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*Editorial Board*

CHRISTOS J. NEGAKIS

# Accounting Based Valuation: A Synthesis and an Analysis

## Abstract

The present paper draws upon the residual income valuation model (RIM) and analyses the conditions under which it can be useful on practical grounds. The paper begins by setting the assumptions required to derive an algebraic formulation of the model. It then goes on to review several empirical tests that have brought about some practical pitfalls of the model. This analysis leads to the conclusion that given the accounting principle of conservatism, the RIM and, in general, the accounting-based valuation models still have a long way to go before becoming operational tools to the hands of financial analysis.

## 1. Introduction

This paper reviews the attempts to model the relationship between shareholder value and financial statement data. Many of these models express the share price as a function of book values, earnings and the cost of capital based on the Clean Surplus Relation (CSR). One such model is broadly referred to as the Residual Income valuation model (RIM), which under certain conditions, is equivalent to the Dividend Discount Valuation Model (DDM) coupled with the CSR. Their difference is that RIM makes use of accounting data rather than dividends. Moreover, as the DDM, the RIM makes no unrealistic, constraining assumptions and book values, earnings and return on equity can all vary by any amount within the model. In other words, there is always a definable, straightforward relationship between the share price and both book value and earnings. In fact, this kind of valuation models is the only one that holds true for any method of accounting. This gives the model special importance.

It might appear that the above valuation model is too good to be true. Nevertheless, it really is as good as it appears and its obvious attractions have generated a great deal of interest in recent times. James Ohlson (1995) has been the pioneer in bringing the model to light. However, it seems that he has built on a well-established tradition. The model appears to have been first operationalised by Preinreich (1938), and by Williams (l938). It has since been reviewed in some detail by (notably) Edwards and Bell (1961), Kay (1976), Peasnell

(1982), Edwards, Kay and Mayer (1987) and Brief and Lawson (1991). Thus, the awareness of the model may be new, but the model is not.

Due to the different places and different times that the model has appeared, it is not surprising that it has come to be given different names. Some are abnormal earnings, residual income, super profits, clean surplus, excess earnings, economic income and economic profit. Each of these names is intended to convey the same meaning, and the underlying structure of the model is precisely the same in each case.

Unfortunately, in spite of its obvious attractions, the abnormal earnings model is not the solution to the problems of asset valuation, earnings measurement and share price determination. However, the model does provide a rigorous framework for structuring information in the determination of share prices and, if properly understood and used, it can be a valuable tool for investment analysis.

The remainder of this paper is organised as follows. Section 2 describes the clean surplus relation and the attempts to express dividends as a function of the residual income. Section 3 extends the discussion by describing the residual income model. Section 4 describes how linear information dynamics deal with some problems of RIM whereas section 5 introduces some adjustments for finite horizons and reports empirical results. Section 6 summarises the paper and offers implications for future research.

## 2. Clean Surplus relation

The implicit assumption in accounting based valuation research is the clean surplus relation (CRS), which requires that all changes in the balance sheet flow through the profit and loss account. Inherent in this assumption lies the concept of comprehensive or all-inclusive income which in FASB's Concepts Statement No6 'Elements of Financial Statements' (1985) is defined as the 'change in equity of a business enterprise during a period from transactions and other events and circumstances from non-owner sources. It includes all changes in equity during a period except those resulting from investments by owners and distributions to owners' (Paragraph 70). This definition differs from the conventional earnings concept which asserts that: "earnings is a measure of performance, during a period that is concerned primarily with the extent to which asset inflows associated with cash-to-cash cycles, substantially completed during the period, are in excess (or less than) asset outflows associated directly or indirectly, with the same cycles". (FASB Concepts Statement No 5, Recognition and Measurement in Financial Statements of Business Enterprises, 1984, Paragraph 34).

In algebraic terms the clean surplus relation (CRS) can be represented as follows:

$$E(BV_t) = E(BV_{t-1}) + E(X_t) - E(D_t) \quad (1)$$

Where:

$E(BV_t)$: is the expected book value of equity capital at the end of period t

$E(BV_{t-1})$: is the expected book value of equity capital at the end of period t-1 (beginning of period t)

$E(X_t)$: is the expected earnings of period t

$E(D_t)$: is the expected dividends to be paid to shareholders in period t

Equation (1) implies that future book values of equity are expected to increase by expected earnings and decrease by expected dividends. Ohlson (1995) states that dividends reduce book value rather than current earnings. Instead of reducing current earnings, the payment of dividends at time t reduces future periods' expected earnings due to the reduction in the company's asset base. This reduction should be calculated at the company's specific discount rate. It should be pointed out, however, that dividends should be interpreted broadly to include any flows accruing to shareholders, either in the form of cash or in the form of capital gains, or in any other form (the Modigliani and Miller dividend irrelevancy proposition, 1961).

Stated in an ex-post version, equation (1) yields on rearrangement an identity for dividends. It follows that dividends are calculated as the period's earnings plus the change in the book value of equity during the period:

$$D_t = X_t + (BV_{t-1} - BV_t) \tag{2}$$

Equation (2) expresses dividends paid to shareholders as a function of earnings and changes in book value and holds, irrespective of the choice of a particular accounting method. When the only change in book values between two consecutive balance sheets is depreciation, then dividends equal earnings plus depreciation.

Equation (2) shows an accounting-based definition of dividends that has been the basis for all accounting-based equity valuation studies. However, the goal has always been to find a plausible way to apply accounting data in valuation models in a straightforward way. Beaver (1989) and DeAngelo (1991) recognise that the valuation process in practice is a three-link process and involves using previous years' earnings data to forecast future earnings, which in turn are used to estimate future dividends and finally companies' values. This process can only be simplified if an accounting measure of performance emerges as a correct valuation attribute without the need to be transformed into future dividends[1].

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[1] Lee (1999) highlights five key concepts in connection with the valuation task that should always be taken into account in order to avoid misconceptions about valuation. The first concept is that valuation is inherently prospective. This refers to the estimation of the present value of expected payoffs to shareholders, which need to be timely and accurate. The second concept is that the valuation task is inherently interdisciplinary. Therefore, the process of valuation encompasses knowledge derived from the fields of accounting, finance, economics, marketing and corporate strategy.

Such a measure of accounting performance that prevailed as a correct valuation attribute is the residual income (or abnormal earnings), which, unlike simple earnings, recognises that the capital employed by a company bears a cost that should be accounted for. Residual income (RI) is broadly defined as the accounting earnings of the period less a charge for the use of invested capital. The charge is obtained by multiplying the cost of equity capital ($k_e$) with the book value of equity at the beginning of period t.

In formal terms:

$$RI_t = X_t - k_e BV_{t-1} \tag{3}$$

Where: $k_e$ is the cost of equity capital of the company.

Residual income can also be expressed as a function of the return on equity (ROE), in the following manner:

$$RI_t = (ROE_t - k_e)BV_{t-1} \tag{4}$$

Where: $ROE_t$ is the return on equity capital defined as period earnings divided by the book value of equity at the beginning of the period:

$$ROE_t = \frac{X_t}{BV_{t-1}} \tag{5}$$

The difference between $ROE_t$ and $k_e$ is often referred to as the return spread and determines both the sign and the magnitude of the residual income.

O'Hanlon and Rees (1995) relate residual income to dividends by simultaneously adding and subtracting the term ($k_e * BV_{t-1}$) into equation (2). In so doing, dividends can be mapped as a function of residual income as follows:

$$D_t = RI_t + BV_{t-1}(1 + k_e) - BV_t \tag{6}$$

This relation shows that in every period, dividend is equal to the residual income for the year, plus the opening book value of equity, times one, plus the required cost of equity, less the closing book value of equity.

Kousenidis *et al* (1998) use another formulation to express dividends as a function of RI by assuming that the book value of equity grows during period t at a rate $g_t$ so that:

$$BV_t = BV_{t-1}(1 + g_t) \tag{7}$$

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The third concept is that accounting systems and their numbers are crucial to valuation. The fourth concept is that valuation models are merely pro forma accounting systems. Despite the fact that alternative valuation techniques imply different accounting systems forecasting is still the core issue in valuation and not manipulation of puzzling valuation equations. The fifth and final concept is that fundamental analysis facilitates forecasting. Fundamental analysis involves inferring the value of a business firm's equity without reference to the prices at which the firm's securities trade in the capital markets (Bauman, 1996).

Substituting equation (6) into equation (2) and rearranging terms results in:

$$D_t = X_t - g_t BV_{t-1} \tag{8}$$

Or equivalently in terms of ROE:

$$D_t = (ROE_t - g_t)BV_{t-1} \tag{9}$$

Taken together, equations (3), (4), (8), and (9) show that dividends can be expressed as a function of residual income plus a term for the accounting valuation error in the following way:

$$D_t = RI_t + (k_e - g_t)BV_{t-1} \tag{10}$$

The second term in the right-hand side of Equations (6) and (10) represents variants of the error term prevailing when RI is used to estimate dividends. In a valuation framework, Equations (6) and (10) imply that RI can be used as a proxy for dividends in the fundamental DDM. The result, however, will be a biased estimate of the company's equity value and the bias will be the discounted sum of the term $BV_{t-1}*(1+k_e)-BV_t$, or equivalently $(k_e-g_t)*BV_{t-1}$, (for all t = 1, 2... N). The discounted accounting valuation error term is more explicitly analysed by Peasnell (1982), who attributes its existence to the differences in the valuations made by accountants and economists which, in turn, are shown to depend on the differences between $g_t$ and $k_e$.

## 3. The Residual Income Model (RIM)

Following the discussion above, many accounting researchers have tried to apply variants of the discounted dividend valuation model using accounting data ever since Williams (1938, see also Preinreich, 1938) conceptualised it. Many of these attempts involve using dividends expressed as a function of residual income and resulted in the first accounting-based valuation models. These models share many commonalities and express the value of a company as the discounted sum of periodic residual income figures, plus a term representing the accounting valuation error (Edwards and Bell, 1961; Kay, 1976; Peasnell, 1982; Edwards, Kay and Mayer, 1987; Brief and Lawson, 1991; among others).

In a thorough review of valuation studies, Ohlson (1990) urges researchers to take into account two key elements that make an equity valuation model theoretically valid. The price of a security is determined by the present value of its dividends and every valuation function satisfies inter-temporal consistency requirements to exclude arbitrage opportunities. As Ohlson points out, dividends are the only relevant inputs for valuation on the grounds that only dividends can be consumed by shareholders as opposed to earnings and free cash flows. Moreover, the no arbitrage condition leads to an equilibrium which allows a direct link between stock prices and future dividends. On the other hand, as Ohlson notes, many researchers arbitrarily substitute earnings

or cash flows for dividends as the capitalisation attribute in many valuation models. Of course, these practices may not lead to invalid conclusions. The theoretical background on valuation is of little relevance for most empirical questions and thus useful empirical studies can be conceived even when the concepts of what determines security valuation are unspecified or when the study maintains hypotheses that do not derive from more primitive assumptions. Thus, Ohlson appears to be convinced that additional progress can only be achieved through the development of a model which is firmly related to equity valuation theory.

Using these guidelines, Ohlson (1990, 1991, and 1995) and Feltham and Ohlson (1994, 1995, and 1996) have developed a model, which directly relates information variables with equity values. In its most general form, the model expresses firm value as the sum of its invested capital and the discounted present value of the residual income from its future activities. As Lee (1999) prescribes the model, the value of a firm equals:

$$\begin{aligned}(\text{Firm Value})_t &= (\text{Capital})_t + \text{PV (all future wealth-creating activities)} \\ &= (\text{Capital})_t + \text{PV (all future "residual income")}\end{aligned}$$

The RIM that appears in the accounting literature is a special case of the above equation in which capital and earnings are defined in terms of shareholders. This form of the RIM is equivalent to the dividend discount model coupled with the CSR. In formal terms, the model that results from this combination can be expressed as follows:

$$MV_t = BV_t + \sum_{s=1}^{\infty} \frac{E_t(X_{t+s} - k_e BV_{t+s-1})}{(1+k_e)^s} = BV_t + \sum_{s=1}^{\infty} \frac{E_t\left[(ROE_{t+s} - k_e)BV_{t+s-1}\right]}{(1+k_e)^s} \tag{11}$$

or equally:

$$MV_t = BV_t + \sum_{s=1}^{\infty} \frac{E_t(RI_{t+s})}{(1+k_e)^s} \tag{12}$$

Where: $MV_t$ is the implied market value of the company at the end of period t derived according to the RI model.

Bauman (1996) states that the intuition of the model is that book values and earnings are relevant valuation attributes, not merely signals of other attributes. Book value represents a stock measure of value whilst earnings measure increments to book value. Dividends enter the model due to their impact on the time-series of subsequent realisations of accounting data.

## 4. Linear information dynamics

Although the RIM appears as an accounting valuation model, it does not directly relate reported financial statement numbers to equity value. The residual income or abnormal earnings variables entering the model are fore-

casts, not past realisations. Ohlson (1995) deals with this problem by passing the notion of 'linear information dynamics' which is a system of linear time-series equations that expresses the stochastic process, which dominates the evolution of abnormal earnings and non-accounting information as follows:

$$X^a_{t+1} = \omega X^a_t + \phi_t + \varepsilon_{1,t+1}$$
$$\phi_{t+1} = \gamma\phi_t + \varepsilon_{2,t+1} \quad (13)$$

where Xt is the abnormal earnings (or residual income) and $\phi_t$ is information other than abnormal earnings.

These variables are assumed to follow an autoregressive process with a single time lag either AR (1) or modified AR (1) and the coefficients ω and ϕ are the persistence parameters. The persistence parameter ω is defined as the relationship between abnormal earnings in two consecutive years, as follows:

$$RI_{t+1} = \omega RI_t \quad (14)$$

Ohlson imposes two assumptions on the model which are, first, that the value of the persistence parameters lies between 0 and 1 and, second, that any given persistence parameter is constant over time. Concerning ω taken together, these assumptions ensure that, over time, abnormal earnings become gradually closer to 0. The higher the persistence in abnormal earnings, the longer it takes for the return on equity and the cost of capital to converge. On the other hand, it is possible for the two rates to diverge and for the rate of return spread to grow, indicating that ROE's are mean reverting.

The assumption of a constant persistence parameter allows the use of current abnormal earnings to predict future abnormal earnings, and thereby current share price. For every £1 of abnormal earnings that a company expects to achieve in the current year, it is expected to earn (according the equation above) £ω in the following year, £$\omega^2$ in the year after, then £$\omega^3$ and so on. In total, every pound earned in the most recent year therefore has a present value equal to a perpetuity cash flow that starts at £ω and grows at a rate of (ω -1) each year. This present value may be termed the 'price-abnormal earnings' (PA) ratio because, similarly to the price-earnings (PE) ratio, it is the multiple that converts current abnormal earnings into shareholder value. Similar to the DGM, ω and ω-I are the analogues of dividends (D) and dividend growth (g), respectively. The present value of £1 of abnormal earnings is therefore calculated as follows:

$$\textit{present value of £1 of current abnormal earnings = PA ratio} = \frac{\omega}{k_e + 1 - \omega}$$

Using this expression, the abnormal earnings valuation model can now be presented as follows

$$MV_t = BV_t + \left(\frac{\omega}{k_e + 1 - \omega}\right) \quad (15)$$

As abnormal earnings persistence increases, so the numerator in the PA multiple rises and the denominator falls, with both effects increasing the value of abnormal earnings. For a given shareholder value, the persistence of abnormal earnings determines the 'split' of value between book value and discounted abnormal earnings.

This expression can be used to illustrate the inter-relationship between the PE Price-to-book (PB) value and PA ratios. Consider the extreme cases where the value of the persistence parameter, ω is either 0 or 1. If it equals 0, then the PA ratio is also 0, and price equals book value. This is simply because zero persistence implies that, whatever tile level of abnormal earnings in the most recent period, expected future abnormal earnings are equal to 0. In other words, the rate of return spread remains constant and equal to 0. The company might be expected to grow, but tile growth is not expected to create or destroy value for shareholders.

At the other extreme, the value of the persistence parameter is 1, and the PA ratio becomes equal to 1 over the cost of capital. The company is able to sustain a constant return on equity that differs from the cost of capital, and abnormal earnings are constant in perpetuity. This requires, in fact, that all earnings are either paid out as dividends or re-invested at a return equal to the cost of capital. Otherwise, the retention of earnings would allow growth in abnormal earnings, causing the persistence parameter to exceed 1. In turn, this assumption of constant abnormal earnings in perpetuity implies that there is a constant PE ratio, equal to 1 over the cost of capital. The share price can therefore be expressed in terms of just current earnings and the cost of capital or alternatively in terms of current book value, current abnormal earnings and the cost of capital. The proof of this is very straightforward:

Let ω=1 then it follows that:

$$MV_t = BV_t + (\frac{1}{k})RI_{t+1} \tag{16}$$

Substituting Residual Income as defined in equation 14 yields:

$$MV_t = BV_t + \frac{X_{t+1} - B_tVk_e}{k_e} = \frac{B_tVk_e + X_{t+1} - B_tVk_e}{k_e} = \frac{X_{t+1}}{k_e} \tag{17}$$

This discussion has shown that, within Ohlson's model, when the persistence parameter on abnormal earnings is either 0 or 1, price equals either book value or earnings divided by the cost of capital, respectively. In other words, the persistence of abnormal earnings determines the relative importance of book value and earnings in valuation. This is best seen, in fact, when the persistence parameter lies somewhere between 0 and 1, such that neither the price-book value ratio nor the price-earnings ratio can be interpreted independently of one another.

The term $\phi_t$ of equation 13 represents the predictable effects of value-relevant non-accounting information. In essence, this variable implies that prices reflect information about future earnings that is not contained in current earnings. Finally, $\varepsilon_{1,t+1}$ and $\varepsilon_{2,t+1}$, are the zero mean disturbance terms.

The importance of the linear information dynamics is that it provides an informational link between current and future abnormal earnings. Thus, firm values can now be expressed in terms of current period accounting numbers rather than future expected values. Lundholm (1995) notes that the CSR together with the linear information dynamics concept lead directly to two Modigliani - Miller propositions: (1) Observed dividends are uninformative about firm value (dividend irrelevance theorem) and (2) the relation between current dividends and future earnings is negative (dividend displacement property).

Feltham and Ohlson (1995, 1996) provide a more generalised version of the model, which accommodates the existence of both financial and non-financial operating activities because of the different accounting treatment of these activities. The book and market values of financial assets and liabilities generally coincide and financial activities are assumed to have a zero net present value ('unbiased accounting'). On the other hand, operating assets are often valued through conservative principles, which are recognised as biased in the sense that book values of operating assets are less than the expected present value of the associated future cash flows. In the long run, the difference between market value and book value is not expected to nullify under conservative accounting (see Biddle *et al*., 2000; Basu, 1997; Ball *et al*., 2000a, Pope and Walker, 2000). Thus, the conservative assessment of the value of operating assets must be offset by an optimistic assessment of future expected abnormal operating earnings. Thus the model of Feltham and Ohlson incorporates only expected operating abnormal earnings since their book value closely approximates market value on the assumption that all financial activities enter the model through the book value variable.

Bauman (1996) recognizes that the above modifications bear two important implications for the fundamental valuation task. First, it is necessary to consider the nature of a firm's assets and liabilities and the associated accounting treatments. Second, due to conservative accounting, a firm's return on equity (ROE) is expected to asymptote to some level above its cost of equity capital and not to converge to the cost of capital.

Hand and Landsman (1998), Myers (1999), and Dechow *et al* (1999) test the appropriateness of incorporating a LID variable into the model when it is applied to practical situations. All acknowledge the difficulty of defining and applying an information variable in practical settings. A further result shows that even when this variable is properly defined and included, the model offers no comparative advantage in the sense that it does not provide superior and more consistent equity values than RIM without incorporating an infor-

mation variable. Lee, (1999) however, warns researchers to take into account that LID refers to some assumptions of the model rather than to propositions derived by the model. This means that the LID assumptions follow logically from basic economic concepts such as dividend irrelevance and they represent only one of many possible ways that past accounting numbers can be mapped into future forecasts. Thus, Lee urges future researchers to direct their efforts towards identifying alternative information sources that can be used to predict future earnings.

## 5. Adjustments for finite horizons

The initial RIM assumes discounting future abnormal earnings over an infinite time-horizon. However, Ohlson (1995), shows that the model can be applied over a finite time-horizon by adding a term which accounts for the company's terminal value of the equity capital. The RIM adjusted for a finite time horizon, n, has the following form:

$$MV_t = BV_t + \sum_{s=1}^{n} \frac{E_t(RI_{t+s})}{(1+k_e)^{t+s}} + \frac{E_t(MV_n - BV_n)}{(1+k_e)^n} \tag{18}$$

The terminal value that appears in equation 18 captures the present value of all future RI figures from time n to infinity since:

$$MV_n = BV_n + \sum_{j=1}^{\infty} \frac{E_n(RI_{n+j})}{(1+k_e)^{n+j}} \tag{19}$$

Penman (1997) provides a general framework for understanding the role of terminal value calculations. What Penman asserts is that all variants of the DDM model, when consistently parameterised, yield the same valuations over infinite horizons. However, the DDM model applied for finite horizons tends to guide the researcher to a different terminal value assumption and therefore to potentially different value estimates. The results of Penman show that forecasting dividends, cash flows or abnormal earnings over a finite horizon, will obtain similar valuations if terminal value is calculated on a cum-dividend basis in all cases. Furthermore, Penman shows that the proper calculation of the terminal value component offsets the error prevailing by truncating the forecast horizon. The error arises because forecasts beyond the horizon are omitted in the truncation. But the error is also due to forecasts up to the horizon. If forecasts to the horizon capture the value without error there is no need for a terminal value, whereas if they do not, terminal value is needed to correct the error. Finally, Penman attributes the existence of the error to the recognition and measurement principles of accounting. Thus, Penman calls for changes in accounting practices that will enhance the proper calculation of terminal values.

Ou and Penman (1995), examine for the appropriate length of the forecasting horizon develop a combination approach for this purpose. They test the behaviour of price-to-book ratios over time to see whether price and book values converge over reasonable horizons or whether price-to-book ratios remain constant. They find evidence that the premiums of price over book value do not persist or change over time. Based on this observation Ou and Penman assume that there is a point in time when the premium over book value is expected to become constant. This is actually the point of time when the price-earnings ratios are expected to be normal, that is to be equal to $(1+k_e)/k_e$. In support of this approach, their analysis indicates a general levelling-off of observed premia, except for firms with particularly high price-to-book ratios. For these firms, either an extension of the forecast horizon or a terminal value adjustment is required.

## 5.1 Comparison of RIM to the DDM

A path of empirical research on valuation compares the RIM model to the DDM and in general to other valuation models. Penman and Sougiannis (1997,1998) assume a rational expectations framework and implement the RIM using ex-post-realised earnings as a proxy for expected earnings. Drawing upon the Modigliani and Miller dividend irrelevance theorem, the authors expect an appropriate valuation variable to be both insensitive to dividend payout and able to capture all value relevant firm information. Penman and Sougiannis provide evidence in support of GAAP earnings as a correct valuation variable. First, they find a negative relation between dividend payments and subsequent stock price, which supports the MM dividend displacement property. Moreover, they depict that prices calculated from forecasted GAAP earnings are insensitive to future dividends. Dividends on the other hand, are negatively related to subsequent period's earnings. Some controversial evidence is reported by Penman and Sougiannis (1998) who evidence a short-term signalling effect, namely that there exists a small positive association between dividends paid in period t and earnings in period t+1. However, they maintain the dividend irrelevance proposition by finding that cum-dividend earnings are independent of the dividend payout pattern. Thus, the authors conclude that GAAP earnings are a suitable target in valuation analysis as long as the value displaced by dividend payments is considered.

A limitation of the Penman and Sougiannis approach is that they substitute earnings' forecasts with actual earnings. Bernard (1995) uses forecasted earnings and dividend data from the Value Line database to examine the empirical implications of the finite horizon abnormal earnings valuation model. Using a four-year forecast horizon, Bernard shows that Value Line earnings' forecasts perform better than forecasting dividends in explaining the variation in observed stock prices. Francis *et al* (1998), use earnings and cash flow forecasts by Value Line analysts to directly compare alternative valuation

models. Assuming that actual stock prices are the best estimate of the true intrinsic value, they conclude that the RIM model potentially generates better value estimates than all other valuation models examined.

Moreover, Francis *et al* (1999), use time-series earnings forecasts to estimate RIM values. Again, their results indicate that abnormal earnings models outperform dividend and cash flow models in estimating the equity value of a company. A simple time-series model of residual income is found to perform equally well as analysts in generating a measure of intrinsic value estimates. This finding made the authors wonder whether the analysts' information advantage translates into meaningful differences in their intrinsic value estimates relative to mechanical-based estimates.

Brief and Zarowin (1999) on the other hand, use realised earnings to account for expected earnings, and finds that the nature of earnings is an important factor that determines the superiority of the RIM model. In particular, they observe that for firms with transitory earnings, dividends have greater individual explanatory power than earnings. However, book value and earnings have about the same explanatory power as book value and dividends. This finding implies that book value compensates for the valuation irrelevant transitory earnings. Finally, for companies with permanent earnings, the authors support that earnings have the greater explanatory power of all the three variables, although in this case the book value and dividends is dominated by book value and earnings combination.

### 5.2 Earnings / returns relations using RIM valuation

In their widely cited paper, Easton and Harris (1991), examine the association between earnings-to-price (E/P) ratios with stock returns. Their original model, which served as guidance for several other studies, includes two measures of the E/P ratio. One is calculated by dividing the current year's earnings to the previous year's stock price. The other uses the change in earnings to calculate the E/P ratio. The results of Easton and Harris show that both earnings and changes in earnings contain relevant information for stock returns.

Liu and Thomas (1999) expand on the Easton and Harris model to examine whether abnormal earnings bear information content for stock returns. The explanatory variable they use consists of the ratio of change in RIM value to the current year's RIM value. The results of this study reveal that the correlation of the value ratio with contemporaneous returns increases significantly when compared to regressions that contain only a linear combination of historical accounting numbers. Hence, the authors conclude that researchers should incorporate all value relevant accounting information into the models before reaching sound conclusions about the relationship between earnings and stock returns.

Motivated by the Fama and French (1992,1993) findings on the relevance of the book-to-market ratio in explaining the cross-section of stock returns, several researchers have examined the usefulness of a value-to-price ratio (VP), calculated in terms of abnormal earnings. Frankel and Lee (1998), use mean I/B/E/S analysts' forecasts to estimate an intrinsic value measure for each firm in their sample. They show that the resulting V/P ratio is a better predictor of cross-sectional returns than measures such as book-to-market or firm size. Specifically, high (low) V/P firms earn higher (lower) future long-term risk-adjusted returns over the next three to five years. Because of the importance of analysts' forecasts to the valuation model, Frankel and Lee also examine the predictability of errors in these forecasts. They find that errors in the mean I/B/E/S analysts' forecasts are predictable in the cross-section. A two-stage trading strategy based on both a V/P filter and an analyst error prediction filter results in even higher predictive power for future returns.

Dechow *et al* (1999), apply the RIM model in a research design that consists of five major features: (1) use of the Feltham-Ohlson framework, (2) definition of abnormal earnings or residual income, (3) variety of earnings forecasting models examined, (4) variety of forecasting or prediction context examined, and (5) use of analysts' forecasts as a proxy for other information. In essence, their results confirm the results of Frankel and Lee, concerning the predictability of analysts' forecast errors. This is a finding, which both studies have taken to imply, that investors naively price predictable errors in analysts' forecasts. In an empirical context, this finding indicates that analysts' forecast errors can be used in conjunction with their forecasts to produce even greater differential future returns than those attainable via analysts' forecasts alone. Moreover, Dechow *et al*, examine the explanatory power of a V/P ratio and conclude that this ratio adequately predicts the cross-section of expected stock returns.

Lee and Swaminathan (1999) and by Lee *et al*, (1999) use a V/P ratio to predict average returns of the thirty Dow-Jones industrial firms. Lee and Swaminathan use various regression models and prove that a V/P ratio outperforms the book-to-price (BV/P), the earnings to price (E/P), and the dividend yield (D/P) ratios in predicting average stock returns.

Lee *et al*, examine the question of how value estimates based on residual income should be evaluated when the stock market price is a noisy measure for the true intrinsic value. Instead of assuming that prices always equal intrinsic value, they model price and value as a cointegrated system, implying that both price and value are constantly converging to the true but unobservable intrinsic value. They show that in this framework, under fairly general conditions, better value estimate will not only be more correlated with contemporaneous returns, but will also yield better predictions of future returns. In a final illustration, they find that an aggregate V/P ratio for the thirty stocks in the Dow-Jones industrial average has significant predictive power for overall market returns in the US.

Beaver (1999), objects to the use of the V/P ratio on two major grounds. First, he maintains that trying to predict earnings within a linear information dynamics context may not always be appropriate, since the Feltham and Ohlson framework conforms more closely with a RIM model based on analysts' forecasts. Secondly, Beaver criticises the use of a cross-sectional, time-series constant cost of capital. He argues that this practice actually translates into a residual income figure, which is nothing but ROE minus a constant. Thus, Beaver asserts that when the cost of capital is held constant across years and across firms in the sample, deflation by stock price makes the ratio V/P difficult to interpret, since the ratio is confounded by movement in the market value over time and could obscure the persistence of abnormal earnings. Thus, Beaver concludes that when the cost of capital framework is held constant, a ratio of intrinsic value to book value of equity (V/BV) may be more relevant.

### 5.3 Estimation of the cost of capital

Instead of assuming a constant cost of capital, Gebhardt *et al* (1999), and Brief (1999), use RIM framework to estimate the implied rate of return, which can be thought of as the ex-ante cost of equity capital. Gebhardt *et al,* examine the empirical properties of the internal rate of return and try to explain their results under an arbitrage pricing theory framework. Their analysis reveals a number of firm specific observed factors, such as leverage, market liquidity, information environment and earnings variability. Specifically, they find that the market demands higher risk premia with high leverage, low market capitalisation, low analyst coverage, and more volatile (less predictable) earnings. A final result of this study demonstrates that the ex-ante cost of capital is not related to historical betas, hence assumptions based on beta stability throughout the years may be highly restrictive.

## 6. Concluding Remarks

The residual income valuation model (RIM) developed by Ohlson (1995) and Feltham and Ohlson (1995) has emerged as a popular accounting-based valuation model. On the other hand, the model has gained many supporters among accounting researchers. However, the results of the empirical studies show that the practical application of the model requires simplifications, which violate the theoretical underpinning of the model. First, the model is built on the clean-surplus accounting system, which is not always compatible with GAAP accounting. Second, valuation models require forecasts about the future payoffs accruing to shareholders. Given the accounting principle of conservatism, financial statements do not result in forecasts of future earnings that satisfy the assumptions predicted by the model.

Finally, the validity of the model is usually tested by comparing implied values with actual market values. This clearly implies that market values are considered as *a priori* correct valuations. This assumption as Lee (1999) points out is crucial for the validity of the model and he urges researchers to base their judgments mainly on RIM values. What he implicitly believes is that market values may not always be correct, thus RIM values may be more useful in estimating equity values. However, this is only true on the assumption that forecasted future earnings and terminal values are in accordance with the theory underlying the model.

Empirical research shows that this does not always hold. Thus, the issue of whether market values or RIM values are more appropriate in equity valuation, is a question that is still under investigation. Future research should be oriented towards trying to resolve the issues that raise doubt on the correctness of RIM valuation on practical grounds. Moreover, it is also required to investigate on the factors that cause the deviations between market values and RIM values. This could result in an accounting-based valuation model that is wholly accepted by both academics and practitioners. However, the question as to whether this is feasible, guarantees further empirical research.

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DIMOSTHENIS HEVAS

# The Valuation of The Differential Tax Treatment of the Earnings Components

## Abstract

In this paper I test the capital market effects of the differential tax treatment of the various earnings components within the context of the earnings-book values capitalisation model, when income tax is reported under the income tax payable method. I argue that under this method, both the tax-free earnings, as well as the tax free reserves that are consequently shown in equity, embody an undisclosed contingent liability and the well informed rational investor should account for it. The empirical tests were carried out using data from the Athens Stock Exchange for the period 1994 – 2000. The findings from the empirical analysis suggest that there is both a positive effect (through yearly earnings) and a negative effect (through book values) of the differential tax treatment of certain parts of the income. While in the short run the positive effects of the untaxed earnings provide the share with a price premium, in the long run, as tax free reserves accumulate on the book value of equity, the negative effect of the book value is higher than the positive effect of the yearly earnings and the overall effect of the differential tax treatment becomes negative.

## 1. Introduction

Governments usually use the corporate income tax as an instrument in order to control firms' investing and operating activities. This is done either by non-taxing the income from certain activities or, by taxing it at tax rates lower than the statutory tax rates or, by non-taxing a certain percentage of the yearly earnings if the firm undertakes investment in certain activities. (Hereinafter in this study, the term "tax free earnings" will be used to denote all earnings which, in the year that they are recognised, are either taxed at a rate lower than the statutory tax rate or are not subject to income tax).

The result of the differential tax treatment of certain parts of the annual income is that part of the reported net income is taxable and part is tax-free. As a result, there is a difference between the amounts of income tax expense, which should be recorded if all income was taxable, and the amount of income tax actually paid in that particular year. Depending on the tax legislation that is in force in each country, this difference may be of either a permanent or a temporary nature. In the latter case, the income tax not paid in the year that the tax-free income was earned, will/may be paid at a possibly

unknown yet, future date. In other words, the non-taxed component of net income embodies a contingent liability which, under the tax payable method, is undisclosed.

The purpose of this paper is to examine the market value effects of the timing differences arising from the differential taxation of the various income components under the tax payable method.

From a valuation point of view and within the context of the earnings-book value capitalisation model, the deferral, to an unknown future date, of the total (or part) of the income tax of certain income components is expected to have the following consequences:

(a) The reported net income figure (NI), which is a measure of the earnings generating ability of the reporting entity, is an aggregation of two different income items; one calculated on a pre-tax (or reduced tax) basis (UNI) and the other calculated on an after tax basis (TNI). The untaxed (or taxed at reduced rate) income embodies a contingent liability, which under the tax payable method is undisclosed, while the taxed net income does not. Therefore, we expect that these two income items will not have the same Earnings Response Coefficients (ERCs); rather, we should expect that the ERC of the untaxed income would differ from that the ERC of the taxed income.

(b) Usually, both the untaxed income and the income taxed at a lower rate are shown in the balance sheet as retained earnings, separately from the other retained earnings. It means that the reported book value figure (BV), which is firstly, a measure of the firm's net assets committed in producing earnings and, secondly, a measure of the realisable value of the firm's net assets in case of insolvency, is also an aggregation of two different figures. The first figure includes the accumulated over the years tax-free retained earnings and retained earning taxed at lower rates (ATFR) which also include a contingent liability since, under certain circumstances, they may be taxed in the future. The second figure (BV – ATFR) includes any paid in capital plus those retained earnings that were taxed at the statutory income tax rate. We also expect that the Book Value Response Coefficients (BVRCs) of the two book value items will differ because the nominal value of the ATFR overestimates both the amount of the net operating assets permanently committed in producing earnings, as well as the firms' realisable value in case of insolvency, while the nominal value of the (BV – ATFR) item does not. As a result, I expect that the estimated BVRC of the ATFR variable will be smaller from that of the (BV – ATFR) variable.

The theoretical and empirical evidence on the valuation effects of the differential tax treatment of the various income items is limited only on the value relevance of investment tax credits (ITC), i.e. earnings that were not subject

to corporate income tax because the reporting entity undertook (or committed itself to undertake) certain investing activities.

Theoretically, the introduction of an ITC is expected to cause a decline in the firm's value in the long run. This decline should be equal to the amount of the ITC. In the short-run, however, if output prices remain constant, investment tax credits can only increase firm value because they lower the firm's cost of capital. If output price is not constant, the total effect of investment tax credits on the value of the firm is ambiguous, because the increase in investments and output will cause output prices to decline and, therefore, the value of expected earnings from existing investments will decline too. So, the net effect on firm's value will depend on the relation between the excess return caused by new investment compared with the decline in the value of the existing investments (for a review of the ITC literature see: Feldstein, 1981; Auerbach and Kotlikoff, 1983; Auerbach, 1986; and, Downs and Hendershott, 1987).

Empirically, Lyon (1989), using data from the USA, reported a positive relation between changes in firm's market values and changes in the ITC rates. His findings suggested that the benefit a firm is expected to receive from the new investment far outweighs the decline in the value of the existing investments.

In Europe, Hevas and Papadaki (2000), using data from the Athens Stock Exchange, reported a negative relationship between the ITC committed to new investment and firm's values. They attributed their findings to the fact that under Greek tax law, the creation of an ITC reduces dividends distribution and investors in the market probably view this negatively.

This study examines the capital market effects of the differential tax treatment of the various income components when the income tax payable method is applied for the recording of income tax expense. The empirical tests will be carried on a sample of companies listed on the Athens Stock Exchange. It contributes to the literature in the following ways:

(a) It is the first study of its kind that examines the effects of the differential taxation of the various income components upon the value relevance of earnings and book values. Therefore, it is expected that the result of this study will be of interest to capital markets regulators, accounting regulators and tax policy makers alike.

(b) Under the tax payable method for recording income tax expense (which is adopted by Greek accounting standards), no deferred asset or liability is recognised where a timing difference arises between the current period's income tax expense and income taxes payable; only the income taxes payable are shown in the annual accounts. This study provides, therefore, additional evidence on the appropriateness of this method for reporting corporate income tax.

(c) In 2003, the Greek tax authorities reduced drastically the differential taxation of the various income components. This study will hopefully provide evidence on the likely effect of this tax policy measure upon firms' values.

In section 2 of this study, I provide a description of the Greek tax accounting system. In section 3, I present the models to be tested empirically. A description of the data is given in section 4 while the results are reported in section 5. The study concludes with section 6.

## 2. Company Taxation in Greece

Corporate income tax was first introduced in Greece in 1992. In the pre-1992 period, Greek corporations (i.e., those having the legal form of a *societe anonyme*) were not taxed; they were only paying an advanced corporation income tax on the total amount of retained earnings; this advancement was returned to the corporation when these retained earnings were distributed as dividends to the shareholders. Distributed earnings, however, were subject to personal income tax. This system of taxation changed in 1992 (with Law 2065/1992) when corporation income tax was introduced. Under the new tax system, all earnings are taxed at corporation level while all distributed earnings are tax-free for the recipients. The statutory tax rate was determined at 40 per cent for firms whose shares are not listed and 35 per cent for firms whose shares are. Since 2004, the statutory tax rate was reduced to 35 per cent for all firms, listed and non-listed.

One of the characteristics of the 1992 tax legislation is that, although it provides for certain types of realised financial income to be taxed at a reduced (or even zero) rate tax rate, it punishes the distribution of this income by overtaxing it. The same tax treatment applies to the investment tax credits created on planned or realised investment. More specifically, according to the 1992 tax legislation:

(a) The following types of corporations' income are not taxed:
    i. The gains from the sale of securities listed on the Athens Stock Exchange;
    ii. The interest income originating from certain types of government and private bonds to the extent that it is retained. The tax-free interest income is calculated by multiplying the total interest income from these types of bonds by the firm's retention ratio.

(b) All corporations, which have either invested in certain activities (prescribed in the tax legislation) or commit themselves to invest in certain activities, can enact investment tax credits; these are calculated as a fixed percentage of the yearly-retained earnings.

(c) The following types of corporations are taxed at reduced rates;

i. The gains from the sales of shares not listed (they are taxed at a flat rate of 5 per cent);

ii. The gains from the sale of participating interests not listed (they are taxed at a flat rate of 30 per cent);

iii. The interest income originating from certain types of government and private bonds as well as that from deposits in banking institutions, to the extent that it is retained (all these types of interest income are tax at flat rates ranging from 7 per cent to 15 per cent). The interest income that is taxed at a rate lower than the statutory tax rate is calculated by multiplying the total interest income from these types of bonds and deposits by the firm's retention ratio.

According to the both tax and financial accounting legislation, all income that is either exempt from tax or is taxed at a reduced rate must be shown in the Table of Appropriation of Results as either "Tax Free Reserves" or "Reserves from Specially Taxed Income" or as "Investment Tax Credits". (Hereinafter the term "Tax Free Reserves" is used to denote these three categories of income). The accumulated amount of these reserves is shown in the balance sheet, as part of the equity of the reporting entity.

In the future, unless they are retained forever, these tax-free reserves can be used in one of the following ways:

(a) They can be used to offset any losses shown on the balance sheet. This accounting treatment has no tax consequences for the reporting entity.

(b) They can be distributed as dividends to the shareholders of the reporting entity. In that case, the reporting entity must pay an income tax, which is calculated by multiplying the amount of the reserve distributed by $\frac{t_c}{1-t_c}$, where $t_c$ is the statutory tax rate. In other words, if a corporation listed (not listed) on the Athens Stock Exchange creates these reserves it will avoid the payment of tax at 35 per cent (40 per cent) of the amount of the reserve but if it distributes this reserve in the future as dividends it will be taxed at a flat rate of 54 per cent (67 per cent).

(c) They can be capitalised, in which case they are treated as a dividend distribution.[1]

From those presented above, it is clear that although Greek Tax Law encourages Greek corporations to invest in certain activities (financial and non financial) and retain the income earned, on the other hand, it strongly discourages the subsequent distribution of those reserves in the form of dividends.

[1] An exception to this is the capitalisation of investment tax credits after a period of ten years from their creation, which are taxed at a flat rate of 5 per cent (for listed) or 10 per cent (for not listed), under the restriction that the new shares that will be issued will not be cancelled for a period of 10 years after their issuance.

Further, all those reserves embody a contingent liability which is not disclosed in the annual accounts of the reporting entity because Greek accounting standards adopt only the Tax Payable Method for the recording of Income Tax and, therefore, no deferred tax assets and liabilities are recognised in the annual accounts.

## 3. The Model

I will test the value relevance of differential tax treatment of the various earnings components using Ohlson's (1989) version of the earnings-book values capitalisation model. More specifically, I will test whether disaggregating:

(a) The net income to the part that is either tax free or taxed at a rate lower than the statutory tax rate, and to the part that is taxed at the statutory tax rate, and

(b) The book value to accumulated tax free reserves and residual book value,

improves the explanatory power of the earnings-book value capitalisation model.

The models that will be actually tested are, therefore, the following:

$$MV_j = a + bNI_j + c\ BV_j \quad (1)$$

$$MV_j = a + b_1TNI_j + b_2UNI_j + c_1(BV_j - ATFR_j) + c_2ATFR_j \quad (2)$$

where

$MV_j$ = the market value of firm j six months after fiscal year end;

$NI_j$ = the annual net income of firm j;

$UNI_j$ = the yearly earnings of firm j that were taxed at either null or lower tax rate;

$TNI_j = NI_j - UNI_j$;

$BV_j$ = the book value of firm j;

$ATFR_j$ = the accumulated tax free reserves of firm j;

All variables in Models (1) and (2) were deflated by the Total Assets in the beginning of the year so as to reduce the problems caused by heteroscedasticity. Model (1) is the basic earnings-book values capitalisation model while Model (2) is the disaggregated model.

On *a priori* grounds, if the $UNI_j$ and the $ATFR_j$ variables are value relevant we should expect that the adjusted coefficient of determination of model (2) will be higher than that of model (1). Additionally, we should expect that the estimated earnings response coefficients and book value response coefficients, in model (2), will differ among each other.

## 4. The Data

The data were obtained from the Statistical Department of the Athens Stock Exchange and cover all non-financial sector firms for which data were available for the period 1994–2000. I identified 157 firms which created either tax-free reserves or reserves taxed at the statutory tax rate at least once in the period 1994–2000. After eliminating all cases in which the $UNI_j$ variable had a zero value, I had a sample of 484 firm-years.[2]

In Table 1, I present univariate summary statistics for the variables included in models (1) and (2).

*Table 1.* – DESCRIPTIVE STATISTICS. (N= 484)

| | Mean | Median | Maximum | Minimum | St. Dev. |
|---|---|---|---|---|---|
| $MV_j$ | 6.323 | 1.322 | 1090.893 | 0.0006 | 54.345 |
| $NI_j$ | 0.120 | 0.087 | 3.174 | 0.0013 | 0.203 |
| $TNI_j$ | 0.082 | 0.062 | 2.692 | -0.025 | 0.134 |
| $UNI_j$ | 0.038 | 0.018 | 2.386 | 6.54E-06 | 0.119 |
| $BV_j$ | 0.844 | 0.727 | 10.478 | 0.113 | 0.731 |
| $BV_j - ATFR_j$ | 0.674 | 0.575 | 10.298 | 0.088 | 0.613 |
| $ATFR_j$ | 0.170 | 0.120 | 3.396 | 0.0003 | 0.266 |

*Definition of Variables*: $MV_j$ = the market value of firm j six months after fiscal year end; $NI_j$ = the annual net income of firm j; $UNI_j$ = the yearly earnings of firm j that were taxed at either null or lower tax rate; $TNI_j = NI_j - UNI_j$; $BV_j$ = the book value of firm j; $ATFR_j$ = the accumulated tax free reserves of firm j; all variables in Models (1) and (2) were deflated by the Total Assets in the beginning of the year

From the figures listed in Table 1, we can see that in some cases, the mean values deviate substantially from their median values, suggesting that the means have been influenced by a few outlying observations. For this reason, I performed diagnostic tests suggested by Belsley *et al* (1980) for the presence of influential observations and the results reported in Tables 3 and 4 were considerably improved when in all equations the influential observations were omitted.[3]

## 5. The Empirical Results

Table 2 presents Spearman correlation coefficients among the different variables used in this study.

[2] These reserves are shown on the Table of Appropriation of Results. Since no distinction is done on the Database of the Athens Stock Exchange between "Tax Free Reserves", "Reserves Taxed at Lower Tax Rates" and "Investment Tax Credits" I could not separate them in my empirical analysis.

[3] As outliers we treated all those observations for which the distance between the fitted value and the actual value was greater than three standard deviations.

*Table 2.* – SPEARMAN CORRELATION COEFFICIENTS. (n = 484)

| | $MV_j$ | $NI_j$ | $UNI_j$ | $TNI_j$ | $BV_j$ | $ATFR_j$ | $BV_j - ATFR_j$ |
|---|---|---|---|---|---|---|---|
| $MV_j$ | 1 | | | | | | |
| $NI_j$ | 0,583* | 1 | | | | | |
| $UNI_j$ | 0,270* | 0,619* | 1 | | | | |
| $TNI_j$ | 0,574* | | 0,292* | 1 | | | |
| $BV_j$ | 0,370* | 0,463* | 0,372* | | 1 | | |
| $ATFR_j$ | 0,112** | 0,406* | 0,639* | 0,182* | 0,420* | 1 | |
| $BV_j - ATFR_j$ | 0,371* | | 0,125* | 0,387* | | 0,002 | 1 |

*Definition of Variables:* $MV_j$ = the market value of firm j six months after fiscal year end; $NI_j$ = the annual net income of firm j; $UNI_j$ = the yearly earnings of firm j that were taxed at either null or lower tax rate; $TNI_j = NI_j - UNI_j$; $BV_j$ = the book value of firm j; $ATFR_j$ = the accumulated tax free reserves of firm j; all variables in Models (1) and (2) were deflated by the Total Assets in the beginning of the year

Notes:
*: Significant at a = 0.01; **: Significant at a = 0.05; ***: Significant at a = 0.10;

From the figures listed in Table 2 we observe that the $MV_j$ variable is highly correlated with all the independent variables. Moderate correlation coefficients are also observed among the various independent variables of our study. These results indicate the existence of collinearity among certain independent variables. For this reason, the condition index suggested by Belsley, Kuh and Welsch (1980) was calculated for each equation in order to examine the presence of multicollinearity· The values obtained are very low, suggesting the absence of multicollinearity. We also corrected for heteroscedasticity using White's (1980) heteroscedasticity-consistent co-variance matrix.

Table 3 presents the empirical results of estimating models (1) and (2) using the Ordinary Least Squares (OLS) method. The figures in parentheses stand for the t-ratios of the estimates. It should also be said that the results presented in Tables 3 and 4 were obtained using yearly dummies. Contrary to other studies (Martikainen *et al*, 1997), the inclusion of the yearly dummies improved significantly the explanatory power of both models.

*Table 3.* – O.L.S. RESULTS. Pooled Regressions For The Basic And The Disaggregated Model

| Model | Dependant Variable | Constant | NIj | TNIj | UNIj | BVj | BVj – ATFRj | ATFRj | Adj. $R^2$ |
|---|---|---|---|---|---|---|---|---|---|
| 1 | MVj | 0.206<br>1.41 | 10.089<br>(21.48)* | | | 0.380<br>(1.45) | | | 0.856 |
| 2 | MVj | 0.223<br>(1.54) | | 10.282<br>(18.48)* | 12.463<br>(19.78)* | | 0.645<br>(2.39)** | -1.325<br>(2.91)* | 0.862 |

*Definition of Variables:* $MV_j$ = the market value of firm j six months after fiscal year end; $NI_j$ = the annual net income of firm j; $UNI_j$ = the yearly earnings of firm j that were taxed at either null or lower tax rate; $TNI_j = NI_j - UNI_j$; $BV_j$ = the book value of firm j; $ATFR_j$ = the accumulated tax free reserves of firm j; all variables in Models (1) and (2) were deflated by the Total Assets in the beginning of the year

Notes:
*: Significant at a = 0.01; **: Significant at a = 0.05; ***: Significant at a = 0.10;

From the figures listed in Table 3 for models (1) and (2) we notice that the disaggregation of both the total earnings and total book value variables improves the explanatory power of the earnings-book values capitalisation model from 0.856 to m0.862. I also performed a Wald test of equality between the $b_1$ and $b_2$ coefficients as well as between the $c_1$ and $c_2$ coefficients of the disaggregated model. In both tests the null hypothesis was rejected at the 1 per cent level of significance.

As far as the estimated ERCs of model (2) are concerned, it appears that the estimated ERC of the $UNI_j$ variable is higher from that of the $TNI_j$ variable. In other words, investors value higher the ability of the firm to exploit the tax system and reduce current tax payments by creating tax-free reserves while, in the pricing of the earnings generating ability of the firm they ignore the contingent liability that is embodied in the tax-free earnings.

Looking at the estimated BVRCs of model (2) we notice that although the BVRC of the ($BV_j$ - $ATFR_j$) variable is positive, as expected, the $ATFR_j$ variable is negatively associated with share prices. Possibly, investors believe that these reserves are not created because there are projects with a positive Net Present Value (NPV) where these reserves can be reinvested, but that they are created only in order to reduce current period's income tax expense. Furthermore, they may be conscious of the reduction in the value of these reserves in case of a future distribution of them, and they price the $ATFR_j$ variable accordingly.

Further, from the values of the estimated coefficients of the $UNI_j$ and the $ATFR_j$ variables (and assuming that they are constant over time) we notice that, if a firm starts creating tax free reserves from zero and if it is assumed to create one monetary unit of tax free reserves each year, the positive influence of $UNI_j$ variable will outweighs the negative influence of the $ATFR_j$ variable, in a diminishing order, for the first nine years; in the tenth year, one monetary unit disposed for the creation of the annual tax free reserve will increase the market value of the firm by 12.463 monetary units but the accumulated tax-free reserve will reduce the market value by 13,25 (= 1,325 × 10) monetary units. It looks as if the creation of tax-free reserves has an overall positive effect on market values in the short run only; in the long run, the overall effect of accumulating tax free reserves will be negative. Therefore, undertaking activities that allow the firm to create deferred tax liabilities should be treated only as a short run policy instrument by the firms' management.

In Table 4, I carry out a contextual analysis by the degree of usage of the tax-free reserves legislation by firms. Firms were divided into heavy and light users of the tax-free reserves legislation according to the degree that the tax-free reserves participate in the book value of the firm. To do this, I calculated the $ATFR_j/BV_j$ variable, which measures the accumulated tax-free reserves as a percentage of the book of equity, and I classified those firms with a value of the $ATFR_j/BV_j$ variable above the median as heavy users of the tax reserves

legislation and those below the median as light users of the tax free reserves legislation. Then, I tested the validity of my results for those firms that make heavy use of the tax free reserves and for those that do not. The implicit assumption is that models (1) and (2) will be more informative for heavy users.

*Table 4.* – Contextual Analysis by the Degree of Usage of the Tax-Free Reserves Legislation

| | **Model 1 High Users** | **Model 1 Light Users** | **Model 2 High Users** | **Model 2 Light Users** |
|---|---|---|---|---|
| **Dependant Variable** | **$MV_j$** | **$MV_j$** | **$MV_j$** | **$MV_j$** |
| **Constant** | 0.436<br>(1.66)*** | 0.034<br>(0.19) | 0.434<br>(1.63) | 0.045<br>(0.21) |
| **$NI_j$** | 11.185<br>(14.56)* | 10.242<br>(9.79)* | | |
| **$TNI_j$** | | | 10.934<br>(11.17)* | 10.012<br>(7.60)* |
| **$UNI_j$** | | | 13.013<br>(12.86)* | 11.283<br>(2.52)** |
| **$BV_j$** | -0.248<br>(-0.54) | 0.770<br>(2.49)** | | |
| **$BV_j$ – $ATFR_j$** | | | 0.316<br>(0.52) | 0.7444<br>(2.53)** |
| **$ATFR_j$** | | | -1.748<br>(-2.20)** | 0.847<br>(0.33) |
| **Adj. $R^2$** | 0.920 | 0.423 | 0.923 | 0.425 |

*Definition of Variables*: $MV_j$ = the market value of firm j six months after fiscal year end; $NI_j$ = the annual net income of firm j; $UNI_j$ = the yearly earnings of firm j that were taxed at either null or lower tax rate; $TNI_j$ = $NI_j$ -$UNI_j$; $BV_j$ = the book value of firm j; $ATFR_j$ = the accumulated tax free reserves of firm j; all variables in Models (1) and (2) were deflated by the Total Assets in the beginning of the year

Notes: *: Significant at a = 0.01; **: Significant at a = 0.05; ***: Significant at a = 0.10

From the figures listed in Table 4, we see that both models (1) and (2) perform better for the heavy users group of firms than for the light users group of firms. Comparing the results presented in Table 4 we notice that, for the heavy users group, the disaggregation provided for in model (2) increases only marginally the explanatory power of model (1) but not for those classified as light users.

All estimated ERCs in models (1) and (2) of Table 4 are statistically significant at a = 0.01 and a 0.05. With respect to the estimated BVRCs, the estimated coefficient of the $BV_j$ variable in the basic models is statistically significant at a = 0.05 and with a positive sign only for the light users group. In the disaggregated model, the ($BV_j$-$ATFR_j$) variable is statistically significant at a = 0.05 and with a positive sign only in the light users group while the $ATFR_j$ variable is statistically significant at a = 0.05 and with a negative sign only in the heavy

users group. It appears that as long as the accumulated tax-free reserves are small, investors price (positively) only the ability of the firm's management to exploit the tax legislation and reduce current period's income tax expense. As tax free reserves accumulate over time, investors become conscious of both the potential absence of projects with a positive NPV (where these retained earnings could be reinvested) and the reduction in the value of those tax-free reserves that will be realised in case of a future distribution of them, and they react accordingly.

## 6. Conclusions

In this paper I tested the capital market effects of the differential tax treatment of the various earnings components within the context of the earnings-book values capitalisation model, when income tax is reported under the income tax payable method. I argued that under this method, the resulting tax free reserves embody an undisclosed contingent liability and the well informed rational investor should account for it. The empirical tests were carried out using data from the Athens Stock Exchange for the period 1994 - 2000. In the empirical tests, I checked for heteroscedasticity using White's (1980) heteroscedasticity consistent co-variance estimation matrix. The empirical results suggest that:

(a) When reported net income includes both taxed and untaxed items, separate disclosure of those items in the income statement improves the explanatory power of the earnings-book value capitalisation model. Further, the ERC of the net income taxed at the statutory tax rates is statistically different from the ERC of the untaxed (or taxed at a lower rate) net income, as expected.

(b) The accumulated, over time, retained tax-free earnings, which are part of the firm's equity, are negatively associated with stock prices. This may be due to the unfavourable tax treatment of these reserves since they will be overtaxed in case that they will be distributed as dividends to the shareholders.

Overall, the creation of tax-free reserves has a positive and a negative effect on a firm's value. The positive effect is due to the reduction in the current tax payment, while the negative effect is due to the unfavourable tax treatment of the accumulated tax-free reserves when they will distributed as dividends. In the short run, when the accumulated tax-free reserves are low, the positive influence of the reduction in tax of this year's earnings outweighs the negative effect of the accumulated tax-free reserves. This results in an overall positive effect of tax-free reserves on firms' values in the short run. In the long run, as the accumulated tax-free increase, the positive influence of the reduction in tax of this year's earnings cannot outweigh the negative effect of the accumulated tax free reserves any more and this causes an overall negative effect of

the tax free reserves on firms values in the long run. Therefore, undertaking activities that allow firms to create tax free reserves must be seen by the firms' management only as a short run instrument that can help them to manage earnings and share prices but which can cause adverse effects on the firm's value in the long run.

For regulators, the findings of this study suggest that the communication of the deferred tax liabilities is vital to the market participants and, therefore, the tax payable method, which does not disclose such information, is not the appropriate method to be adopted for financial reporting purposes. The findings of this study also suggest that the change in the Greek tax legislation that occurred in 2004 is expected to have a positive effect on shares values in the long run.

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ANTONIOS STAVROPOULOS
STAVROS TSOPOGLOU
ATHANASIOS BAZAKIDIS

# Determining Fair Value of Enterprises due to Sale and Taxation

## Abstract

In Greece, as in all national economies, capital gains transfer taxes due to sale, inheritance and parent allowance, tax burden depends on government tax-acts and regulations. Taxes paid when business entities are transferred are normally the result of predetermined rates on the difference between the minimum value of the company and the amount paid in the transfer transactions. The minimum value of business entities, following all relevant government Acts and explanatory Circular Letters, is determined by their legal form. It is shown that how a business entity's legal form determines its value, according to Greek tax regulations and secondly how the related tax burden, which arises during its sale to third parties or transfer to relatives, is calculated. It will be illustrated that this measurement depends on a firm's legal structure.

## 1. Introduction

The Greek Government Tax Authority[1], in order to impose capital transfer taxes on equity stocks, partnership shares and sole trader enterprises because of sale, inheritance or parental allowance, determines the value of business entities in ways that depend on the legal form of the related enterprise. This value becomes the basis for tax calculation.

Tax on transfers resulting from parents' gifts and allowances to their children or inheritance is calculated according to the "Inheritance and Allowance Tax Code", which provides three different tax rate tables depending on the degree of affinity. Taxation rate and degree of affinity are directly related. Closest affinity results in lower taxation and vice versa because as the degree of affinity becomes more distant, tax exemptions decrease and tax rates increase.

In the case of Sole Trader Enterprises (STE)[2], General Partnership (GP) or Limited Partnership (LP) fractional shares, transfers from a parent to a child or from a spouse to another spouse, due to retirement of the owner, since 1st January 2001, no transfer tax is imposed in Greece.

[1] Similar to the Inland Revenue (IR) for the UK or the Internal Revenue Service (IRS) for the USA.

[2] or Sole Proprietorship in the USA.

Transfers that result from the sale of a STE and Corporation [(Societé Anonym (S.A.)[3] stock, not listed in the Stock Exchange, to first or second-degree relatives, are taxed with rates of 1.20 per cent or 2.4 per cent respectively.

Finally, transfers resulting from the selling of a STE, Partnership shares or S.A. shareholders' equity to third parties are taxed by a factor of 3‰, 0.5 per cent or 20 per cent depending on the legal structure of the firm.

The purpose of this article is firstly to show how a business entity's legal form determines its value, according to Greek tax regulations. Secondly, it will show how the related tax burden, which arises during its sale to third parties or transfer to relatives, is calculated. It will be illustrated that this measurement depends on a firm's legal structure. To this end, similar financial accounting data for business entities with different legal form will be used. Relevant tax rate tables are included in the Greek Ministry of Economy (Treasury Department) Acts, 119720/22-12-1999 and 1030366/01/04/2003, as well as in its circular letters (CL) published as explanatory documents[4].

## 2. Determination Of The Minimum Equity Stock Value For Corporations

### 2.1. Corporations Unlisted in the Stock Exchange

The transfer of equity stock of unlisted S.A.s must be carried out with a notary public or with a private document that should include at least the following statements:

The exact time and date of transfer of the equity stock.

The way that the transfer documents are prepared and signed.

Complete personal information of the contracting parties (sellers, purchasers etc) together with the full name, registered office address, Tax Identification Number[5], Public Tax Office (PTO)[6] to which the owner-transferee is obligated to pay the defined tax.

Information of the transmitted shares (name, head office address, Tax Identification Number of the company to which the stocks belong, their number and issue value, their serial numbers and any existing adjunct coupons.

The documents of transfer must be completed (sale, gift, parental allowance, exchange, replacement etc). In case of a sale, the exact agreed amount as well as the method of payment must be stated.

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[3] Corporation in the USA, Limited by Shares Company in the UK or Societé Anonym in France and Europe.

[4] Circular Letter (CL) is used for the Greek word "*enkyklios*" used by government authorities very widely to as explanatory statements.

[5] (AFM) acronym in Greek.

[6] (DOY) acronym in Greek.

When signed, the document describing the transaction is submitted by the transmitter to the PTO in which the party is listed, for authentication within ten days from the date of signature.

The greater value between the agreed value and the minimum value of the stocks is taxed independently at a rate of 5 per cent.

The unsettled tax on the capital gains value from the sale of stocks is paid by the seller and is paid only once.

In cases where foreign companies' stocks are being transferred, for tax purposes, the 5 per cent tax rate will be imposed on the agreed value of the sale (special treatment as an incentive).

Parties that inherit an unlisted S.A. company equity shares are obliged to submit to the Public Tax Office in which they are listed, two copies of a statement with the minimum value of the stocks.

1. The minimum value per share of equity stock is determined as follows:

   Return on Owners' Equity is calculated

   $$\text{Return on Owners' Equity} = \frac{\text{Average Net Profit}}{\text{Average Owners' Equity}} \quad (1)$$

   If the resulting return on the owners' equity is negative or zero the process of calculation is stopped and the taxable value is the one agreed.

2. We increase the value of owners' equity at hand, on the previous day to the date on which the statement is to be submitted, by the capital gains return computed. To this result we also add the difference between the value of the company's real estate, as it is determined on the date of transfer in the "taxation of real estate transfer act, and its book value in the company accounts, if the latter is smaller. The minimum value per share is then calculated if we divide the above sum total with the number of owners' equity shares outstanding on the same date.

3. Owners' equity capital is the balance of the company's relevant accounts as it appears on the previous day to the date on which the statement of transfer is submitted. These accounts, according to the General Accounting Plan, are:

   Account 40: (Owners' Share Capital) excluding balances of dub-accounts 18.12 (Share Capital Owed), 33.04 (Capital Owed) and 33.05 (Payments for Share Capital Delayed)

   Account 41: (Reserve funds, Differences from readjustments, Investments subsidies), minus funds from sub-account 41.01 (Unsettled difference from issuance of stock over par).

   Account 42: [Net Profit (Retained)].

4. In cases where companies, as a result of changes in legal form or mergers and acquisitions, have issued less than three Financial Accounting State-

ments, the return on owners' equity capital is the ratio of three years' average profits as they appear in the Profit and Loss Statements, and the same period average owners' equity capital from the Balance Sheets of the related firms prior to the change.

In all other cases, the ratio results from the division of average profits and average owners' equity capital from the published Balance Sheets and Profit and Loss Statements of the five (5) years prior to the stocks transfer date. If less than five Accounting Statements have been published, data from the latest four (4) or three (3) years' statements is obtained.

5. Net Profit and Loss is given in accounts 86.00 and 86.01 respectively as well as in account 80 (Operations Account) before its closing to account 86.

We should note that:

In cases where the value of transferred shares in the agreement document (notary public or private) is different from that resulting from the above calculations, the larger of the two is taken into consideration.

In cases where we have the sale of naked ownership of unlisted capital shares, first a tax obligation of 5 per cent on the value of naked ownership (Act 1136/02) is imposed; subsequently when the usufruct is also transferred it is also taxed at the rate of 5 per cent. When only the usufruct is sold, no transfer tax obligation exists. Only with the full transfer of ownership rights is the relevant transfer tax being paid. If, from the value of full ownership the value of usufruct is subtracted, one obtains the value of naked ownership. The value of the usufruct is calculated based on the age of the usufructuary, as shown in Table 1:

*Table 1.* – USUFRUCT AND NAKED OWNERSHIP RATES

| Usufructuary Age (years old) | Percent usufruct (over full ownership) | Percent Naked Ownership (over full ownership) |
|---|---|---|
| Under 20 | 80% | 20% |
| 20-30 | 70% | 30% |
| 30-40 | 60% | 40% |
| 40-50 | 50% | 50% |
| 50-60 | 40% | 60% |
| 60-70 | 30% | 70% |
| 70-80 | 20% | 80% |
| Over 80 | 10% | 90% |

When usufruct is set for a specified period of time, a fraction of 1/20 (5 per cent) per year (periods less than a year are counted as a whole year) up to a maximum 8/10 (80 per cent) of the value of the full property rights is used. In the case where the usufruct is of lifelong or indefinite duration and the usufructuary is a limited company, the usufruct value is limited to 8/10 (80 per cent) of full property (Act 1136/02, Act 2961/01 article 15). If the value

of the naked ownership agreed is greater than the one derived from the above calculations, then 5 per cent tax is calculated on this greater value.

Shares unlisted in the Stock Exchange, that are contributed to a corporation as initial equity capital or as an addition to existing capital are taxed with a 5 per cent factor on their real value because this act is not considered a sales or a transfer but a contribution of equity capital (CL 1033/25.01.00).

When equity share capital is transferred before the end of a company's first accounting period and there is no published Financial Accounting Statements, the figure of share capital is obtained from the General Ledger account balance on the date prior to that of the transfer day. The same clause holds in cases where share capital is transferred after the accounting period but before the publication of the Financial Accounting Statements (CL 1066328/16.07.03 Ministry of the Economy).

The Profit and Loss figure is taken from the respective entry in sub-form E3 of the Income Tax Return Form and not as it may have changed by possible revisions, due to later tax audits (CL 1066328/16.07.03).

The following example will illustrate the accounting practices stated above, using a corporation that has been in operation for eight years (1/1/1992-31/12/2002) and is about to transfer a fraction of its share capital.

*Table 2.* – FINANCIAL ACCOUNTING DATA FOR A S.A.(€)

| Balance Sheet date | Profit and Loss | Owners' Equity |
|---|---|---|
| 31/12/2002 | 42,500.00 | 67,000.00 |
| 31/12/2001 | 41,000.00 | 66,000.00 |
| 31/12/2000 | 41,000.00 | 65,000.00 |
| 31/12/1999 | 39,500.00 | 64,000.00 |
| 31/12/1998 | 35,000.00 | 63,000.00 |
| Total | 199,000.00 | 325,000.00 |
| Year average | 199,000,00/5 = 39,000.00 | 325,000.00/5= 65,000.00 |

This company owns a fixed asset (real estate) with a book value of € 300,000.00 and a fair value, as of January 1st 2003, of € 350,000. Based on these facts the application of all above accounting laws and circular statements of practice one obtains the following results:

$$\text{Average Return on Owners Equity} = \frac{39,800,00}{65,000.00} = 0.62 \text{ or } 62 \text{ per cent}$$

Minimum real value of the enterprise according to the Greek Tax Authorities equals:

Owners' Equity Capital balance (at the date of sale)] plus an increase of equity based on the five year average return on equity rate (1+return rate) plus the difference between the fair value of the fixed asset and its book value:

67,000.00*1.62 = € 108,540.00

and

108,540.00+(350,000.00-300,000.00)= € 158,540.00

This is the tax base value of the Limited Company and a transfer tax of,

158,540.00*5% = € 7,927.00

will be imposed if the entire enterprise is to be transferred. When a smaller percentage of the firm is transferred, the tax burden is calculated proportionally.

### 2.2 Corporations Listed in the Stock Exchange

The transfer of shares of a listed Limited Company must be carried out with the mediation of a stockbroker, which is obligatory. A 3‰ tax is imposed on the stock sale which is placed in the Athens Stock Exchange. This tax is calculated on the value of the stocks appearing on a document issued by the brokerage firm which completes the transaction and burdens the seller of the stocks (Act 2579/98 article 2; CL 1025535/23.2.980 Ministry of Economy and Act 2753/99).

It should be noted that this tax rate was firstly set at 3‰ by 2579/98, article 22) then increased to 6‰ by 2742/1999, article 22 (since 8.10.1999) and lastly set to its present value (3‰) by 2874/2000, article 37 paragraph 5 (since 1.1.2001).

The same tax rate (3‰) also applies to transfers of Limited stocks that have been approved for listing in the Stock Exchange and which are distributed to the public as initial offerings for the purpose of wider distribution of stock. (1224/17.09.02, CL 1055613 Ministry of the Economy)

Following the previous example, if the Stock Exchange market value of the Limited shares is, for example, three times its book value as of 1/1/2003, the date of sale, the tax burden for the transfer of these stocks will be:

Share capital market value = (31/12/2002 equity)*3 = € 67,000.00*3 = € 201,000.00 and Tax burden = € 201,000.00*3‰ = € 603.00

The amount of the tax due is proportional to the fraction of shares transferred.

## 3. Determination of the Minimum Value of Sole Trader Enterprises, General And Limited Partnerships, Joint Ventures and Civil Societies

The minimum value of an enterprise for tax purposes is defined as the sum of intangible assets and owners' equity. If then from that amount, the value of acquiring the assets is subtracted, the capital gains surplus is determined. This

value is the amount on which a transfer tax of 20 per cent is applied when the firm is sold. The parts that constitute the above calculations are explained below and estimation examples are given as well.

### 3.1 Intangible Value

For the estimation of the intangible value of a business entity, one has to determine the average net profit or income for the five most recent years.

When double entry accounting books are kept, average profit is calculated by the sum of net profit figures from the Profit and Loss accounts and averaged for the set period.

In cases where 1st and 2nd category and no accounting books are kept, income declared from all sources related to the business is added and averaged for the five-year period prior to the transfer date.

If the number of years of operation is less than five, average income is measured only just for the years at hand.

From the average profit or income calculated above, the amounts explained in paragraphs A1 and A2 are subtracted.

A1. The yearly salary specified by the White-collar Collective Agreement that is in effect as of January 1st for a clerk occupied for five years and not counting fringe benefits. For service enterprises this salary is further increased by 30 per cent. Starting 1/1/2003 the amount of the salary per year was set at 9,300.00 € for firms engaged in the production and/or sale of goods and 12,090.00€ for service firms. These figures are used in the case of STEs as given.

In the case of GPs, Joint Venture and Civil Companies, the salary expense is doubled, i.e.

2* 9,300.00= € 18,600.00 for goods firms and

2*12,090.00= € 24,180.00 for service firms.

When the transfer involves an LP fractional share, the amount of the set salary is doubled and further multiplied by the percentage participation of the partner to the firm's equity. This amount cannot be smaller than the set salaries stated above (€ 9,300.00 and € 12,090.00).

If, for example, a partner owns a fractional share of 60 per cent in a LP, the salary expense allowed for subtraction will be:

(2*9,300.00)*60%=11,160.00€ for a goods firms

A2. Interest on owners' capital of the firm, calculated using the nominal coupon rate of a one-year Greek government Treasury Note (the risk-free rate of the economy). For 2003 this rate was 2.69 per cent.

A3. The amount calculated above is defined as the profit of the firm, and it has to be discounted with a present value factor given by the following relation:

$$PVIF_{i,n} = \frac{1-(1+i)^{-n}}{i} = \frac{1-\frac{1}{(1+i)^{n}}}{i} \quad (2)$$

where,

PVIF=Present Value Interest Factor

i is the one-year Greek Treasury Note nominal coupon rate

n is the number of years (here five years)

A4. The calculated present value of the five-year average profit is further increased using the following factors depending on the years of operation.

| Years of Operations | Factor |
|---|---|
| over 3 to 5 | 10% |
| over 5 to 10 | 20% |
| over 10 to 15 | 30% |
| over 15 | 40% |

If the transfer involves small enterprises that do not keep accounting books or that simply keep a Purchases book, the above rates are decreased by 50 per cent.

### 3.2 Owners' Capital

I. *The case of 1st and 2nd category accounting Books*

In order to estimate owners' capital for firms keeping 1st and 2nd category accounting Books the following amounts are added (A-C) or subtracted (D):

A. The un-depreciated value of fixed assets for all non-service firms in this section, with the exception of Sole Trader Enterprises where real estate and cars are excluded and are not considered fixed assets since they are owned by a physical person (and not by the enterprise).

   If depreciation expenses have not been recorded for any reason, the book value of fixed assets is decreased by the amount of depreciation that should have been recorded.

B. The stock of goods for sale which is set as 10 per cent of goods purchased in the accounting period prior to the date of transfer (Act 1053/03 Treasury Department). In cases where an inventory valuation process has been completed, the accounting book entry is used.

C. Collectibles of non-service firms that amount to 10 per cent of wholesale and not retail sales which are recognized in the accounting period prior to the date of transfer.

D. Payables of non-service firms that amount to 10 per cent of Purchases.

The net amount resulting from paragraphs A-D is the figure used for Owners' Capital.

II. *The case of double entry accounting books.*

To calculate Owners' Capital for firms that keep this type of books, we add together the following figures:

A. The book value of Owners' Capital as it appears in the firm's most recently published official Balance Sheet.

B. The difference between the value of real estate as determined by the Real Estate Transfer Tax Authority on the date of transfer and its book value, if the latter is smaller than the former.

The sum of A and B is the figure for Owners' Capital.

### 3.3 Acquisition Costs

The cost of acquiring fixed assets is set according to the Tax Authority and must be determined for transfer tax purposes as followed:

A. In the case of STE with 1st or 2nd category accounting books, the cost of establishing a firm is the sum or cash payments for rent lease contracts, fixed capital cash-purchases necessary to begin operations and goods cash-purchases that were used to create revenue. This total amount cannot be less than 3,000.00€

B. In the case of STE with double entry accounting books, the cost of establishing the firm is taken from the enterprise's accounting books.

C. In all other cases, the relevant costs are taken as stated either in the firm's memorandum of association (case of 1st and 2nd category accounting books) or in its accounting books (case of double entry accounting books).

Where changes have occurred in the Owners' Capital structure prior to the date of transfer, the tax base amount is the average of the past five (or less if relevant) years of Owners' Equity as recorded in the firm's accounting books.

In the following example, an LP partner transfers his fractional share within year 2003 to another partner. Owners' Capital figures of the firm for the last five years are given below:

*Table 3.* – SHARE CAPITAL OF AN LP (€)

| Date | Share Capital |
|---|---|
| 31/12/2002 | 40,000.00 |
| 31/12/2001 | 20,000.00 |
| 31/12/2000 | 20,000.00 |
| 31/12/1999 | 10,000.00 |
| 31/12/1998 | 10,000.00 |
| Total | 325,000.00 |
| Year average | 100,000.00/5 = 20,000.00 |

The minimum value of the capital gains for the transferred firm is found if, from the minimum value of the transferred ownership, the cost of its acquisition is subtracted. The difference is taxed at a rate of 20 per cent.

If the notary public or private document states a transfer value greater than the minimum value found above, then the agreed value is taken into consideration in all further calculations (CL 1066328/18.7.03)

The party obliged to pay the 20 per cent tax on capital gains of the entire firm, or the partner share sold, is the seller, since he benefits from this gain. The tax must be declared and paid to the Government Tax Office in which the sold firm is listed. The first page of the Tax Return Form is kept at the GTO, whilst the remaining two are kept by the seller.

If the transfer of an asset is completed without filing the necessary Tax Return Document and payment of the tax burden, then the person who acquires the asset is wholly and, in parallel, responsible together with the seller for payment of the amount owed as tax.

To illustrate the above procedures, the following example is used.

A General Partnership operating for eight years and keeping double entry accounting books, which owns real estate that as of 1/1/2003, date that the asset is transferred, with a book value of 300,000.00. The fair value of the asset is of 350,000.00 euros and the firm's financial accounting figures for the last five years are given below:

*Table 4.* – FINANCIAL ACCOUNTING DATA OF AN LP (€)

| Financial Accounting Accounts Date | Net Profit from Operations | Owners' Equity |
|---|---|---|
| 31/12/2002 | 42,500.00 | 67,000.00 |
| 31/12/2001 | 41,000.00 | 66,000.00 |
| 31/12/2000 | 41,000.00 | 65,000.00 |
| 31/12/1999 | 39,500.00 | 64,000.00 |
| 31/12/1998 | 35,000.00 | 63,000.00 |
| Total | 199,000.00 | 325,000.00 |
| Year average | 199,000.00/5 = 39,800.00 | 325,000.00/5 = 65,000.00 |

Based on these data the following calculations must be made:

*Table 5*. – MINIMUM VALUE CALCULATIONS FOR A LP (€)

| | | | |
|---|---|---|---|
| Average Profit | | | 39,800.00 |
| Less Annual salary expenses | 93,000.00*2 | 18,600.00 | |
| Interest on average Owners' Equity | 65,000.00*2.69% | 1,748.50 | 20,348.50 |
| Net average gain | | | 1,9451.50 |
| $[PVIF]_{i=2.69\%,\ n=5}$ | $\{1-[(1/(1.0269)^5]\}/0.0269$ | 4.60 | |
| a. Present value of average gains | 1,9451.50*4.60 | | 8,9476.90 |
| b. plus years of operation adjustment 20% | 89,476.90*20% | | 17,895.38 |
| c. plus Owners' Capital (31/12/2002) | | | 67,000.00 |
| d. plus excess real estate value | | | 50,000.00 |
| Total | (a+b+c+d) | | 224,372.28 |

The above amount is the minimum value of the enterprise for the Government Tax Authority for tax purposes. Subsequently, the calculated minimum value is compared to the agreed actual value of the transfer and the larger of the two is chosen. Supposing that the calculated minimum value is the larger of the two, we proceed as follows:

*Table 6*. – TAX CALCULATIONS FOR A LP (€)

| | |
|---|---|
| Minimum transfer value | 224,372.28 |
| less value of acquisition of share capital | 65,000.00 |
| Surplus (Capital Gain) | 159,372.00 |
| Tax burden (20%*159,372.00) | 31,874.46 |

In the case of an STE and the same accounting and transfer data, the results would be as follows:

*Table 7*. – MINIMUM VALUE CALCULATIONS FOR A STE (€)

| | | | |
|---|---|---|---|
| Average Profit | | | 39,800.00 |
| Less Annual salary expenses | 9,300.00*1 | 9,300.00 | |
| Interest on average Owners' Equity | 65,000.00*2.69% | 1,748.50 | 11,048,50 |
| Net average gain | | | 28,751.50 |
| [PVIF]i=2.69%, n=5 | $\{1-[(1/(1.0269)^5]\}/0.0269$ | 4.60 | |
| a. Present value of average gain | 28,751.50*4.60 | | 132,256.90 |
| b. plus years of operation adjustment 20% | 132,256.90*20% | | 17,895.38 |
| c. plus Owners' Capital (31/12/2002) | | | 67,000.00 |
| d. plus excess real estate value | | | 50,000.00 |
| Total | (a+b+c+d) | | 275,708.28 |

The above amount is the minimum value of the enterprise for the Government Tax Authority for tax purposes. Subsequently, the calculated minimum

value is compared to the agreed actual value of the transfer and the larger of the two is chosen. Supposing that the calculated minimum value is the larger of the two, we proceed as follows:

*Table 8.* – TAX CALCULATIONS FOR A STE(€)

| | |
|---|---|
| Minimum transfer value | 275,708.28 |
| less value of acquisition of share capital | 65,000.00 |
| Surplus (Capital Gain) | 210,708.28 |
| Tax burden (20%*210,708.28) | 42,141.66 |

## 4. Determination of the Minimum Value of Limited Liability Companies (Llc)

In order to determine the minimum value of an LLC, we addition the values of Intangible Assets and Shareholders' Equity. This amount is the minimum value for tax purposes. To find the capital gain that is considered the base for transfer tax calculations, we then subtract all acquisition costs. The difference is taxed with a factor of 20 per cent. For LLCs the above figures are calculated as follows:

### 4.1. Intagible Assets

In the case of LLCs we follow the calculation procedure in the same way as Part 3 above. The only difference is that since these companies keep double entry accounting books, all relevant figures are taken from the accounting books.

### 4.2. Shareholders' Equity

To estimate shareholders' equity for tax purposes we also follow the same procedure as before. Here again though, book value figures for all relevant amounts are also used. Shareholders' equity is the sum of equity at book value, plus the difference between the fair value of fixed assets, as set by the tax authority, and their book value.

The sum of intangibles and shareholders' equity is the minimum value of the Limited Company. Again, only if the agreed actual value of the transfer is larger than the minimum, the former is considered the tax basis amount.

### 4.3 Acquisition Costs

The cost of acquisition of an LLC share capital is the cost written in the company memorandum of association. When changes in capital have occurred, prior to the date of transfer as above, the cost of acquisition is the five-year

average share capital at book value. Where less than five accounting periods have elapsed, the average is taken over the given years.

An example to illustrate the case of a LLC is given below:

A Limited Liability Company operating for eight years, owns real estate that as of 1/1/2003, date that the asset is transferred, with a book value of 300,000.00. The fair value of the asset is of 350,000.00 euros and the firm's financial accounting figures for the last five years are as follows:

*Table 9.* – SHARE CAPITAL OF AN LLC (€)

| Date | Share Capital |
|---|---|
| 31/12/2002 | 40,000.00 |
| 31/12/2001 | 20,000.00 |
| 31/12/2000 | 20,000.00 |
| 31/12/1999 | 10,000.00 |
| 31/12/1998 | 10,000.00 |
| Total | 100,000.00 |
| Year average | 100,000.00/5 = 20,000.00 |

*Table 10.* – FINANCIAL ACCOUNTING DATA OF AN LLC (€)

| Financial Accounting Accounts Date | Net Profit from Operations | Owners' Equity |
|---|---|---|
| 31/12/2002 | 42,500.00 | 67,000.00 |
| 31/12/2001 | 41,000.00 | 66,000.00 |
| 31/12/2000 | 41,000.00 | 65,000.00 |
| 31/12/1999 | 39,500000 | 64,000.00 |
| 31/12/1998 | 35,000.00 | 63,000.00 |
| Total | 199,000.00 | 325,000.00 |
| Year average | 199,000.00/5 = 39,800.00 | 325,000.00/5 = 65,000.00 |

*Table 11.* – MINIMUM VALUE AND TAX CALCULATIONS FOR A LLC

| | | | |
|---|---|---|---|
| Average Profit | | | 39,800.00 |
| Less Interest on average Owners' Equity | 65,000.00*2.69% | | 1,748.50 |
| Net average gain | | | 38,051.50 |
| [PVIF]i=2.69%, n=5 | $\{1-[(1/(1.0269)^5]\}/0.0269$ | 4.60 | |
| a. Present value of average gains | 38,051.50*4.60 | | 175,036.90 |
| b. plus years of operation adjustment 20% | 175,036.90*20% | | 35,007.38 |
| c. plus Owners' Capital (31/12/2002) | | | 67,000.00 |
| d. plus excess real estate value | | | 50,000.00 |
| Total minimum value | (a+b+c+d) | | 327,044.28 |

*Table 12.* – TAX CALCULATIONS FOR A LLC

| | |
|---|---|
| Minimum transfer value | 327,044.28 |
| less value of acquisition of share capital | 65,000.00 |
| Surplus (Capital Gain) | 262,044.28 |
| Tax burden (20%*262,044.28) | 52,408.86 |

## 5. Summary Results of Business Entities

From the examples in parts 2, 3 and 4 it is noted that companies with similar financial accounting figures but different legal form, according to Government Tax Authority regulation, result in different minimum capital gains for tax purposes. As a result, any transfer taxes that may arise, depend on the legal form of companies alone.

The results found are summarised in the following table in order to illustrate the differences:

*Table13.* – SUMMARY RESULTS FOR BUSINESS ENTITIES (ANALYSED IN PART 2,3 AND 4)

| Business entity legal form | Minimum value of surplus (capital gain) | Tax rate | Transfer tax because of sale | Index of transfer tax burden relative to a listed S.A. |
|---|---|---|---|---|
| S.A. unlisted | 158,540.00 | 5% | 7,927.00 | 13.15 |
| S.A. listed | 201,000.00 | 3‰ | 603.00 | 1.00 |
| LLC | 262,044.28 | 20% | 52,408.86 | 86.91 |
| GP and LP | 159,372.28 | 20% | 31,874.46 | 52.86 |
| STE | 210,708.28 | 20% | 42,141.66 | 69.89 |

S.A. = Societé Anonym (Corporation)

LLC = Limited Liability Company

LP = Limited Partnership

GP = General Partnership

STE = Sole Trader Entreprise

It is noted that based on similar financial accounting data assumptions, Greek transfer tax regulations result in an unlisted S.A. paying 13 times more transfer taxes, due to sale, than one listed in the Stock Exchange S.A. The sale of an LLC will result in 87 times more transfer taxes than the listed S.A. and the LP and GP 53 and 70 times the S.A. respectively.

In the case where we have a transfer, due to sale, of STEs, shares unlisted in the Stock Exchange, fractional company shares, percentage ownership of Civil Societies or Joint Ventures (with the exclusion of construction Joint Ventures), the following taxes fall on the sellers.

*Table 14.* – SUMMARY RESULTS OF BUSINESS ENTITIES SOLD TO 1ST AND 2ND DEGREE RELATIVES (ANALYSED IN PART 2)

| Business entity legal form | Value of the Business entity before tax | Tax rate (1st degree relative) | Tax amount | Tax rate (2nd degree relative) | Tax amount |
|---|---|---|---|---|---|
| S.A. unlisted | 158,540.00 | 1.2% | 1,902.48 | 2.4% | 3,804.96 |
| S.A. listed | 201,000.00 | 3‰ | 603.00 | 2.4% | 603.00 |
| LLC | 327,044.28 | 1.2% | 3,924.50 | 2.4% | 7,849.06 |
| GP and LP | 224,372.28 | 1.20% | 2,692.47 | 2.4% | 5.384.93 |
| STE | 275,708.28 | 1.2% | 3,308,50 | 2.4% | 6,617.00 |

As shown in table 14. in cases where firms are sold to relatives of the 1st and 2nd degree, the lowest tax amount is paid by Corporations listed in the Stock Exchange and the highest by Limited Liability Companies. Unlisted corporations, sole trader enterprises and general or limited partnerships are in between the aforementioned.

## 6. Conclusions

Using similar financial accounting data for unlimited and limited liability companies or listed and unlisted (in the Athens Stock Exchange) corporations, it was found that listed corporations are burdened with the smallest amount of transfer taxes and limited liability companies with the largest. Unlisted corporations, general and limited partnerships and sole trader enterprises are in between the order mentioned.

Following those assumptions, when firms are transferred to relatives of the 1st and 2nd degree, again the lowest is paid by listed corporations and the highest by limited liability companies. Unlisted corporations pay the second smallest amount of tax while sole trader enterprises and general and limited partnerships follow in between in that order.

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DIMITRIOS VASILIOU
NIKOLAOS ERIOTIS

# The Determinants of Dividend Policy: Some Greek Data

## Abstract

The objective of this paper is to examine the corporate dividend policy in the Greek market. In a classic study, John Lintner estimated a Partial Adjustment Model where the change in dividend between time t and t-1 depends upon the total earnings of the firm at time t, the dividend at time t-1 plus a constant term. A similar model is applied on a panel sample of a large number of firms listed on the Athens Stock Exchange for the period 1996 – 2001. The hypothesis that is tested in this paper is that the dividend at time t depends upon the earnings at time t and the dividend at time t-1. Our empirical results justified our hypothesis that the Greek companies prefer to distribute, each year a rather constant dividend, which they adjust from year to year according to their earnings.

## 1. Introduction

Over the past five decades, finance scholars have engaged in extensive theorising about factors that might be important in determining a firm's dividend policy. However, why is dividend policy so interesting? One reason is that a company's dividend decision has an immediate impact upon the firm's financial structure. If the dividend payment is increased, fewer funds are available internally for financing investments. Consequently, if additional equity capital is needed, the company has to issue new common stock. However, it seems rather puzzling that there are many firms that pay dividends and also issue stock from time to time. This is because they could avoid the stock issues by paying lower dividends. Another reason is that a company's dividend decision may change the value of its stock. The theoretical work on this issue tells us that there are three controversial points of view. One school of thought believes that an increase in dividend payout increases firm value[1]. A second group believes that an increase in dividend payout reduces value[2]. And a third bloc claims that dividend

* The authors would like to thank the participants at the European Applied Business Research Conference, held at Venice (Italy) on 9-13 June 2003, for valuable comments and suggestions.

[1] See Gordon (1963), and Lintner (1962).

[2] See Lintzenberger and Ramaswamy (1979).

policy makes no difference[3]. However, the empirical evidence on the determinants of corporate dividend policy is unfortunately very mixed[4]. As a consequence, the academic finance community cannot offer prescriptions for managers on these matters.

In this paper, we study the determinants of dividend payments of the major Greek firms during the period 1996 – 2001. There have been only two attempts in the Greek finance literature to tackle this issue. Moreover, this article is the first one, according to the authors' knowledge, which employs pooling techniques and analyses the dividend choices of most of the firms listed on the Athens Stock Exchange in Greece, over a recent period.

The paper is organised as follows. Section 2 describes briefly the empirical models that explain how corporate managers decide on dividend payments and presents the main findings of the relevant literature. Section 3 discusses the data and the variables employed in the analysis. Section 4 reports the model that is designed to provide a basis for assessing the relevant importance of the various factors explaining the corporate dividend policy. Section 5 provides the results of the empirical analysis. Finally, section 6 presents the conclusions.

## 2. Empirical Models of Dividend Policy

In a classic study, Lintner (1956) conducted a series of interviews with corporate managers about their dividend policies. His original sample consisted of 600 companies from which he finally has chosen only 28, to survey and interview. These firms were not selected as a statistically representative sample but were deliberately selected to encompass a wide variety of situations. Lintner made a number of important observations concerning the dividend policies of these companies. First, companies have long-run target dividend payout ratios. Second, managers are more interested on dividend changes than on absolute levels. Third, the corporations smooth dividends; that is, dividend changes follow shifts in long run sustainable earning. And fourth, managers avoid dividend changes that might have to be reversed.

Lintner developed a partial adjustment model that captures the above findings. According to Lintner, each firm i has a target dividend payout ratio ($r_i$). Using this payout ratio, Lintner, computed the target dividend at time t ($D_{it}^*$) as a proportion of the real earnings of the firm i at time t ($E_{it}$), i.e. $D_{it}^* = r_i E_{it}$. In real world the dividend, which the firm finally pays, at time t, ($D_{it}$) differs from the target one ($D_{it}^*$). Thus, it is more reasonable

[3] See Miller and Modigliani (1961).

[4] For more information see Frankfurter and Wood, Jr. (2002), Allen and Michaely (1995), Barclay, Smith and Watts (1995), and Short, Zhang, and Keasey (2002).

to model the change between the actual dividend at time t and time t-1, instead of the actual dividend at time t only. Taking the change in actual dividends into account, it is realistic and consistent with the long-run target payout ratio, to assume that the actual change in dividend at time t, ($D_{it}$ - $D_{i,t-1}$), equals to a constant portion ($\alpha_i$) plus the speed with which the dividend, at time t-1, has adjusted to the target dividend at time t, ($D_{it}^*$ - $D_{i,t-1}$). Since the target dividend at time t is a proportion of the real earnings at time t, the final model is as follows:

$$D_{it} - D_{i,t-1} = a_i + c_i r_i E_{it} - c_i D_{i,t-1} \quad (1)$$

where $D_{it}$ = the actual dividend payment during period t, $E_{it}$ = the earnings of the firm during period t, $c_i$ = the adjustment factor (which indicates the speed with which the dividend, at time t-1, has adjusted to the optimal target dividend at time t), and $r_i$ = the target payout ratio. This theoretical model can be estimated using the following econometric model:

$$\Delta D_{it} = a_i + \beta_1 E_{it} + \beta_2 D_{i,t-1} + \varepsilon_{it} \quad (2)$$

where $\Delta D_{it}$ = the change in dividend from time t-1 to time t, for the firm i, $\beta_1$ represents the product $c_i$ times $r_i$ of the theoretical model, $\beta_2$ = the variable $c_i$ of the theoretical model with negative sing (that is, $\beta_2 = - c_i$), and $\varepsilon_{it}$ = the error of the model[5]. Lintner's estimation of the above model appeared fairly good, explaining 85 per cent of the dividend changes in his sample of companies.

Fama and Babiak (1968) undertook a more comprehensive study of the Lintner model's performance, using data for 392 major industrial firms over a 19-year period (1946 – 1964). Their test of Lintner's model suggest that it provides a fairly good explanation of how firms decide on the dividend policy, but they concluded that the model can be improved by introducing, as an additional explanatory variable, the earnings from the previous year without the constant term. However, it is necessary to stress that the model that Fama and Babiak (1968) suggest, is not based on an economic theory, but it comes from an ad hoc approach on the dividend policy.

An alternative behavioural justification often used in the literature in order to derive equation (2) is the adaptive expectations model[6]. This model assumes that the dividend at time t is given by a proportion ($\kappa_i$) of the long run expected earnings at time t ($E_{it}^*$) plus a small disturbance term ($v_{i,t}$). In addition, the model assumes that the change in the long-run expected earnings, from time t-1 to time t, ($E_{it}^*$ - $E_{i,t-1}^*$), can be expressed as a proportion ($\lambda_i$) of the change between the actual earnings at time t and the expected long-run earnings at time t-1, ($E_{i,t}$ - $E_{i,t-1}^*$). The optimal value for $\lambda_i$ is one (full adjustment). Thus, the final theoretical model suggests

[5] $\beta_1 = c_i r_i \Rightarrow r_i = (\beta_1 / c_i) \Rightarrow r_i = (- \beta_1 / \beta_2)$.

[6] For a discussion, see Brittain (1966), pp. 27-31.

that the change in dividend ($D_{i,t} - D_{i,t-1}$) equals to a constant portion ($\alpha_i$) plus the proportion ($\kappa_i$) of the actual earnings ($E_{i,t}$) minus $\lambda_i$ times the dividend at time t-1 (note that the optimal $\lambda$ is one):

$$D_{it} - D_{i,t-1} = a_i + \kappa_i E_{it} - D_{i,t-1} + v_{it} \quad (3)$$

However, Fama and Babiak (1968) claim that their estimations suggest that the adaptive expectations appears to be an inappropriate specification to their sample.

There are only two studies conducted for the Greek market. Patsouratis (1989) investigated empirically the Greek corporate dividend behaviour employing analysis of covariance. The basis of this research is the classic work of Brittain (1964). His sample consists of 25 firms and covers the period 1974 – 1983. Joannos and Filippas (1997) examined the dividend policy of 34 firms listed in the Athens Stock Exchange during the period 1972 – 1988. Their empirical results lead to the general conclusion that Lintner's model best describes the dividend policy of Greek firms. Current profits constitute the most important variable that tends to influence the change in dividends while the previous period dividends tend to also significantly influence the change in the dividend policy of the firms.

## 3. Data and Variables

The empirical analysis of the association between dividends and the explanatory variables is conducted on a sample of firms listed on the Athens Stock Exchange for the period 1996 to 2001. For a firm to be included in the sample, two criteria had to be met. First, the firm had to be listed on the Exchange for the whole of the period under consideration. Second, the firm would be required to be listed in the year 1995. This condition was imposed to ensure that dividend policy was not distorted by the effects of a recent official listing. The sample was further reduced to 149 firms, as a result of missing data. This number of firms corresponds to 63 per cent of the listed companies on the Athens Stock Exchange in 1996.

In order to examine empirically the dividend models discussed in the previous section, the key variables of interest are measures of dividends (D), and earnings (E). These variables were derived from data collected from the financial database of the Athens Stock Exchange. Dividends ($D_{i,t}$) are calculated as the total amount of dividends of the firm i at time t, earnings ($E_{i,t}$) as net income available to stockholders for the firm i at time t.

Our sample consists of 149 firms in 5 year period; that is, a panel of data with 745 observations. For a model that we had to consider the variables in lags, the total panel includes 596 observations.

## 4. The Model

The first model that we test, using the panel data from the Greek market during 1996 – 2001, is similar to the Lintner's model. In order to estimate the coefficients and improve the empirical model we consider the Pooled Least Square and the Generalised Least Square method where cross-section weights were taken into account when it was necessary.

The use of panel data models is a powerful research instrument, because it combines the cross-sectional data with time-series data, and provides results that could not be estimated and studied if we use only time-series or cross-section data. A general model for panel data that allows the researcher to estimate panel data with great flexibility and formulate the differences in the behaviour of the cross-section elements is theoretically as follows[7]:

$$y_{it} = x'_{it}\beta + z'_{it}a + \varepsilon_{it}$$

where $y_{it}$ = is the dependent variable, $x_i$ = is the matrix with the independent variables, and $z_i$ = is a matrix which contains a constant term and a set of individual or group specific variables, which may be observed or unobserved. This model is a classical regression model. If the matrix $z_i$ can be observed, for all individuals, then the least square method gives efficient and consistent estimators.

The pooled regression considers that $z_i$ contains only a constant term. In this case the ordinary least square method provides an efficient and consistent estimate for the β and the α coefficients. If $z_i$ is unobserved and correlated with the independent variables then the least squares estimator of β is biased and inconsistent, as a consequence of an omitted variable. The fixed effects method takes those problems into account and gives an unbiased and consistent estimator of β and α. If the unobserved individual effects can be formulated, and under the assumption that these observations are uncorrelated with the independent variables, the econometric model can be estimated by the random effects method.

In his paper, Lintner (1956) estimated the Partial Adjustment Model where the change in dividend between time t and t-1 depends upon the total earnings of the firm at time t, the dividend at time t-1 plus a constant term. A similar model is applied for the Greek market during 1997 – 2001. The econometric presentation of the model is:

$$\Delta D_{it} = a_i + \beta_1 E_{it} + \beta D_{i,t-1} + \varepsilon_{it} \qquad (4)$$

where $D_{it}$ = the dividend of the firm i at time t, $E_{it}$ = the net income available to stockholders for the firm I at time t, $\varepsilon_{it}$ = the error at time t, and $\Delta D_{it} = D_{it} - D_{i,t-1}$ = the change between the dividend at time t and time t-1, for the firm i,

[7] For more information see Greene (2003).

This model seems rather perplexing. In practice, firms are more explicit and simple when they have to take a decision concerning the total dividend that they are going to distribute at time t. To the extent that this claim is correct, it appears more reasonable to estimate an econometric model with all the variables (dependent and independent) either in changes or without changes. Consequently, the hypothesis that will be tested in this paper is that the dividend at time t (or the change in dividends at time t) depends upon the earnings at time t (or the change in earnings at time t) and the dividend at time t-1 (or the change in dividends at time t-1). Thus, we approach the Lintner's model in two different ways. First, we consider the following model:

$$\Delta D_{it} = a_i + \beta_1 \Delta E_{it} + \beta_2 \Delta D_{i,t-1} + \varepsilon_{it} \quad (5)$$

where $D_{it}$ = the dividend of the firm i at time t, $E_{it}$ = the net income available to stockholders for the firm i at time t, $\varepsilon_{it}$ = the error at time t, $\Delta D_{it} = D_{it} - D_{i,t-1}$ = the change between the dividend at time t and time t-1, for the firm i, and $\Delta E_{it} = E_{it} - E_{i,t-1}$ = the change in the net income available to stockholders for the firm i at time t. Second, we consider the following model:

$$D_{it} = a_i + \beta_1 E_{it} + \beta_2 D_{i,t-1} + \varepsilon_{it} \quad (6)$$

where $D_{it}$ = the dividend of the firm i at time t, $E_{it}$ = the net income available to stockholders for the firm i at time t, and $\varepsilon_{it}$ = the error at time t.

## 5. Empirical Results

Tables 1 to 6 present the estimations of the econometric models (4), (5) and (6), respectively. In order to run and improve the performance of the models we estimate them using the total, the fixed effects and the random effects model. As we were expected, the random effects model did not provide us with significant results. That happens because the random effects model considers that the individual effects of each firm can be observed and formulated, an assumption that does not hold for our sample. The estimates with the fixed effects model proved to be the appropriate one.

The results from the model of Lintner as we represented in equation (4) for the Greek market, during the five-year period (total observations 745) with the total and the random effects models are represented in the tables 1 and 2, respectively.

*Table 1.*

| **Model** | $\Delta D_{it} = a_i + \beta_1 E_{it} + \beta_2 D_{i,t-1} + \varepsilon_{it}$ | | | |
|---|---|---|---|---|
| **Method** | **Total (GLS, cross section weights)** | | | |
| | **Coefficients** | **t – Stat.** | **Prob. (t – Stat.)** | **Stand. Error** |
| **Constant** | 76,940.42 | 7.2651 | 0.0000 | 10,590.37 |
| **E** | 0.1070 | 16.3995 | 0.0000 | 0.0065 |
| **$D_{t-1}$** | -0.2068 | -10.2928 | 0.0000 | 0.0201 |
| **$R^2$** | 0.3157 | | | |
| **$R^2$ adj.** | 0.3139 | | | |
| **F – Stat.** | 171.2240 | | | |
| **S.E.** | 11,933,756 | | | |

GLS: Generalised Least Square
S.E. is the square error of the regression.

The results with the total model indicate that the Lintner's model explains the 31.6 per cent of the changes in dividend from year to year. The F – Statistic proves the validity of the estimated model. In addition, all the coefficients are statistically significant in level of confidence 95 per cent.

The same econometric model estimated with the Fixed Effects model, where cross – section weights were taken into account, is presented in table 2.

*Table 2.*

| **Model** | $\Delta D_{it} = \beta_1 E_{it} + \beta_2 D_{i,t-1} + \varepsilon_{it}$ | | | |
|---|---|---|---|---|
| **Method** | **Fixed Effects (cross section weights)** | | | |
| | **Coefficients** | **t – Stat.** | **Prob. (t – Stat.)** | **Stand. Error** |
| **Constant** | – | – | – | - |
| **E** | 0.1670 | 22.2382 | 0.0000 | 0.0075 |
| **$D_{t-1}$** | -0.7341 | -27.8250 | 0.0000 | 0.0264 |
| **$R^2$** | 0.6895 | | | |
| **$R^2$ adj.** | 0.6110 | | | |
| **F – Stat.** | 1,319.0670 | | | |
| **S.E.** | 10,535,413 | | | |

GLS: Generalised Least Square
S.E. is the square error of the regression.

The results from the fixed effects model improve our first estimation. This means that, there are individual or group effects, which cannot formulated (since the random effects model did not give any valid estimation) but must be taken into account. The improved estimation explains the 68.9 per cent of the changes in dividend from year to year. The F – Statistic proves the higher validity of this model compared to the last one. In addition, all the coefficients are statistically significant in level of confidence 95 per cent.

The decision to change the dividend depends on the net earnings and the dividend that the firm distributed a year before. As the net earnings increasing, the firm increases the dividend. The negative sing in the dividend at time t-1 reveals the intention of the firm to stabilise the dividend that distributes. If an increase had occurred in last year's dividend payment which implies that an increase might had appeared in last year's dividend change, then a decrease in this year dividend change should be expected, in order to "smooth" dividends.

The results from the first attempt to improve the empirical model (according to equation 5) are presented in tables 3 and 4. Because we had to estimate all the variables in changes and run the model with one variable in one lag ($\Delta D_{i,t-1}$) the total number of observations decreased to 596.

*Table 3.*

| **Model** | $\Delta D_{it} = a_i + \beta_1 E_{it} + \beta_2 D_{i,t-1} + \varepsilon_{it}$ | | | |
|---|---|---|---|---|
| **Method** | **Total (GLS, cross section weights)** | | | |
| | **Coefficients** | **t – Stat.** | **Prob. (t – Stat.)** | **Stand. Error** |
| **Constant** | 222,739.8 | 5.5175 | 0.0000 | 40,397.8 |
| **ΔE** | 0.1727 | 24.9491 | 0.0000 | 0.0069 |
| **$\Delta D_{t-1}$** | -0.0866 | -2.8023 | 0.0052 | 0.0309 |
| **$R^2$** | 0.5175 | | | |
| **$R^2$ adj.** | 0.5159 | | | |
| **F – Stat.** | 318.04 | | | |
| **S.E.** | 10,033,736 | | | |

GLS: Generalised Least Square
S.E. is the square error of the regression.

The results from the total model indicate that the improved version of the model of Lintner explains the 51 per cent of the changes in dividend from year to year. The F – Statistic proves the validity of the estimated model. In addition, all the coefficients are statistically significant in level of confidence 95 per cent. In our attempt to test if the model without the constant term has greater explanatory power, we found that the adjusted $R^2$ is lower than 36 per cent with all the coefficients statistically significant at 95 per cent.

In order to improve the estimation we consider that there exist individual effects for each firm, which cannot be observed. Thus, we estimate equation (5) with the fixed effects model, and the findings appear in table 4.

*Table 4.*

| **Model** | $\Delta D_{it} = \beta_1 E_{it} + \beta_2 D_{i,t-1} + \varepsilon_{it}$ | | | |
|---|---|---|---|---|
| **Method** | **Fixed Effects (cross section weights)** | | | |
| | **Coefficients** | **t – Stat.** | **Prob. (t – Stat.)** | **Stand. Error** |
| Constant | - | - | - | - |
| ΔE | 0.0999 | 12.7626 | 0.0000 | 0.0078 |
| $\Delta D_{t-1}$ | -0.3878 | -9.6983 | 0.0000 | 0.0399 |
| $R^2$ | 0.5477 | | | |
| $R^2$ adj. | 0.3953 | | | |
| F – Stat. | 539.0414 | | | |
| S.E. | 13,527,072 | | | |

GLS: Generalised Least Square
S.E. is the square error of the regression.

The estimation of the model using the fixed effects method improved our results. The explanatory power of the fixed effects model improved from 51.6 per cent to 54.8 per cent. In both models, the sings of the change in dividend at time t-1 and the change in the net earnings remain unchanged.

The results of the model suggest that, the decision to change the dividend at time t is positively related with the change in net earnings of that year and negatively with the change in dividend that happened a year ago. The first indicates that the firm adjusts its dividend according to its earnings. An increase in the earnings has a direct positive effect in the dividend and vice versa. This finding appears quite logical. On the other hand, an increase in last year's dividend ($\Delta D_{i,t-1}$) has a negative impact on this year's dividend. If the last year's dividend was lower than the dividend two years ago, then the firm increases this year's dividend in order to adjust it towards the long-run target dividend. In case that the change in dividend at time t-1 was positive, the firm lowers its dividend at time t in order to keep the level of the investors' income unchanged.

The regression of the model with all the variables, dependent and independent, in normal values (i.e. equation 6) is presented in the following tables (5 and 6).

*Table 5.*

| **Model** | $\Delta D_{it} = \beta_1 E_{it} + \beta_2 D_{i,t-1} + \varepsilon_{it}$ | | | |
|---|---|---|---|---|
| **Method** | **Total (GLS, cross section weights)** | | | |
| | **Coefficients** | **t – Stat.** | **Prob. (t – Stat.)** | **Stand. Error** |
| Constant | 76,940.41 | 7.2651 | 0.0000 | 10,590.37 |
| E | 0.1070 | 16.3995 | 0.0000 | 0.0065 |
| $D_{t-1}$ | 0.7931 | 39.4550 | 0.0000 | 0.0201 |
| $R^2$ | 0.9375 | | | |
| $R^2$ adj. | 0.9373 | | | |
| F – Stat. | 5,560.9 | | | |
| S.E. | 11,933,756 | | | |

GLS: Generalised Least Square
S.E. is the square error of the regression.

The results from the total model indicate that this version of Lintner's model with $R^2$ 93.8 per cent has the greater explanatory power amongst the three. The high F – Statistic proves the validity of that version of the model. In addition, all the coefficients are statistically significant in level of confidence 95 per cent. In our attempt to test if the model without the constant term has greater explanatory power we found a lower $R^2$ (i.e. $R^2$ = 92 per cent) and all the coefficients statistically significant at 95 per cent.

Until now, all the estimated models were improved using the fixed effect model. The results with the fixed effects model are as follows:

*Table 6.*

| **Model** | $\Delta D_{it} = \beta_1 E_{it} + \beta_2 D_{i,t-1} + \varepsilon_{it}$ | | | |
|---|---|---|---|---|
| Method | Fixed Effects (cross section weights) | | | |
| | Coefficients | t – Stat. | Prob. (t – Stat.) | Stand. Error |
| Constant | - | - | - | - |
| E | 0.1670 | 22.23 | 0.0000 | 0.0075 |
| $D_{t-1}$ | 0.2658 | 10.08 | 0.0000 | 0.0264 |
| $R^2$ | 0.9592 | | | |
| $R^2$ adj. | 0.9489 | | | |
| F – Stat. | 13,980.71 | | | |
| S.E. | 10,535,413 | | | |

GLS: Generalised Least Square
S.E. is the square error of the regression.

The results from the fixed effects model improves the explanatory power from 93.8 per cent to almost 96 per cent and the F – Statistic appears even better. In addition, all the coefficients are statistically significant in level of confidence 95 per cent.

In both estimations, with the total and the fixed effects models, both sings of the independent variables are positive. The sign in the net earnings indicates that the firm changes the dividend according to its earnings; as the earnings increasing the dividend increases as well. On the other hand, the positive sign in dividend supports the hypothesis that firms are not willing to change their dividend policy from year to year; an increase in last year's dividend has a positive impact on this year's dividend.

Comparing the model of Lintner with our two extensions, we conclude that our findings suggest that our sample firms follow a rather stable dividend policy. The dividend in year t depends on last year's dividend, plus an adjustment of the net earnings of the firm.

## 6. Conclusions

Lintner suggested a model indicating patterns of behaviour and policy regarding corporate dividends. This model includes two variables that determine the corporate dividend decisions. The result of our versions of this

model provides a significant estimation with explanatory power of 68,9 per cent (when cross section weights and groups characteristics are taken into account). This empirical analysis proposes an alternative model similar to Lintner's one without though incorporated changes in the employed variables. The explanatory power of that model is increased to 95.9 per cent. Our evidence suggests that the dividend at time t can be expressed as the long-run target dividend payout (represented by the dividend variable at time t-1) and an adjustment to the net earnings at time t. Thus, on the evidence so far available, it appears that the Greek sample companies have a general dividend policy: to distribute, each year, a rather constant dividend, which is adjusted to earnings.

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ANDREAS G MERIKAS
ANNA A MERIKAS
THEODOROS SYRIOPOULOS

# Is There Interdependency between the Real and Financial Sectors of the Economy? The Cases of Germany, Spain and Greece

## Abstract

This paper contests Fama's proxy hypothesis, which states that inflation is negatively related to real economic activity. Furthermore, the negative relationship between stock returns and inflation, reflects the positive impact of real variables on stock returns. Two issues are presently addressed: first to determine if there exists a relationship between the real and financial sectors in the three countries under examination. Once this is established, we investigate and try to quantify this relationship. The study uses annual data covering the years 1961-2002, on the German, Spanish and Greek economies, and looks at Fama's hypothesis in the light of new contradictory findings which indicate a negative impact of real economic activity on stock returns. The findings suggest that in Germany, employment growth has a negative effect on stock returns and influences positively the change in inflation. The rational lies in the fact that employment growth forecasts inflation which is expected to erode firms' profits. This is expressed through falling stock returns. On the other hand, in Spain, employment growth has a negative effect on stock returns and negatively influences the rate of change in inflation. Output growth, however, is positively related to the change in inflation. Part of the explanation for the findings in the two countries above, lies with the fact that newly employed people have higher marginal propensity to consume. For Greece, although it has been possible to report a robust and statistically significant relationship between the real and financial sectors of the economy, employment growth is not found statistically significant when related to the change in inflation. Nevertheless, it is found that employment growth is positively related to stock returns. It appears that the Greek economy, which is undergoing a different stage in its business cycle, operates with a substantial unemployment rate, the increase of which reduces inflation.

## 1. Introduction

This paper primarily deals with the issue of establishing a relationship between the real and financial sectors in the three countries under investigation - Germany, Greece and Spain. 'Early stock price work' has little empirical evidence proving that stock prices respond to macroeconomic news. It was found that about the only thing that matters is monetary news. Schwert (1981), Pearce and Roley (1985), Hardouvelis(1987) and Cutler, Porterba and Summers (1990).

On the contrary, Ederington and Lee (1993), show that monthly macro news announcements are important predictors of the returns on interest rates and foreign exchange rates futures in the first 15 minutes of the trading day. Also, McQueen and Roley (1993), show that macro news announcements significantly affect stock prices conditional on the state of the business cycle.

On the other hand, King, Sentana and Waldhwani(1994), conclude that relating asset returns derived from macroeconomic variables explains only a minor part of the co-variance dynamics. They use monthly data. On the same lines, Ammer and Mei (1996), find that most of the co-variance between national indices is explained by the co-movement across countries in common stock risk premia rather than by co-movement in fundamental variables. (Future dividend growth, real interest rates, real FX rates). Furthermore, Karolyi and Stulz (1996), find that neither macroeconomic nor interest rate shocks affect co-movement between US and Japanese shares.

Errunza and Hogan (1998) find no evidence that past macro variables affect equity returns in the U.K, Switzerland, Belgium or the U.S. Connolly and Wang (1998), find that macroeconomic surprises do not affect returns in Japan, the U.S or the U.K, however, some role for them exists when accompanied by large movements in return or volatility. Flannery and Protopapadakis (2002), show that returns are significantly correlated with inflation and money growth. Employment only affects the second.

The second major issue that this paper looks at is the hypothesis that stock prices respond negatively to positive real economic activity. If the hypothesis is true, it means that strong economic activity causes inflation and induces policy makers to implement a counter cyclical macroeconomic policy; a negative stock price response to news of an improving economy is justified if the expected effect of a contractionary policy is greater than the expected output gain that the news suggests.

An exhaustive literature review suggests that the prominent theory is Fama's proxy hypothesis (1981), which states that inflation is negatively related to real economic activity, and the negative relationship between stock returns and inflation reflects positive impact of real variables on stock returns. Later studies support this hypothesis. (Fama and Gibbons (1984), Fama (1990). Geske and Roll in 1983 and Kaul in 1987 emphasise the importance of policy responses in explaining stock returns.

However, McQueen and Roley in 1993 suggested that negative stock price responses are observed only under certain circumstances. News of high economic activity reduces stock prices in a booming economy, but increased stock prices in a weak economy. Further expansion in a booming economy results in high inflation rather than fast output growth. The same outcome was reached by Park (1997), who used an alternative approach. He noticed that stock prices frequently fall when positive news about real economic activity is announced.

The announcement of booming economic activity causes rational investors to expect contractionary policy. If the expected negative effects of contractionary policy are greater than the expected positive effects of high economic activity on the firm's profits, it is logical that stock prices respond negatively to the announcement. This negative relationship usually occurs when the economy is at its peak, rather than when it is going through a recovery phase. The real economic variables that were used by Park, were separated between those that influence more future inflation and those that influence more future corporate cash flows. One should expect that stock prices would respond positively to the first group of variables and negatively to the second.

Finally, Boyd, Jagannathan, Hu (2001), find unemployment is positively related to stock prices during an economic expansion but is negatively related to stock prices during a contraction. They conclude that higher unemployment predicts lower interest rates and lower corporate profits and that the relative importance of these effects differs over the business cycle.

## 2. Data and Methodology

We used annual data for Germany, Spain and Greece covering forty-two years from 1961 to 2002 and all values were expressed in growth rates. The reason we use annual data is because we are interested in long-term effects. The analysis involved seven macroeconomic variables, two we considered as endogenous, that is the stock returns and inflation and the rest were treated as exogenous.

As a measure of stock return we used the rate of return on the General Stock Index. Inflation was measured by the rate of change in the Consumer Price Index (CPI). Employment growth, industrial production, fixed capital formation and retail sales were all extracted from the U.N publications, the "Economic Survey of Europe", over various years. Data for the General Stock Indices, ASE for Greece, DAX for Germany and IBEX for Spain were obtained from each country's National Stock Exchange.

All of the variables were checked for stationarity with the Augmented Dickey-Fuller test. The results are presented below in Table 1.

*Table 1.* – CRITICAL VALUES AT 1% IS -3.6067 AND AT 5% IS -2.9378

| | **Germany** | **Spain** | **Greece** |
|---|---|---|---|
| Variables | ADF | ADF | ADF |
| Stock Returns(SRI) | -5.40 | -5.09 | -4.87 |
| Employment Growth (EMPL) | -5.01 | -2.72 | -3.77 |
| Output Growth (GDP) | -3.64 | -2.65 | -2.38 |
| Investment Growth(INV) | -4.44 | -3.73 | -4.62 |
| Industrial Production Growth(PROD) | -4.96 | -3.15 | -2.34 |
| Retail Sales Growth(RET) | -3.70 | -2.87 | -3.32 |
| Inflation (ΔCPI) | -2.47 | -1.25 | -1.87 |

We observe that not all variables are stationary. We take the first difference of the variables, which are not stationary and re-run the unit-root tests.

All the variables become stationary.

To capture the dynamic structure of the relationship among the variables and also the dynamic impact of random disturbances on the variables under consideration, we adopted a distributed lag model, which was then tested for ARCH effects. The mathematical form of the model used is given below:

$$Y_t = \delta + \alpha_1 Y_{t-1} + \sum \varphi_i X_{i,t-i} + e_t$$

Where $Y_t$ is an endogenous variable, and $X_t$ are exogenous, $e_t$ is a white noise process independent of $Y_t$ and $X_t$ by assumption.

To examine the relationship between stock returns and real variables we regressed stock returns on the five macroeconomic variables.

$$RSI_t = a_1 RSI_{t-1} + b + b_1 EMPL_t + b_2 EMPL_{t-1} + b_3 GDP_t + b_4 GDP_{t-1} + b_5 INV_t + b_6 INV_{t-1} + b_7 PROD_t + b_8 PROD_{t-1} + b_9 RET_t + b_{10} RET_{t-1} + e_t$$

Then, to examine the relationship between inflation and real variables, we regressed the change in inflation on the five macroeconomic variables

$$DCPI_t = a_1 DCPI_{t-1} + b + b_1 EMPL_t + b_2 EMPL_{t-1} + b_3 GDP_t + b_4 GDP_{t-1} + b_5 INV_t + b_6 INV_{t-1} + b_7 PROD_t + b_8 PROD_{t-1} + b_9 RET_t + b_{10} RET_{t-1} + e_t$$

The above models were tested for ARCH effects and the ML method of estimation was adopted.

## 3. Empirical Results

### 3.1 The Case of Germany

Table 2 shows the final specification of the model for the relationship between stock returns and macroeconomic variables. Since stock prices reflect the economy's long-term prospects, we focused on annual data. Employment appears to be significant at the 1 per cent level, while it exerts a strong negative effect on stock returns. The impact multiplier is 5.4, that is, if employment grows by 1 per cent, stock returns will fall by 5.4 per cent. The reason for this is the increase in employment forecasts inflation which is expected to erode firms' profits and this is expressed through falling stock returns.

The lagged GDP coefficient is significant at the 1 per cent level and is also negative which is again in line with the analysis that the announcement effect dominates the positive impact of GDP growth. More specifically, a 1 per cent production growth reduces stock returns by about 2.6 per cent points. The model was tested for ARCH effects and it was found that a lagged shock has a significant and negative impact on future volatility.

*Table 2.* – THE RELATIONSHIP BETWEEN STOCK RETURNS AND ECONOMIC ACTIVITY (STD. ERRORS IN PARENTHESES)

| | | | |
|---|---|---|---|
| $RSI_t = 16.8 - 5.36EMPL_t - 2.57GDP_{t-1}$ | | | |
| (3.21) | (1.89) | (1.08) | |
| $h^2_t = 319.08 - 0.086e^2_{t-1}$ | | | |
| (3.3) | (0.03) | | |

Table 3 presents the final specification of the model for the relationship between the change in inflation and economic activity. Significant results were yielded for all variables. Lagged employment and GDP growth are positively related with the change in inflation, while lagged industrial production is negatively related. The magnitude of the coefficient of employment is also among the largest of all the variables. An increase in lagged employment by 1 per cent, increases inflation by 0.43 of a percentage point. Also a 1 per cent increase in lagged growth increases inflation by 0.43 of a percentage point. Industrial production also appears to exert a significant influence both statistically and economically. The model was also tested for ARCH effects and an ARCH (2) model was found significant. A lagged shock of two periods has a significant negative impact on future volatility. The main outcome of the analysis presented in Table 3 is that employment growth and output growth both have strong effects on inflation.

*Table 3.* – THE RELATIONSHIP BETWEEN THE CHANGE IN INFLATION AND ECONOMIC ACTIVITY (STD. ERRORS IN PARENTHESES)

| | | | | |
|---|---|---|---|---|
| $\Delta(\Delta CPI)_t = -0.97 + 0.44EMPL_{t-1} + 0.43GDP_{t-1} - 0.14PROD_{t-1}$ | | | | |
| (0.26) | (0.15) | (0.13) | (0.07) | |
| $h^2_t = 0.77 + 0.19e^2_{t-1} - 0.07e^2_{t-2}$ | | | | |
| (0.29) | | (0.29) | (0.03) | |

## 3.2 The Case of Spain

Spain's major economic problem during the years under examination was the low levels of employment. These, together with the low levels of industrial productivity were seriously undermining the ability of the country's industrial firms to effectively compete in both foreign and domestic markets. After its accession into the monetary union, Spain showed a significant improvement in all its macroeconomic variables.

Table 4 shows the final specification of the model for the relationship between the change in stock returns and macroeconomic variables. Employment appears to be significant at the 10 per cent level while it exerts a negative effect on stock returns. If the rate of change in employment growth is 1 per cent,

stock returns will fall by 3.18 percentage points. The reason for this is that the increase in employment forecasts inflation, which is expected to erode firms' profits and this is expressed through falling stock returns.

The ΔGDP coefficient is significant at the 1 per cent level and is positive which is in line with the analysis that the announcement effect does not dominate the positive impact of GDP growth. More specifically, a 1 per cent increase in the rate of production growth, increases stock returns by about 4 percentage points. The lagged stock returns' coefficient was insignificant. It was retained, however, for the robustness of the relationship.

The model was tested for ARCH effects and an ARCH(2) model fitted best. It shows that a two period lagged shock exerts a significant negative impact on future volatility.

*Table 4.* – THE RELATIONSHIP BETWEEN STOCK RETURNS AND ECONOMIC ACTIVITY (STD.ERRORS IN PARENTHESES)

$$RSI_t = 14.4 - 3.18\Delta EMPL_t + 4.09\Delta GDP_t - 0.08RSI_{t-1}$$
$$(2.57) \quad (1.79) \qquad (1.58) \qquad (0.14)$$

$$h^2_t = 440.6 + 0.006e^2_{t-1} - 0.19e^2_{t-2}$$
$$(137.4) \quad (0.19) \qquad (0.09)$$

Table 5 presents the final specification of the model for the relationship between the change in inflation and economic activity. In the model, significant results were yielded for all variables. Employment is negatively related to the change in inflation, whilst lagged GDP growth is positively related. The magnitude of the coefficient of lagged retail sales is the largest among all the variables and it is also highly significant. An increase in employment by 1 per cent reduces the change in inflation by 0.31 of a percentage point. The effect of lagged growth is also significant. All other variables exert insignificant influences both statistically and economically. That is why they were dropped from the final model.

The ARCH (1) model seems to explain the variance of the error term.

*Table 5.* – THE RELATIONSHIP BETWEEN THE CHANGE IN INFLATION AND ECONOMIC ACTIVITY (STD. ERRORS IN PARENTHESES)

$$\Delta(\Delta CPI)_t = -2.09 - 0.31EMPL_t + 0.15GDP_{t-1} + 0.61RET_{t-1}$$
$$(0.22) \quad (0.08) \qquad (0.04) \qquad (0.07)$$

$$h^2_t = 0.47 - 2.02e^2_{t-1}$$
$$(0.43) \quad (0.8)$$

### 3.3 The Case of Greece

The following model, presented in Table 6, was constructed for Greece where the employment coefficient was significant at the 1 per cent level and its value positive. The reason is that the increase in employment forecasts growth, which is expected to improve firms' profits and this is expressed through rising stock returns. This is in line with Fama's proxy hypothesis. All other variables included exerted a positive and significant impact on stock returns. An ARCH(1) model seemed to explain future volatility.

*Table 6.* – THE RELATIONSHIP BETWEEN STOCK RETURNS AND ECONOMIC ACTIVITY (STD. ERRORS IN PARENTHESES)

$$RSI_t = -15.8 + 3.22EMPL_t + 2.05\Delta GDP_t + 4.64RETS_t$$
(2.45) (0.75) (0.38) (0.56)

$$h^2_t = 6.59 + 9.25e^2_{t-1}$$
(84.7) (2.35)

The following model, in Table 7, presents a sound statistical relationship where ΔGDP is negatively related with the change in inflation and positively related with the growth in employment. The employment coefficient, though positive, was found to be statistically insignificant. An ARCH(1) model seems to explain future volatility.

*Table 7.* – THE RELATIONSHIP BETWEEN INFLATION AND ECONOMIC ACTIVITY (STD.ERRORS IN PARENTHESES)

$$\Delta(\Delta CPI)_t = -3.49 + 0.26EMPL_t - 0.59\Delta GDP_{t-1} + 1.04RET_{t-1}$$
(0.68) (0.29) (0.05) (0.15)

$$h^2_t = 8.69 - 0.22e^2_{t-1}$$
(2.16) (0.07)

## 4. Conclusion

Our findings for Germany support the hypothesis that the stock market's reaction to real economic variables reflects the variables' effects on inflation. Stock returns were found to be negatively related with employment growth and GDP growth, thus supporting that expected contractionary policy has a negative impact on stock prices. As far as the relationship between inflation and real economic activity is concerned, inflation is positively related to GDP growth and employment growth which instigate contractionary policy, thus verifying the previous hypothesis. The explanation lies with the fact that employment growth has a large effect on aggregate demand as newly employed people have a high marginal propensity to consume. Thus the stock market reacts negatively to a high rate of employment growth.

The results for Greece support the Fama's Proxy hypothesis. Since Greece has traditionally experienced high rates of unemployment, an increase in employment growth may not necessarily cause inflationary pressures and hence contractionary policy. Testing though in the second model - the relationship between inflation and employment growth - our suggestion is disproved since the change in employment growth seems to be positively related to the change in inflation, though insignificant. For Spain, the model also supports the initial hypothesis concerning the negative relationship between real economic activity and the stock market. Testing though for the relationship between employment growth and inflation change was found to be negative and to exert a significant impact.

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# About the Athors

**Nikolaos Eriotis** is an assistant Professor of Accounting at the National & Kapodestrian University of Athens. He received a BA degree from Pandion University, dept. of Public Administration (Economics), MSc and PhD degrees in Accounting from the University Paris 1 Sorbonne et Pantheon. Dr Eriotis also possesses an extensive professional experience. Prior to coming to the National & Kapodestrian University of Athens, he was a senior lecturer of Accounting at the Athens University of Economics and Business. He has lectured at the undergraduate, postgraduate and executive level at the Athens University of Economics and Business, at the University Paris 13 (Paris Nord), and at the National Technical University. He has also served as a senior economist in the Department of Consumer Protection at the Greek Ministry of Development. Dr Eriotis authors two books published by the Hellenic Open University. His main research interests are focused in the areas of financial accounting and cost accounting.

**Dimosthenis Hevas** is an Associate Professor of Financial Accounting and Head of the Accounting and Finance Department of the Athens University of Economics and Business. He has taught various courses of Financial Accounting and Tax Accounting. His main research interests are in the area of Accounting and Capital Markets. He has published in various journals such as: *The International Journal of Accounting*, *Applied Financial Economics*, *Managerial Finance*, *Espace Europe*, etc.

**Anna Merikas** is currently an Associate Professor of Economics in the Department of Economics at Deree College - The American College of Greece Athens. She has served in various consultancy positions in the industry, she is a qualified trader of the Athens derivatives exchange and her main research interests include: econometric modelling, portfolio management, behavioural finance, shipping finance.

**Andreas Merikas** is a Professor of Finance, in the Department of Shipping at the University of Pireaus. He has served in various managerial positions in business, has published numerous articles in the field and his main research interests include: corporate finance, derivative products, portfolio management, risk management and shipping finance.

**Christos I. Negakis** is an Assistant Professor of Accounting in the Department of Economics at the Aristotle's University of Thessaloniki, Greece. Dr Negakis holds degrees from the Aristotle's University of Thessaloniki (Greece) and from the Ca Foscari Universita degli studi di Venezia (Italy). His research interests are in the information content of accounting numbers, auditing, failure prediction models and performance measurement systems. Dr Negakis has served as an internal auditor and consultant for many Greek companies. He holds a visiting position at the University of Macedonia (Greece) where he teaches auditing in their postgraduate programme.

**Antonios Stavropoulos** is a Lecturer of Accounting at the Department of Applied Informatics, University of Macedonia, Greece. He studied and received his BSc in Economics and PhD degree in Applied Informatics at the University of Macedonia (Thes-

saloniki, Greece). His main areas of research interest are Accounting, Financial Management, Cost Analysis and Computer Assisted Accounting.

**Theodore Syriopoulos** is currently an Assistant Professor of Finance, in the Department of Shipping, Trade and Transport at the University of the Aegean, Chios, Greece. Prior to that Dr Syriopoulos has served in various managerial positions in business consulting, investment banking, capital markets and fund management. His research interests include corporate finance, asset valuation, portfolio management, mutual funds, risk management and shipping finance.

**Stavros Tsopoglou** is an Assistant Professor of Finance at the Department of Applied Informatics, University of Macedonia (Thessaloniki, Greece). He studied and received his BBA and MBA at Ohio University (Athens, Ohio) and York University (Toronto, Ontario) respectively. He received his PhD degree in Applied Informatics at the University of Macedonia. His research area includes Financial Management, Money and Capital Markets, and Enterprise Resource Management (Financial Modules) Systems.

**Dimitrios Vasiliou** is a Professor of Bank Management at the Hellenic Open University. He graduated in Economics from the National and Kapodistrian University of Athens, and earned both an MA and a PhD from the University of Kent at Canterbury. Professor Vasiliou possesses an extensive professional experience. Before joining the Hellenic Open University, he was an assistant professor of Financial Management at the Athens University of Economics and Business. He has taught a variety of courses at the undergraduate, graduate and executive levels at the Athens University of Economics and Business, Charles University of Prague (Universitas Carolina Pragensis), the National Technical University, and at the Institute of Banking Executives of Ionian Bank. He has also served as a senior economist in the Department of Economic Research of the Ionian Bank. Professor Vasiliou authored five books published by the Hellenic Open University. His current research interests are focused in the areas of corporate finance, portfolio investments, and bank management.

**Athanassios Vazakides** is an Assistant Professor of Accounting at the Department of Applied Informatics, University of Macedonia, Greece. He studied and received his BSC in Economics and PhD degree in Applied Informatics at the University of Macedonia. His research area includes Accounting, Financial Management, Cost Analysis and Computer Assisted Accounting.

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