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VALUATION AND TRADING EFFICIENCY IN THE GREEK STOCK MARKET

BY

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INTRODUCTION

1. HISTORY

Even though the Greek Stock Exchange was founded at the end of the eighteenth century it never played a key role in the economic arena of Greece for many reasons. The economic environment was not the appropriate for it to flourish and the opportunities required for it to achieve its goals were nonexistent. High interest rates, taxation of profits, government intervention, and unfavorable tax code placed the Stock Market on a secondary position in respect with other sectors of the economy.

Moreover the Industrial revolution's effects were evidenced in Greece with a big delay. Therefore it did not alter the structure of the established family oriented enterprises. Consequently it impeded the occurrence and the establishment of big companies, which in turn hindered the development of the Stock Market. According to the findings of Ioannis Stergiopoulos (1988) and other Greek economists, at that time the valuation theory did not apply in the Greek stock market.

Today, however, the economic conditions seem to be changing. The new perspective is an economy geared towards a free market, creating a new liberalized economic environment. Consequently the stock market has a leading role in the evolution of the economic growth, allowing transactions to take place on the floor more easily and companies to enjoy the advantages of financing. Although it is an old institution, only recently has it been given the appropriate attention. The changes that occurred were the following: New legal code has been designed; Tax relief has been applied for profits in order to attract cash inflows. Interest rates (eventually no risk premium too) and inflation have declined in a geometric progress. Government intervention has been reduced allowing the financial market to operate by the "invisible hand". All these changes in the economic framework will lead to the globalization of the stock market. Moreover in light of the European Monetary Union that Greece joined on January 1st 2001 will stabilize the Economy by granting to Greece a strong currency, which will assist and facilitate the capital inflow process tremendously and therefore allowing for valuation analysis on the Athens Stock Exchange.

2. SUMMARY OF THE PAPER

This paper is concerned with various aspects of the Greek Stock Market.
It is separated into two parts:

i) In the first part we check the efficiency of the fundamental value of the companies in the Greek Stock Market, working from the literature on real options. We regress to find the beta of each company in order to incorporate it in the determination of the projected earnings and the Present Value of Cash Flow (PVCF) for each company. Then we do a regression analysis; the market capitalization and the real option value against various discounted earnings and components of the balance sheets of each company.

ii) In the second part we check the efficiency of trading. We deal with the efficiency of the stock market by examining calendar effects like the end of the month effect, the January effect and the weekend effect as well as mean-reversion trading rules.

3. DATA

The data that we are using for this research is the balance sheets data of all the companies that are trading in the stock market. The source used for those was the archives of the Athens Stock Exchange, the Statistical Institution of Greece, the software program called "effect" that lists financial information and as a last resort the archives of every individual company. Moreover we obtained the market prices, the number of shares and therefore the market capitalization of the companies from the Statistical Institution of Greece and from the "effect" software. We also have available to us the daily P/E of every company for a series of ten years as well as the Athens Stock Exchange index ever since 1975 (monthly and weekly) whose source was the Statistical Institution of Greece and the "effect" software. All daily and monthly stock return data is from the International Finance Corporation (IFC).

CHAPTER 1: REAL OPTIONS IN THE GREEK STOCK MARKET

1. LITERATURE

The various studies have proven that the discounted cash flow (DCF) approaches as well as the net present value (NPV) rule are very important for forecasting the growth opportunity and earnings of a company. The basic idea is that several existing models use the assumption that a firm can invest in positive – NPV projects for a limited number of years.

Brealey and Myers reassure us that the Value of a firm today always equals the future cash flow discounted at the opportunity cost of capital. They summarize it with the following:

PV (firm) = PV (cash flow) = PV (revenues - costs - investment).

The value of a business is computed as the discounted value of free cash flows out to a valuation horizon plus the forecasted value of the business at the horizon, also discounted back to the present value according to Brealey and Myers. Finite growth models have been developed by Modigliani and Miller (1961), Holt (1962) and Mao (1966), Gordon and Gordon (1997). This is the methodology used in this research paper for every company examined.

Real options represent an additional value to the company that possesses them. Growth options indicate the expansion potential of the company, the enhancement of research and development as well as advertising and finally the preservation of the preexisting projects that have either been scheduled or have already been started. In other words the growth option is the potential of a company to grow, to produce more and to be profitable. Black and Scholes created the cornerstone for the real options quantitative valuation. Few theories have had the academic and practical impact of Black-Scholes (1973) that created their model assuming that a risk free rate hedge can be created by taking offsetting positions in an option and its underlying stock.

Alexander and James (1998) conducted a study that investigated whether the stock market relates to the information of the path of earnings. They concluded that securities measured for the entire period were affected by the earnings path and they also noticed a firm size effect; the smaller the company the bigger the effect.

Danielson (1998) developed a model which supported that in order for an analyst to quantify the expectations implied by a stock price is to consider that the factors a stock price depends on expected earnings (cash flows), reinvestment rate, discount rate, and length of period of competitive advantage.

Burger, Ofek and Swary (1996) use yet another real option, the abandonment option. Its definition is the difference between the market value of a company and the Present Value of Cash Flow.

Kester (1984) defines the growth option as the difference between the total market value and the capitalized value of its current income stream. He also supports that in order to be efficient they have to be combined with managerial flexibility that would alter its operating strategy so that it capitalizes on profitable future opportunities or mitigate losses.

Hayes and Garvin argue that these methods usually undervalue investment opportunities leading to underinvestment by not exploiting the whole potential growth of a security. They attribute that to wrong strategic movements. Moreover Kester (1984) supports that discounted cash flow analysis understates the value.

The market value of the firm according to Chung and Charoenwong, is comprised of the value of assets in place and the present value of growth opportunities. The present value of growth opportunities predicts the value of future investments, which are expected to yield rates of return in excess of the opportunity cost of capital.

Burger, Ofek and Swary (1996) investigate whether the investors price the option to abandon a firm at its exit value. Theory prices the real option as an American put with both a stochastic strike price (exit value) and a stochastic value of the underlying security (the value of cash flows). The empirical implications are that firm value increases in exit value, after controlling for expected going concern cash flows, that are more generalizable assets produce more abandonment option value. Using discounted earnings forecasts to proxy for expected cash flows and prior literature to categorize asset generability; they find strong support for the predictions of real option theory.

2. METHODOLOGY

Based on the formula developed by Myers and Majd, we make the assumption on the relation between the firm value and the firm's characteristics that determine the real option value.

$$\textbf{VALUE} = \textbf{PVCF} + \underset{\textit{Abandonment}}{P\,(PVCF, EXIT, SDEV)} + \underset{\textit{Growth}}{C\,(PVCF, INVESTMENT, SDEV)} \quad (1)$$

Where:

VALUE = the firm's market value

PVCF = present value of the firm's expecting operating cash flows

P = operator representing a put option (abandonment option)

EXIT = exit value of the firm's assets

SDEV = standard deviation of the ratio of PVCF over EXIT

C = operator representing a call option (growth option)

INVESTMENT = Price paid for Investment

Equation *(1)* shows that the firm's market value equals the sum of the value of its expected operating cash flows plus the value of its real options.

The first term of the second part of equation *(1)* is the PVCF, the second term is the option to abandon and the third is the option to expand or the growth option.

PVCF is the expected present discounted value of earnings of the company.

PVCF = E (Earnings)

Therefore the PVCF adds to this value the average of price of earnings. It is an average of what a company could potentially earn. But the company will not just settle for the average. They will explore their opportunities to determine whether it is better to abandon (second term) or it is better to grow (third term). They will weight out their options and decide. If we divide every term of that equation up to the abandonment option by PVCF,

We get: $$\left(\frac{VALUE}{PVCF}\right) = 1 + P\left(1, \frac{EXIT\ SDEV}{PVCF}\right) + C\left(1, \frac{INVESTMENT\ SDEV}{PVCF}\right)$$

$$\Rightarrow \left(\frac{VALUE}{PVCF}\right) - 1 = P\left(1, \frac{EXIT\ SDEV}{PVCF}\right) + C\left(1, \frac{INVESTMENT\ SDEV}{PVCF}\right)$$

So the value of the option is a function of the ratio of EXIT to PVCF, which is nothing more than the EXCESS EXIT VALUE, which in turn is positively related to the real

option value. Moreover INVESTMENT to PVCF represents the excess growth opportunity from the real option to expand.

PVCF

The goal is to analyze the method of deriving the calculation of PVCF.

We calculate the projected earnings for five years of each company by taking into account their earnings for the previous ten years. So, for every company we take the earnings of every company from 1990 to 1999 and we project their earnings from 2000 to 2004, using the optimal trend structure and ARMA process.

We calculate the PVCF formula for every company.

For that we use the same PVCF CALCULATION that Berger uses:

$$PVCF = \frac{earn\ 2000}{1 + rf + \beta\ (rm\text{-}rf)} + \frac{earn\ 2001}{(1 + rf + \beta\ (rm - rf))^2} + \frac{earn\ 2002}{(1 + rf + \beta\ (rm - rf))^3} + \frac{earn\ 2003}{(1 + rf + \beta\ (rm - rf))^4} + \frac{earn\ 2004}{(1 + rf + \beta\ (rm - rf))^5} + \frac{earn\ 2004}{(rf + \beta\ (rm - rf) - g)(1 + rf + \beta\ (rm - rf))^5}$$

Where:

PVCF:	present value of predicted cash flows
$earn_t$:	earnings forecast of year t
r:	expected CAPM return (i.e. $r = rf + \beta(rm - rf)$)
g:	the growth rate of earnings of the ASE index
rf:	risk free rate
rm:	stock market return
rm-rf:	risk premium of the stock market over the risk free rate
ri-rf:	risk premium of the company's return on the risk free rate

MARKET RATE (rm)

For the derivation of the market rate, we used the weekly returns of the Stock Market Index that we got from the IFC.

We took the closing Price of a hundred stocks every week as well as the market return growth of the stock market as a whole for this week. Then we average out the growth of the weekly market returns for this whole period and we get a market return growth of 0.01246.

The AVERAGE annual growth of the market return is 0.1726.

(We took the average of the annual market return of the IFC data from December 1975 to April 1999)

Therefore **rm = 0.1726**

RISK FREE RATE (rf)

In order to derive the risk free rate of the market we obtained the three-month treasury bills returns from the Federal Bank of Greece from 1990 to 1999 and we adjusted it for every week.

In order to get the risk free rate of every week, we used the following formula:

$$(1 + tb)^{(1/52)} - 1$$

Where:

tb: is the corresponding weekly return of the Treasury bill return for that week. We then take the average of those weekly risk free rates which is 0.001994

$$(1+r)^{52} - 1 = 0.1091$$

The average annual risk free rate is 0.1091

Therefore **rf = 0.1091**

BETA (β)

In order to figure out the betas for each of the companies we used the data from the IFC for 58 companies and we got the ri-rf and the rm-rf rates for each week for every company.

Then we used the following formula:

$$(ri\text{-}rf) = \alpha + \beta\,(rm\text{-}rf) + \varepsilon$$

We regressed it in SAS and we got the beta and the intercept of each one of these companies. Then we matched up the rest of the companies that we did not have data for by sector and size. Therefore we got a beta for every company.

GROWTH OF EARNINGS (g)

In order to calculate the growth of earnings for a mature company of the stock market as a whole (g), we take the growth of the actual earnings of each company that comprises the ASE index, we subtract the corresponding yearly inflation rate and we take the average for every company which we call the average of discounted earnings growth rates of each company consisting the ASE index for the years 1990 to 1999. We add the inflation rate of 2000 to each one of those averages and we take the average of all these which is the growth rate g of the ASE index which equals -0.01829.

Therefore **g = -0.01829.**

We checked for other prices of growth that are incorporated in the PVCF. Berger, Ofek and Swary try two other different growth rates.
One is g = 0 which is incorporated in the PVCF0 and g = 4 which is incorporated in the PVCF4. We run a regression to see which one is more statistically significant.

TABLE 1

DEPENDABLE VARIABLE	LOG EQUITY	LOG EQUITY	LOG EQUITY
LOG PVCF	0.481281 **		
	9.563		
LOG PVCF0		0.477344 **	
		9.480	
LOG PVCF4			0.466198 **
			9.225
OBSERVATIONS	124	124	124
ADJUSTED R-SQUARE	0.4218	0.4175	0.4042
CONSTANT	12.096806 **	12.149118 **	12.299015 **
	9.874	9.875	9.856

Note: The t-statistic is below each estimate. indicates that it is significant at the 10%.. ** indicates that it is significant at the 5% level*

There is no major difference between the three regressions. The Adjusted R-square, the intercepts, the coefficients, the number of observations and all the t-values are the same. So we can continue with g = -0.01829 that we computed before.

This is all we needed for the PVCF calculation which is using expected discounted earnings for the next five years 2000 to 2004 and it calculates the present value of the perpetuity for the earnings from year 2004 by assuming a constant nominal terminal growth rate of -0.01829.

The sample selected consists of 188 companies. The criterion for the sample selection was the matching balance sheet categories, so that they could be lined up for comparison and analysis. The only sectors that have balance sheets that are structured differently are the banking and the insurance sector. So this cross-sectional analysis is being done on all the other sectors for a series of ten years.

3. EMPIRICAL RESULTS

3.1 VARIABLES

The dependent variables are:

1. The Market Equity is the market capitalization of a company, which is measured according to the following formula: Market Equity = Price of a share x number of shares.
2. The Real Option Value is the difference between the market value and the PVCF. It represents the excess value of a firm beyond sash flows.
3. The Equity over Assets Value applies a scaling by assets. Due to the fact that larger companies have larger assets and larger variation, we divide their equity by assets in order to get the value of the market capitalization per monetary unit. This also corrects for possible heteroskedasticity.

The independent variables are:

1. PVCF is the discounted value of cash flows and it declares the present and the future liquidity of the company.
   PV = Earnings / r-g. Therefore if the growth rate g is higher than r then the PV becomes negative.
2. The Exit Value is the resale value of the company; which is derived by the different assets of the company: fixed assets, inventory, receivables, financial securities, available funds minus the transitory bills, the short run obligations and the total obligations.
3. The Excess Exit Value shows how much more I can get from the company if I sold it rather than keeping it. It is the opportunity cost of the operation of the company. In other words it measures how likely it is for the company to go bankrupt. People do not value the company with the earnings but with what it sells for.
4. The Excess Book value is the difference between the owner's equity and the PVCF.
   Exc Bk = Bk of Equity / PVCF
5. The Change on Earnings measures if the company becomes more profitable or not. The implication of that variable is the take over on other companies given that the company has accelerated growth in earnings. In order to get that value we estimated

the lagged value and then we calculated the growth rate change of every year for each company.

GROWTH RATE IN EARNINGS = (TOTAL EARNINGS – LAG of EARNINGS)/ LAG of EARNINGS

6. The Change on Total Assets Value states if the assets are worth more sold or producing. We calculated it by taking the lagged variable of the general total assets of each company and by then estimating the growth rate.

   GROWTH RATE OF ASSETS = (TOTAL ASSETS – LAG of ASSETS)/ LAG of ASSETS

7. The Book to Market Value is the fundamental value of the company over the value that is being priced at the stock market or in other words the Market Capitalization.

   Book to Market Value = Assets / Liabilities + Market Capitalization

   The smaller the ratio is, the more profitable the Company.

8. The Small Variable is a dummy variable that differentiates the companies according to their size. The average size of the companies' grand total assets is 40 billion. Any company with total assets higher than that is considered to be large and every company with total assets lower than that is considered to be small. This variable looks at the size of the company. The large companies have more growth opportunities whereas the small are riskier and therefore they have higher betas.
9. The Exit Value over Assets Value applies a scaling by assets. Just because large Companies have larger assets and larger variation, we divide it by assets to get the value of the resale value per monetary unit. This also eliminates Heteroskedasticity because we eliminate the large variation.
10. The Industry Variable is a dummy variable that categorizes various industries with the criterion of common characteristics. Some industries have higher growth opportunities than others and some have higher betas than others.

    Industry 1 includes the companies that extract metals and oil as well as the mining companies.

    Industry 2 includes the companies that produce or sell food as well as bakery companies.

    Industry 3 includes the communication companies like press and publishing companies, telecommunications and phone companies as well as internet and computer companies.

    Industry 4 includes companies that produce chemicals, cosmetics and cigarettes.

Industry 5 includes the sector of "various" companies that don't belong in any other category and the sector of companies that participate in more than one industry (holding companies).

Industry 6 includes construction companies and companies that produce construction materials.

Industry 7 includes companies that extract things from nature and turn them into commodities, like weaving companies and companies that produce wood and paper.

Industry 8 includes the sectors that were excluded either because there were comprised of very few companies or because they had no common characteristic with any other company; and they were the sector of shipping, the sector of leasing and the sector of tourism (hotels).

The most descriptive statistics are presented at the following table:

TABLE 2

Variable	N	Mean	Std Dev	Min	Max
PVCF (1)	141	8357.24	10567.42	18.21	28189.41
TFAS (2)	157	21784858.3	115535199	1551	1421293859
GTASST (3)	157	39717821.4	163041383	338363	1984276495
REALOPT (4)	129	0.4360175	1.9619979	-1	10.6019659
BKMK (5)	149	0.0159523	0.1743125	0.01	2.1287303
CHASST (6)	157	0.2073890	0.3614465	-0.96	2.0509150

(1) Present Value of Cash Flow

(2) Total Fixed Assets

(3) General Total of Assets

(4) Real Option Value

(5) Book to Market Value

(6) Change on Assets

3.2 REGRESSION OUTPUT

In the following section we exhibit the empirical results, which we derived from the regression analysis.

The regression analysis is outlined as follows:

There are 25 regressions, which are distinguished in three sets according to the different dependent variables. The three dependent variables that we are referring to are the Log of Equity, the Real Option Value and the Equity over Assets and they are all run against different sets of independent variables in order to figure out their behavior.

Dependent Variable: Log Equity

Table 3: it presents two regressions including only PVCF and abandonment option that replicates Burger, Ofek and Swary's regression: a) independent variables are the log PVCF, the exit value and b) independent variables are the log PVCF, the excess exit value.

Table 4: it presents two regressions where the change on total earnings, the change on total assets and the book to market value are added on the independent variables of both of the regressions of Table 3 in order to account for growth options.

Table 5: it presents two regressions where the small is added on the independent variables of both of the regressions of Table 4.

Table 6: it presents two regressions where the six industries variables (industry 1 – industry 6) are added on the independent variables of both of the regressions of Table 5.

Table 7: it presents one regression where we control for collinearity the second regression (with the excess exit value) of Table 6.

Dependent Variable: Real Option Value

Table 8: it presents two regressions: a) independent variables are the excess exit value, the sales over PVCF, the change on total earnings, the change on total assets and the book to market value, b) independent variables are the excess book value, the sales over PVCF, the change on total earnings, the change on total assets and the book to market.

Table 9: it presents two regressions where the small is added on the independent variables of both of the regressions of Table 8.

Table 10: it presents two regressions where the seven industries variables are added on the independent variables of both of the regressions of Table 9.

Table 11: it presents two regressions where we control for collinearity the first regression of table 10 by eliminating a) 2 independent variables and b) another 2 independent variables.

Dependent variable: Market Equity over Assets

Table 12: it presents two regressions: a) independent variables are the PVCF over total assets, the exit value over total assets and b) independent variables are the PVCF over total assets, the excess exit value over total assets.

Table 13: it presents two regressions where the change on total earnings, the change on total assets and the book to market value are added on the independent variables of both of the regressions of Table 12.

Table 14: it presents two regressions where the small is added on the independent variables of both of the regressions of Table 13.

Table 15: it presents two regressions where the seven industries variables are added on the independent variables of both of the regressions of Table 14.

Table 16: it presents two regressions where we control for collinearity a) the first regression of table 15 by eliminating 4 independent variables b) the second regression of table 15 by eliminating 4 independent variables.

TABLE 3

LOG PVCF	0.138573* 1.642	0.365452** 4.414
EXIT VALUE		
LOG TOTAL FIXED ASSETS	0.914597** 5.983	
LOG TOTAL INVETORY	0.282449** 2.16	
LOG TOTAL RECEIVABLES	0.168605 0.795	
LOG TOTAL FINANCIAL SECURITIES	-0.004161 -0.084	
LOG TOTAL AVAILABLE FUNDS	0.124939 1.301	
LOG TRANSITORY BILLS	-0.136271* -1.76	
LOG SHORT RUN OBLIGATIONS	-0.122423 -0.511	
LOG TOTAL OBLIGATIONS	-0.335419** -3.723	
EXCESS EXIT VALUE		
EXCESS TOTAL FIXED ASSETS VALUE		0.2858092 0.591
EXCESS TOTAL INVETORY VALUE		6.125862* 1.792
EXCESS TOTAL RECEIVABLES VALUE		-1.84761 -1.01
EXCESS TOTAL FINANCIAL SECURITIES VALUE		-5.18012 -0.464
EXCESS TOTAL AVAILABLE FUNDS VALUE		5.972675 1.231
EXCESS TRANSITORY BILLS VALUE		1.871599 0.186
EXCESS SHORT RUN OBLIGATIONS VALUE		2.614098 1.215
EXCESS TOTAL OBLIGATIONS VALUE		-1.45094 -0.857
OBSERVATIONS	*54*	*56*
R-SQUARE	*0.7433*	*0.5231*
ADJUSTED R SQUARE	*0.692*	*0.4317*
CONSTANT	*6.33*** *3.443*	*14.626981*** *7.233*

Note: The t-statistic is below each estimate, indicates that it is significant at the 10%,,** indicates that it is significant at the 5% level*

Table 3: it presents two regressions: a) independent variables are the log PVCF, the exit value and b) independent variables are the log PVCF, the excess exit value.

In the first regression (column 1) we run the log equity versus the exit value and in the second one (column 2) the log equity versus the excess exit value.

In Table 3 after controlling for PVCF, we see how equity value is related to the exit value of net assets.

Column 1 displays the regression of equity value on PVCF and exit value.

The Present Value of Cash Flows indicates the earning power that a company has right now. Its coefficient is 0.13. That means that for an additional unit of PVCF, equity increases by 0.13. This is a sign of inefficiency of the market. The ideal would be to have one to one increase. The t-value of the PVCF variable demonstrates that the variable is almost significant.

As opposed to the PVCF that is the earning power right now, all the other variables are the potential earning power that the company will have in the future. Exit value, which is the resale value of the company or in other words the different types of assets that the company has consists eight variables: Fixed Assets, Inventory, Financial Securities, Available Funds, Transitory Bills, short-run and Long-run obligations.

The Fixed Assets, the Inventory and the Total Obligations variables seem to be statistically significant since the resale value of the company depends on those more so than the other variables. Moreover the Fixed Assets variable has a bigger coefficient and higher significance. The logical reasoning behind this is that it is more valuable than the inventory if the company goes out of business.

The Total Obligations variable is negative and it indicates the debt that the company has to pay. The fact that it has to pay debt makes it less valuable .The negative sign of the coefficient reflects this.

The regression has a considerably high R-square, which indicates that a large amount of the variation is explained by the variables.

Theory shows that the ratio of exit value to PVCF, rather than exit value itself, is the stochastic price of the abandonment option.

In column 2 the log of exit value is replaced by the excess exit value.

The increased coefficient of PVCF, which is also very significant, shows that after controlling the option's strike price the market value of the firm's equity increases more in the present value of cash flow.

The positive estimates that comprise the excess exit value support the fact that the abandonment option makes a significant contribution to the firm value.

TABLE 4

LOG PVCF	0.217249**	0.432281**
	2.789	6.399
EXIT VALUE		
LOG TOTAL FIXED ASSETS	0.573439**	
	3.729	
LOG TOTAL INVETORY	0.128323	
	1.051	
LOG TOTAL RECEIVABLES	0.176715	
	0.901	
LOG TOTAL FINANCIAL SECURITIES	0.019932	
	0.461	
LOG TOTAL AVAILABLE FUNDS	0.050707	
	0.589	
LOG TRANSITORY BILLS	-0.059103	
	-0.795	
LOG SHORT RUN OBLIGATIONS	0.03592	
	0.163	
LOG TOTAL OBLIGATIONS	-0.260476**	
	-3.314	
EXCESS EXIT VALUE		
EXCESS TOTAL FIXED ASSETS VALUE		-0.00546129
		-0.128
EXCESS TOTAL INVETORY VALUE		-0.00546129**
		2.022
EXCESS TOTAL RECEIVABLES VALUE		0.8243337
		0.526
EXCESS TOTAL FINANCIAL SECURITIES VALUE		3.242595
		0.367
EXCESS TOTAL AVAILABLE FUNDS VALUE		-1.21467
		-0.287
EXCESS TRANSITORY BILLS VALUE		5.473513
		0.733
EXCESS SHORT RUN OBLIGATIONS VALUE		0.5320637
		0.324
EXCESS TOTAL OBLIGATIONS VALUE		-1.19071
		-0.942
CHANGE ON TOTAL EARNINGS	0.06744	-0.165219
	0.254	-0.54
CHANGE ON TOTAL ASSETS	0.968411**	1.659597**
	2.127	2.746
BOOK TO MARKET VALUE	-126.791447**	-179.475289**
	-5.131	-6.186
OBSERVATIONS	*52*	*53*
R-SQUARE	*0.845*	*0.7833*
ADJUSTED R-SQUARE	*0.7984*	*0.7198*
CONSTANT	*8.164897***	*13.030745***
	5.081	*8.017*

Note: The t-statistic is below each estimate, * *indicates that it is significant at the 10%,,* ** *indicates that it is significant at the 5% lev.*

Table 4: it presents two regressions where the change on total earnings, the change on total assets and the book to market value are added on the independent variables of both of the regressions of Table 3.

On table 4 there are three more independent variables added in both of the regressions of table 3; the change on total earnings, the change on total assets and the book to market value.

The majority of the variables seem to be significant on the five percent level. The book to market value is very significant and has a negative coefficient as expected since it is negatively related to equity.
The R-square of the new regression has increased from 74% to 84.5 % for the exit value regression and from 52% to 78% for the excess exit value regression.
The significance of the intercepts increased significantly while the intercept value dropped for the exit value regression, in contrast with the excess exit value regression whose intercept dropped.
The PVCF value becomes significant at the five percent level for the exit value regression and it becomes extremely significant for the excess exit value regression.

For the exit value regression everything else remains pretty much the same except from:
The sign of the financial securities variable that changes but it is not significant anyway.
The inventory value becomes significant on the 5 percent level.

TABLE 5

LOG PVCF	0.213947** 2.778	0.286538** 3.644
EXIT VALUE		
LOG TOTAL FIXED ASSETS	0.474832** 2.838	
LOG TOTAL INVETORY	0.128131 1.062	
LOG TOTAL RECEIVABLES	0.157209 0.809	
LOG TOTAL FINANCIAL SECURITIES	0.011483 0.266	
LOG TOTAL AVAILABLE FUNDS	0.030762 0.357	
LOG TRANSITORY BILLS	-0.05892 -0.802	
LOG SHORT RUN OBLIGATIONS	0.100556 0.452	
LOG TOTAL OBLIGATIONS	-0.298267** -3.63	
EXCESS EXIT VALUE		
EXCESS TOTAL FIXED ASSETS VALUE		0.03729931 0.095
EXCESS TOTAL INVETORY VALUE		3.712198 1.561
EXCESS TOTAL RECEIVABLES VALUE		0.7651366 0.534
EXCESS TOTAL FINANCIAL SECURITIES VALUE		3.577378 0.443
EXCESS TOTAL AVAILABLE FUNDS VALUE		-5.2666 -1.283
EXCESS TRANSITORY BILLS VALUE		6.519025 0.953
EXCESS SHORT RUN OBLIGATIONS VALUE		2.979444* 1.742
EXCESS TOTAL OBLIGATIONS VALUE		-3.49619** -2.517
CHANGE ON TOTAL EARNINGS	0.164314 0.607	0.191903 0.631
CHANGE ON TOTAL ASSETS	0.763421* 1.615	1.273623** 2.243
BOOK TO MARKET VALUE	-121.931741** -4.945	-161.169669** -5.917
SMALL	-0.511852 -1.408	-1.252982** -2.998
OBSERVATIONS	*52*	*53*
R-SQUARE	*0.8525*	*0.823*
ADJUSTED R-SQUARE	*0.8033*	*0.7655*
CONSTANT	*10.449799*** *4.604*	*17.684992*** *8.226*

Note: The t-statistic is below each estimate, indicates that it is significant at the 10%,.** indicates that it is significant at the 5% level*

Table 5:it presents two regressions where the small is added on the independent variables of both of the regressions of Table 4.

On Table 5, the new variable added (on both regressions of table 4) is the SMALL variable.

It is very significant for the regression of the excess exit value and almost significant in the 10 % level for the first regression of the exit value. The sign of its coefficients are negative in both regressions, fact that states that there is an inverse relation between the size of the company and its market capitalization, which is intuitive also.

The R-square increases from 78% to 82.3% for the excess exit value regression and from 84 to 85.25 for the exit value regression.

The intercept is now higher in both regressions and is still significant in the exit value regression while its significance increases in the excess exit value regression.

The PVCF value remains as significant in both regressions.

On the excess exit value regression two variables become more significant:

The excess total obligations variable becomes significant on the 5 % level

The excess short run obligations variable becomes significant on the 10 % level.

TABLE 6

LOG PVCF	0.248709** 3.332	0.339356** 4.289
EXIT VALUE		
LOG TOTAL FIXED ASSETS	0.32345* 1.851	
LOG TOTAL INVETORY	0.085878 0.671	
LOG TOTAL RECEIVABLES	0.306948 1.582	
LOG TOTAL FINANCIAL SECURITIES	0.020439 0.491	
LOG TOTAL AVAILABLE FUNDS	0.10522 1.181	
LOG TRANSITORY BILLS	-0.064873 -0.939	
LOG SHORT RUN OBLIGATIONS	-0.045977 -0.2	
LOG TOTAL OBLIGATIONS	-0.303979** -3.887	
EXCESS EXIT VALUE		
EXCESS TOTAL FIXED ASSETS VALUE		0.010452 0.268
EXCESS TOTAL INVETORY VALUE		4.195767* 1.749
EXCESS TOTAL RECEIVABLES VAL		-0.200859 -0.136
EXCESS TOTAL FINANCIAL SECURITIES VALUE		4.649355 0.553
EXCESS TOTAL AVAILABLE FUNDS VALUE		-0.927283 -0.211
EXCESS TRANSITORY BILLS VALUE		-0.129111 -0.018
EXCESS SHORT RUN OBLIGATIONS VALUE		2.93619* 1.753
EXCESS TOTAL OBLIGATIONS VALUE		-3.055227** -2.241
CHANGE ON TOTAL EARNINGS	0.120903 0.478	0.214106 0.653
CHANGE ON TOTAL ASSETS	0.175973 0.375	0.830857 1.306
BOOK TO MARKET VALUE	-135.32383** -5.658	-162.114004** -5.724
SMALL	0.90599 -1.665	-0.891844** -2.078
INDUSTRY 1	0.90599** 2.547	0.720137* 1.854
INDUSTRY 2	0.874975** 2.099	0.992961** 2.299
INDUSTRY 3	1.827142** 3.081	1.031321 1.127
INDUSTRY 4	0.502754 1.222	0.430339 0.945
INDUSTRY 5	0.522527 1.356	0.112371 0.266
INDUSTRY 6	0.219465 0.585	0.192095 0.484
OBSERVATIONS	*52*	*53*
R-SQUARE	*0.8986*	*0.8615*
ADJUSTED R-SQUARE	*0.8402*	*0.7841*
CONSTANT	*11.264883*** *4.996*	*15.723962*** *7.065*

Note: The t-statistic is below each estimate, indicates that it is significant at the 10%,** indicates that it is significant at the 5% level*

Table 6: it presents two regressions where the six industries variables (industry 1 – industry 6) are added on the independent variables of both of the regressions of Table 5.

On Table 6, new independent variables are added which are the six industries: industry 1, industry 2, industry 3, industry 4, industry 5 and industry 6 (Industry 7 and Industry 8 are omitted).

The majority of the new variables exhibit significance at least at the 10 % level.

More specifically:

The intercept remains about the same in the exit value regression but its significance increases.

The intercept of the excess exit value regression drops and its significance remains approximately at the same high level.

The PVCF coefficient remains the same but its significance increases.

The R-square increases from 80% to 90% in the exit value regression.

The R-square increases and from 82% to 86% in the excess exit value regression.

The changes on the exit value regression are:

The total available funds variable as well as the small variable become significant on the 10 % level.

On the excess exit value regression there is no major changes.

TABLE 7

LOG PVCF	0.371563**
	7.748
EXCESS EXIT VALUE	
EXCESS TOTAL FIXED ASSETS VALUE	-0.001152**
	11.741
EXCESS TOTAL INVETORY VALUE	2.898790**
	2.650
EXCESS TOTAL RECEIVABLES VALUE	
EXCESS TOTAL FINANCIAL SECURITIES VALUE	
EXCESS TOTAL AVAILABLE FUNDS VALUE	0.068042
	0.041
EXCESS TRANSITORY BILLS VALUE	2.321772
	0.475
EXCESS SHORT RUN OBLIGATIONS VALUE	
EXCESS TOTAL OBLIGATIONS VALUE	
CHANGE ON TOTAL EARNINGS	0.129195
	0.857
CHANGE ON TOTAL ASSETS	0.305954
	0.932
BOOK TO MARKET VALUE	-132.099302**
	-8.101
SMALL	-0.979020**
	-4.095
INDUSTRY 1	0.613347**
	2.33
INDUSTRY 2	0.808655**
	2.828
INDUSTRY 3	0.978017*
	1.959
INDUSTRY 4	0.133127
	0.412
INDUSTRY 5	0.108910
	0.379
INDUSTRY 6	0.204236
	0.775
OBSERVATIONS	*88*
R-SQUARE	*0.816*
ADJUSTED R-SQUARE	*0.778*
CONSTANT	*15.193009*
	11.741

*Note: The t-statistic is below each estimate, * indicates that it is significant at the 10%,. ** indicates that it is significant at the 5% level*

Table 7:it presents one regression where we control for collinearity the second regression (with the excess exit value) of Table 6.

On Table 7, we control for correlation of the variables of table 6.
The regression of the exit value did not exhibit any signs of correlation.
The excess exit value regression, on the contrary displayed signs of high collinearity, and therefore we had to eliminate four variables (that displayed collinearity of more than 80%). We eliminate the excess short run obligations, the total obligations variable the excess total receivables variable and the excess financial securities variable.

The R-Square decreases as expected.
Four variables become significant.
The significance of another two variables increases.
The intercept remains the same but its significance augments dramatically.
The number of observations increases from 53 to 88.

TABLE 8

EXCESS EXIT VALUE		
EXCESS TOTAL FIXED ASSETS VALUE	0.195103**	
	2.117	
EXCESS TOTAL INVETORYVALUE	9.225827*	
	1.901	
EXCESS TOTAL RECEIVABLES	-8.20807*	
	-1.952	
EXCESS TOTAL FINANCIAL SECURITIES VALUE	13.4978	
	0.699	
EXCESS TOTAL AVAILABLE FUNDS VALUE	27.0471**	
	2.049	
EXCESS TRANSITORY BILLS VALUE	66.41107	
	1.071	
EXCESS SHORT RUN OBLIGATIONS VALUE	-5.94674	
	-1.153	
EXCESS TOTAL OBLIGATIONS VALUE	2.575623	
	0.765	
EXCESS BOOK VALUE		1611.268774**
		4.636
SALES /PVCF	1856.523395**	-177.189588
	4.449	-0.528
CHANGE ON TOTAL EARNINGS	0.006312	-0.084299
	0.011	-0.848
CHANGE ON TOTAL ASSETS	-0.180602	0.089833
	-0.158	0.223
BOOK TO MARKET VALUE	-20.164008	-4.633996**
	-0.366	-5.13
OBSERVATIONS	*48*	*96*
R-SQUARE	*0.4808*	*0.355*
ADJUSTED R-SQUARE	*0.3077*	*0.3195*
CONSTANT	*-0.263032*	*1611.028954***
	-0.743	*4.636*

Note: The t-statistic is below each estimate. indicates that it is significant at the 10%,,** indicates that it is significant at the 5% level*

Table 8: it presents two regressions: a) independent variables are the excess exit value, the sales over PVCF, the change on total earnings, the change on total assets and the book to market value, b) independent variables are the excess book value, the sales over PVCF, the change on total earnings, the change on total assets and the book to market.

On Table 8 two regressions are presented:

In the first regression (first column) the real option is run against the exit value, the sales over PVCF ratio, the change on total earnings, the change on total assets and the book to market value.

The excess total fixed assets value is positive and significant at the 5% level.

The excess total available funds value is positive and significant at the 5% level.

The sales over PVCF value is positive and significant at the 5% level.

The excess total inventory value is positive and significant at the 10% level.

The excess total receivables value is negative and significant at the 10% level.

The R-square of the first regression is moderate.

All the values have the expected signs.

In the second regression (second column) the real option is run versus the excess book value, the sales over PVCF ratio, the change on total earnings, the change on total assets and the book to market value.

The excess book value is positive and significant at the 5% level.

The book to market value is negative and significant at the 5% level.

The intercept is positive and significant at the 5% level.

The R-square of the second regression is moderate.

All the values have the expected signs.

TABLE 9

EXCESS EXIT VALUE		
EXCESS TOTAL FIXED ASSETS VALUE	0.185045**	
	2.013	
EXCESS TOTAL INVETORYVALUE	10.163385**	
	2.082	
EXCESS TOTAL RECEIVABLES	-7.91217*	
	-1.891	
EXCESS TOTAL FINANCIAL SECURITIES VALUE	13.628248	
	0.71	
EXCESS TOTAL AVAILABLE FUNDS VALUE	27.900512**	
	2.125	
EXCESS TRANSITORY BILLS VALUE	56.391296	
	0.908	
EXCESS SHORT RUN OBLIGATIONS VALUE	-7.750869	
	-1.453	
EXCESS TOTAL OBLIGATIONS VALUE	4.506519	
	1.216	
EXCESS BOOK VALUE		1639.652618**
		4.696
SALES /PVCF	1735.673875**	-178.857086
	4.071	-0.533
CHANGE ON TOTAL EARNINGS	-0.160606	-0.095921
	-0.273	-0.957
CHANGE ON TOTAL ASSETS	0.205168	0.182862
	0.174	0.44
BOOK TO MARKET VALUE	-31.634303	-4.726624**
	-0.569	-5.198
SMALL	0.8387	0.289187
	1.213	0.933
OBSERVATIONS	*48*	*96*
R-SQUARE	*0.5017*	*0.3612*
ADJUSTED R-SQUARE	*0.3167*	*0.3186*
CONSTANT	*-1.011055*	*1639.168696***
	-1.424	*4.696*

Note: The t-statistic is below each estimate, * indicates that it is significant at the 10%,,** indicates that it is significant at the 5% level*

Table 9: it presents two regressions where the small is added on the independent variables of both of the regressions of Table 8.

The observations on the first regression (column 1) of the Table 9 are:

The Excess Total Fixed Assets value is significant and it also positively related to the real option value.

The Excess Total Receivables value, which is significant on the 10% level, is inversely related to the real option value; it insinuates that if another company takes over it is difficult to collect debts perhaps due to informal contracts.

The Excess Total Inventory value is significant at the 5% level and it also positively related to the real option value.

The Excess Total Available Funds value is significant at the 5% level and it also positively related to the dependent value.

The Sales over PVCF value is significant at the 5% level and it also positively related to the dependent value.

The R-square increases from 48 to 50%.

The observations on the second regression (column 2) of the table 9 are:

The excess book value variable is very significant and positively related to the real option as expected.

The book to market variable exhibits a high significance and an inverse relationship with the dependent variable.

The R-square increases from 35 to 36 %.

Overall all the significant variables have the expected sign.

TABLE 10

EXCESS EXIT VALUE		
EXCESS TOTAL FIXED ASSETS VALUE	0.178645*	
	1.955	
EXCESS TOTAL INVETORYVALUE	9.615742*	
	1.938	
EXCESS TOTAL RECEIVABLES	-6.785272	
	-1.491	
EXCESS TOTAL FINANCIAL SECURITIES VALUE	10.328419	
	0.526	
EXCESS TOTAL AVAILABLE FUNDS VALUE	28.531466*	
	1.96	
EXCESS TRANSITORY BILLS VALUE	71.409181	
	1.104	
EXCESS SHORT RUN OBLIGATIONS VALUE	-9.303541*	
	-1.604	
EXCESS TOTAL OBLIGATIONS VALUE	5.068192	
	1.236	
EXCESS BOOK VALUE		1765.186947**
		5.001
SALES /PVCF	1565.256921**	-304.593091
	3.491	-0.898
CHANGE ON TOTAL EARNINGS	-0.423377	-0.089045
	-0.641	-0.894
CHANGE ON TOTAL ASSETS	-0.646161	0.171953
	-0.475	0.399
BOOK TO MARKET VALUE	-39.329117	-4.750169**
	-0.674	-5.277
SMALL	1.20529*	0.402496
	1.679	1.329
INDUSTRY 1	1.690372**	1.009933**
	2.123	2.521
INDUSTRY 2	1.232835	1.047069**
	1.34	2.406
INDUSTRY 3	3.068288*	0.663021
	1.674	1.012
INDUSTRY 4	1.48615	1.181562**
	1.515	2.317
INDUSTRY 5	0.810381	0.571991
	0.869	1.341
INDUSTRY 6	0.372996	0.159277
	0.429	0.394
OBSERVATIONS	*48*	*96*
R-SQUARE	*0.6079*	*0.4437*
ADJUSTED R-SQUARE	*0.351*	*0.3643*
CONSTANT	*-2.068383***	*1764.033121***
	-2.222	*4.999*

Note: The t-statistic is below each estimate, indicates that it is significant at the 10%,,** indicates that it is significant at the 5% level*

Table 10: it presents two regressions where the seven industries variables are added on the independent variables of both of the regressions of Table 9.

We start another set of regression analysis with the dependent variable being the real option. On Table 9 there is one more independent variable added in both of the regressions of Table 8, the SMALL variable. On Table 10 another two regressions are presented, where there are six more independent variables added in both of the regressions of Table 9; Industry 1, Industry 2, Industry 3, Industry 4, Industry 5 and Industry 6 (Industry 7 and Industry 8 are omitted).

We observe for the first regression (column 1) of Table 10:
The fixed assets, the available funds and the inventory variable are significant and positive with the real option since it is the value we would get if we sold the Company. The bigger this value becomes, the more the real option is.
The excess total receivables value is significant at the 10% level and it is negative as expected since it denotes the value that I would get if the company went bankrupt which in turn is inversely related to the real option.
The Sales/PVCF variable is very significant and positively related to the real option,
Since it indicates an increased sales activity that in turn indicates that if the company was sold it would do well in sales.
The SMALL variable is significant on the 10% level.
Industry 1 is significant at the 5% level and Industry 3 at the 10 % level. This indicates that for this specific regression those two industries have either good growth opportunities or that they have the option to abandon. The rest of the industries will not have an option to do either since they will not have an alternative for change.
The intercept for the excess exit value is significant and negative indicating that the real option is not overvalued.
The R-square increases from 50 to 61 %.

We observe for the second regression (column 2) of Table 10:
The excess book value is significant and positive. It is the bankruptcy value and it is positively related to the real option value.

The book to market value is significant and inversely related to the real option value because it is the growth variable in the since that it indicates if the assets are worth more than what we paid for. If this is the case so there is an arbitrage opportunity and we should buy more.

The R-square increases from 31 to 44% for the second regression.

TABLE 11

EXCESS EXIT VALUE		
EXCESS TOTAL FIXED ASSETS VALUE	0.200135**	-0.01815
	2.209	-0.577
EXCESS TOTAL INVETORY VALUE	9.406961*	4.301494
	1.971	1.993
EXCESS TOTAL RECEIVABLES	-10.053368**	
	-2.61	
EXCESS TOTAL FINANCIAL SECURITIES VALUE	-1.368913	
	-0.085	
EXCESS TOTAL AVAILABLE FUNDS VALUE	35.577395**	6.356664
	2.642	1.798
EXCESS TRANSITORY BILLS VALUE	38.756683	4.306185
	0.814	0.214
EXCESS SHORT RUN OBLIGATIONS VALUE		
EXCESS TOTAL OBLIGATIONS VALUE		
EXCESS BOOK VALUE		
SALES /PVCF	1497.938957**	927.159278**
	3.347	3.832
CHANGE ON TOTAL EARNINGS	-0.168699	-0.257675
	-0.265	-0.915
CHANGE ON TOTAL ASSETS	-0.863469	0.201369
	-0.656	0.326
BOOK TO MARKET VALUE	-37.409525	-2.165485**
	-0.646	-2.22
SMALL	0.85018	0.888379**
	1.273	2.208
INDUSTRY 1	1.435628*	1.063369**
	1.829	2.153
INDUSTRY 2	1.581789*	1.036646*
	1.756	1.87
INDUSTRY 3	2.843181	0.908148
	1.552	0.982
INDUSTRY 4	1.328508	1.226585**
	1.356	2.034
INDUSTRY 5	0.607232	0.244177
	0.652	0.457
INDUSTRY 6	0.302965	0.290468
	0.351	0.574
OBSERVATIONS	*48*	*82*
R-SQUARE	*0.5731*	*0.3723*
ADJUSTED R-SQUARE	*0.3389*	*0.2318*
CONSTANT	*-1.610465**	*-1.645307***
	-1.81	*-3.149*

Note: The t-statistic is below each estimate, indicates that it is significant at the 10%,.** indicates that it is significant at the 5% level*

Table 11: it presents two regressions where we control for collinearity the first regression of table 10 by eliminating a) 2 independent variables and b) another 2 independent variables.

On Table 11, we control for correlation of the independent variables of Table 10.
We run the collinearity tests for both of the regressions of Table 10.
The results show that only the excess exit value regression shows autocorrelation.
So now we run two new regressions where we eliminate:

1. Excess short run obligations and excess total obligations.
2. Excess total receivables and excess total financial securities (additionally).

The selection of those variables was based on multicollinearity tests that displayed .8 and .9 correlation among them. After the elimination of those variables there was no signs of correlation.

For the regression that the two variables are eliminated (column 1):
The variables become significant in the 5 % level and almost all the others become significant in the 10 % level.
The R-square drops as expected.

For the regression that the two additional variables are eliminated (column 2):
The Book to market variable becomes significant with a negative coefficient as expected.
The small variable becomes significant too and it is positively correlated to the Real Option value.
The R-square drops more.

TABLE 12

PVCF/TOTAL ASSETS	0.042623 0.774	0.005818 0.174
EXIT VALUE/TOTAL ASSETS		
TOTAL FIX. ASS. / TOTAL ASS.	-10464 -0.521	
TOTAL INVET. / TOTAL ASSETS	-14146 -0.682	
TOTAL RECEIV. /TOTAL ASSETS	-10878 -0.532	
TOTAL FIN SEC./TOTAL ASSETS	-9734.443234 -0.486	
TOT AVAIL FUNDS/TOT. ASSETS	-13391 -0.583	
TRANSIT BILLS/ TOTAL ASSETS	-2320.493913 -0.08	
SHORT RUN OBLIG. /TOT. ASSETS	25857** 3.821	
TOTAL OBLIG. / TOTAL ASSETS	-25829** -4.825	
EXCESS EXIT VALUE / ASSETS		
EXC FIXED ASSETS/ASSETS		0.003679243 1.096
EXC INVETORY /ASSETS		-0.30* -1.9
EXC RECEIVABLES/ASSETS		-0.41** -2.37
EXC FIN SEC/ASSETS		0.47* 1.902
EXC AVAILABLE FUNDS/ASSETS		-0.38 -1.052
EXC TRANSITORY BILLS/ASSETS		-0.96** -5.379
EXC SHORT RUN OBLIG/ASSETS		2.09** 9.957
EXC TOTAL OBLIGATIONS/ASSETS		-1.52** -9.833
OBSERVATIONS	*56*	*56*
R-SQUARE	*0.6216*	*0.8587*
ADJUSTED R-SQUARE	*0.5491*	*0.8317*
CONSTANT	*13641* *0.684*	*2206.216059*** *3.636*

Note: The t-statistic is below each estimate, * indicates that it is significant at the 10%,, ** indicates that it is significant at the 5% level*

Table 12: it presents two regressions: a) independent variables are the PVCF over total assets, the exit value over total assets and b) independent variables are the PVCF over total assets, the excess exit value over total assets.

We now start a new set of regressions where the variables are divided with assets in order to avoid big variation that bigger companies might have.

On Table 12, in the first regression, (column 1) we run the market equity over assets versus the PVCF over assets and the exit value over assets. In the second one (column 2), we run the market equity over assets versus the PVCF over assets and the excess exit value over assets.

We notice that in the first regression (column 1):
Short run obligations over assets are very significant.
Total obligations over assets are significant and negative indicating an inverse relationship between market equity and obligations, since obligations represent the leverage of the company.
The intercept of this regression is insignificant exhibiting no case of overvalue of the company.
The R-square for the exit value regression is 62 %.

We notice that in the second regression (column 2):
Excess Short run Obligations over assets are very significant.
Excess Total Obligations over assets are significant and negative indicating an inverse relationship between market equity and obligations too.
Excess Transitory Bills are very significant and negative since they are also included in the liabilities of the company that would oppose to the market equity.
Excess Receivables over assets are significant on the 10% level.
The R-square for the excess exit value regression is 86 %.

TABLE 13

PVCF/TOTAL ASSETS	0.073745 1.231	0.017992** 2.244
EXIT VALUE/TOTAL ASSETS		
TOTAL FIX. ASS./ TOTAL ASSETS	-11233 -0.557	
TOTAL INVET./ TOTAL ASSETS	-18743 -0.895	
TOTAL RECEIV/TOTAL ASSETS	-9130.023598 -0.43	
TOTAL FIN SEC/TOTAL ASSETS	3306.755908 0.123	
TOTAL AVAIL FUNDS/TOT ASSETS	-29411 -1.235	
TRANSIT BILLS/ TOTAL ASSETS	6377.633743 0.221	
SHORT RUN OBLIG/TOT ASSETS	23728** 3.464	
TOTAL OBLIG/ TOTAL ASSETS	-23132** -3.974	
EXCESS EXIT VALUE / ASSETS		
EXCESS FIXED ASSETS/ASSETS		0.008885516 1.095
EXCESS INVETORY /ASSETS		-0.3675727** -2.105
EXCESS RECEIVABLES/ASSETS		-0.481492** -2.183
EXCESS FIN SEC/ASSETS		0.664486067** 2.57
EXCESS AVAILABLE FUNDS/ASSETS		-0.7922515** -2.032
EXCESS TRANSITORY BILLS/ASSETS		-0.875717** -4.812
EXCESS SHORT RUN OBLIG/ASSETS		2.1374076** 9.697
EXCESS TOTAL OBLIGATIONS/ASSETS		-1.455497** -9.249
CHANGE ON TOTAL EARNINGS	-2453.598196 -1.08	748.710321 0.62
CHANGE ON TOTAL ASSETS	8689.821651** 2.213	4153.532274** 2.101
BOOK TO MARKET VALUE	-419745** -2.233	-266052** -2.456
OBSERVATIONS	*53*	*53*
R-SQUARE	*0.6856*	*0.8883*
ADJUSTED R-SQUARE	*0.5936*	*0.8556*
CONSTANT	*13775* *0.684*	*1586.78725*** *2.244*

*Note: The t-statistic is below each estimate, * indicates that it is significant at the 10%, ** indicates that it is significant at the 5% lev.*

Table 13: it presents two regressions where the change on total earnings, the change on total assets and the book to market value are added on the independent variables of both of the regressions of Table 12.

On Table 13, we add the three variables change on total earnings, change on total assets and book to market value.

On the exit value regression of Table 13 (column1):
Change on total assets is significant and positive showing that a positive increment on assets will have a positive effect on equity.
Book to market is negative and significant showing that the reverse variable of growth is inversely related to equity.
Consistently with the previous regression on Table 12 (column 1):
Short run obligations over assets are very significant.
Total obligations over assets are significant and negative indicating an inverse relationship between market equity and obligations.
The R-squares for the exit value regression has increased from62 to 68.5%.

On the excess exit value regression of Table 13 (column2):
Change on total assets is significant and positive showing that a positive increment on assets will have a positive effect on equity.
Book to market is negative and significant showing that the reverse variable of growth is inversely related to equity.
Excess Short run obligations over assets are very significant and that total obligations over assets are significant and negative indicating an inverse relationship between market equity and obligations.
Excess Transitory bills are very significant and negative since they are also included in the liabilities of the company that would oppose to the market equity.
Excess financial assets are significant and positive since they move together with equity.
The R-squares for the excess exit value regression has increased from 85 to 89%.

TABLE 14

PVCF/TOTAL ASSETS	0.073593 1.208	0.01832 0.503
EXIT VALUE/TOTAL ASSETS		
TOTAL FIX. ASS./ TOTAL ASS.	-11361 -0.542	
TOTAL INVET./ TOTAL ASSETS	-18932 -0.847	
TOTAL RECEIV/TOTAL ASSETS	-9328.265075 -0.41	
TOTAL FIN SEC/TOTAL ASSETS	3145.088383 0.113	
TOTAL AVAIL FUNDS/TOTAL ASSETS	-29573 -1.19	
TRANSIT BILLS/ TOTAL ASSETS	6608.298109 0.217	
SHORT RUN OBLIGATIONS/TOTAL ASSETS	23692** 3.353	
TOTAL OBLIGATIONS/ TOTAL ASSETS	-21011** -3.688	
EXCESS EXIT VALUE / ASSETS		
EXCESS FIXED ASSETS/ASSETS		0.008314837 1.019
EXCESS INVETORY /ASSETS		-0.2935308 -1.514
EXCESS RECEIVABLES/ASSETS		-0.4499528** -2.009
EXCESS FIN SEC/ASSETS		0.666125276** 2.57
EXCESS AVAILABLE FUNDS/ASSETS		-0.7773703 * -1.987
EXCESS TRANSITORY BILLS/ASSETS		-0.8992588** -4.878
EXCESS SHORT RUN OBLIG/ASSETS		2.1424427** 9.692
EXCESS TOTAL OBLIGATIONS/ASSETS		-1.525995** -8.641
CHANGE ON TOTAL EARNINGS	-2461.127322 -1.063	936.735172 0.763
CHANGE ON TOTAL ASSETS	8720.684902** 2.107	3504.496377 * 1.659
BOOK TO MARKET VALUE	-420871** -2.16	-240931** -2.147
SMALL	56.75999 0.027	-1132.288211 -0.888
OBSERVATIONS	*53*	*53*
R-SQUARE	*0.6856*	*0.8904*
ADJUSTED R-SQUARE	*0.5834*	*0.8548*
CONSTANT	*13880* *0.668*	*2520.770465 ** *1.988*

Note: The t-statistic is below each estimate, indicates that it is significant at the 10%,** indicates that it is significant at the 5% level*

Table 14: it presents two regressions where the small is added on the independent variables of both of the regressions of Table 13.

On Table 14, two regressions are presented where there is one more independent variable added in both of the regressions of Table 13, the SMALL variable.

The observations on the first regression (column 1) of the Table 14 are:
Short run obligations over assets are very significant.
Total obligations over assets are significant and negative indicating an inverse relationship between market equity and obligations.
The R-square of the exit value regression remains the same at the level of 68.5%.

The observations on the second regression (column 2) of the Table 14 are:
Change on total assets is significant and positive showing that a positive increment on assets will have a positive effect on equity.
Book to market is negative and significant showing that the reverse variable of growth is inversely related to equity.
Excess Short run obligations over assets are very significant.
Excess Total obligations over assets are significant and negative indicating an inverse relationship between market equity and obligations.
Excess Transitory bills are very significant and negative since they are also a debt of the company that would be against to the market equity.
Excess financial assets are significant and positive since they are positively related to equity.
The intercept of this regression is insignificant denoting the fair value of the company.
The R-square of the excess regression increases slightly from 88 to 89%.

TABLE 15

PVCF/TOTAL ASSETS	0.094661 1.443	0.028852 0.835
EXIT VALUE/TOTAL ASSETS		
TOTAL FIX. ASS./ TOTAL ASS.	-12056 -0.537	
TOTAL INVET./ TOTAL ASSETS	-23525 -0.956	
TOTAL RECEIV/TOTAL ASSETS	-4939.527763 -0.204	
TOTAL FIN SEC/TOTAL ASSETS	9959.846025 0.326	
TOT AVAIL FUNDS/TOT ASSETS	-17848 -0.621	
TRANSIT BILLS/ TOTAL ASSETS	1946.249628 0.058	
SHORT RUN OBLIGATIONS/TOT ASSETS	24717** 3.111	
TOTAL OBLIGATIONS/ TOTAL ASSETS	-23132** -3.113	
EXCESS EXIT VALUE / ASSETS		
EXCESS FIXED ASSETS/ASSETS		-289607440 -0.032
EXCESS INVETORY /ASSETS		-0.2392715 -1.267
EXCESS RECEIV/ASSETS		-0.2757987 -1.164
EXCESS FIN SEC/ASSETS		0.761738214** 2.859
EXCESS AVAILABLE FUNDS/ASSETS		-0.5891767 -1.381
EXCESS TRANSITORY BILLS/ASSETS		-0.9264812** -5.199
EXCESS SHORT RUN OBLIG/ASSETS		2.0654146** 9.416
EXCESS TOTAL OBLIGATIONS/ASSETS		-1.506028** -9.125
CHANGE ON TOTAL EARNINGS	-1878.916255 -0.75	2222.267468* 1.812
CHANGE ON TOTAL ASSETS	6331.398835 1.273	4584.856455** 2.046
BOOK TO MARKET VALUE	-455785** -2.093	-298198** -2.641
SMALL	-209.818885 -0.092	-1188.162401 -0.975
INDUSTRY 1	1141.424053 0.37	-918.258592 -0.572
INDUSTRY 2	3477.066524 0.965	2196.609131 1.252
INDUSTRY 3	-446.575713 -0.085	-1580.123979 -0.58
INDUSTRY 4	-2933.360391 -0.765	-1535.359219 -0.845
INDUSTRY 5	-1242.53587 -0.37	-4316.856296** -2.203
INDUSTRY 6	-1587.419893 -0.498	-1129.451543 -0.717
OBSERVATIONS	*53*	*53*
R-SQUARE	*0.7168*	*0.921*
ADJUSTED R-SQUARE	*0.5585*	*0.8769*
CONSTANT	*12095* *0.534*	*2664.581429** *1.63*

Note: The t-statistic is below each estimate. * indicates that it is significant at the 10%,.** indicates that it is significant at the 5% level*

Table 15: it presents two regressions where the seven industries variables are added on the independent variables of both of the regressions of Table 14.

On Table 15 another two regressions are presented, where there are six more independent variables added in both of the regressions of Table 14; Industry 1, Industry 2, Industry 3, Industry 4, Industry 5 and Industry 6 (Industry 7 and Industry 8 are omitted).

We observe for the first regression (column 1) of Table 15:
Short run obligations over assets are very significant.
Total obligations over assets are significant and negative indicating an inverse relationship between market equity and obligations.
Book to market value is negative and significant showing that the reverse variable of growth is inversely related to equity.
The intercept is insignificant eliminating any suspicion for the overvaluing of the company.
The R-square for the exit value regression still increases from 68 to 72%.

For the excess exit value regression (column 2) of Table 15:
Excess financial assets are significant and positive displaying a positive relation with assets.
Change on total assets is significant and positive showing that a positive marginal increase on assets will have a positive effect on equity.
Book to market is negative and significant.
Short run obligations over assets are very significant.
Total obligations over assets are significant and negative indicating an inverse relationship between market equity and obligations.
Transitory bills are very significant and negative since they are also liable bills of the company that would decrease market equity.
Industry 5 shows a significant and negative coefficient.
The R-square for the excess exit value regression increases from 89 to 92%.

TABLE 16

PVCF/TOTAL ASSETS	0.081286** 4.677	0.131605** 2.254
EXIT VALUE/TOTAL ASSETS		
TOTAL FIXED ASSETS/ TOTAL ASSETS	1369.150748** 4.677	
TOTAL INVENTORY/ TOTAL ASSETS	-669.08114 -0.169	
TOTAL RECEIVABLES/TOTAL ASSETS	5922.815288 1.193	
TOTAL FIN. SECURITIES/TOTAL ASSETS		
TOTAL AVAILABLE FUNDS/TOTAL ASSETS		
TRANSIT BILLS/ TOTAL ASSETS		
SHORT RUN OBLIGATIONS/TOTAL ASSETS		
TOTAL OBLIGATIONS/ TOTAL ASSETS	-7653.773797** -2.558	
EXCESS EXIT VALUE / ASSETS		
EXCESS FIXED ASSETS/ASSETS		-17276668299** -2.587
EXCESS INVETORY /ASSETS		-0.7710088** -2.863
EXCESS RECEIVABLES/ASSETS		
EXCESS FIN SECURITIES/ASSETS		0.610630164** 4.001
EXCESS AVAILABLE FUNDS/ASSETS		
EXCESS TRANSITORY BILLS/ASSETS		
EXCESS SHORT RUN OBLIGATIONS/ASSETS		0.727837563** 5.263
EXCESS TOTAL OBLIGATIONS/ASSETS		
CHANGE ON TOTAL EARNINGS	-948.079804 -0.933	-1480.08343 -0.814
CHANGE ON TOTAL ASSETS	476.303092 0.232	8004.119656** 2.117
BOOK TO MARKET VALUE	-790.794626 -0.311	-497872** -2.494
SMALL	-217.890361 -0.152	3176.205527 1.564
INDUSTRY 1	846.183677 0.478	793.654483 0.285
INDUSTRY 2	3756.622856* 1.85	4073.001688 1.384
INDUSTRY 3	1582.944946 0.533	894.464349 0.194
INDUSTRY 4	772.555403 0.338	894.464349 -0.641
INDUSTRY 5	2587.878843 1.386	-2620.152206 -0.835
INDUSTRY 6	-602.213492 -0.311	-2471.388344* -1.734
OBSERVATIONS	*94*	*56*
R-SQUARE	*0.5506*	*0.6707*
ADJUSTED R-SQUARE	*0.4652*	*0.5503*
CONSTANT	*1597.836602* *0.778*	*-2621.812701* *-0.952*

*Note: The t-statistic is below each estimate, * indicates that it is significant at the 10%l, ** indicates that it is significant at the 5%lev.*

Table 16: it presents two regressions where we control for collinearity a) the first regression of table 15 by eliminating 4 independent variables b) the second regression of table 15 by eliminating 4 independent variables.

On Table 16, we control for correlation of the independent variables of table 15. We run the collinearity tests for both of the regressions of Table 15 and we concluded that several variables are highly correlated with each other.

So we eliminated:

1. From the exit value regression (column 1), the variables of financial securities over assets, the available funds over assets, the transitory bills over assets and the short run obligations over assets.
2. From the excess exit value regression (column 2), we removed the variables of the excess receivables over assets, the excess available funds over assets, the excess transitory bills over assets and the excess total obligations over assets.

After the omission of those variables that displayed .8 or .9 correlation with the other variables, the rest were not correlated.

For the exit value regression (column 1) we observe that:

The PVCF over assets becomes extremely significant

The fixed assets over assets variable is very significant and it has a positive sign indicating that it is positively related to the market equity over assets, as expected.

The receivables are significant on the 5% level with a positive sign.

The total obligations over assets show a high significance and are negatively correlated with the market equity as expected.

The intercept is big but insignificant indicating that it does not add to the value of market equity.

The R-square for the exit value regression decreases from 71 to 55 %.

For the excess exit value regression (column 2) we observe that:

The PVCF is significant with a small coefficient.

The excess financial securities over assets show a high significance.

The excess fixed assets over assets are significant.

The short run obligations over assets are significant.

The excess inventory over assets variable is significant.

The change on assets shows a high significance and is positively related to market equity.

in contrast with the book to market value, which is significant but negative.

The intercept is big but since it is insignificant it does not play any major role.

The R-square for the excess exit value regression decreases from 92 to 67 %.

4. CONCLUSION

This part of the paper dealt with examining the valuation efficiency of the Greek Stock Market. The market value seemed to be higher than the Present Value of Cash Flow. But this is expected since this difference implies the real option of the company, which could either be the growth option or the abandonment option of the Company. Moreover it is a usual phenomenon in every stock market.

The R-Squares of the regressions were relatively high. While we were adding more variables the R-Square was increasing. Additionally the majority of the regressions intercepts are very close to zero. These results indicate that the dependent variables are very well explained by the independent variables and therefore we do not have to add any additional value for the equation to be valid.

Therefore the results of the empirical tests denote efficiency in the Greek stock market because they imply that the companies are not overvalued. The Greek stock market does not display any inefficiency in the valuation part.

CHAPTER 2: EFFICIENCY OF THE GREEK STOCK MARKET

1. GENERAL

The implication of the Efficient Market Hypothesis is that the asset prices reflect optimal use of all available information and therefore the price of a traded asset is an optimal forecast of the asset's "fundamental value". Another insight of the Efficient Market Hypothesis is the ability to forecast future stock prices since the theory implies that the sequence of prices will be a random walk with drift:

$P_{t+1} = (1+r) P_t + \varepsilon_{t+1}$

Where: $E(\varepsilon_{t+1}) = 0$ because it follows the i.i.d. Process.

The Efficient Market Hypothesis can be restated in terms of returns rather than the prices of stocks. Markowitz and Sharpe developed the CAPM model that states that the risk-adjusted returns on all securities are the same if they take place in an efficient environment. Moreover any differences between asset returns are attributed to systematic risk (risk for all the securities in a market and also the reason for a "risk premium") and unsystematic risk (risk that is different for every security and is captured by the company's beta).

Therefore $E(R_i) = rf + (rm - rf) \beta_i$.

One prerequisite should hold for all these theories to be valid:

The specific stock market that we are doing the analysis on does not show any signs of anomalies or gross inefficiencies.

In order to examine the stock market efficiency we run efficiency tests on the market returns of the Athens Stock Exchange Index. The source of the data was the International Financial Corporation that provided us with the monthly returns ever since 1975, weekly returns ever since 1988 and daily returns ever since 1995.

Many empirical studies were conducted in the seventies to display the efficiency of various stock markets. On the contrary, during the eighties empirical tests were made to prove the inefficiency of the stock markets, by identifying systematic variations in stock prices related to the calendar year.

We examine the existence of anomalies of the Greek stock market for the following cases:

- THE END OF THE MONTH EFFECT
- THE JANUARY EFFECT
- THE WEEKEND EFFEECT
- TECHNICAL ANALYSIS OF STOCK RETURNS

We first present the literature and then the empirical results.

2. LITERATURE

2.1. THE END OF THE MONTH EFFECT

According to that anomaly the last days of a month and the first couple of days of the following month are comparatively higher.

Ariel (1987) was the first to identify the anomalies in the U.S. stock prices at the beginning and end of the calendar month: on the last day of the month and the three following days the changes in the stock prices are markedly positive.

Baron conducted a research on the Italian Stock Market for the end of the month effect. He noticed that there is a clear difference between the first and second halves of the calendar month. On the basis of the sample obtained by excluding the observations corresponding to the first day of each monthly account to the trading days after a public holiday, stock prices are found to fall in the first part of the calendar month and then rise in the second. The end of the month price is particularly large. Specifically the changes observed on the 30^{th} are positive and significant for each of the sub-periods examined.

2.2. THE JANUARY EFFECT

According to that anomaly, the rate of return on stocks seems to be considerably higher during January.

There are various pieces of literature written on this topic. Rozeff and Kiney (1976), Keim (1983) and Lakonishok and Smidt (1984) documented originally the anomaly of the January effect, which is the significantly greater rate of change in the stock prices in January than any other month. This could be interpreted as liquidity or payroll effects as well as tax effects.

Keim (1983) has shown that the January effect appears to be due largely to price behavior in the first five trading days of January.

Giannasca and Macchiati conducted a research on the Italian Stock Market for the January effect and they found that there was a pronounced seasonal pattern with the daily changes in stock prices during the January account.

Kato and Schallheim (1985) concluded that there is a January seasonal in firms that coincide with traditional Japanese bonuses paid at the end of December.

Reinganum (1983) found that the January effect and the small firm effect are commingled: the January effect appears to exist primarily for small firms.

Ariel (1987) notices a pattern in daily stock returns in every month but February that parallels precisely the pattern that occurs at the turn of the year.

2.3. THE WEEKEND EFFECT

This is another abnormality that has to do with the tendency of stocks and the market as a whole to decrease between the Friday's close and the Monday's opening.

French (1980) and Gibbons and Hess (1981) documented unusual stock returns over weekends, as well as others that conducted studies on the weekend effect. Researchers have uniformly reported evidence of anomalous returns between the market close on Fridays and the market close on Mondays. It is known that weekday patterns are found in other national markets that are present to other varying degrees in the returns of firms of all sizes (Keim (1984), Keim and Stambaurgh (1984), Rogalski (1984)). However, there have been some disagreements in the literature about the size, timing, or stability of the weekend effect. Efforts to explain the weekend effect as a consequence of settlement practices have met only with mixed success. Consequently, researchers regard the pattern of negative Monday stock returns as an anomaly.

Frank Cross (1973) reports that stock prices have risen more often on Fridays than any other day of the week and that they have risen least often on Mondays. Merrill (1966) found that between 1952 and 1965 the Dow Jones Industrial Average advanced on 64.6% of all Fridays, but on only 43 % of all Mondays. The chances of a rise on Tuesday, Wednesday, and Thursday were 54 %, 56.3 %, and 56.5 %, respectively.

Moreover the behavior of the S&P Composite on the 844 Fridays and Mondays in the sample shows that the S&P Composite rose on 523 Fridays, or 62% of all Fridays, whereas it rose on Monday only 333 times, or on 39.5 % of all Mondays. Cross presents that the difference between Fridays and Mondays has been consistent from year to year. Standard non-parametric tests show that the distribution of price changes on Mondays proceeded by "up Fridays" is significantly different from the distribution of price changes on other days preceded by an advance. Likewise, the price changes on Mondays following "down Fridays" are significantly different from price changes on other days, following a decline.

On the other hand Robert Conolly (1989) analyzes the robustness of the weekend effects to alternative estimation and testing procedures. He concludes that from the finance theory perspective the evidence of a weekend anomaly is clearly dependent on the estimation method and the sample period. When transaction costs are taken into account, the probability that arbitrage profits are available from weekend-oriented trading

strategies seems very small. This conclusion is obviously consistent with an efficient markets approach.

Condoyanni, O'Hanlon and Ward (1986) conducted a study that investigates the weekend effect through an analysis of the daily returns in capital markets in a number of different countries. The results demonstrate that the weekend effect is a pervasive feature of capital markets around the world.

Lawrence Harris (1988) presented a study conducted using data from the NYSE stocks. These data make possible simultaneous analyses of both cross-sectional and intra-temporal characteristics of the day of the week effect. Fourteen months of the complete transaction record of the NYSE were examined and he concluded that there are cross-sectional differences in weekday patterns found in both trading-period and nontrading-period returns. For large firms the negative close-to-close return accrues between the Friday close and the Monday open. For small firms it accrues during the Monday trading day. It is unlikely that the weekend effect in this sample is caused entirely by high Friday closing prices, caused either by systematic errors in the data or by deliberate price manipulation.

2.4. TECHNICAL ANALYSIS OF STOCK RETURNS

This anomaly of mean reversion is the tendency of stocks that have had high returns in the past to have lower returns in the future and those that have had low returns in the past to have higher returns in the future.

De Bondt and Thaler (1985) show that over 3 to 5 year holding period stocks that had relatively low returns during that period, achieve higher returns than stocks that had higher returns during that period.

Papers Jegadeesh and Lehmann report evidence of shorter-term return reversals and they conclude that contrarian strategies that select stocks based on the returns of previous performance in the short run generate abnormal returns.

Despite the fact that many studies support the contrarian strategy, the majority of portfolio managers seem to pick stocks that had shown an increasing trend in the price in the preceding period.

The market overreaction as they call it, or in other words Dreman presuming that winners must eventually lose and losers popularized contrarian investment strategy must eventually win. Chan proved that market overreaction is statistically significant. Shiller, Rosenberg, Reid, Howe and Lanstein support it. This topic has enjoyed controversy though, because many analysts that made research found opposite results. For example Dipa Dutia and William Davidson run regressions on almost all NYSE and AMEX firms from 1963 to 1985 and they found that winners keep on winning and losers keep on loosing. Abnormal returns earned in one year are positively related to the abnormal returns earned in the next year. This evidence is against to the overreaction investment philosophy.

3. EPMIRICAL RESULTS

3.1. THE END OF THE MONTH EFFECT

According to that anomaly, the last days of the month and the first couple of days of the following month, the change in the stock prices is markedly positive.

From the daily data that we had available to us starting on December 1975 to April 1999, we calculate the percentage growth rate of every day for this period. For each one of those results we computed the following formula:

$$((1+\%CHANGE)^{1/DAYS})-1 \quad (2)$$

where:

% change = the growth rate of every day

days = the number of days in that particular month

Then we separate the days into two columns. One column contains the last two days of the month as well as the first day of the next month and the other column contains all the other days. We run the analysis of variance single factor test on those two groups.

SUMMARY				
The last 2 days and 1st of next month	819	1,232,698	0.001505	0.000259
All the other days 2	137	0.034297	0.00025	0.000332
Between Groups	0.000185	1	0.685174	0.408018
Within Groups	0.257295	954		
Total	0.25748	955		

Conclusion of the test:

The p-value of this test, which is the major determinant, is more than 5%, indicating that the market has been efficient. Moreover the averages and the variances of the two groups are very close.

3.2. THE JANUARY EFFECT

According to that anomaly the rate of return on stocks seems to be considerably higher during January. The explanation for this phenomenon is that investors sell the stocks that incur a loss at the end of the year so that these losses will be deducted from the capital gains taxes that they are obliged to pay. Come January, they purchase all those below real value stocks in order to build the desired portfolio. The increased January activity leads to the so-called January effect.

We use formula *(2)* to compute the returns. Then we separated the returns of every month and we constructed a table of twelve columns. Then we run an analysis of variance for those to check for the variation among the different months' returns.

SUMMARY				
January	24	1,504,138	0.062672	0.000380
February	24	1,658,681	0.069112	0.000472
March	24	1,504,138	0.062672	0.000380
April	24	1,556,010	0.064834	0.000408
May	23	1,417,878	0.061647	0.000371
June	23	1,469,653	0.063898	0.000404
July	23	1,423,716	0.061901	0.000383
August	23	1,427,033	0.062045	0.000388
September	23	1,480,021	0.064349	0.000420
October	23	1,434,758	0.062381	0.000396
November	23	1,488,997	0.064739	0.000426
December	23	1,444,636	0.062810	0.000397
Between Groups	0.00111	11	0.250828	0.993211
Within Groups	0.107817	268		
Total	0.108927	279		

Conclusion of the test:

The p-value of this test is more than 5%, indicating efficiency of the market. Moreover the averages and the variances of the various groups are close.

3.3. THE WEEKEND EFFECT

Another abnormality has to do with the tendency of stocks and the market as a whole to decrease between the Friday close and the Monday opening. A rationalization for this is that the government and the firms release good news during the trading days which affects the positive evolution of the stocks and therefore the market in general, and they release the bad news during the weekend which has a negative affect in the Monday opening of the market.

We examined this case in the Greek Stock market by taking the available data from the International Financial corporation, which provided us with the daily returns of the Athens Stock Exchange from the July 30th 1995 to May 3rd 1999; a total of 996 days. For each one of those results we computed the following formula:

$$((1+\%CHANGE)^{1/DAYS})-1$$

Where:

% change = the growth rate of every day

days = the number of trading days (e.g. 3 days if a weekend has preceded)

Then we separate the five-day outcomes and therefore we form five columns and we run the following analysis of variance single factor test.

SUMMARY				
Monday	199	0.25283	0.001271	0.000293
Tuesday	199	0.15563	0.000782	0.000048
Wednesday	200	0.412493	0.002062	0.000315
Thursday	198	-0.15549	-0.00079	0.000361
Friday	199	0.601531	0.003023	0.000275
Between Groups	0.001621	4	1,567,381	0.180824
Within Groups	0.255925	990		
Total	0.257546	994		

Conclusion of the test:

The p-value of this test, which is the major determinant, is more than 5%, indicating that the market has been efficient. Moreover the averages of the five different groups are very close as well as the variances. The Monday returns do not exhibit significant differences than the other days.

3.4. TECHNICAL ANALYSIS OF STOCK RETURNS

This anomaly of mean reversion is the tendency of stocks that have had high returns in the past to have lower returns in the future and those that have had low returns in the past to have higher returns in the future; returns tend to revolve around the mean.

For this efficiency test we follow the same methodology that Bessembinder and Chan (1998) followed in their analysis "Market Efficiency and the returns to Technical Analysis" which was used for the Variable Length Moving Average. It involved a short-term moving average of prices compared to a long term moving average. Buy signals are emitted when the short-term average exceeds the long term average. Sell signals are emitted when the short-term average is less than the long term average.
We perform this test for several short-term and long-term combinations.
We examined this case in the Greek Stock market by taking the available data from the International Financial corporation, which was the daily returns of the Athens Stock Exchange from the July 30th 1995 to May 3rd 1999; a total of 996 days. For each one of those results we computed the following formula:

$((1+\%CHANGE)^{1/DAYS})-1$ average return per day formula

where:
% change = the growth rate of every day
days = the number of trading days

IV.Ia. 1-50

Short-term day 1, Long term the moving average of the previous 50 days

For this test, we align the return of the current day (t_1), which we calculated in the formula above, with the average market return of the past 50 days (t_{1-50}). Below it, the second day (t_2) with the average market return of the past 50 days (t_{2-50}) and so on... If the short run return is bigger we use a buy signal for that comparison and analogously if it is smaller a sell signal. We sort them by the buy and sell indications and we run an analysis of variance.

SUMMARY				
buy	515	1,051,873	0.002042	0.000297
sell	390	0.171446	0.00044	0.000265
Between Groups	0.00057	1	2,016,101	0.155984
Within Groups	0.255384	903		
Total	0.255954	904		

Conclusion of the test:

The P-value is 0.16 that is more than 5%. Moreover the variances and the averages are close. Therefore the means reversion test displays efficiency in the mean reversion test of the Greek Stock Market.

IV.Ib. 1-50 > 1%

Then we eliminate the differences that are smaller or equal of 1% of the corresponding 50-day average value. In order to do that we calculate the ratio of the difference of the s-term value over the corresponding value of the 50-day average and then we take the percentages of those values. If they are less or equal to 1% we eliminate them and if they are more than 1% we keep them. For the remaining difference values we run another analysis of variance.

SUMMARY				
Buy	464	11,195	0.002413	0.0003
Sell	441	0.103819	0.000235	0.000263
Between Groups	0.001072	1	3,797,444	0.05164
Within Groups	0.254883	903		
Total	0.255954	904		

Conclusion of the test:

The P-value is more than 5%. Moreover the variances and the averages are very close. Therefore the means reversion test displays efficiency in the mean reversion test of the Greek Stock Market.

IV.IIa. 1-150

Short-term day 1, Long term the moving average of the previous 150 days

For this test we align the return of the current day (t_1), which we calculated in the average return per day formula, with the average market return of the past 150 days (t_{1-150}). Below it, the second day (t_2) with the average market return of the past 150 days (t_{2-150}) and so on... If the short run return is bigger we use a buy signal for that comparison and analogously if it is smaller a sell. We sort them by the buy and sell indications and we run an analysis of variance.

SUMMARY				
Buy	541	0.952582	0.001761	0.000341
Sell	266	0.243856	0.000917	0.000247
Between Groups	0.000127	1	0.409791	0.522258
Within Groups	0.249547	805		
Total	0.249674	806		

Conclusion of the test:

The P-value is 5%. Moreover the variances and the averages are close. Therefore the mean reversion test displays efficiency.

IV.IIb. 1-150 > 1%

Then we eliminate the differences that are smaller or equal to 1% of the corresponding 150-day average value. In order to do so, we calculate the ratio of the difference of the s-term value over the corresponding value of the 150-day average and then we take the percentages of those values. If they are less or equal to 1% we eliminate them and if they are more than 1% we keep them. For the remaining values we run another analysis of variance.

SUMMARY				
Buy	512	1,062,713	0.002076	0.000349
Sell	295	0.133726	0.000453	0.000241
Between Groups	0.000493	1	1,591,336	0.207501
Within Groups	0.249182	805		
Total	0.249674	806		

Conclusion of the test:

The P-value is 0.21 more than 5%. Moreover the variances and the averages are close. Therefore this means reversion test displays efficiency.

IV.IIIa. 5-150

Short term average of the past 5days, Long term the moving average of the previous 150 days

For this test we align the return of the five day average (t_{1-5}), which we calculated in the average return per day formula, with the average market return of the past 150 days (t_{1-150}). Below it, the second day (t_{2-5}) with the average market return of the past 150 days (t_{2-150}) and so on... If the short run return is bigger we use a buy signal for that comparison and analogously if it is smaller a sell signal. We sort them by the buy and sell indications and we run an analysis of variance.

SUMMARY				
Buy	543	0.962157	0.001772	0.00035
Sell	264	0.234281	0.000887	0.000227
Between Groups	0.000139	1	0.448321	0.503325
Within Groups	0.249535	805		
Total	0.249674	806		

Conclusion of the test:

The P-value is more than 5%. Moreover the variances and the averages of the two groups are close. Therefore the mean reversion test displays efficiency.

IV.IIIb. 5-150 > 1%

Then we eliminate the differences that are smaller or equal to 1% of the corresponding 150-day average value. In order to do that we calculate the ratio of the difference of the s-term value over the corresponding value of the 150-day average and then we take the percentages of those values. If they are less or equal to 1% we eliminate them and if they are more than 1% we keep them. For the remaining values we run another analysis of variance.

SUMMARY				
Buy	512	0.967482	0.00189	0.000361
Sell	295	0.228957	0.000776	0.000221
Between Groups	0.000232	1	0.748885	0.387087
Within Groups	0.249442	805		
Total	0.249674	806		

Conclusion of the test:

The P-value is more than 5%. Moreover the variances and the averages are close. Therefore the reversion test displays efficiency.

IV.IV.a. 2-200

Short-term average of past two days, Long term the moving average of the previous 200 days.

For this test we align the return of the two-day average (t_{1-2}), which we calculated in the average return per day formula, with the average market return of the past 150 days (t_{1-200}). Below it, the second day (t_{2-2}) with the average market return of the past 200 days (t_{2-200}) and so on... If the short run return is bigger we use a buy signal for that comparison and analogously if it is smaller a sell signal. We sort them by the buy and sell indications and we run an analysis of variance.

SUMMARY				
Buy	532	0.819869	0.001541	0.00038
Sell	227	0.369817	0.001629	0.0002
Between Groups	0.00000123	1	0.003781	0.950987
Within Groups	0.246934	757		
Total	0.246935	758		

Conclusion of the test:

The P-value is more than 5%. Moreover the variances and the averages are close. Therefore the mean reversion test displays efficiency.

IV.IV.b. 2-200 >1%

Then we eliminate the differences that are smaller or equal to 1% of the corresponding 200-day average value. In order to do that we calculate the ratio of the difference of the s-term value over the corresponding value of the 200-day average and then we take the percentages of those values. If they are less or equal to 1% we eliminate them and if they are more than 1% we keep them. For the remaining values we run another analysis of variance.

SUMMARY				
Buy	498	0.842061	0.001691	0.000391
Sell	261	0.347624	0.001332	0.000203
Between Groups	2.21E-05	1	0.067664	0.79484
Within Groups	0.246913	757		
Total	0.246935	758		

Conclusion of the test:

The P-value is more than 5%. Moreover the variances and the averages are close. Therefore the mean reversion test displays efficiency.

3.4 CONCLUSION

In this second part of the paper we checked for trading inefficiencies. First we examined for calendar effects like the January effect, the end of the month effect, the weekend effect as well as mean reversion tests with multiples of combinations. None of the cases that we examined display any inefficiency in the Greek Stock Market.

GENERAL CONCLUSION

This paper dealt with examining the valuation efficiency and the trading efficiency in the Greek Stock Market. For the first part, the market value seemed to be higher than the Present Value of Cash Flow. But this is expected since this difference implies the real option of the company, which could either be the growth option or the abandonment option of the Company. Moreover it is a usual phenomenon in every stock market. Additionally the majority of the regressions intercepts are very close to zero, indicating that the dependent variables are very well explained by the independent variables and therefore we do not have to add any additional value for the equation to be valid. This result also denotes efficiency in the Greek stock market because it implies that the companies are not overvalued. Therefore the Greek stock market does not display any inefficiency in the valuation part.

In the second part of the paper we checked for trading inefficiencies. First we examined for calendar effects like the January effect, the end of the month effect, the weekend effect as well as mean reversion tests with multiples of combinations. All these tests that we run do not indicate that the Greek Stock Market displays any inefficiency.

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ABSTRACT

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Valuation and Trading Efficiency in an Emerging Stock Market

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This paper is concerned with the various aspects of the Greek Stock Market. This paper is separated into two parts; in the first I check the efficiency of the fundamental value of the companies in the Greek Stock Market, working from the literature on real options, and in the second one the efficiency of trading. For the Valuation part, I regress to find the beta of each company in order to incorporate it in the determination of the projected earnings and the Present value of cash flow for each company. Then I run regressions of the equity the market Capitalization and the real option value against various variables of the balance sheets of each company to see how they react. Moreover I deal with the efficiency of the stock market by examining calendar and mean reversion-trading rules. The Greek stock market does not display any inefficiency in the valuation nor in the trading part.

VITA

Despina Kantzi, daughter of Nikolaos and Sophia Kantzi, was born on May 18, 1972, in Athens, Greece. After graduating in 1990 from Athens College High School in Athens, she entered the Long Island University where she pursued and received the Bachelor Degree in Political Science.

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