KANSAS CITY SOUTHERN	3.3614	0.7169	0.2133
HUFFY CORP	1.9209	0.4070	0.2119
NOLAND COMPANY	1.9859	0.4116	0.2072

ROWE COS	1.2036	0.2489	0.2068
MILLER HERMAN INC	1.6546	0.3390	0.2049
ACETO CORP	1.2322	0.2517	0.2042
WOLVERINE WORLD WIDE INC	1.2032	0.2443	0.2031
TOOTSIE ROLL INDS INC	1.5992	0.3233	0.2022
TORO COMPANY	2.4127	0.4877	0.2021
C A E INC	0.7205	0.1455	0.2019
PLACER DOME INC	1.0794	0.2159	0.2000
NEXEN INC	1.6830	0.3360	0.1997
TRANZONIC COMPANIES	1.2284	0.2429	0.1977
AGILYSYS INC	0.7226	0.1422	0.1969
NORDSTROM INC	2.0356	0.3993	0.1961
MOSINEE PAPER CORP	1.9169	0.3745	0.1954
PANASONIC CORP	2.7438	0.5327	0.1941
MEDTRONIC INC	2.9024	0.5516	0.1900
NOVO NORDISK A S	2.9530	0.5584	0.1891
DANIEL INDUSTRIES INC	1.0190	0.1925	0.1889
COMMERCIAL METALS CO	2.3413	0.4418	0.1887
GAP INC	1.6536	0.3119	0.1886
RYLAND GROUP INC	2.1292	0.3997	0.1877
P V H CORP	1.5833	0.2953	0.1865
M T S SYSTEMS CORP	1.6641	0.3063	0.1841
SEQUA CORP	2.7823	0.5117	0.1839
ALLEN ORGAN CO	2.3957	0.4385	0.1831
HESS CORP	3.6960	0.6748	0.1826
KEITHLEY INSTRUMENTS INC	0.8238	0.1493	0.1812
G & K SERVICES INC	1.1816	0.2138	0.1809
WAL MART STORES INC	1.9279	0.3458	0.1794
VALMONT INDUSTRIES INC	2.2791	0.4063	0.1783
DOLLAR GENERAL CORP NEW	1.1139	0.1960	0.1760

SIGMA ALDRICH CORP	2.4511	0.4278	0.1746
LOWES COMPANIES INC	1.6152	0.2816	0.1744
WARWICK VALLEY TELEPHONE CO	3.7775	0.6405	0.1696
GREAT LAKES CHEM CORP	2.3097	0.3890	0.1684
ARCHER DANIELS MIDLAND CO	1.9606	0.3260	0.1663
IPSCO INC	2.7394	0.4339	0.1584
APACHE CORP	2.3063	0.3594	0.1558
HELMERICH & PAYNE INC	2.0855	0.3249	0.1558
DISNEY WALT CO	2.6260	0.4073	0.1551
PIONEER CORP JAPAN	1.1861	0.1703	0.1435
HEWLETT PACKARD CO	2.6385	0.3753	0.1422
NOBLE ENERGY INC	1.6858	0.2297	0.1363
HONDA MOTOR LTD	2.9264	0.3884	0.1327
CRACKER BARREL OLD COUNTRY STORE	1.4434	0.1746	0.1210
V S E CORP	1.6139	0.1906	0.1181
STANDARD COMMERCIAL CORP	2.9253	0.3358	0.1148
SHENANDOAH TELECOM COMPANY	3.4106	0.3850	0.1129
FUJIFILM HOLDINGS CORP	2.0113	0.2241	0.1114
SEA CONTAINERS LTD	4.6123	0.4984	0.1081

TYSON FOODS INC	1.3272	0.1416	0.1067
VIRCO MFG CORP	0.7891	0.0740	0.0938
CENTEX CORP	2.1800	0.2016	0.0925
BRINKS CO	2.1083	0.1934	0.0917
DILLARDS INC	2.6262	0.2214	0.0843
HEICO CORP NEW	1.0943	0.0919	0.0839
CIRCUIT CITY STORES INC	1.2505	0.1037	0.0829
INTERNATIONAL SPEEDWAY CORP	2.0574	0.1649	0.0801
UNIFIRST CORP	1.8493	0.1405	0.0760
COMINCO LTD	1.9819	0.1492	0.0753
SOUTHWEST AIRLINES CO	1.5074	0.0945	0.0627
PRECISION CASTPARTS CORP	2.8621	0.1393	0.0487
C T COMMUNICATIONS INC	13.1824	0.2511	0.0190
JOURNAL COMMUNICATIONS INC	3.0321	0.0424	0.0140
DART GROUP CORP	-0.0200	0.1303	-6.5141
mean	2.4290	0.9159	0.3636
variance	1.8977	0.3768	0.0985
standard deviation	1.3776	0.6139	0.3139
kurtosis	20.6265	4.7306	380.6515
Skewness	3.3799	1.7729	-17.2978