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ΤΜΗΜΑ ΛΟΓΙΣΤΙΚΗΣ & ΧΡΗΜΑΤΟΟΙΚΟΝΟΜΙΚΗΣ

ΠΡΟΓΡΑΜΜΑ ΜΕΤΑΠΤΥΧΙΑΚΩΝ ΣΠΟΥΔΩΝ

TESTING THE RELATION BETWEEN PRICE-TO-EARNINGS RATIO AND STOCK RETURNS IN THE ATHENS STOCK EXCHANGE

ΣΤΕΦΑΝΗΣ ΛΑΜΠΡΟΣ

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Τμήμα Λογιστικής & Χρηματοοικονομικής

του Οικονομικού Πανεπιστημίου Αθηνών

ως μέρος των απαιτήσεων για την απόκτηση

Μεταπτυχιακού Διπλώματος Ειδίκευσης

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SUMMARY

Market anomalies have always been an object of research by many scholars and financial professionals since they create opportunities for abnormal gains to be earned by profitable investment decision- making based on past information. Among others, Basu (1997), Fama and French (1992), Jaffe, et.al. (1989), as well as, Lakonishok, et.al. (1994) documented the existence of P/E effect as market inefficiency, in the US and UK markets at different periods of time. They found that high future stock returns are generally associated with initially low P/E stocks so it is possible to accumulate excess returns by taking long positions in such stocks. In this study we examined the possibility that this effect might also hold for Athens Stock Exchange (ASE) during a period of five years (2000- 2005).

The methodology that we adopted was based on regression analysis. Using cross-sectional regressions we managed to produce evidence that documented the existence of the P/E phenomenon. In respect to our resulting evidence, the investment on stocks with low P/E ratio is justified in the short term (1 year holding period), as the ratio is found to be negatively related to subsequent equity performance. Furthermore, accounting variables such as market value and earnings growth play an important role in the explanation of the cross- sectional variation of stock returns. However, the contrarian investment strategy does not seem to hold for earnings growth, in the short term, as this factor is found to be positively related to future equity return. The "size- effect" as it appears in literature, is found to hold for firms listed on ASE, as stocks of firms with relative small market value, produce higher returns. The resulting evidence presented industry as being an indicative factor of such fundamentals, as well as, past market returns to be negatively related to subsequent stock performance.

We could not verify the existence of P/E effect on firms listed on ASE using the extrapolation model of Lakonishok, et.al. (1994). However, our results are consistent with the overreaction hypothesis of De Bondt and Thaler (1985, 1987). Thus, the relation of P/E to future stock returns can be attributed to the investor's overreaction to news announcements.

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INTRODUCTION

Market anomalies have always been an object of research by many scholars and financial professionals since they create opportunities for abnormal gains to be earned by profitable investment decision- making based on past information. Among others, Basu (1997), Fama and French (1992), Jaffe, et.al. (1989), as well as, Lakonishok, et.al. (1994) documented the existence of P/E effect as a market inefficiency, in the US and UK markets at different periods of time. They found that high future stock returns are generally associated with initially low P/E stocks so it is possible to accumulate excess returns by taking long positions in such stocks. In this study we examined the possibility that this effect might also hold for firms listed on Athens Stock Exchange (ASE) during a period of five years (2000- 2005).

After the market boom and the great recession that followed during the period of 1999-2000, ASE has been showing signs of maturity and stabilization. Especially after the integration of the Greek economy to the common monetary system (euro- €) of the European Union in 2001 and the conduct of the Olymbic Games in Athens (2004), the Greek stock market has demonstrated significant stability in terms of growth. However, as in the developed markets of UK and the US, certain inefficiencies still exist in ASE. Other research by Kavusanos and Dockery (2001), Antoniou, et.al. (2001) and Kyriazis and Diacogiannis (2002) has evidenced the validity of certain anomalies for the Greek stock market. Although, none of these studies covered as much as five years after the beginning of the recession in 2000, their findings provided a motivation to this research which is focused on the P/E anomaly.

The methodology that we adopted was based on regression analysis. Using cross-sectional regressions we managed to produce evidence that documented the existence of the P/E phenomenon. In respect to our resulting evidence, the investment on stocks with low P/E ratio is justified in the short term (1 year holding period), as the ratio was found to be negatively related to subsequent equity performance. Furthermore, accounting variables such as market value and earnings growth play an important role in the explanation of the cross- sectional variation of stock returns. We also found industry to be an indicative factor of such variables, as well as, past market returns to be negatively

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related to subsequent stock performance. We could not verify the existence of P/E effect on firms listed on ASE using the extrapolation model of Lakonishok, et.al. (1994). However, our results are consistent with the overreaction hypothesis of De Bondt and Thaler (1985, 1987). Thus, the relation of P/E to future stock returns can be attributed to the investor's overreaction to news announcements.

This study is separated into four sections: 1) Literature Review is a reference to prior research. 2) Data and Methodology describes the process of our analysis. 3) Empirical Findings presents the results of our research and 4) Conclusion refers to the implications of our findings.

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1. LITERATURE REVIEW

1.1 The Role of P/E in Contrarian Investment

Price to earnings ratio and its reciprocal, earnings to price, (earnings yield) were first introduced in literature by Graham and Dodd in 1934, as a benchmark for equity valuation. The application of P/E ratio was based on the idea that earnings are related to value. The fact that each share is worth a number of times its current earnings became commonly accepted as market makers and financial investors based their buy/sell decisions on a specific P/E level. The authors specified that P/E ratio, which is calculated by current fundamentals, never provides an exact appraisal for stocks[1]. The price of equity fluctuates as earnings and any expectations related to them, continuously change through time. However, the P/E multiple can give general guidelines to a conservative stock buyer, by suggesting "speculative stocks". This term was used to describe stocks that comprise greater amount of risk and they should, therefore, be avoided by conservative (risk- averse) investors. The concept that current earnings can be used to measure value, is not absurd, as the majority investors (the overall market) react momentarily to present information in order to earn abnormal returns (speculation) without too much consideration of the validity of this information[2]. The authors argued that high returns could also be eared by purchasing high P/E stocks (above the current accepted level), but they suggested that the odds are against for such an occurrence. As a conclusion, P/E ratio was first regarded as a rough benchmark for selective stock investment. A tool for implementing specific financial strategies that in the long- term, manage to produce above- market returns. These strategies which first appeared in literature (Graham and Dodd (1934), Drenman (1977)) by the term "value strategies," have been an object of research from many scholars and financial professionals

[1] This idea was reinforced by Penman (1998) who claimed that current earnings are an imperfect measure of value of the stockholders. This opinion was supported by the fact that present earnings are deducted from the matching of current revenues with current expenses, a procedure clearly affected by subjectivity (accounting accrual convention). According to Penman's view, market prices change in relation to expected value to be added from future business operations. On the other hand, current earnings represent current value to stockholders. P/E is, therefore, a comparison between expected additional value and current additional value to equity.

[2] Graham referred to the market as: "a voting machine rather than a weightening machine... (which) makes its values first and finds reasons afterwards".

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throughout the world. The concept of value strategies is to invest in stocks with low prices and exceptional financial/ accounting performance criteria such as dividends, earnings, cash flows, book value of assets and share capital.

Later researches (Basu (1977), Jaffe, Keim and Westerfield (1989) and Fama and French (1992)) supported the effectiveness of the basic principle of such strategies, using P/E ratio (or E/P). They showed that stocks with low P/E ratios produce higher returns. Their resulting evidence presented P/E ratio as an indicator of under priced stocks.

Basu (1977) using a sophisticated cross- sectional analysis manage to present solid evidence that stocks associated with low P/E ratios repeatedly "beat the market", bearing lower degree of systematic risk (CAPM theory[3]). The author estimated portfolios risk from SLB versions of the original CAPM model. He found that the higher annual returns of low P/E portfolios were not related with neither risk (meaning market risk, with the average amount of 100 stocks, each portfolio was well diversified), nor taxes paid for earnings or other transaction costs. The fact that investing to low P/E stocks led to high statistically significant, abnormal returns is contradictory to the efficient market hypothesis. For as long as past data can be used to predict future returns the market is inefficient. The case is that in a perfect arbitrary market all investors share the same piece of information, so they react immediately and uniformly to any new profitable chance, as soon as it is presented. In this way it is impossible for anyone to accumulate excess returns for a long period of time as the majority of investors will foresee this opportunity and act accordingly. As a result, if theory holds, then investor's behavior will eventually eliminate the P/E anomaly, as more and more market participants will investing in low P/E stocks, driving their prices up. Moreover, the absence of risk- return relationship somehow throws dispute to the estimators of market risk (i.e. market beta) and abnormal returns. Nevertheless, high P/E portfolios were proved to be superior to any other portfolio randomly constructed by stocks from the sample. This superiority of the P/E

[3] The Asset Pricing Model was first formulated by Sharpe (1964), Lintner (1965) and Black (1972). Based on the original model, Ross (1976) developed the CAPM (Capital Asset Pricing Model) theory, which, among others, presented a strong, univariate relationship between "systematic risk" and required return. By the term "systematic risk" it is implied the type of risk that is related to unexpected events that affect the whole market (i.e. market risk), and thus cannot be diversified.

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portfolios was measured using Treynor's and Sharpe's ratios (reward- to- volatility and reward- to- variability measures)[4].

Fama and French (1992) found evidence that questioned the application of beta (market risk) in the explanation of stock returns. In tandem with the previous research of Basu (1977) that although it had been carried out under the assumption of a strong positive relationship between market risk and return (SLB model)), its evidence proved otherwise. The findings of this research were in line with any past evidence regarding the relation between P/E and future stock returns. The researchers concurred to the idea that stocks with low P/E produce higher future returns (on a monthly basis). However, more importance was given to book- to market ratio, as it appeared to hold more explanatory power when combined with market value- MV (size effect variable). They tested the validity of several regression models, combining market value, market beta, BE/ME (book equity- to- market equity), E/P (earnings- to- price), a dummy E/P variable was used to reflect negative earnings and two leverage ratios. The conduction of statistical tests proved that high average returns of stocks with negative earnings, are better explained by MV (size effect), rather than E/P proxy variable. The tests showed that apart from market beta, all other independent variables were associated with average monthly returns. Specifically, market value were negatively related to average returns, whereas, E/P and BE/ME ratios were positively related. The model with the highest explanatory potency included BE/ME ratio and MV. The authors found that BE/ ME and E/P were strongly correlated. As a result, the inclusion of both ratios in a bivariate model appeared to be problematic. The result was the absence of significance from the part of E/P. Evidence suggested that most of the positive effect of E/P to average return derived from the ratio's positive correlation with BE/ME. Lastly, it is important to mention that the inadequacy of SLB model does not reject the general concept of risk- return relation. The authors regarded BE/ME, E/P and MV variables to be better estimates of risk than beta.

Of course, other strategies were also implemented to exploit behavioral and physiological factors of investors conduct. Some of these theories justified the existence of P/E anomaly. De Bondt and Thaler (1985, 1987) showed that the majority of investors

[4] Sharpe's ratio was considered to be more reliable to support low P/E portfolio's superiority. Although Treynor's ratio constituted to the idea, the application of beta was questionable because of the fact that the results disputed the CAPM theory.

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overreact to corporate news. They explained overreaction as the case of intense variances in stock prices which are followed by reverse movements (price corrections) of the same intensity. They showed for instance that when news for increased earnings occur, investors overreact, bidding the company's stock price too high. A correction to price occurs in the following three to five years. Thus, P/E ratio is at high levels in the first year (when price increases relative to earnings) and then slowly reduces until the third or the fifth year where the correction takes place. At the same period, prices drop generating negative returns. As a result, high initial levels of P/E are associated with low subsequent returns. If negative news concerning earning's growth follow, P/E is reduced and high subsequent returns are gained in the next three to five years (during the time of the price correction). It is necessary to underline that the whole idea is based on the assumption that future earnings growth volatility is below price volatility[5], otherwise the overreaction theory is not capable of explaining the P/E anomaly.

The overreaction hypothesis is consistent with the concept of "winners and losers". The authors showed that "loser portfolios" gain superior risk- adjusted returns for the subsequent three to five years. They also pointed out an asymmetry of overreaction effect as it appeared to be much larger for "losers" than for "winners". Hence, the duration of higher returns for the losers was longer than that of the winners (more than five years). The findings also presented evidence of seasonality (most of the annual exceptional returns of losers were realized in January)[6].

1.2 Earnings Growth as an indicator of P/E

Beaver and Morse (1978) showed that P/E differences among stocks are not significantly explained by earnings growth in the subsequent 14 years. Initial differences in P/E are

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[5] The statement holds for the extrapolation model Lakonishok, et.al. (1994) under which, investors consider current earnings to be an accurate measure for expected future earnings. In such case, the earnings growth variable is believed to be static and not mean reverting.

[6] The overreaction hypothesis was later disputed by Jagadeesh and Titman (1993) who found that stocks with positive past returns (previous six months), yield positive excess future returns (the next three to twelve months). These results were later related to earnings announcement by Chan, et.al. (1996) who found that stock markets are react slowly to earnings- related announcements. Moreover, Zaroiwn (1989, 1990), Chan (1988) and Ball, et.al. (1995) argued that the higher returns of stocks with poor corporate performance are associated with higher risk premiums to compensate for the increased level of risk that these stocks comprise. However, the overreaction theory was reinforced by the findings of Chopra, Lakonishok and Ritter (1992) and Lakonishok, et.al. (1994), (see note 5).

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sustained during the same period of time. However, evidence proved a negative correlation between P/E and current earnings growth (that takes place in the same year of the calculation of P/E) and a strong positive correlation the year thereafter. These findings led the authors to attribute the lack of explanatory power of long- term, future earnings growth to P/E ratio to the existence of "transitory earnings" (a term fist used by Molodovsky (1953)). Firms with low earnings growth appear to have high P/E in the same year because investor's believe that earnings have been affected by temporary, random events or accounting management policies (inflation, large writing- offs, change in accounting treatments, excess provisions)[7]. This belief motivates long positions is such stocks, setting the market price at relative high level. Hence, expected earnings are higher than realized current earnings (firms with negative transitory components). In the next year, when earnings growth increases and market's participant's expectations are confirmed, the relation between P/E and earnings growth is reversed (thus the positive correlation between P/E and 2- year earnings growth is justified). The research concludes that P/E might be affected more by differences in accounting methods rather than risk or growth.

It is worth mentioning that the results of this research were later confirmed by Penman (1996). Penman also provided evidence about the transitory effect in earnings expected growth and concluded that price-to-book value ratio is a more accurate indicator (than P/E) of future growth as it is unaffected by "transitory earnings". The reason for this is that P/B is related to the expected future return on equity (ROE) and not directly related to future profitability, which is subjected to transitory elements. He attempted to describe the relation between P/E and P/B ratios using expected ROE (which he found to be serially correlated with current ROE). The empirical evidence presented that much of the variability of P/B ratio is explained by future ROE, whereas, future ROE is not a good indicator of P/E. In addition, the author showed that observed P/E and P/B ratios were relevant to P/E and P/B ratios recalculated from the dividend discount model (under the assumption that future ROE is representative of the cost of capital and that accounting earnings were calculated according to GAAP- clean surplus accounting- profit are either

[7] At investor's belief, these events, (in all probability) will not reoccur. In the case of accounting management practices, investor's assume that they undermine the true, fair view of earnings.

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given as dividends or are capitalized or a combination of the two). The above finding documented that during 1968- 1985 stocks in the US market were fairly priced.

1.3 The relation of P/E with Accounting Methods

P/E was also tested for any relation with accounting methods, as it is composed by EPS which are in turn subjected to earnings management practices. Consistent with previous statement, Craig, et.al. (1987) found that E/P ratio (depended variable) is significantly related to the inventory accounting method (FIFO vs. LIFO) and income tax credit method. The method that researchers used was based on a cross- sectional analysis of different portfolios formed according to the inventory policies and tax credibility methods. In addition, the model, which they developed, was comprised by several factors used to account for other influences in E/P ratio (such as earnings growth, size, beta and proxy variables to capture year- related parameters). Their aim was to isolate any other factors related to E/P in order to estimate more accurately the significance of the inventory method to the ratio. Their research showed that firms using LIFO to inventory book keeping and deferred investment tax credit (conservative accounting policies) are associated with higher E/P ratios than firms which implemented FIFO and flow through tax credit alternative (less conservative reporting methods). In addition, they found P/E ratio to be negatively associated with indicators of risk, such as beta and size (surrogated by market value) variables[8]. Strong negative relationship was also proved to exist among P/E and the dividend yield, as it is logical that firms producing high earnings relative to price (high E/P) pay higher dividends.

These results where confirmed a year later by Lee (1988). The author found that the reciprocal of P/E ratio (E/P) is on average higher in firms using LIFO inventory method. He applied a similar multivariate model in response to the previous study of Craig, et.al. (1987) in order for the results to show the appropriate precision. The research concluded that the income policy qualifying the inventory accounting choice seemed to be unrelated with that underlying other accounting methods, such as depreciation, pension amortization and investment tax credit accounting. As a result, the overall behavior of

[8] This case supports the idea of Ball (1978) that P/E can be applied as a risk factor (a proxy for unknown risk variables that affect future returns).

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E/P cannot be attributed to the effects of other accounting treatments. Lastly, it is important to underline that the above research covered a period of time more extended than that of the previous study of Craig, et.al. (16 instead of just 5 years) and this fact also increases the significance of its resulting evidence.

1.4 Industry- P/E in Equity Valuation

Moreover, Alford (1992) found P/E to be an accurate measure of equity valuation. The findings of his research concluded that much of the diversity of P/E is attributed to the variety in the level of risk and earnings growth of individual firms[9]. In addition, the industry factor appears to be a good proxy for risk and earnings growth related to P/E ratios. Alford showed that the use of industry P/E[10] multiplied by the firm's earnings per share (EPS) was proved to be an accurate estimator of its equity. The assessment of the accuracy of P/E estimator was made under the efficient market hypothesis. In an efficient market, the market price changes randomly to reflect all new information. Thus, it can be used to test the accuracy of the theoretical price that Alford calculated, using P/E ratio. Of course, this condition might not hold for many inefficient markets.

1.5 The Extrapolation Model

Lakonishok, et.al. (1994) implemented E/P ratio as an expected future earnings growth indicator, in an excessive cross- sectional analysis[11]. It proved that investors tend to favor stocks with exceptional past and current performance ("glamour stocks") as they believe that past success will continue in the future (extrapolation effect)[12]. Thus, glamour stocks

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[9] This implication was supported by previous evidence from Beaver and Morse (1978) and Kothari (1989) who documented the effect of earnings growth and other proxies of risk (beta, size variables) on P/E ratio.

[10] The industry P/E was determined from the median P/E of the firms, which constituted the industrial sector.

[11] The idea is justified by Gordon's price formula, presented in Gordon and Shapiro (1956):

$P_t = \frac{D_{t+1}}{k-g} = \frac{n*E_{t+1}}{k-g} \Leftrightarrow g = k - \frac{n*E_{t+1}}{P_t}$ where n=the dividend payout ratio, D_{t+1} =next period's dividends, E_{t+1} =next period's earnings, k= discount rate and g= the dividend growth which can also be the earnings growth if we assume that dividends are proportionate to earnings.
We also assume that the dividend payout ratio remains constant (n).

[12] The equation in note 8 becomes: $g = k - \frac{n*E_t}{P_t}$ as the extrapolation phenomenon equals current with future earnings. Thus, stocks with low E/P reflect high future growth and vise versa.

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become overestimated, fail to meet investor's expectations and are gradually abandoned. They also concluded that, stocks with low E/P ratio (high earnings growth related to glamour stocks) are less overestimated than stock with low cash flow to price ratio. These stocks are more possible to produce exceptional returns in the future due to temporary, short term decline in earnings, rather than stocks with low C/P.

The formation of portfolios with higher E/P ratios (low expected future earnings growth) and lower sales growth (low current growth) presented the higher future 5- year average and cumulative return when compared with portfolios formed with different criteria (combinations of ratios of fundamentals to price such as B/M, Cash flows/P and sales growth). In addition, regression analysis proved that E/P has significant predictive power of future annual returns. On the other hand, company's size was by itself incapable of explaining future stock performance, which appeared to be related to more than one parameter[13].

1.6 The P/E Effect in ASE

Recent empirical research (Kyriazis, Diacogiannis (2002)) on Athens Stock Exchange (ASE) supported and reinforced the performance of value strategies. The authors provided strong evidence that future return is highly related with low P/E ratios (high E/P) and high dividend yields (D/P), regardless of risk taken. On the contrary, low B/M (book- to- market) ratios and low market value- MV (small- sized firms) earn greater returns but at the expense of higher risk undertaken, and only when in the case of boom markets. The above argument leads to the conclusion that stocks with low B/M and MV should be avoided in times of market recession preceding a significant boom, as the additional risk that these stocks comprise is being realized at this time. The preceding high returns are attributed to the investor's overreaction in the period of increasing prices. This specific research also led to an important argument concerning the traditional theory of CAPM. The researchers found that stocks with lower systematic risk earn higher

[13] These results are in accordance with the earlier research of Fama and French (1992).

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returns in the future. This market anomaly was attributed to the overall inefficiency of ASE[14].

1.7 Modern Theories on the behavior of P/E

Moving away from stock selection strategies, the academic interest was focused on the general behavior of the market P/E during the years. Campbell and Shiller (2001) after observing market P/E changes in an enormous period of time (1871- 2000), claimed that the ratio's behavior should be considered to be mean- reverting. The case that P/E could be regarded as stationary was supported by the idea that the ratio is been composed by two non- stationary parameters, which appeared to be positively correlated (this relationship is known as cointegration, Engle and Granger (1987)). The mean reverting behavior of P/E justified the predictability of the ratio in the future market prices. The authors showed that the P/E ratio will revert back to its mean when it has currently reached an extreme level, by changes occurred in price rather than earnings. They provided evidence that the variability of P/E could interpret very little of the changes in earnings (earnings growth variable), as the latter appeared to be very static during the period examined. The model which they constructed was based on a) 10- year price returns without accounting for dividends (prices did not included dividend capitalization) and b) the market P/E, as it was been calculated by using 10- year smoothed earnings in the denominator. The results were quite impressive in terms of the forecasting capability of the P/E ratio to the 10- year real stock returns. Moreover, it was mentioned that the effect of P/E ratio to future market returns might be biased due to diversity in earnings accounting treatments. When large amounts are invested in intangible assets and this amount is expensed rather than capitalized, earnings are undervalued. The research concludes by stating that in cases where market P/E has moved too far from the historical average mean, (such is the case of the US stock market in 2000) the model's predictability may be affected.

[14] Market inefficiencies, which have also been proved to hold for the Greek market by previous research, (Antoniou, et.al. (2001)) justify the implementation of value strategies in the long term, but only as a result of investor's overreaction to news associated with each firm separately (specific overreaction).

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Studies that followed, adopted the general principle of Campbell's and Shiller's views. An unpublished research by Weigand and Irons (2004) identified a significant flow in the relationship of P/E and stock returns at a high level of the market P/E. They found that the P/E ratio seized to be mean reverting during 1960. At the same time, Fed model was starting to gain applause in the academic field. The idea of the Fed model was that P/E ratio is related to interest rate yields from the Gordon's relationship. This means that market P/Es are on average influenced by interest rates[15]. The above correlation was proved to be both significant and negative. The authors explained the change in P/E-stock return relationship as a change in investor's behavior, after the introduction of the Fed model. Market participants began to implement Fed model in their financial valuations, this trend produced a strong relevance between P/E ratio and interest yields. The idea that stocks are "fairly valued" only when they are priced to deliver the nominal returns of 10- year T- bills was characterized as a behavioral mistake by Asness (2003). In tandem with this view, researchers proved that it is possible to construct a multivariate model using a dummy variable in place of extreme level P/Es (above 21) to produce more accurate results. The inclusion of two other macroeconomic factors (production as it was expressed by earnings growth and inflation) increased the explanatory power of the model. The difference in methodology from Campbell and Shiller's study is that the authors used 10- year overlapping periods (preceding and following each month) to calculate returns instead of 10- year moving average in earnings in order to smooth earnings.

According to recent unpublished research by Anderson and Brooks (2005) it is possible to analyze the variability of P/E ratio to the variability of other P/Es concerning the company's size, the market average P/E ("year effect"), the industrial sector and a residual P/E to reflect any other effect which exclusively influenced the specific P/E of the firm ("indiosyneratic effect"). They decomposed the P/E ratio to the elements above and found that the ratio has a positive relationship with the size P/E, market average and "indiosyneratic" P/E and a negative relationship with the sector P/E. The researchers assigned different weights to each element and constructed a new P/E ratio. They exploited the new ratio by forming a low P/E portfolio which provided superior 1- year

[15] Weigand and Irons (2004) used 10- year treasury yields to account for the discount rate.

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returns than the returns earned from a low P/E portfolio, using the traditional P/E. The difference in the returns gained; between the two strategies was 2.5% annually. The authors concluded (in accordance with any previous constituency of P/E anomaly) that the higher returns produced by implementing the new statistic, cannot be regarded as a compensation for greater risk.

In respect to this recent study of Anderson and Brooks (2005), we decided to focus our research not only on the potential effect of P/E ratio on the stock returns in general; but also to provide it with an industry- related orientation[16]. In order to address this distinction, we studied the P/E influence on stock performance in a specific sample, which was comprised of firms of three highly related industrial sectors. These sectors were the construction industry, the industry of basic metals and the industry of non-metallic minerals and cements. Below we provide some information concerning the development of such sectors in the Greek market, during the period of 1999- 2004.

1.8 The Greek Construction Industry

The construction industry represents one of the most important, fast- growing sectors of the Greek economy. This is attributed to the implementation of many development projects many of which are financed by the Third Community Support Framework (CSF), in addition to the projects in the light of the Olympic Games that took place in 2004. Another factor that contributes to the growth of the construction industry is the development of the so called self- financed, BOT (Built- Operate- Transfer) projects[17]. According to the construction economic institute, the contribution margin of the construction industry to the Greek GNP (Gross National Product) was about 21% during the period 1999-2004. This was a time of intense changes for the construction industry, as the number of mergers and acquisitions increased dramatically, resulting in reduction in the number of firms. The reasons for the increased industrial activity, in the field of

[16] This idea is also consistent with the results of the study of Alford (1992).

[17] Many construction organizations are eager to pursue modern methods of project finance. These include self- finance (BOT) and co- finance that focuses on partnerships with other financial organizations (banks, insurance firms). BOT (Built- Operate- Transfer) method determines that the construction industry operates the project as soon as it is finished, for an agreed period of time. During that period, the firm is profited by the income earned from the operation of the project, as it is also responsible for its maintenance. After the agreed period, the project is transferred to the public sector. This method has also advantages for the state, in the way that it releases it form the cost of raising the required initial capital for the investment.

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mergers and acquisitions, are found in the implementation of the new legal framework (regulation 2940/2001[18]) which changed the criteria of recognition allowance of the construction industries. Under the new regulation, the Greek construction firms were forced to grow in size in order to preserve their ability to participate in any given project, regardless of its production cost. As a result, the increase of mergers and acquisitions led to the reinforcement of the industrial firms, which in addition to their experience (developed through the creation of large- scale projects), were given a remarkable boost of competitive advantage in the Hellenic and international market.

The demand for constructions is greatly influenced by the demand for the development of public projects. In the period of 1999-2004 the need for public athletic facilities and traffic network development was increased in the light of the Olympic Games that performed in Athens in 2004. The finance of the Olympic projects and much of the construction expense, which was covered by the Third CSF of the European Union (200-2006), provided considerable support to the construction activity. Construction activity was also directed to the erection of hotel facilities. According to the data from the Greek hotel union, during 1990- 2001 the growth of the hotel industry reached the rate of 2,3%. Moreover, the construction growth is being promoted by the building activity of the private sector, which according to the number of the approved building licenses, generated an increase equal to 9% during 2001- 2002. The Balkan and the Eastern Europe markets are also characterized by high levels of demand in development projects. This fact seems to present an opportunity for the Greek construction companies to extend their activities in these countries.

The new regulation 2940/2001, which specified different recognition criteria for the construction companies, promoted the creation of large groups in the construction industry. Small companies were either merged, or forced to become associates or subsidiaries to larger firms. So the purpose of the new regulation was to increase the competitiveness of Greek firms in the international project competitions. This was true as Hellenic construction industries, in that time, were large in number, but lacked production

[18] The regulation 2940/2001 specified that all construction firms will be classified according to their total assets in seven groups. The seventh cluster was comprised of the 14 largest organizations, instead of 60 that were included under the terms of the old legal framework. From the implementation of the new regulation which determined a new procedure in the license approval, the number of construction firms in the three last classes was reduced from 328 to 127 (percentage reduction of 67%).

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and performance efficiency. The regulation also promoted the development of construction firms by providing considerable tax benefits. The benefits targeted any activity related to the purchase and installation of new equipment or the erection of new production units in order to facilitate future performance. Furthermore, the tax benefits were significant for firms which aimed at the development of quality and security control units. In addition to any tax benefits, the regulation provided that certain subventions to be given for financing equipment replacement/ modernization of the construction industries.

After the passing of the Olympic Games and the exhaustion of the fund from the Third CSF, the construction industry growth is expected to be reduced. Consistent with this view, many of the Greek construction firms are turning their investing activities to new sectors, such as real estate[19], energy (through the erection of electricity production units) and communications, which begin to demonstrate exceptional growth potential. Furthermore, the majority of construction industries are starting to participate in public projects for the preservation of the natural environment, or turning towards development projects in neighbor economies (the Balkans or Eastern Europe).

1.9 The Greek Industry of Basic Metals

The Greek market of basic metals is comprised by the steel, copper and the aluminum markets. The application of these metals in the construction industry was increased in the last decade, as many traditional building materials (cement, iron, wood) were being replaced by elaborate metallic components, such as aluminum and steel frames and recesses, which are more durable and quicker to produce. Moreover, the use of copper in the cable production remains at high levels due to the high conductivity of this metal. Last but not least, steel continues to be one of the most useful materials in the construction industry, as it provides the frame for every concrete construction.

Specifically, the aluminum industry in Greece is characterized by high growth (over the average European growth). The production of aluminum products was increased from 109 thousand tons in 1990 to 385 thousand in 2004 (18% average annual growth),

[19] The participation of the construction firms to real estate is through the purchase of existing real estate firms or though the incorporation of their own real estate subsidiaries. The real estate market in Greece presents.

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pushing the Greek aluminum market to the first place in terms of growth, among the relevant markets of the other European economies. In he sector of aluminum extrusion, the production showed a considerable, average increase of 17,8% from 1990 to 2004. The most important reason for this remarkable growth is the extended application of this metal in vehicle production and aerospace industry, which was considerably increased in the late 90's. The significant growth in the industry of basic metals is also driven by the application of steel and copper in the development projects (athletic facilities, steelwork bridges, electricity production units) that were constructed during the period of 1995-2004 (pre- Olympic period). The price indexes of basic metals and metallic objects were increased in 1999 to 0,7% and 1,8% accordingly. The relative increases performed in 1998 were 4,3% and 6,4%. The international prices of basic metals and metallic objects fell during 1999. In the first quarter of 2000, the industrial production index of the basic metals and metallic goods were lifted to 15% and 8,9%, accordingly.

The overall production growth of the basic metals industry reached the average (annual) level of 5,2% during the period 1995- 2004, whereas the average growth in the general manufacturing production index was only 3,6%[20].

1.10 The Greek Industry of Cements and Non- Metallic Minerals

The Greek economic sector of cements and non- metallic minerals is mainly comprised of companies occupied in the production of cement and marbles. The first branch (cement industry), which is represented by two large corporations, TITAN and HRAKLES Corp. presented intense signs of concentration with industries of the Balkan countries. The increased number of mergers and acquisitions with foreign firms reinforced the position of the Greek companies in the international market and provided them with new production solutions, since the cement market is being characterized by considerable difficulties in finding proper raw materials (competitive minerals in terms of cost and endurance). As a result, the production of cements and non- metallic mineral led to an increase of approximately 12% in 2002 from 9,3% in 1998 (base year: 1995). The second branch of non- metallic minerals concerns the production of marble. The Greek market of

[20] This index, which is calculated by the General Secretariat Of National Statistical Service Of Greece, includes the overall productivity of the Greek economy, with the exception of building activity, as well as, farming, fishing and agricultural production.

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marble contributes about 13,5% to the overall production of non- metallic minerals. As in the case of cement market, most of the imports that marble industries make concern raw materials from the Balkan countries, which are gifted with richer mineral reserves than Greece. Nevertheless, the volume of marble (finished and scrap) that is exported is about 9 times the volume imported. The equivalent amounts are 268000 tons and 30000 tons approximately.

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2. DATA AND METHODOLOGY

Initially we collected all companies listed in ASE (Athens Stock Exchange) for the time period 2000- 2005. From this overall sample we deducted all firms that belonged to the financial sector (banking, insurance, portfolio investment firms). Firms from the real estate management were also excluded. The main argument for the above restriction is that these firms apply different accounting frameworks to the presentation of their financial statements and the determination of their accounting income. It is clear that in such cases, the comparability of accounting fundamentals of firms from the financial sector and real estate with those of the other companies is not realistic and does not provide any reliable evidence. In view of this qualification, the size of our research sample was reduced to 226 firms.

Price data and accounting information for each stock included in the sample were obtained from Datastream's electronic database. Returns were calculated under the assumption that: 1) dividends are reinvested to produce additional return, and 2) the rates of stock return for each day are continuously compounded. Prices given from Datastream have been adjusted for stock splits, bonus issues, new issues, scrip dividends and capitalization of reserves.

The formula that was implemented for the computation of daily rates of return was the following:

$$R_{it} = \ln\left(\frac{P_{it} + D_{it}}{P_{it-1}}\right)$$

Where, R_{it} is the return of the stock i at day "t".

P_{it} is the closing price of the stock i at day "t".

P_{it-1} is the closing price of the stock i at day "t-1".

D_{it} is the cash dividend paid for the stock "i" on day "t".

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The analysis is conducted in two different samples:

Sample A includes firms listed in the ASE (excluding all firms from the financial and the real estate sectors).

Sample B is comprised of stocks from three industrial groups:

a) The construction industry.
b) The industry of basic metals.
c) The industry of non- metallic minerals and cements.

The aim of this distinction is to support our effort to analyze the influence of P/E ratio on stock returns in highly correlated industries. As previous studies have shown[21], firms in related industries are affected by similar factors of risk and earnings growth. In addition, related industries are more likely to present strong resemblance in the accounting methods that they follow for the preparation of their annual financial reports. Hence, it is expected that industry classification might be able to control for cross- sectional differences in these three terms since firms in related industries are relatively homogeneous. It is also proven that these three factors (earnings growth, risk, accounting methods) are descriptive of the time- series behavior of P/E ratio[22]. So by focusing this research in a specific sample of industry- related companies the influence of cross-sectional parameters on P/E is minimized and, thus, hope to achieve more significant evidence of the relationship between our two variables, the P/E ratio and stock returns.
Below we provide some terminology of the variables used in our research procedure:

Cumulative Return (CR)

To determine the cumulative stock returns (CR) we cumulate all daily stock returns from the 1st of April of the current fiscal year to the 31st of March of the next.

[21] Alford (1992), Anderson and Brooks (2005).
[22] Craig, et.al. (1987), Lee (1988), Beaver and Morse (1978).

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Cumulative Market Return (CMR)

As in the case of CR, to compute the cumulative market returns we cumulate the daily returns of the general index of Athens stock exchange from the 1st of April of the current fiscal year to the 31st of March of the next.

Price- to- Earnings ratio (P/E)

Earnings- to- price ratio at year t-1 is defined as: P_{it} / EPS_{it-1}

Where, P_{it} is the stock's "i" closing price at 31/3 of the financial year t and EPS_{it-1} represents the firm's "i" earnings per share[23] related to the financial year t-1.

The reason that EPS of the previous fiscal year is matched with the stock's market price of 31/3 of the current fiscal year is to address the fact that although the accounting information reflected in the annual financial statements for any given firm is related to the financial year ended in 31/12, in most cases, it is not until late March of the next fiscal year, when the financial reports are being published[24]. In respect to this average 3-month delay before the announcement of financial statements we calculate observed E/P ratios .

Market Value (MV)

Past evidence have argued that firm's size plays an important role to the formation of stock returns[26]. To proxy for the firm's size we implemented the firm's market value (MV) which was computed on a daily basis by the closing share price multiplied by the

[23] The EPS (earnings per share) figure for each stock is computed by dividing the last financial period's earnings to the weighted average number of common shares outstanding. Earnings used in EPS are defined as earnings before extraordinary items (discontinuing operations), but after income taxes and preference dividends.

[24] If this problem is not addressed the results of our study will be affected by "look ahead" bias. Meaning that although past accounting information is known to us looking five years ahead, it should be linked to the time it reached public views and matched with the subsequent stock returns.

[25] We used E/P ratios instead of P/E, since P/E does not take into account the existence of negative earnings. In the case of negative earnings P/E cannot be computed as it has no financial significance, whereas E/P is automatically set to zero, receiving the lowest possible value.

[26] Among others, Fama and French (1992), Lakonishok et.al. (1994) who concurred that size is negatively related to future stock performance.

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number of ordinary shares in issue[27]. The logarithmic form **(ln(MV))** was applied in order to smooth the distribution of values[28]. In the context of our analysis we used average annual MV from the average mean of 252 daily observations.

Earnings growth (EG)

The earnings growth is computed using the following formula:

$$EG_{it-1} = \frac{EPS_{it-1} - EPS_{it-2}}{EPS_{it-2}}$$

Where, EG_{it-1} is the earnings growth of the stock "i" at year t-1.

EPS_{it-1} is the earnings per share of the stock "i" at year t-1.

EPS_{it-2} is the earnings per share of the stock "i" at year t-2.

Table 1 presents the descriptive statistics of the variables used in our research. The table is comprised of three panels which refer either to different variables or to different samples or both.

Table 1

Panel A data are collected from the firms of sample A.

Panel B data are collected from the firms of sample B.

Panel C data are collected from the firms of sample A.

No. of years: 5 (2000- 2005).

[27] The amount of shares in issue is updated daily in response to new equity issues or changes in capital. For companies with more than one class of equity capital, the market value is expressed according to the individual issue.

[28] This idea is consistent with Fama and French (1992) methodology.

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Descriptive Statistics

Panel A

	CR	*DPE*	*PE*	*MV*	*CMR(-1)*	*EG*
Mean	-0.368	0.192	40.927	260.513	-0.072	1.812
Median	-0.368	0.000	17.5	88.365	-0.288	0.000
Max.	3.085	1.000	1126	11896.110	0.479	1752.769
Min.	-2.788	0.000	0.000	2.850	-0.471	-1.000
Std. Dev.	0.639	0.394	90.498	700.901	0.409	52.348
Observations			1122			

Panel B

	CR	*DPE*	*PE*	*MV*	*CMR(-1)*	*EG*
Mean	-0.333	0.080	53.394	301.475	-0.070	0.50
Median	-0.328	0.000	18.823	117.570	-0.288	0.00
Max.	3.085	1.000	1126	3289.550	0.479	28
Min.	-2.505	0.000	0.000	6.100	-0.471	-1.000
Std. Dev.	0.638	0.271	132.36	434.324	0.411	2.399
Observations			225			

Panel C

	EG(+1)	*EG*	*PE*
Mean	2.928	1.812	53.595
Median	0.000	0.000	25.277
Max.	1.752.769	1752.769	1126
Min.	-1.000	-1.000	0.00
Std. Dev.	67.331	52.348	103.374
Observations	904[29]	1122	1122

[29] In order to test the effect of P/E ratio on subsequent earnings growth, we had to link earnings growth data of one (+1) year ahead with current P/E information. This process led to the reduction in the number of observations by excluding growth data of the first year (2000) of the examined period.

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According to the descriptive statistics data of table 1, the mean and median of MV variable in panel A are 260.513 and 88.365 millions of €, whereas the equivalent amounts of MV variable in panel B are 301.475 and 117.570 millions of €. This difference between the two panel indicates that firms from sample B are relative large in comparison to the firms of the other industrial sectors.

The models we used to test the significance of P/E ratio to future stock returns were the following:

$$\mathbf{CR_{it}= \alpha_0+ \alpha_1(P/E)_{t-1}+ \alpha_2(DP/E)_{t-1}+ \varepsilon_t} \qquad \mathbf{(1)}$$

Where, CR_{it} is the cumulative return of the stock "i" for the year t.

$(P/E)_{t-1}$ is the price- to- earnings ratio of t-1 year.

$(DP/E^{30})_{t-1}$ is calculated when earnings are negative. In such a case the dummy variable is equal to 1 and the P/E ratio is zero. In every other case the dummy variable is zero.

$$\mathbf{CR_{it}= \alpha_0+ \alpha_1(P/E)_{t-1}+ \alpha_2(DP/E)_{t-1}+ \alpha_3 ln(MV)_{t-1}+ \varepsilon_t} \qquad \mathbf{(2)}$$

Where, CR_{it} is the cumulative return of the stock "i" for the year t.

$(P/E)_{t-1}$ is the price- to- earnings ratio of t-1 year.

$(DP/E)_{t-1}$ is calculated when earnings are negative. In such a case the dummy variable is equal to 1 and the P/E ratio is zero. In every other case the dummy variable is zero.

$ln(MV)_{t-1}$ is the market value of the firm at year t-1.

[30] To address the fact that when earning are negative P/E cannot be determined, since is such case it has no financial significance, we use a dummy P/E variable. This concept is consistent with Fama and French (1992).

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According to Fama and French (1992), high average returns of stocks with negative earnings, are better explained by MV (size effect), rather than P/E proxy variable. The following model was formulated to examine this possibility.

$$\mathbf{CR_{it}= \alpha_0+ \alpha_1(P/E)_{t-1}+ \alpha_2 ln(MV)_{t-1}+ \varepsilon_t} \qquad \mathbf{(3)}$$

Where, CR_{it} is the cumulative return of the stock "i" for the year t.

$(P/E)_{t-1}$ is the price- to- earnings ratio of t-1 year.

$ln(MV)_{t-1}$ is the market value of the firm at year t-1.

$$\mathbf{CR_{it}= \alpha_0+ \alpha_1(P/E)_{t-1}+ \alpha_2(DP/E)_{t-1}+ \alpha_3 CMR_{t-1}+ \varepsilon_t} \qquad \mathbf{(4)}$$

Where, CR_{it} is the cumulative return of the stock "i" for the year t.

$(P/E)_{t-1}$ is the price- to- earnings ratio of t-1 year.

$(DP/E)_{t-1}$ is calculated when earnings are negative. In such a case the dummy variable is equal to 1 and the P/E ratio is zero. In every other case the dummy variable is zero.

CMR_{t-1} is the cumulative market return of the year t-1.

$$\mathbf{CR_{it}= \alpha_0+ \alpha_1(P/E)_{t-1}+ \alpha_2(DP/E)_{t-1}+ \alpha_3 ln(MV)_{t-1}+ \alpha_4 EG_{it-1}+ \varepsilon_t} \qquad \mathbf{(5)}$$

Where, CR_{it} is the cumulative return of the stock "i" for the year t.

$(P/E)_{t-1}$ is the price- to- earnings ratio of t-1 year.

$(DP/E)_{t-1}$ is calculated when earnings are negative. In such a case the dummy variable is equal to 1 and the P/E ratio is zero. In every other case the dummy variable is zero.

$ln(MV)_{t-1}$ is the market value of the firm at year t-1.

EG_{it-1} is the earnings growth of stock "i" at year t-1.

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$$CR_{it} = \alpha_0 + \alpha_1(P/E)_{t-1} + \alpha_2(DP/E)_{t-1} + \alpha_3 CMR_{t-1} + \alpha_4 \ln(MV)_{t-1} + \alpha_5 EG_{it-1} + \varepsilon_t \quad (6)$$

Where, CR_{it} is the cumulative return of the stock "i" for the year t.

$(P/E)_{t-1}$ is the price- to- earnings ratio of t-1 year.

$(DP/E)_{t-1}$ is calculated when earnings are negative. In such a case the dummy variable is equal to 1 and the P/E ratio is zero. In every other case the dummy variable is zero.

CMR_{t-1} is the cumulative market return of the year t-1.

$\ln(MV)_{t-1}$ is the market value of the firm at year t-1.

EG_{it-1} is the earnings growth of stock "i" at year t-1.

In order to test the effect of earnings growth on the next year's stock returns the following model was applied:

$$CR_{it} = \alpha_0 + \alpha_1 EG_{it-1} + \varepsilon_t \quad (7)$$

Where, CR_{it} is the cumulative return of the stock "i" for the year t.

EG_{it-1} is the earnings growth of stock "i" at year t-1.

It is obvious to all the models implemented in the analysis that we relate stock returns with accounting variables with one year lag. The reason for this time difference, is that we want to examine the predictability of certain accounting parameters (MV, P/E, and EG) to stock returns. In this way, all accounting variables represent past information the moment they enter our models. In order to control for the market effect we introduced the cumulative market return variable (CMR).

Apart from the relation between P/E ration and stock returns we examined the effect of earnings growth directly to the ratio. For this purpose we developed the following two models:

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$$EG_{it} = \gamma_0 + \gamma_1 (P/E)_t + \varepsilon_t \quad (8)$$

$$EG_{it+1} = \gamma_0 + \gamma_1 (P/E)_t + \varepsilon_t \quad (9)$$

Where, EG_t is the earnings growth at year

$(P/E)_t$ is the price- to- earnings ratio calculated at time t (at the end of the period that EG_t represents) of the stock "i".

EG_{t+1} is the earnings growth at year t+1.

By applying these equations we hope to find evidence of the association between P/E and current/ future growth. Previous academic research by Beaver and Morse (1978) found P/E ratio to be negatively related to the current period's earnings growth this result was attributed to the effect of "transitory earnings". On the other hand, Lakonishok, et.al. (1994) concluded that, as long as, extrapolation theory holds, observed P/E is related to future growth, but in an opposite way than the one predicted by Gordon's formula[31]. So provided that investors extrapolate current and past growth into the future, P/E ratio will be negatively related to future growth. However, this association is obvious only after the fist two years of the determination of P/E. Before that time, stocks with high P/E perform better in terms of growth than stocks with lower ratio (in respect to Gordon's formula). This evidence is not contradictory to the findings of Beaver and Morse (1978), as the two authors also claimed that P/E is negatively correlated with current earnings growth but positive correlated with earnings growth of the next year. Of course, the explanations given in each study differ[32].

The coefficients of the independent variables were estimated using the OLS (Ordinary Least Squares) method which provides the best linear unbiased estimators (BLUE) of he regression parameters, α_0 and α_i.

The correlation coefficients of the variables used in our analysis are shown in table 2. It is obvious that in panel A, the correlation coefficients of PE, MV and CMR with CR are

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[31] According to Gordon's model: $g = k - \frac{n^* E_{t+1}}{P_t}$, which means that as P/E increases (i.e. E/P decrease), earnings growth (g) will also increase.

[32] Lakonishok, Shleifer and Vishny (1994) believe in the application of the extrapolation effect, whereas, Beaver and Morse (1978) attribute the phenomenon to the existence of "transitory earnings".

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significant at 1% level[33]. On the other hand, in panel B, the correlation coefficients of PE and CMR with CR are significant at 5% level. Furthermore, the variables of panel C are relatively uncorrelated.

Table 2

Panel A data are collected from the firms of sample A.

Panel B data are collected from the firms of sample B.

Panel C data are collected from the firms of sample A.

N is the number of observations.

Sig. is the t-statistic of the correlation coefficient.

No. of years: 5 (2000- 2005).

Panel A	**Pearson Correlations**					
	CR	***PE***	***DPE***	***MV***	***CMR(-1)***	***EG***
CR	1					
Sig	.					
N	1122					
PE	-0.108**	1				
Sig.	0.000	.				
N	1122	1122				
DPE	-0.050	-0.221**	1			
Sig.	0.096	0.000	.			
N	1122	1122	1122			
MV	-0.133**	0.164**	-0.202**	1		
Sig.	0.000	0.000	0.000	.		
N	1122	1122	1122	1122		
CMR(-1)	-0.225**	0.112**	0.157**	0.191**	1	
Sig.	0.000	0.000	0.000	0.000	.	
N	1122	1122	1122	1122	1122	
EG	0.021	-0.014	-0.021	-0.028	-0.030	1
Sig.	0.485	0.632	0.486	0.352	0.317	.
N	1122	1122	1122	1122	1122	1122

[33] We computed Pearson correlations which were tested with two- tailed test of significance.

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Panel B

	CR	*PE*	*DPE*	*MV*	*CMR(-1)*	*EG*
CR	1					
Sig	.					
N	225					
PE	-0.136*	1				
Sig.	0.042	.				
N	225	225				
DPE	-0.113	-0.119	1			
Sig.	0.090	0.074	.			
N	225	225	225			
MV	-0.070	0.113	-0.245**	1		
Sig.	0.299	0.090	0.000	.		
N	225	225	225	225		
CMR(-1)	-0.144*	0.120	0.078	0.175**	1	
Sig.	0.031	0.073	0.246	0.009	.	
N	225	225	225	225	225	
EG	0.049	-0.056	-0.130	0.079	-0.030	1
Sig.	0.466	0.404	0.051	0.239	0.317	.
N	225	225	225	225	225	225

Panel C

	EG(+1)	*EG*	*PE*
EG(+1)	1		
Sig	.		
N	904		
EG	-0.001	1	
Sig.	0.962	.	
N	904	1122	
PE	0.006	-0.014	1
Sig.	0.865	0.632	.
N	904	1122	1122

**: Indicates statistical significance at 1% level.

*: Indicates statistical significance at 5% level.

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3. EMPIRICAL FINDINGS

This section presents the empirical findings from the analysis of the model adopted in this study.

Table 3: Regression results with White Heteroskedasticity- Consistent Standard Errors & Covariance.

No. of years: 5 (2000- 2005).

Panel A data are collected from the firms of sample A.

Panel B data are collected from the firms of sample B.

Panel C data are collected from the firms of sample A.

Panel A $CR_{it}= \alpha_0+ \alpha_1(P/E)_{t-1}+ \alpha_2(DP/E)_{t-1}+ \alpha_3 \ln(MV)_{t-1}+ \alpha_4 EG_{it-1}+ \alpha_5 CMR_{t-1}+ \varepsilon_t$

Model No.		*PE*	*DPE*	*MV*	*EG*	*CMR(-1)*	*F-statistic*	*Adjusted R-squared*
1	Coefficient	-0.001	-0.125					
	t- statistic	(-3.320)***	(-2.326)**				9.824***	0.015
2	Coefficient	-0.001	-0.163	-0.065				
	t- statistic	(-2.791)***	(-3.016)***	(-4.654)***			13.368***	0.032
3	Coefficient	-0.001		-0.057				
	t- statistic	(-2.524)**		(-4.140)***			14.481***	0.023
4	Coefficient	-0.001	-0.060			-0.325		
	t- statistic	(-2.807)***	(-1.123)			(-7.231)***	23.310***	0.056
5	Coefficient	-0.001	-0.163	-0.064	0.000			
	t- statistic	(-2.786)***	(-3.000)***	(-4.632)***	(5.704)***		10.071***	0.031
6	Coefficient	-0.001	-0.093	-0.045	0.000	-0.294		
	t- statistic	(-2.442)**	(-1.680)*	(-3.258)***	(3.919)***	(-6.363)***	16.046***	0.063
7	Coefficient				0.000			
	t- statistic				(11.526)***		0.488	0.000
	Observations				1122			

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Panel B $CR_{it} = \alpha_0 + \alpha_1(P/E)_{t-1} + \alpha_2(DP/E)_{t-1} + \alpha_3 \ln(MV)_{t-1} + \alpha_4 EG_{it-1} + \alpha_5 CMR_{t-1} + \varepsilon_t$

Model No.		*PE*	*DPE*	*MV*	*EG*	*CMR(-1)*	*F-statistic*	*Adjusted R-squared*
1	**Coefficient**	-0.001	-0.308					
	t- statistic	(-3.733)***	(-2.166)**				4.078**	0.027
2	**Coefficient**	-0.001	-0.358	-0.045				
	t- statistic	(-3.405)***	(-2.296)**	(-1.149)			3.316**	0.030
3	**Coefficient**	-0.001		-0.027				
	t- statistic	(-3.363)***		(-0.739)			2.425*	0.012
4	**Coefficient**	-0.001	-0.283			-0.183		
	t- statistic	(-3.327)***	(-2.032)**			-(1.827)**	3.799**	0.036
5	**Coefficient**	-0.001	-0.350	-0.045	0.008			
	t- statistic	(-3.368)***	(-2.220)**	(-1.160)	(0.311)		2.525**	0.027
6	**Coefficient**	-0.001	-0.320	-0.035	0.004	-0.159		
	t- statistic	(-3.136)***	(-2.046)**	(-0.867)	(0.183)	(-1.439)	2.487**	0.032
7	**Coefficient**				0.013			
	t- statistic				(0.586)		0.532	-0.002
	Observations				225			

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Panel C			
(a)	$EG_{it} = \gamma_0 + \gamma_1(P/E)_t + \varepsilon_t$		
	PE	F-statistic	Adjusted R-squared
Coefficient	0.003		
t- statistic	(0.425)	0.029	-0.001
Observations		904	

(b)	$EG_{it+1} = \gamma_0 + \gamma_1(P/E)_t + \varepsilon_t$		
	PE	F-statistic	Adjusted R-squared
Coefficient	-0.008		
t- statistic	(-1.041)	0.228	-0.001
Observations		1122	

*: indicates statistical significance at 10% level.

**: indicates statistical significance at 5% level.

***: indicates statistical significance at 1% level.

Evidence from the regression analysis presented in table 3, underline a strong negative association between P/E ratio and subsequent stock returns. All models in panel A are statistically significant at 1% level, except for the seventh model. In panel B, all models are significant at 5% level, save the third model that includes PE and MV variables and which is significant at 10% level and the seventh model.

In both panels A and B, PE variable coefficients in the initial models are both negative and statistically significant at 1% level. Especially, in panel B, this level of significance is retained in every independent variable combination, whereas in panel A the level of significance of PE coefficient is reduced to 5% in the third and the sixth model. Moreover, the dummy PE variable is both negative and significant at the 5% level in all models of panel B. In panel A, the same variable coefficient is insignificant in the fourth

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model, significant at 10% level in the sixth model, at 5% level in the fist model and at 1% level in all other models[34].

In panel A, the MV coefficient is both negative and significant at 1% level. On the contrary, in the second panel that displays regression results from sample B, this is not the case since MV variable appears to be wholly insignificant. For panel A, CMR variable is negative and significant at 1% level in panel A. In panel B this variable is insignificant in the sixth model and significant at 5% level in the fourth model. Moreover, in panel A, EG variable is found to be positively related to subsequent stock CR. Its coefficient is both positive and statistically significant at 1% level. Lastly, it is worth mentioning that the adjusted R^2 coefficient reaches its uppermost limit in the sixth regression model in panel A and the fourth regression model in panel B. The relevant values are 6.3% and 3.6% accordingly. The reason for this difference is that MV and EG variables are wholly insignificant for the regressions of panel B and their inclusion in any of the models results in loss of significance and explanatory potential. The results in panel C do not provide any significant evidence of the relation between P/E ratio and current or future EG, which would have otherwise confirmed the extrapolation theory[35].

[34] We also found PE and dummy PE variables to be both negative and significant at 1% when used in a model with **monthly** cumulative returns instead of annual CRs. In addition, the overall significance of this model was found to be in the level of 1% (F-statistic=12.717).

[35] Lakonishok, et.al. (1994).

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4. CONCLUSION

Evidence from past research has argued that P/E inefficiency holds for the UK and the US markets since observed P/E ratios can be used for selecting stocks that would earn exceptional future returns. The same case is found to be valid for ASE.

Our results from **panel A**, demonstrate a strong negative relation between P/E ratio and subsequent equity returns. These findings are consistent with the concept of "value strategies", meaning that by investing on "value stocks" (with low P/E ratio) one can achieve higher return. However, the contrarian investment strategy does not seem to hold for earnings growth. EG variable is found to be positively related to share returns of the next year. So it is obvious that "glamour stocks", in terms of earnings growth, will continue to gain higher returns at least in the short term. We also find stock returns to be negatively related to prior market performance. The CMR variable is proved to be statistically significant and its inclusion in the same model with PE and the other cross-sectional variables (MV, EG), demonstrates superior results in terms of significance and predictability. The "size- effect" as it appears in literature, is found to hold for the Greek market, as stocks of firms with relative small size, produce higher returns. This case is deducted from the fact that MV variable is found to be both negative and statistically significant in all our models. In addition, MV appears to be a better proxy for the future returns of firms with negative earnings than dummy PE. The fact that the replacement of dummy PE variable with MV leads to a better model in terms of statistical significance (the F-statistic rises from 13.368 to 14.481) is consistent with the findings of Fama and French (1992).

The results from **panel B** reinforce the existence of the P/E effect. Our tests in sample B, which included stocks from highly correlated industries, produce more significant results of the P/E ratio's influence on stock returns in comparison with those of sample A. This fact is consistent with the evidence of Alford (1992), as well as, Anderson and Brooks (2005) in relation to the explanatory potential of the industry factor in the cross- sectional variation of stock returns. The increase in the significance of the PE variable in the second panel indicates that the relative heterogeneity of earnings growth, risk and accounting methods of firms belonging in different industries is related to the variability of their stock returns. This could well be the reason for the absence of any significance of

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the EG variable in sample B. The relative homogeneity of the firms in this sample in terms of earnings growth reduces the explanatory power of the variable. The case is that firms from corresponding industries, even though they show considerable resemblance in their rates of earnings growth, they do not present the same degree of uniformity in their stock return rates. This appears to be exactly the case as, according to the data of table 1, the standard deviation of EG and CR in panel A is 52.348 and 0.639, accordingly. On the other hand, in panel B the equivalent standard deviation of EG is only 2.399, although the standard deviation of CR is almost the same of that of panel A (0.638). So EG obviously fails to describe equity performance of industry related firms in a cross- sectional analysis. Furthermore, size effect is not apparent in panel B. The low significance of MV variable can be attributed to the fact that firms from the three corresponding industries[36] are relatively large. In such a case, the absence of relative small firms in sample B has led to the insignificance of MV variable which in turn evidences the absence of the size effect. Moreover, the subsequent equity returns of this panel show little relevance with market returns. CMR loses its statistical significance as soon as it is combined with the rest of the variables in the same model. This evidence concurs to the idea that firms from the three related industries (sample B) are less affected by market changes than the other companies[37]. Nevertheless, further research is required for this statement to be fully confirmed.

Even though our results document the existence of P/E relation with subsequent stock returns, it would be wrong to attribute this anomaly to the extrapolation effect[38]. If PE were negatively related to future EG[39], then we would have argued that glamour stocks (with high P/E ratio) demonstrate lower growth rate. Hence, investors are prone to the naive belief that current firm performance (in terms of earnings growth) will be sustained, which is the case of the extrapolation theory. However, in the light of the findings of panel C, such a statement would be unjustified. The irrelevance of PE with current and subsequent earnings growth in combination with the finding of a strong positive relation

[36] 1) construction industry, 2) the industry of basic metals and 3) the industry of non- metallic minerals and cements.

[37] This also means that the stocks of firms from these sectors are less risky (in terms of market risk) than that of the rest industrial groups.

[38] Lakonishok, et.al. (1994).

[39] A relationship between P/E and future earnings growth has proved to exist by Beaver and Morse (1978) and Lakonishok, et.al. (1994).

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between EG and future return, illustrate that P/E effect cannot be attributed to extrapolation, at least in the short term. On the other hand, our results are consistent with the overreaction hypothesis of De Bondt and Thaler (1985, 1987). Investor's overreaction to corporate news indicates the possibility of existing market inefficiencies that could provide the opportunity for abnormal gains. In the case of P/E ratio, this can be interpreted as taking long positions in stocks at the time of the market's reaction to new information that would drive their prices down ("bad news"). The P/E of these stocks in all probability would be lower as bad news will cause their prices to drop. However, the same stocks will produce superior returns in the long term, after new information announcements have seized and during the time of the correction to their prices. Hence, an investor with initial long position on such stocks will eventually earn higher return. As other research has pointed out[40] this could well be the case for ASE. The fact that the Greek market during the period of 2000- 2005 has repeatedly shown signs of successive changes in the opposite direction between the years, also proves the existence of the overreaction hypothesis.

[40] Kyriazis, Diacogiannis (2002) and Antoniou, et.al. (2001).

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REFERANCE

Alford, A. W., 1992, The Effect of The Set of Comparable Firms On The Accuracy of Price-Earnings Valuation Method, Journal of Accounting Research 30, 94- 108.

Anderson, Keith P., and Chris Brooks, June 2005, Decomposing The Price-Earnings Ratio, Working Paper.

Antoniou, A., E. Galariotis and S. Spyrou, 2001, Contrarian Profits and The Overreaction Hypothesis: The Case of The Athens Stock Exchange, Working Paper.

Assness, Clifford S., Fight The Fed Model, 2003, Journal of Portfolio Management, 11-24.

Ball, R., S. Kothari, and J. Shanken, 1995, Problems In Measuring Portfolio Performance: An Application To Contrarian Investment Strategies, Journal of Financial Economics 38, 79- 107.

Basu, S., 1977, Investment Performance of Common Stocks In Relation To Their Price Earnings Ratios: A Test of The Efficient Market Hypothesis, Journal of Finance 32, 663-682.

Beaver, W. and D. Morse, 1978, What Determines Price- Earnings Ratios?, Financial Analysts Journal 34, 65- 76.

Black, F., 1972, Capital Market Equilibrium With Restricted Borrowing, Journal of Business (July), 444- 455.

Campbell, John Y., and Robert J. Shiller, 1998, Valuation Ratios and The Long- Run Stock Market Outlook, Journal of Portfolio Management, 11- 26.

ATHENS UNIVERSITY OF ECONOMICS & BUSINESS ΟΙΚΟΝΟΜΙΚΟ ΠΑΝΕΠΙΣΤΗΜΙΟ ΑΘΗΝΩΝ

Chan, L. K. C, N. Jegadeesh, and J. Lakonishok, 1996, Momentum Strategies, Journal of Finance 51, 1681- 1713.

Chan, K. C., 1988, On Contrarian Investment Strategy, Journal of Business 61, 147- 163.

Chopra, N., J. Lakonishok, and J. Ritter, 1992, Measuring Abnormal Performance: Do Stocks Overreact?, Journal of Financial Economics 31, 235- 268.

Craig, D., J. Jonshon, and M. Joy, 1987, Accounting Methods and P/E Ratios, Financial Analysts Journal 34, 41- 45.

De Bondt, W. and R. Thaler, 1985, Does The Stock Market Overreact?, Journal of Finance 40, 793- 805.

De Bondt, W. and R. Thaler, 1987, Futher Evidence On Investor Overreaction and Stock Market Seasonality, Journal of Finance 42, 557- 581.

Drenman, D. Phychology and The Stock Market: Why The Pros Go Wrong and How To Profit (Warner Books, New York).

Dhaliwal, Dan S., David A. Guenther, and Mark A. Trombley, May 2000, The Effect of The LIFO Inventory Method On Earnings-Price Ratios, Working Paper.

Fama, E. and K. French, 1992, The Cross- Section of Expected Stock Returns, Journal of Finance 47, 427- 465.

Fama, E. and K. French, 1995, Size and Book-To-Market Factors In Earnings and Returns. Journal of Finance 50, 131- 155.

Gordon, M. and E. Shapiro, 1956, Capital Equipment Analysis: The Required Rate of Profit, Management Science 3, 102- 110.

ATHENS UNIVERSITY OF ECONOMICS & BUSINESS
ΟΙΚΟΝΟΜΙΚΟ ΠΑΝΕΠΙΣΤΗΜΙΟ ΑΘΗΝΩΝ

Graham, B. and Dodd, 1934, Security Analysis (Mcgraw- Hill, New York)

Jain, Prem C., and Joshua G. Rosett, January2002, Macroeconomic Variables and The E/P Ratio, Working Paper.

Jegadeesh, N. and S. Titman, 1993, Returns To Buying Winners and Selling Losers: Implications For Market Efficiency, Journal of Finance 48, 65- 92.

Jaffe, J., D. B. Keim, and R. Westerfield, 1989, Earnings Yields, Market Values, and Stock Returns, Journal of Finance 44, 135- 148.

Kavussanos, M. G., E. Dockery, 2001, A multivariate test for stock market efficiency: the case of ASE, Journal of Applied Financial Economics 11, 573- 579.

Kothari, S. P., 1989, The Relation Between Earnings To Price Ratios, Systematic Risk and Growth: Implications of Earnings As A Noisy Indicator of Firm Value, Working Paper.

Kyriazis, Dimitris, and George Diacogiannis, May 2004, Testing The Performance of Value Strategies In The Athens Stock Exchange, Working Paper.

Lakonishok, J., A. Shleifer, and R. Vishny, 1994, Contrarian Investment, Extrapolation and Risk, Journal of Finance 49, 1541- 1578.

Lee, C., 1988, Inventory Accounting and Earnings/Price Ratios: A Puzzle, Contemporary Accounting Research 5, 371- 388.

Lintner, J., 1965, The Valuation of Risky Assets and The Selection of Risky Investments In Stock Portfolios and Capital Budgets, Review of Economics and Statistics (February), 13- 37.

ATHENS UNIVERSITY OF ECONOMICS & BUSINESS
ΟΙΚΟΝΟΜΙΚΟ ΠΑΝΕΠΙΣΤΗΜΙΟ ΑΘΗΝΩΝ

Mcmanus, Ian, Owain Ap Gwilym, and Stephen Thomas, 2004, The Role of Payout Ratio In The Relationship Between Stock Returns and Dividend Yield, Journal of Business Finance & Accounting, 1355- 1387.

Molodovsky, N., 1953, A Theory of Price-Earnings Ratios, Financial Analysts Journal (November 1953), 65- 80.

Penman, S., 1996, The Articulation of Price-Earnings Ratios and Market-To-Book Ratios and The Evaluation of Growth, Journal of Accounting Research 34, 235- 260.

Penman, Stephen H., 1998, Financial Statement Analysis and Security Valuation, (Mcgraw- Hill, Boston)

Ross, S. A., 1976, The Arbitrage Theory of Capital Asset Pricing, Journal of Economic Theory 13, 341- 360.

Sharpe, W. F., 1970, Portfolio Theory and Capital Markets (Mcgraw- Hill, New York).

Trombley, Mark A., Dan S. Dhaliwal and David A. Guenther, September 1999, Inventory Accounting Method and Earnings-Price Ratios, Working Paper.

Weigand, R., and Robert R. Irons, March 2004, The Market P/E Ratio: Stock Returns, Earnings, and Mean Reversion, Working Paper

Zarowin, P., 1990, What Determines Earnings Price Ratios Revisited, Journal of Accounting, Auditing and Finance, 439- 458.

ATHENS UNIVERSITY OF ECONOMICS & BUSINESS
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ΒΙΒΛΙΟΘΗΚΗ

Δωρεά

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