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Examination of Fundamental Correlations
and Linkages among Stock Markets

Initial Public Offerings (IPOS) – Pros and Cons

Portfolio Theory: Risk and Return

Corporate Deals, Mergers & Acquisitions

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It is the time that if entrepreneurs and executives can escape the imposed psychological depression, they will see opportunities or solutions and successfully encounter the, admittedly harsh for business development, environment.

The search of a strong partnership through corporate deals, mergers & acquisitions that can improve financial ratios, enrich the product range or strengthen the supply chain locally or abroad is a way out that some businesses might choose. Else, “chapter 11” is not a bad escape for others. Either-or, the action based on professional business and financial analysis together with a business plan is of paramount importance. The era of collaborations hype without professional documentation of business proposals is long gone! Reliability is the first characteristic questioned in this environment. We continue to insist and believe in proper analysis of business proposals as the only way to achieve excellence in any partnership or stand alone scenario.

This year is expected to be even more challenging. By foreseeing and accepting the unavoidable characteristics of the upcoming even more demanding market environment as well as by considering that as the new milestone, we seize any opportunity that will contribute to our scope.

We are cautious because of intelligence, but optimists because of will!

Panayiotis L. Zarifis
Christophoros J. Makrias
Nicholas I. Georgiadis



We continue to
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Examination of Fundamental Correlations and Linkages among Stock Markets¹

Abstract

The recent international economic recession has proved that there is a strong connection among stock markets, and when a derangement hits one stock market then this problem is being generalized and affects other stock markets. In this paper we attempt to examine the hypothesis of normality in different stock markets and on later stages, to calculate the correlation among them. More specific, we are trying to distinguish the relationship between Greece's stock market and the most important stock markets in Europe, USA and Asia. Moreover, after finding out the correlation between these markets, we try to find out long term relations, using the Johansen cointegration test.

Key words

stock markets, correlation, cointegration analysis

JEL Classification: C58, G1

1. Introduction

The examination of the linkages and relations between different stocks markets in today's academic fields is of high importance. This happens as

the necessity for minimizing the non systematic risk and simultaneously the creation of an efficient portfolio is becoming bigger and bigger in an environment of high macroeconomic uncertainty and consecutive economic crises. At this point we have to mention that the connection between two or more stock markets is not a permanent situation, but is changing continuously through years, because of the alteration in the structural components of each stock market and the variety of the variables that have a noticeable effect in the interdependence of stock markets. This means that two markets that were correlated in the 90's, now they may not be connected or they may have a negative correlation, depending on the macroeconomic and microeconomic factors of the two markets. The most striking aspect of the above could be the case of Greece. The years before the entrance in the Eurozone, the Greek stock market may have had a strong connection with developing countries such as Balkan countries or some Asian Basin countries. Since Greece became member of the Eurozone the

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situation in Greece has gradually changed in terms of economic and social growth. The developing rates of the Greek economy contributed to be characterized as developed country, and this may have affected the relations between Greece's market and the other developed markets. In other words, the examination of correlations between different stock markets is a very sensitive and difficult task, because a stock market reflects the political, economic and social expectations. In this paper, we study the linkages among nineteen stock markets, four US markets, thirteen European markets and two Asian markets by using their basic indices in order to find how the economic crisis has affected the relations among them and also to analyze the relations between the Greek market and the rest markets of our sample. First, we are trying to calculate the correlation coefficients among these markets. Then we examine if there are long run relationships between Greece's stock market and the rest markets of our sample using the cointegration analysis. From the results of the cointegration analysis we have evidence about the indices that are very important for international stock market influences. The organization of the paper is as follows: section 2 reviews the literature, section 3 describes the methodology used in the paper and section 3 presents the data, the descriptive statistics, the results from the correlation matrices and the results of the econometric method for cointegration. Finally, in section 5 the conclusions are presented.

2. Literature Review

There is a lot of academic work in the field of correlation, cointegration and fundamental similarities between different stock markets. Scanning the literature review about correlations and long term relation between different stock markets, we find that the results are highly controversial. On the one hand, there are papers that find no significant correlations among stock markets. However, there is as equally number of papers that suggest strong correlation and long term relation in the examined markets. Of course, it is a very difficult task to decide whether two or more markets are strongly connected, in terms of correlation coefficients and cointegration tests, as the prerequisites, (such as mean, standard deviation, different parameters) under which these techniques for testing the relations based on, are changing rapidly, in an environment of uncertainty, lack of trust, and political and economic instability. Consequently, papers that are written decades before may not reflect the nowadays trends and for this reason the results create a confusion regarding the main purpose of these papers, which is to examine the correlations between different stock markets. Many researches such as Hilliard (1979), Jaffe and Westerfield (1985a, 1985b), Eun and Shim (1989), Von Fusterberg and Jeon (1989) and Cambell and Hamao (1992), show that there is positive correlation between stock markets. According to Roll (1992), the mean correlation between the different stock markets is low at price and is related with great variance among the

examined stock markets. In the examination of the correlation of stock markets, the use of gravity models is becoming more and more widely used. There are models that seek to explain the connection between stock markets and investigate patterns in the co – movements of particular stock markets. Nevertheless, Anderson (1979), Bergstrand (1985), Feenstra, et al. (1998), Anderson and Van Wincoop (2001) have expanded theoretical background.

The importance of the correlation between stock markets can be recognized by the crucial effect of contagion in the international financial sector and is becoming more and more vital due to the increase of the capital flows across national boundaries and the existence of lead-lag interrelationships among stock exchanges. King and Wadhwani (1990) developed the idea of market contagion whereby shocks in a major market, such as the US, spills over into other markets. With the United States being a major investor in many countries and posing a huge political influence on several countries in the world, studies have been done to investigate the causal relationship between the United States and other equity markets. Results indicate that the United States is an important global factor that moves the world markets. For example, Eun and Shim (1989) examined nine major stock markets (Australia, Canada, France, Germany, Hong Kong, Japan, Switzerland, the United Kingdom and the United States) over the period of December 1979 through December 1985, and found evidence that the

United States market is leading world-wide trends. Cheung and Mak (1992) examined the causal relationship between the developed markets and Asian emerging markets and found that the United States market has been a ‘global factor’ which leads both the developed and most of the Asian emerging markets. Forbes and Rigobon (2002), implemented parameter stability tests based on conditional correlation analysis which is correct for three types of bias, resulting from heteroscedasticity, endogeneity and omitted variable respectively, in order to find the influence of strong linkages to the mechanism of contagion.

Furthermore, empirical results showed that little of stock market co-movement can be accounted for, by observable economic factors and the majority is due to unobservable factors such as investor sentiment (King et al., 1994). The vital role of correlation can be easily understood by the long and extensive academic research in the field of interdependence and is becoming more and more important due to the increase of the capital flows across national boundaries and the existence of lead-lag interrelationships among stock exchanges (Corhay et al., 1993).

As far as cointegration analysis is concerned, this is the most popular approach that examines linkages and causality between stock markets and there is a lot of research that shows either the lack of cointegration between examined stock markets or the cointegration evidences between markets that can be characterized as emerging or emergent, according to

the fundamental market components in each case. Cointegration analysis was firstly developed 29 years ago, starting with the seminal contributions by Granger (1981), Engle & Granger (1987), and Granger & Hallman (1991), Kanas (1998) examined the existence of cointegration between U.S.A stock market and the corresponding stock markets of six European countries. The evidences showed the lack of cointegration between the examined markets. Kniff and Pynnonen (1999) examined the cointegration and the linkages between powerful markets, such as U.S.A and Japan stock markets and the influence of these markets to smaller stock markets. The results showed that changes in the stock prices in U.S.A had important influences to the other stock markets. According to Bruner et al., (2008) there are indicators of cointegration between countries that can be characterized either as emergent or as emerging, result that confirms the positive correlation between stock markets and the possible further market cointegration.

3. Methodology

In order to examine the relationships among different stock markets, in our methodology we include different methods. More specifically, at the early stages we used the correlation coefficient and the correlation matrix, in order to find out the linkages. In further analysis, we tried to apply the cointegration analysis in view of long term relations. We have to mention that we specialized our analysis in

Greece, and we examined in detail the relations between the Greek market and the financial markets of Europe and five indices from USA and Asia region.

3.1 Correlation Analysis

The simplest way to examine the relation between two variables is to calculate the correlation coefficient. Let X and Y be two random variables the correlation coefficient $\rho_{X,Y}$ between X and Y with expected values μ_X and μ_Y and standard deviations σ_X and σ_Y is defined as

The correlation coefficient can take values in the interval $[-1,1]$ or $-1 \leq \rho_{X,Y} \leq 1$. If $\rho=1$ that indicates that there is a perfect positive dependence between the two variables that it means that when the variable X is increasing the variable Y , also increasing by the same amount. If $\rho=-1$ that

$$\tilde{r}_{x,y} = \text{corr}(x,y) = \frac{\text{cov}(x,y)}{\sigma_x \sigma_y} = \frac{E[(x - \mu_x)(y - \mu_y)]}{\sigma_x \sigma_y}$$

indicates that there is perfect negative dependence, in other words, when X is increasing, Y is decreasing by the same amount. Generally speaking, when the coefficient is near 1 it is a strong indicator of a strong relation. If $\rho=0$ this means that there is no linear dependence, but we cannot make clear whether they are independent. In any other case we can have an indication by checking the table 1.

When we want to test the dependence of more than two variables, it is very useful to create the correlation matrix. This matrix is a $C[i,j]$ matrix, where $i=j$, which computes the correlation

Table 1: Correlation coefficients classification

Correlation	Negative	Positive
None	-0.09 to 0.0	0.0 to 0.09
Small	-0.3 to -0.1	0.1 to 0.3
Medium	-0.5 to -0.3	0.3 to 0.5
Large	-1.0 to -0.5	0.5 to 1.0

coefficients of the columns of the matrix. That is, row i and column j of the correlation matrix is the correlation between column i and column j of the original matrix. The diagonal elements of the correlation matrix will be 1 since they are the correlation of a column with itself. The correlation matrix is also symmetric since the correlation of column i with column j is the same as the correlation of column j with column i .

3.2 Stationarity

A basic prerequisite, in order to check if two or more variables are cointegrated, is the time series that are examined not to be stationary. A time series Y_t is said to be stationary (weak stationarity) if the following conditions are true:

In other words, a time series is stationary if the mean, the variance and covariance of the series do not depend on time. A typical non stationary form is the following:

$$\begin{aligned}
 E(Y_t) &= \mu = \text{constan}, \forall t \\
 \text{Cov}(Y_t, Y_t) &= E(Y_t - \mu)(Y_t - \mu) = E(Y_t - \mu)^2 = \sigma^2 = \text{constant} < \infty, \forall t \\
 \text{Cov}(y_{t_1}, y_{t_2}) &= E(y_{t_1} - \mu)(y_{t_2} - \mu) = \tilde{\alpha}_{t_1 - t_2}, \forall t_1 \neq t_2, \text{ for } t = 1, 2, \dots, \infty
 \end{aligned}$$

(1)

The term e is a stationary random dis-

turbance term. When $\rho=1$, the above

$$Y_t = \tilde{n} Y_{t-1} + e_t, \text{ for } \tilde{n} = 1$$

model called random walk. If we transform $Y_t = Y_{t-1} + e_t$ into $Y_t - Y_{t-1} = e_t$ the model (1) where $\rho=1$, become stationary since the first difference of Y ($Y_t - Y_{t-1} = e_t$) is stationary. In this case, we say that the series Y is integrated of order d , $Y \sim I(d)$. The order of integration d is the number of unit roots contained in the series, or in other words the number of differencing operations it takes to make the series stationary.

There are different ways to test the stationarity of a time series. The existence of unit root in a series indicates that the series is not stationary, and in order to be so, we have to differencing it until it becomes stationary. The most popular method to operate the unit root test is the ADF-Augmented Dickey-Fuller test (1979). The ADF test provides the appropriate test statistics to determine whether the series contain a unit root according three models:

1. Y_t is a random walk with constant and trend
2. Y_t is a random walk with constant only

3. Y_t is a random walk without constant and trend

$$\Delta y_t = c + \beta_t + \delta y_t - 1 + \sum_{i=1}^p \gamma_i \Delta y_{t-i} + \varepsilon_t$$

$$\Delta y_t = c + \delta y_t - 1 + \sum_{i=1}^p \gamma_i \Delta y_{t-i} + \varepsilon_t$$

Where $i=1,2,\dots,p$ the number of lags, c the constant and t the trend

In this point, we have to mention that the number of lags that are used is the

$$\Delta y_t = \delta y_t - 1 + \sum_{i=1}^p \gamma_i \Delta y_{t-i} + \varepsilon_t$$

minimum in order not to have autocorrelation problems in ε_t . The sequence of the ADF test is to create the H_0 and H_1 hypothesis in order to examine if there is a stochastic trend in the series. We define as

$H_0: c=0$ (non stationarity or existence of unit root)

$H_1: c<0$ (H_0 is rejected, and stationarity)

These hypotheses are checked with the t -statistic where

$$t = \frac{\hat{\phi}}{\text{std.err.}(\hat{\phi})}$$

using the critical values of McKinnon from the Dickey-Fuller matrix.

3.3 Cointegration analysis

The regression of a nonstationary time series on another nonstationary time series may produce a spurious regression, and that is why the test of stationarity is essential. However, the linear combination of these two series has to be subjected to further analysis.

Let X_t and Y_t be two time series.

Subjecting these time series to unit root test, individually, let us consider that both are $I(1)$, or $X_t \sim I(1)$ and $Y_t \sim I(1)$, which it means that they contain a unit root. Suppose then that we regress X, Y as follows:

$$Y_t = a_1 + a_2 X_t + u_t \quad (2)$$

$$u_t = Y_t - a_1 - a_2 X_t \quad (3)$$

Suppose now that we subject u_t to unit root test and find that it is $I(0)$ or $u_t \sim I(0)$, in other words it is stationary. So, despite the fact that X_t and Y_t have stochastic trends, their linear combination cancels out the stochastic trends of the two series because $u_t \sim I(0)$. In this case the variables X, Y are cointegrated. Generally speaking, two variables are cointegrated if they have long term, or equilibrium, relationship between them. In general terms, two variables are said to be cointegrated when a linear combination of the two is stationary, even though each variable is non-stationary. Especially, cointegration between indices implies that these indices are linked in the long run even though they are not stationary.

There are two different methods for testing cointegration such as Engle and Granger test and Johansen cointegration test. However, the most used method is the Johansen method (1988). The Johansen method applies the maximum likelihood procedure to determine the presence of cointegrating vectors in non-stationary time series and detects the number of cointegrating vectors. Johansen adopts a framework that is based on the

assumption that introducing sufficient lags will allow for a well-behaved disturbance term. The Johansen procedure analyses bivariate and multivariate cointegration, directly investigating cointegration in the VAR (Vector Autoregression) model. Let Y_t a vector $n \times 1$ of nonstationary series which is integrated of order 1, $Y_t \sim I(1)$. Denote the VAR model of order p as:

$$y_t = A_1 y_{t-1} + \dots + A_p y_{t-p} + \varepsilon_t$$

Where y_t is a vector of nonstationary and $I(1)$ variables,

- A_i are the matrices of coefficients to be estimated
- ε_t is a vector of innovations.

The VAR model can be written as

$$\Delta y_t = \Pi y_{t-1} + \sum_{i=1}^{p-1} \Gamma_i \Delta y_{t-i} + \varepsilon_t$$

where $D = \sum_{i=1}^p A_i - I$ and $\tilde{A}_i = -\sum_{j=i+1}^p A_j$

Under the restriction that the degree of matrix Π is less than p , that it is $r(\Pi) < p$, then it is identified with the number of endogenous variables, and so the variables are cointegrated. The degree of matrix Π determines the number of cointegrating relations. In particular, if we have p endogenous variables, each of which is $I(1)$, then there are $p-1$ linearly independent cointegrating vectors. The model is estimated with the method of Maximum Likelihood and the checks made by the criterion of Likelihood ratio with $m-p$ restrictions:

$$LR \rightarrow X^2_{m-p}$$

Where m the number of $I(1)$ variables.

4. Empirical results

4.1 Data and analysis

The data set used in this study consists of nineteen indices from sixteen different countries around the world. More specifically, we created an m file in Matlab in order to get the daily prices (close) of each index, from the data base of Yahoo Finance, from January 2006 to December 2010, a period of five (5) years. In the early stages, we separated our sample in geographical regions. From the region of Europe we took data for the predominant indices of the Netherlands, Germany, France, Ireland, Italy, Great Britain, Spain, Portugal, Greece, Belgium, Hungary, Sweden and Turkey. From the USA we have data for Dow Jones, S&P500, S&P100 and Nasdaq and from Asia for Japan and Hong-Kong. The created data series from the examined period consists of 1278 daily observations. The returns used in each of the time series are calculated as follows:

$$r_t = \log \frac{P_t}{P_{pt}}$$

r_t : the day return

P_t : the close price of the index

P_{pt} : the close price of the index the previous day

4.2 Descriptive statistics

Table 2 presents the descriptive statistics of returns of all stock markets included in our analysis. As we can notice from Jarque-Bera column, none of the markets is distributed normally, because this statistic is much higher than the critical value in order to be normal distributed all markets. In addition, the normality is comfortable

to be checked comparing the Kurtosis with 3. If kurtosis < 3 then the returns of the market is distributed normally.

Union and Eurozone, which it means that investors believe that Europe would guarantee the Greek economy

Table 2: Descriptive statistics

COUNTRY/INDEX	Mean	Median	Minimum	Maximum	Variance	St.Deviat	Skewness	Kurtosis	Jarque-Bera
Netherlands	0,031%	-0,05%	-9,54%	10,07%	0,03%	1,648%	0,363	7,67	264,31
Austria	0,039%	-0,08%	-11,33%	10,80%	0,04%	2,018%	0,387	4,494	192,78
Germany	0,031%	-0,03%	-10,05%	9,94%	0,03%	1,641%	0,051	6,547	169,31
France	-0,007%	-0,10%	-10,24%	7,72%	0,02%	1,551%	0,049	6,929	178,11
Ireland	0,036%	-0,06%	-6,69%	10,57%	0,03%	1,661%	0,629	3,581	223,35
Italy	0,059%	-0,03%	-10,30%	8,98%	0,03%	1,647%	0,075	6,408	171,17
London	0,008%	-0,03%	-8,96%	9,71%	0,02%	1,472%	0,284	6,931	229,27
Switzerland	0,008%	-0,06%	-9,57%	7,81%	0,02%	1,271%	0,121	6,643	186,86
Spain	0,021%	-0,10%	-12,61%	10,06%	0,03%	1,679%	0,015	7,28	179,20
Portugal	0,022%	-0,03%	-11,78%	14,77%	0,02%	1,453%	0,554	20,845	624,25
Greece	0,094%	-0,06%	-8,71%	10,75%	0,04%	1,890%	0,354	3,12	152,40
Belgium	0,037%	-0,03%	-8,81%	8,68%	0,02%	1,505%	0,275	5,626	195,77
Hungary	0,018%	-0,01%	-12,35%	13,48%	0,04%	1,958%	0,244	6,166	202,08
Sweden	-0,003%	-0,07%	-8,27%	7,66%	0,03%	1,598%	0,069	3,753	105,71
Turkey	0,000%	-0,05%	-14,78%	15,96%	0,07%	2,695%	0,41	3,644	177,24
Dow Jones	0,006%	-0,06%	-9,98%	8,55%	0,02%	1,434%	0,205	8,503	250,08
S&P500	0,013%	-0,08%	-10,38%	9,93%	0,03%	1,577%	0,477	8,546	310,28
S&P100	0,013%	-0,08%	-10,11%	9,62%	0,02%	1,521%	0,428	8,854	307,06
Nasdaq	0,000%	-0,10%	-10,56%	10,06%	0,03%	1,644%	0,352	6,158	225,38
Nikkei	0,055%	-0,02%	-12,40%	12,88%	0,03%	1,814%	0,627	7,636	320,91
Hong-Kong	-0,014%	-0,08%	-12,55%	14,55%	0,04%	1,958%	0,188	7,161	213,95

Beside this, the highest average return is this one of Greek market (0,094%) although it does not have the biggest standard deviation or in other words the biggest risk, a remarkable notice for the economic recession in Greece, and the of Hong-Kong has the lowest average return (-0,014%). At this point we have to comment the high average return in Greece in combination with relatively low risk. It is for granted that Greece suffers from the worst economic recession of the latest decades, however this may not affect, directly, the investors behavior that choose to invest in the Greek stock market. The low risk, in comparison with the other markets of our sample, may attributed to the fact that Greece is member of either the European

and make it a safe, and simultaneously, an attractive investment sanctuary. Also, the relative political stability and promising fiscal balances during the periods, mainly before and after entry into the eurozone helped to rank the Greece in a dynamic economy, while classified as developed. On the other hand, Turkey is the most risky market according to standard deviation, whereas the safest market in terms of std.deviation is Dow Jones. The high risk in Turkey may attribute to the political instability and weak currency. Also, we can observe that advanced markets such as Dow Jones, Germany, France and Nikkei have low standard deviations which indicate the perfect diversification and the reduction of the no systematic risk.

4.3 Correlation analysis

First of all we have to mention that we include Turkey in our analysis for Europe, due to the fact that it is a neighboring country and it is rational to exist a kind of correlation between the stock markets of Greece and Turkey. As previous researches have shown there are no such big correlations between the countries, although the fact that we examine countries from EU, would be a parameter of high expected correlation prices. We confirm the empirical assumption that there is no significant correlation between Greek stock market and the powerful stock markets of Europe. A point that is worth to be mentioned is the fact that Greek stock market has positive correlation with the majority of the examined stock markets, something that it is not the assumption in the case of the other European coun-

tries. The results from the above table indicate that the biggest correlation is this one with Sweden, followed by Ireland and Italy. The common financial problems that face Greece Ireland and Italy, may affect investors' behavior who seem to approach in the same way these three markets. This leads to the fact that these markets to have many common characteristics reflecting in the correlation coefficients. On the other hand the lowest positive correlation seems to be that with FTSE 100, confirming the empirical assumption that there is no significant correlation between Greek stock market and the powerful stock markets of Europe. In fact those who invest in big financial markets such as London Stock Exchange etc. unlikely would invest and in markets of a second class such as the Greek stock market. Consequently, it seems not to have

Table 3: Correlations coefficients between Greece and European countries

Correlations	
Europe	Greece
Greece	100,00%
Sweden	8,80%
Ireland	8,37%
Italy	7,89%
Spain	4,90%
Germany	3,88%
Hungary	3,73%
Austria	3,16%
Belgium	2,89%
Netherlands	2,87%
Turkey	2,70%
Switzerland	2,62%
Portugal	1,55%
Gr. Britain	0,49%
France	-0,85%

many common characteristics such markets and for this reason we notice a low correlation coefficient between them. Of course, we have to bear in mind the noticeable differences that are observed at the fundamental characteristics of these economies, such as

indexes out of E.U, which is being shown in the table below is small. Although seems to be higher that the corresponding correlation of Athens stock market with great stock markets of E.U The positive correlation that is observed in the most cases, can be

Table 4: Correlation Coefficients for European countries

	Netherlands	Austria	Germany	France	Ireland	Italy	Gr. Britain	Switche	Spain	Portugal	Greece	Belgi	Hung	Sweden
Turkey														
Netherlands	1,00	-0,02	0,95	0,09	0,06	-0,03	0,05	0,07	-0,05	0,17	0,03	0,89	0,03	-0,02 -0,03
Austria	-0,02	1,00	-0,03	0,00	-0,01	0,01	0,06	-0,01	-0,01	0,00	0,03	0,01	0,05	0,01 0,03
Germany	0,95	-0,03	1,00	0,08	0,03	-0,03	0,04	0,08	-0,03	0,17	0,04	0,89	0,04	0,00 -0,03
France	0,09	0,00	0,08	1,00	-0,01	-0,05	0,06	0,03	-0,06	-0,04	-0,01	0,07	0,15	-0,04 0,01
Ireland	0,06	-0,01	0,03	-0,01	1,00	0,14	0,11	0,01	0,00	0,00	0,08	0,01	0,00	0,07 0,07
Italy	-0,03	0,01	-0,03	-0,05	0,14	1,00	0,03	-0,04	0,68	0,04	0,08	-0,04	0,07	0,06 0,04
Gr. Britain	0,05	0,06	0,04	0,06	0,11	0,03	1,00	0,16	0,01	-0,04	0,00	0,08	0,13	0,02 0,08
Switche	0,07	-0,01	0,08	0,03	0,01	-0,04	0,16	1,00	-0,02	0,00	0,03	0,07	0,15	0,23 0,04
Spain	-0,05	-0,01	-0,03	-0,06	0,00	0,68	0,01	-0,02	1,00	0,01	0,05	-0,05	0,02	0,06 0,02
Portugal	0,17	0,00	0,17	-0,04	0,00	0,04	-0,04	0,00	0,01	1,00	0,02	0,20	0,04	-0,02 -0,04
Greece	0,03	0,03	0,04	-0,01	0,08	0,08	0,00	0,03	0,05	0,02	1,00	0,03	0,04	0,09 0,03
Belgium	0,89	0,01	0,89	0,07	0,01	-0,04	0,08	0,07	-0,05	0,20	0,03	1,00	0,06	0,01 -0,03
Hungary	0,03	0,05	0,04	0,15	0,00	0,07	0,13	0,15	0,02	0,04	0,04	0,06	1,00	-0,02 0,08
Sweden	-0,02	0,01	0,00	-0,04	0,07	0,06	0,02	0,23	0,06	-0,02	0,09	0,01	-0,02	1,00 0,02
Turkey	-0,03	0,03	-0,03	0,01	0,07	0,04	0,08	0,04	0,02	-0,04	0,03	-0,03	0,08	0,02 1,00

the GDP, the inflation, the tax system etc. A remarkable point is that the only country that has a negative correlation with Greece is France. The following table is showing the correlations among all European markets. In this table we see the correlations between all the examined countries in Europe. Is it obvious that the powerful stock markets have many negative correlations with other stock markets and these coefficients are connected with higher prices. On the other hand, smaller stock markets are more positively correlated with other European stock markets, but in smaller intensity. We can notice geographical parts of Europe with bigger inter – relationship, such as countries in central Europe as well as Mediterranean countries. The correlation between Greek stock market and powerful stock market

explained by the causality tests, according to which powerful stock markets have serious influences in smaller markets, due to the size and the fundamental characteristics of market movements and structure in these markets. The small correlation of Greek stock market can be explained in a certain point by the fact that had been characterized for a long period as an emerging market, so it is directly expected to have similarities in stock movements with other emerging markets and not with the developed markets, such as these in the next table.

In the following table we can see the correlation between Greek stock market and the most correlated stock markets in EU, through time. Although there is a total significant correlation between these stock markets, if we examine the co –movement

for each year, we are led to the conclusion that there is a noticeable devi-

and Asia for each year from 2006 to 2010. For the Markets we had found

Table 5: Correlation Coefficients between Greece USA and Asia

Correlations	
USA-Asia	Greece
Dow Jones	2,89%
S&P500	2,56%
S&P100	2,56%
Nasdaq	1,30%
Nikkei	3,53%
Hong-Kong	-2,85%

ation in the prices of each the correlation coefficient. This fact may influence the possibility of cointegration between Greece and these markets. However, we can see that if the one correlation matrix is getting higher, the other correlation matrixes of the same year tend to have increasing trend, something that has serious effects on the inter-correlations of these markets and on the portfolio diversification between these stock markets. The same results, of the noticeable deviation in the correlation coefficients we took from all markets of our sample. More specifically, we

that have high correlation in the previous tables we can claim that this strong connection does not change dramatically through years. For the period 2006-2007 we can notice that the linkages between Greece and the northern counties such as Germany, and Netherlands is getting higher, whereas between Greece and the southern countries such as Portugal and Spain is getting lower. In the period 2007-2008 the situation seems to change as the relations between Greece and the northern countries decreasing and between southern countries increasing in absolute val-

Table 6: Correlation coefficients of Greece with particular markets

Correlation of Greece with particular markets						
Year	Ireland	Italy	Spain	Greece	Hungary	Sweden
2006	13,11%	-4,91%	7,44%	100%	1,07%	13,95%
2007	-0,37%	-10,52%	-5,26%	100%	-0,05%	0,79%
2008	3,13%	2,14%	-2,76%	100%	1,54%	2,42%
2009	-1,27%	10,71%	4,55%	100%	3,78%	16,48%
2010	29,23%	19,82%	16,28%	100%	6,42%	11,36%

calculated the correlations for the European markets as well as the USA

ues. On the other hand, during the period 2008-2009, the relations are

strengthened between Greece and both the north and the southern countries. Finally, for the period 2009-2010 we observe that Greece has positive correlation coefficients with the majority of the European markets, which indicates that the Greek market and the rest European markets, all together, move to the same direction. The comovement among these markets during the period 2009-2010, may be attributed to the fact that the global economic crisis affected all the European countries, other less and others more, and the investors apply the same investing behavior either to the strong markets and the weak markets. For this reason, when a strong stock market was falling down, then all the other markets were following this strong market to the downfall and contrary, when a strong market was rising the message was promising for the rest stock markets.

The correlation analysis through years in USA and Asia gave almost the same results as in Europe. More specifically,

the indices in USA tend to behave the same for the examined period. As we can see from the above tables, the correlation coefficients between Dow Jones, S&P100 and Nasdaq are near to 1, which indicates perfect positive relation. The correlation coefficient between these indices and S&P500 is lower. This may be happen because of the size of the S&P500 which consists of five thousand companies. The strong linkages that are noticed between Dow Jones, S&P100 and Nasdaq is reasonable to exist, since these three indices are traded in the same geographical region and attract the same investors or investors with almost the same behavior. On the other hand, we notice that through years the linkages between USA and Asian financial markets are strengthened according to the correlation coefficients. This may be happened as the boundaries of these markets are mixed. The involvement of American companies in Asia and vice versa, Asian businesses in the area of the

Table 7: Correlation analysis in Europe through years 2006-2010

Europe: Correlation Matrix 2006													
	Netherlands	Germany	France	Ireland	Italy	England	Spain	Portugal	Greece	Belgium	Hungary	Sweden	Turkey
Netherlands	1,000	0,892	0,087	0,085	-0,028	-0,019	-0,057	0,021	-0,162	0,754	-0,097	-0,066	0,107
Germany		1,000	0,121	0,153	-0,012	0,035	-0,082	0,060	-0,056	0,852	-0,072	-0,048	0,103
France			1,000	0,004	-0,013	-0,162	0,090	-0,061	0,056	0,037	-0,065	-0,043	-0,018
Ireland				1,000	-0,047	0,010	-0,186	-0,174	-0,064	0,102	-0,095	0,322	0,140
Italy					1,000	0,029	-0,069	-0,093	0,019	-0,080	0,436	0,045	0,053
England						1,000	0,099	0,033	0,040	-0,002	-0,077	0,004	0,049
Spain							1,000	0,015	0,205	-0,133	0,040	-0,128	-0,139
Portugal								1,000	0,122	0,032	-0,033	-0,020	-0,018
Greece									1,000	-0,026	0,095	0,045	-0,012
Belgium										1,000	-0,078	-0,070	0,109
Hungary											1,000	-0,114	-0,090
Sweden												1,000	0,129
Turkey													1,000

Table 7: Correlation analysis in Europe through years 2006-2010

Europe: Correlation Matrix 2007

	Netherlands	Germany	France	Ireland	Italy	England	Spain	Portugal	Greece	Belgium	Hungary	Sweden	Turkey
Netherlands	1,000	0,923	-0,056	0,038	0,049	-0,003	0,072	-0,012	0,043	0,895	-0,008	-0,032	0,051
Germany		1,000	-0,088	-0,013	0,050	-0,036	0,063	-0,019	0,088	0,904	-0,010	-0,004	0,026
France			1,000	-0,051	-0,015	-0,060	-0,129	-0,020	-0,023	-0,048	0,123	0,101	-0,102
Ireland				1,000	0,542	0,087	-0,046	0,065	0,010	-0,026	-0,042	0,102	0,079
Italy					1,000	-0,082	0,145	0,085	-0,095	0,050	-0,046	0,112	0,014
England						1,000	-0,047	0,083	-0,006	-0,003	0,086	-0,119	0,060
Spain							1,000	0,050	-0,053	0,031	-0,047	-0,047	0,048
Portugal								1,000	-0,046	-0,030	0,030	-0,031	0,082
Greece									1,000	0,049	-0,005	0,001	-0,008
Belgium										1,000	-0,035	0,008	0,049
Hungary											1,000	-0,087	0,052
Sweden												1,000	0,025
Turkey													1,000

Europe: Correlation Matrix 2008

	Netherlands	Germany	France	Ireland	Italy	England	Spain	Portugal	Greece	Belgium	Hungary	Sweden	Turkey
Netherlands	1,000	0,954	-0,022	0,066	-0,088	0,100	-0,116	0,076	0,021	0,896	0,009	0,001	-0,092
Germany		1,000	-0,018	0,065	-0,071	0,094	-0,087	0,005	0,030	0,879	0,010	0,017	-0,083
France			1,000	0,003	-0,199	0,085	-0,167	-0,045	-0,085	-0,018	0,140	-0,045	-0,114
Ireland				1,000	0,080	0,042	-0,082	0,018	0,031	0,047	0,040	-0,052	0,091
Italy					1,000	-0,081	0,635	0,011	0,016	-0,086	-0,158	0,042	0,041
England						1,000	-0,105	0,000	-0,029	0,145	0,193	-0,103	0,065
Spain							1,000	-0,080	-0,033	-0,124	-0,199	0,026	0,013
Portugal								1,000	-0,013	0,092	0,028	-0,087	-0,034
Greece									1,000	0,016	0,006	0,021	0,054
Belgium										1,000	0,053	0,008	-0,106
Hungary											1,000	-0,040	0,124
Sweden												1,000	-0,050
Turkey													1,000

Europe: Correlation Matrix 2009

	Netherlands	Germany	France	Ireland	Italy	England	Spain	Portugal	Greece	Belgium	Hungary	Sweden	Turkey
Netherlands	1,000	0,947	0,354	0,017	0,063	-0,004	0,044	0,148	0,056	0,826	0,047	-0,095	0,012
Germany		1,000	0,352	-0,029	0,065	-0,002	0,060	0,130	0,068	0,843	0,033	-0,065	0,017
France			1,000	0,007	0,119	0,042	0,129	-0,092	-0,026	0,294	0,141	-0,082	0,313
Ireland				1,000	0,081	0,161	0,028	-0,002	-0,007	-0,091	0,027	-0,130	0,001
Italy					1,000	0,194	0,884	0,098	0,105	0,042	0,151	-0,078	0,016
England						1,000	0,134	-0,063	-0,029	0,020	0,077	0,058	-0,006
Spain							1,000	0,007	0,044	0,036	0,109	-0,094	0,015
Portugal								1,000	0,067	0,167	-0,010	0,037	-0,102
Greece									1,000	0,081	0,034	0,152	-0,019
Belgium										1,000	0,024	-0,008	0,029
Hungary											1,000	0,005	0,068
Sweden												1,000	-0,001
Turkey													1,000

Europe: Correlation Matrix 2010

	Netherlands	Germany	France	Ireland	Italy	England	Spain	Portugal	Greece	Belgium	Hungary	Sweden	Turkey
Netherlands	1,000	0,954	0,148	0,059	-0,115	-0,060	-0,048	0,506	0,012	0,926	0,191	-0,046	-0,106
Germany		1,000	0,121	0,042	-0,103	-0,066	-0,032	0,549	0,029	0,945	0,187	-0,071	-0,107
France			1,000	-0,016	0,040	0,149	0,005	0,006	0,150	0,096	0,309	-0,094	0,030
Ireland				1,000	0,167	0,172	0,104	-0,002	0,295	0,003	-0,123	0,530	0,090
Italy					1,000	0,163	0,914	-0,003	0,194	-0,110	0,305	0,279	0,041
England						1,000	0,147	-0,135	0,048	-0,074	0,099	0,434	0,437
Spain							1,000	0,077	0,157	-0,024	0,333	0,267	0,065
Portugal								1,000	-0,033	0,561	0,139	-0,067	-0,056
Greece									1,000	0,0782	0,061	0,103	0,005
Belgium										1,000	0,212	-0,095	-0,097
Hungary											1,000	-0,050	-0,009
Sweden												1,000	0,325
Turkey													1,000

U.S., as well as the participation in the indices of each partner region from another region, creates and simultaneously reinforces the interdependence between the two markets (which in our study are reflected by the indices we have used).

4.4 Cointegration analysis

As far as cointegration analysis is concerned, before we apply the Johansen test we have to check the stationarity of the used time series. We use the Augmented Dickey Fuller test (ADF) for stationarity and the results are presented in the following tables. As

Table 8: Correlation analysis for USA and Asia through years 2006-2010

USA&Asia: Correlation Matrix 2006						
	Down Jones	S&P500	S&P100	Nasdaq	Nikkei	Hong-Kong
Down Jones	1,000	0,019	0,957	0,862	0,080	0,063
S&P500		1,000	0,033	0,020	-0,053	-0,035
S&P100			1,000	0,898	0,084	0,089
Nasdaq				1,000	0,062	0,084
Nikkei					1,000	-0,092
Hong-Kong						1,000

USA&Asia: Correlation Matrix 2007						
	Down Jones	S&P500	S&P100	Nasdaq	Nikkei	Hong-Kong
Down Jones	1,000	0,160	0,984	0,918	0,022	0,276
S&P500		1,000	0,167	0,117	0,003	-0,071
S&P100			1,000	0,932	0,016	0,299
Nasdaq				1,000	-0,019	0,297
Nikkei					1,000	-0,032
Hong-Kong						1,000

USA&Asia: Correlation Matrix 2008						
	Down Jones	S&P500	S&P100	Nasdaq	Nikkei	Hong-Kong
Down Jones	1,000	0,055	0,992	0,951	0,038	0,024
S&P500		1,000	0,050	0,040	-0,100	0,038
S&P100			1,000	0,960	0,027	0,022
Nasdaq				1,000	0,004	0,029
Nikkei					1,000	-0,043
Hong-Kong						1,000

USA&Asia: Correlation Matrix 2009						
	Down Jones	S&P500	S&P100	Nasdaq	Nikkei	Hong-Kong
Down Jones	1,000	0,019	0,986	0,936	-0,003	0,038
S&P500		1,000	0,034	0,054	-0,011	0,068
S&P100			1,000	0,948	0,007	0,044
Nasdaq				1,000	-0,011	0,052
Nikkei					1,000	-0,038
Hong-Kong						1,000

Table 8: Correlation analysis for USA and Asia through years 2006-2010

USA&Asia: Correlation Matrix 20010						
	Down Jones	S&P500	S&P100	Nasdaq	Nikkei	Hong-Kong
Down Jones	1,000	0,141	0,986	0,942	-0,037	0,234
S&P500		1,000	0,152	0,157	0,132	-0,040
S&P100			1,000	0,953	-0,016	0,256
Nasdaq				1,000	-0,006	0,248
Nikkei					1,000	-0,051
Hong-Kong						1,000

we see, all examined stock markets in Europe are stationary at 1st differences, so the close prices are not stationary. These non stationary prices are used in Johansen test. In detail, in order the series to be stationary the t-statistic must be lower than the critical value. As we can observe from the tables, at Levels (close prices) the statistic is greater than the critical value and consequently the close prices are

not stationary. However, the first differences are stationary. In conclusion, all markets are integrated at order one, I(1) which means that they have one unit root..

Regarding the cointegration test, we separated our analysis in the geographical region of Europe, USA and Asia. Firstly, we examined the cointegration between the Greek market and all the European markets and then

Table 9: ADF test for European markets

Augmented Dickey-Fuller test statistic		
Stock Market	Levels	1st Difference
Netherlands	-1,418	-37,001
Germany	-1,909	-38,558
France	-1,692	-36,965
Ireland	-1,611	-35,198
Italy	-1,890	-35,928
England	-1,602	-17,569
Spain	-2,282	-36,413
Portugal	-1,920	-31,972
Greece	-1,994	-32,523
Belgium	-1,391	-34,896
Hungary	-1,458	-26,629
Sweden	-1,247	-36,060
Turkey	-1,761	-32,810

Significant at the 0.01 level. The critical values for the test statistics are -3.414 (0.05 level) and -3.968 (0.01 level)

between Greek market and the indices from the USA and Asia. In our test the

Table 10: ADF test for markets from USA and Asia

Augmented Dickey-Fuller test statistic		
Stock Market	Levels	1st Difference
Down Jones	-1,295	-29,706
S&P500	-1,188	-29,871
S&P100	-1,280	-30,147
Nasdaq	-1,160	-28,786
Nikkei	-2,012	-36,731
Hong-Kong	-1,945	-37,170

Significant at the 0.01 level. The critical values for the test statistics are ?3.414 (0.05 level) and ?3.968 (0.01 level)

two hypotheses were:

$H_0: r=0$ (the two markets are not cointegrated)

$H_1: r \leq 1$ (the two markets are cointegrated at order most 1)

The test was based on the Trace statistic and Maximal Eigenvalue statistic.

The critical values are presented in the

table below:

Also in Johansen's cointegration test is necessary to establish the appropriate order of the VAR of each variable system. We used the Schwartz Criterion in order to ensure that the residuals in each equation are uncorrelated.

The following two tables present the

Table 11: Critical values for the cointegration test

C.V	Critical Values	
	Trace	Maximun Eigenvalue
$r=0$	15,49471	14,2646
$r \leq 1$	3,841466	3,841466

results from the Johansen cointegration test. In order a system to be cointegrated (so H_0 is rejected) the Trace value or the Maximal EigenValue must be higher than the critical value. As we can see, this happens only in the

system, of Greece and Italy and for this reason the two markets are cointegrated.

On the other hand, as we see, in the following table, according to Johansen test, there are no cointegration evi-

Table 12: Johansen Cointegration test between Greece and European markets

Johansen Cointegration test					
Countries	Null Hypothesis	Tests for cointegration based on		VAR(p)	Cointegration
		Trace Statistic	Maximun Eigenvalue		
Greece-Hungury	r=0	4,646078	4,312527	VAR(1)	NO
	r≤1	0,333551	0,333551		
Greece-Ireland	r=0	12,578900	11,207070	VAR(1)	NO
	r≤1	1,371830	1,371830		
Greece-Germany	r=0	12,048650	11,556300	VAR(1)	NO
	r≤1	0,492354	0,492354		
Greece-Gr.Britain	r=0	5,840501	5,266267	VAR(1)	NO
	r≤1	0,574234	0,574234		
Greece-Belgium	r=0	11,099740	10,023900	VAR(1)	NO
	r≤1	1,075841	1,075841		
Greece-France	r=0	3,767474	3,454980	VAR(1)	NO
	r≤1	0,312494	0,312494		
Greece-Italy	r=0	15,726210	15,259730	VAR(1)	YES
	r≤1	0,466476	0,466476		
Greece-Netherlands	r=0	7,631328	6,608165	VAR(1)	NO
	r≤1	1,023163	1,023163		
Greece-Portugal	r=0	8,896070	8,497434	VAR(1)	NO
	r≤1	0,398636	0,398636		
Greece-Spain	r=0	12,780210	12,736700	VAR(1)	NO
	r≤1	0,398636	0,398636		
Greece-Sweden	r=0	7,171771	6,293142	VAR(3)	NO
	r≤1	0,878629	0,878629		
Greece-Turkey	r=0	3,707134	3,580602	VAR(1)	NO
	r≤1	0,126532	0,126532		
The critical values of the test based on Maximal eigenvalue are 14,26460 for $r = 0$ and 3,841466 for $r \leq 1$ and while the critical values of the test based on Trace are 15,49471 and 3,841466 respectively.					

dences between Greek stock index and important non European stock indexes, something that in a certain point is expected, due to the significant differences of the fundamental characteristics of these developed markets. It is rational result if we take into consideration the differences in the structure between developed and

developing countries.

From the above two tables we can observe that the Trace statistic in all cases, apart from the case Greece-Italy, is lower than the critical value 15,49471, meaning that we cannot reject the null hypothesis. In other words, there is no cointegration between Greek stock market and the

Table 13: Johansen Cointegration test between Greece and markets from USA and Asia

Johansen Cointegration test					
Countries	Null Hypothesis	Tests for cointegration based on Trace Statistic Maximun Eigenvalue		VAR(p)	Cointegration
Greece-Down Jones	$r=0$	2,098874	2,084023	VAR(2)	NO
	$r \leq 1$	0,014852	0,014852		
Greece-Nasdaq	$r=0$	2,764281	2,561965	VAR(1)	NO
	$r \leq 1$	0,202315	0,202315		
Greece-SP100	$r=0$	2,689340	2,550643	VAR(2)	NO
	$r \leq 1$	0,138698	0,138698		
Greece-SP500	$r=0$	2,611417	2,346186	VAR(2)	NO
	$r \leq 1$	0,265231	0,265231		
Greece-Nikkei	$r=0$	12,367930	12,351460	VAR(1)	NO
	$r \leq 1$	0,016480	0,016480		
Greece-Hong Kong	$r=0$	3,896828	3,842005	VAR(1)	NO
	$r \leq 1$	0,053824	0,053824		

The critical values of the test based on Maximal eigenvalue are 14,26460 for $r = 0$ and 3,841466 for $r \leq 1$ and while the critical values of the test based on Trace are 15,49471 and 3,841466 respectively.

rest stock markets. The only case in which Trace statistic and Maximal Eigenvalue statistic is bigger than the critical values is the case Greece-Italy, and consequently we reject the null hypothesis which it means that there is cointegration between these two stock markets. The existence of cointegration between the Greek and the Italian stock market implies that it is possible to use the price movements in one market in order to predict the future price movements in the other market. The results from the cointegration test may give some very interesting implications concerning the portfolio diversification. More specific, the acceptance of the null hypothesis for the majority of the countries implies that there are no linkages between them and the Greek stock market. Consequently, the Greek

stock market can be used as an investment which will contribute to better diversification of a portfolio. On the other hand, the long term relationship between Greece and Italy indicates that they are not efficient for diversification. Another significant result from the cointegration analysis in Europe is that there is no long term relation between countries that have common economic linkages, such as the same currency euro or are neighboring countries.

Furthermore, the table below shows the cointegration analysis among the main indices of our sample, where the long term relations are more. As we can notice from the following table the major indices in Europe are cointegrated with each other, and also the most European markets are cointegrated with the DJ and Nikkei. Also,

DJ is cointegrated with Nikkei. Besides this, we can notice that smaller markets such as the Portuguese market, represented by PSI20, seem to follow the bigger markets such as the DJ and Nikkei. However, this situation does not seem to be confirmed in the case of Greece, which is cointegrated only with Nikkei. In addition, we can claim that smaller markets are not in long term equilibrium with

other smaller markets, as Greece, Portugal, Italy and Ireland.

5. Conclusions

In this study we tried to find out the relations and the linkages and the long term relations that may exist among different stock markets. We specified our analysis in the linkages that there are between Greece's stock markets and European, Asia and

Table 14: Johansen Cointegration test the predominant indices of the world

Johansen Cointegration test										
	France	Germany	Dow Jones	Gr. Britain	Spain	Ireland	Italy	Portugal	Switzerland	Nikkei
France										
Germany	NO									
Dow Jones	YES	YES								
Gr.Britain	YES	YES	YES							
Spain	NO	NO	NO	NO						
Ireland	YES	NO	NO	NO	NO					
Italy	NO	NO	NO	NO	NO	NO				
Portugal	YES	YES	YES	YES	YES	YES	YES			
Switzerland	YES	NO	YES	YES	YES	YES	NO	YES		
Nikkei	YES	NO	YES	YES	YES	YES	YES	YES	YES	

USAs' stock markets and also the linkages between the main indices in the world. More specific, we examined nineteen indices from seventeen different countries. In the early stages, we present the descriptive statistics for each index/country and then we proceeded to a correlation analysis. This analysis operated by calculating the correlation coefficients for all variables of our sample. Then, in order to distinguish long term relation between the Greek stock market and the rest markets of our sample, we applied a cointegration analysis using the Johansen cointegration test. The results from the cointegration test can be easily combined with the corre-

sponding results from the correlation analysis. The Greek stock market is not connected with important correlations with European stock markets. The size of the Greek stock market and the components of an emerging economy that Greece has been characterized the recent years had serious effects in the interdependence of the Greek stock market. The high correlations that are observed between powerful stock markets cannot be found in the correlations of Athens stock exchange market with other stock markets, information that shows the non leading role in the European Market and in the cross – national capital movements. Another impor-

tant factor, is the inter – correlation between Greek stock market and neighboring markets. According to the findings, the only country that has a noticeable co – movement with Greece, is Italy this is confirmed by cointegration test too. Turkey is not significantly correlated, as well as the Balkan countries, and there is a big deviation in the correlation matrix in each year separately, something that can be an indicator of the unstable linkage between these two markets. The situation in which Greece is strongly related only with Italy and not with the Balkans or Turkey may be a result of the European Union and the policies that Europe implement, in its countries in order to succeed in the desirable integration both economically and fiscally.

The lack of significant correlations and cointegration evidences can have a positive and a negative effect on the competitiveness of Greek stock market. The positive is the fact that Greek stock market can be used by investors for portfolio diversification and compensatory investment policy in order to maximize profits for portfolio selection. The increasing correlation trend of Greek stock market with other E.U countries is a parameter that should be taken into consideration, although the increase is not stable. Considering the present situation of the Greek economy, the correlation may be affected even further, as the macroeconomic characteristics of the Greek economy has completely changed and are expected to have serious influence in the future movements and inter- relationships between

Greece and other countries. The total change for the Greek economy (after the advent of the IMF) has affected and continues to affect every day the Athens Stock Market. The negative aspect is the fact that Greece seems to be adjusted again to the structural characteristics of emerging markets. This would be crucial for the competitiveness and the financial sustainability of Greek economy, because of the declination of the market power, the potential financial tools and market options in order to support the economic development. In conclusion, the gap which is getting more and more precipitous both for the total economy and the stock market, in comparison with the other, mainly, European countries, unavoidable will lead Greece in an economic and social isolation. Under these circumstances, and simultaneously the deterioration of the fundamental macroeconomic variables will make investors not to invest their capitals in the Greek market and consequently the Greek market will lose the attractiveness and the popularity that had some years before. On the other hand, concerning the relations among the main indices in the world we have conclude that there is strong relation between the major indices, but also the smaller indices seem to be quite influenced by the bigger. Beside this the major indices in Europe are cointegrated with each other, and also the most European markets are cointegrated with the DJ and Nikkei. Also Dow Jones is cointegrated with Nikkei. As far as smaller markets are concerned, such as the Portuguese market, seem

to follow the bigger markets such as the Dow Jones and Nikkei. However, this situation does not seem to be confirmed in the case of Greece, which is cointegrated only with one market, the Italian market. Furthermore, smaller markets are not in long term equilibrium with other smaller markets, as Portugal, Italy and Ireland. In this study we examined the linkages in the scope of the general index of each country. Further research could be focused on different sectors of a market. For example, it would be very interesting to find out what is happening in the bank sector of each market and how the new circumstances have affected the relations among the indices which represent the bank sector.

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Initial Public Offerings (IPOS) – Pros and Cons International Practices and Illustrations from the Greek Stock Market

1. Listing on the Stock Exchange

The listing of a company's shares on the Stock Exchange constitutes an important step in the life of an enterprise. The importance is basically attributed to the fact that the enterprise has the ability to access yet another source of financing¹, which the large majority of enterprises do not have. This means that the enterprise can raise a significant level of capital that can be used to support critical investment plans and therefore to provide a significant competitive advantage and important driver for the company's future growth.

2. The Pros and Cons of Going Public Reasons in Favour of Going Public

The listing of a company's shares on the Stock Exchange certainly means the enlargement of the company's owners due to the dispersion criterion. The regulation of the Athens Exchange stipulates that the company should have sufficient dispersion of its shares to the public. An increase of the number of shareholders means that the control of the initial shares

(shares prior to the listing) is limited.

The question therefore that arises is the following: What are the reasons that lead a company to go public?

Answers to the above question can be offered as follows:

- The enterprise may require additional capital in order to capture new important investment opportunities.
- Some of the initial (founding) investors of the company, such as venture capital companies, may want the enterprise to buy their stocks so they can invest this capital in more efficient activities.
- The company may also wish to use the shares as part of a remuneration program for its employees. The listing of stocks renders this easier as their value is determined freely in the stock market.
- The listing of a company's stocks via a public offering does not include all or even the majority of the company's shares.
- Going public does not require collateral or guarantees, as required to receive a loan².

- Going public is accompanied with an increase of the share capital and in this way the credit ability of the company is also increased. Consequently, due to the reliability that characterizes listed companies, the latter may succeed better terms of bank lending.
- Beyond the direct raising of capital, going public gives the company access to investors for future needs in capital at any time (i.e. share capital increases).
- It provides the company with prestige and reliability towards its customers, suppliers, but also the public authorities because of the use of specialized knowledge of the advisers and underwriters. In this manner, the company gets one step ahead its competitors.
- It decreases taxes for the company and in case of transfer of listed shares shareholders are exempt from paying tax on capital gains. This may vary from country to country.
- It attracts many other companies to enter into agreements, strategic alliances or even mergers or acquisitions.
- It constitutes a way of daily valuation for the company through the stock market.
- It facilitates the attraction of new dynamic executives in the company.
- Both the company and its products become more popular to a broader audience.
- Comparative advantage against competitors is achieved (access to sources of capital, projection and publicity).
- Investors control and put “pressure” on the company’s management for better performance.

- The company is monitored by financial analysts (control of forecasts, identification of weaknesses, comments).
- The financing options for investment plans are extended (reduction of dependence on bank debt, more aggressive investment policy).
- The structure of the balance-sheet becomes healthier (proportion of debt / equity, reduction of financing cost).
- Positive effect on profitability (reduction of business risk).

The Athens Exchange as a financing market can offer the following advantages in the context of Greek reality:

- The Athens Exchange, as a source of capital, provides companies with a very significant and competitive alternative source of financing and enables the implementation of important investment plans, which wouldn’t be feasible if dependent on the traditional sources to raise capital, such as bank loans.
- The Athens Exchange leads to the improvement of the capital structure of the domestic corporate community. E.g. The participation of equity in the total capital of the Greek industry reached 45% in 1997, from 28% in 1990. That development provided a rationalization in the market, as it ensured independent and self-reliant growth, as well as long-term sustainability in the Greek industry.

The Athens Stock Exchange as a source of capital leads to the dispersion of assets, a fact that contributes positively to the strengthening of the

Parliamentary Democracy and the Free Democratic Economy.

Today's capitalism has become a reality. Roughly one million Greeks, almost 23% of the active population, invest in the Athens Stock Exchange. Thus they participate in the national wealth.

This dispersion has also a regional character, as more than the 40% of the capital placed daily in the Athens Exchange comes from investors out of Athens.

Furthermore, the Athens Exchange as source of capital allows the realization of the most complete form of privatisation, which consists of the sale of public assets to private buyers. Privatisation by means of selling stocks through the capital market to the broader investment public was used widely in the developed countries.

For example, the division of the Hellenic Telecommunications Organization's (OTE's) capital in millions of shares has been characterized as a milestone in the history of the Greek Capital market. Of course it should be mentioned that the listing of government owned companies also serves payment purposes, as was the case of the former state owned telecom organization of Greece. It decreases taxes for the company and in case of transfer of listed shares shareholders are exempt from paying tax on capital gains. This may vary from country to country.

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case of the former state owned telecom organization of Greece.

Reasons against Going Public

On the other hand there is the conscious decision of the administration of a company to remain a private company with a small number of stockholders.

The basic reasons that lead a company to remain a private company³, beyond the cost of going public, are the following:

- a) Maintaining control of the company from existing stockholders,
- b) The pride that is attached to ownership of the company
- c) The ability that is provided to the businessman or business group to realize their vision
- d) The maintenance of a participating ownership culture amongst the company's employees.

The secondary reasons, that emanate from the above and lead a company to remain private, are the following:

- 1) The company's management focuses on its long-term growth and not on the short-term growth of earnings and the share price. The pressure put by the market on the company's management for impressive short-term performance, which frequently leads to scandals against shareholders, is avoided.
- 2) The company's management avoids the interventions of other "bosses" out of the company in the decision-making process that relates to employees, products and investments⁴.
- 3) The investment decisions regarding to the introduction of new products

are made according to the market's capabilities and not based on the cost of capital, whose measurement faces difficulties and thus may not be reliable.

The decision of a company to remain private imposes certain restrictions as regards to the company's future evolution and growth:

- The company does not have full access to the sources of financing available in the markets. The internal financing constitutes the basic source of financing and is reinforced by short-term and long-term lending capital.
- The financing organizations ask from the stockholders to provide their personal assets as guarantee for the agreement in order to complete a financing agreement.
- The stocks of such companies are not liquid, because they are not often a subject of transaction. In this case, the determination of the valuation of a non public company is based on the methodology which also relates to the tax frame of the particular country.

Of course it is necessary to point out that the adoption of this valuation process differs from the valuation of listed companies and can lead to an overvaluation or under valuation of the price of the stock.

3. The Cost of Going Public

The cost of going public⁵ should be weighed up against the advantages of listing on the stock exchange in order to make the final decision. Going public involves certain expenses. The listing expenses include the following cat-

egories: a) administrative expenses or transaction costs and b) cost of valuation. The cost of listing on the Athens Exchange ranges from 4% to 8% of the value of the issue. The listing process on the Athens Exchange requires the services of underwriters and other experts. Moreover it requires expenses for the publicity and for the writing and circulation of the issue prospectus. It must be also pointed out that the total expenses, according to the existing tax frame, can be amortized within five years. It is noteworthy to provide a brief description of listing expenses.

- The administrative expenses are distinguished in the following 2 categories:

1. Direct expenses that arise from the issuer or the intermediary organization that assists in the issue. For example, advertisements related to the issue, dues of listing on the Athens Exchange, legal and other expenses.
2. The expenses and fees of the underwriter and issue advisor. These expenses are paid either with the form of the difference between the listing price and the price on the issuer, or as a percentage on the total performance, directly from the company. In Greece, the second payment method is customary, and the price difference from the price finally received from investors is named explicit or gross spread.

- The production cost mainly concerns the preparation of the issue, namely all the required audits (financial, legal and tax) as well as the required formal procedures for the realization of the issue, that is to

say the submission of relative documentation to the Hellenic Capital Market Commission.

The reputation and competitiveness of the underwriter constitute an important factor for the success of the issue and consequently its fee is not determined only by the direct expenses linked to the sale of issue, but also by his ability to undertake the new offering successfully. This is explained also by the fact that organizing the issue overall requires a particularly complicated and time-consuming process, the planning of which may considerably increase the overall cost.

- The underwriting of a new issue also involves the undertaking of investment risks from the side of the underwriter and consequently a cost of underwriting. The underwriter in the frame of the process of the underwriting guarantees the sale of the securities and assumes relative risks by buying the non sold securities at a specified price, if such are not absorbed by the investment public so that the issue may be concluded successfully. If the market price is lower than the listing price, and consequently the issue is not absorbed partially or totally, the underwriter will suffer loss, provided that the underwriter is forced to buy the part of the issue that was not absorbed in the listing price.

The danger that an underwriter faces is twofold. The one side concerns the uncertainty of market and the probability that it may change at the time that intervenes between the underwriting agreement and the realization of the sale of the securities and is named “waiting risk”. The second

concerns the incorrect estimate of the expected market price, which constitutes the base to determine the listing price, and is named “pricing risk”.

The underwriting cost depends on the factors that affect the waiting and price risk. Some of such factors correspond to the duration of the time between the determination of the price and issue time, the uncertainty on the market price of the titles, the degree of instability of the market, the information the underwriter has in his disposal in order to make the valuation of the securities and his experience and ability to realize this assessment.

- The services of distribution or disposal refer to the organization of the effort to inform investors, attract them so that they register or give purchase orders for new securities and the final distribution and delivery of securities to the buyers. It is essential for the underwriter to allocate enough access channels throughout a large number of investors. These correspond to the distribution cost.

Research has proved that factors such as the international disposal of the securities and the average market volume per investor affect the distribution cost. One of the most basic factors however constitutes the right valuation of the price of the share and its relation to the market price.

If there is high positive deviation between the two, then the issue will not be covered completely. But if the deviation is negative then the issue will be covered relatively in a short period of time, provided that investors judge it is profitable to buy the share.

- The valuation refers to the estimate of the value of the company and therefore to determining the share price. The mission of underwriters focuses on defining, with the largest possible accuracy, the listing price, in order to approach the market price as more efficiently as possible. The difference between the estimated price and the market price constitutes the implied cost or valuation cost.

The correct valuation of the share price requires the right estimation of the internal value of the share, as well as the conditions of demand and supply in the market. The underwriter is responsible for the collection and study of all the necessary information required for the above task.

The larger the instability of the capital market and the volatility of the price, the more difficult the collection of necessary information for the price estimation, and therefore the larger the valuation cost. The powerful reputation and experience of the underwriter often constitute a guarantee for the company and investors as regards to the correct estimation of the share price. This is true because an experienced underwriter has larger capabilities and a more complete knowledge of the market and therefore can determine the share price more accurately. Nevertheless the presence of an experienced underwriter, due to its stronger capabilities, will considerably increase the valuation cost.

Companies wish to achieve the highest possible listing price in the primary market so as to collect greater capital proceeds. On the other hand underwriters tend to underestimate the

share because if the share price is considered high in the primary market, then there is risk that all the shares may not be sold. If this happens then, apart from the fact that underwriters are obliged to buy the shares that have not been purchased from the broader investment public, there is also risk that the share price will be declining during the initial trading day of the share in the secondary market of Athens Exchange. As to the valuation of the stocks, there is a conflict between underwriters and the company. For the valuation of the stock we should take the following into consideration:

- a) the change in the share price and
- b) the change in the general price level of shares listed on the Athens Exchange.

Specifically, it is calculated the change in the share price of a company in relation with the change of the Athens Stock Exchange Index. The following equation is utilized:

Where,

$$\frac{(P_1 - P_0)}{P_0} : \frac{(\bar{A}_1 - \bar{A}_0)}{\bar{A}_0} = \left(\frac{P_1}{P_0} - 1 \right) : \left(\frac{\bar{A}_1}{\bar{A}_0} - 1 \right)$$

$$\left(\frac{P_1}{P_0} \times \frac{\bar{A}_1}{\bar{A}_0} \right) - 1$$

$$\left[\left(\frac{P_1}{P_0} \times \frac{\bar{A}_1}{\bar{A}_0} \right) - 1 \right] \times 100$$

P₁ = closing price of share on the initial trading day on the Athens Exchange,

P₀ = issue price of the share in the primary market,

Δ₁ = closing price of the index on the day the share price is determined in the primary market,

$\Delta 0$ = index price during the day the share price is determined in the primary market.

If the price from the above relationship is positive, then there is a discount, if it is negative then there is an over-valuation in the primary market

Example

The following data are given:

$P_1 = ₹1,200$, $P_0 = ₹1,000$, $\Delta 1 = ₹2,400$, $\Delta 0 = ₹2,200$

Using these numbers it is found:

$$\left[\left(\frac{1200}{1000} \times \frac{2200}{2400} \right) - 1 \right] \times 100 = 10\%$$

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Portfolio Theory: Risk and Return

Portfolio Theory focuses on the formation / creation of ideal investment portfolios taking into account all the assets that are available for investment in the market place. An investor by examining and analysing assets in terms of risk undertaken and return that can be delivered is in position to select the investments of his / her choice and form the most “appropriate”, and effective in terms of return, investment portfolio.

The large number of the available investment assets, the variety of decisions that an investor is able to make and the different mentalities of investors in the sense of their reactions against market conditions and arising or intrinsic risks, make the formation of an ideal or optimal investment portfolio a very complicated and delicate task.

Through their investment selections, rational investors target to attain the highest possible return for a certain level of risk undertaken, or to minimize their risk to the lowest possible level for a certain level of required return. In essence, the management of risk implies the restructuring of an investment portfolio aiming at more efficiently balancing risk and return.

1. Major Concepts and Terms

The greater understanding of the theory surrounding risk and return issues requires the explanation of a series of concepts and terminologies such as

the following:

Market Efficiency': Indicates the condition in which prices of all investment assets are in balance and their valuation is correlated with the returns of the General Index of the market which these investment assets refer to. As a direct result of the above, investors achieve capital gains due to their better understanding of the systematic risk, the risk of the broader market, and to a lesser or minimal extent due to their understanding of the non systematic risk deriving from certain features / characteristics of the individual investment assets.

Rational Behaviour of Investors: An investor behaves rationally when for a higher risk undertaken by investing in a portfolio of investment assets demands a higher return.

Investment Portfolio: Indicates investment in a group of assets comprising a portfolio, and not investment in a single investment asset.

Risk (in general): It is the uncertainty over the outcome of an event, decision and action.

Risk (in financial terms): The possible loss an investor may incur from an investment.

Investment: The placement of an investor's capital or income in various investment assets / securities with the prospect to gain additional capital greater than the extra capital gain that would be attained if the initial amount

was deposited in a bank for the same time horizon. This also distinguishes investment from saving.

Aggregate (Total) Risk of a Security: It is the sum of the systematic and the non systematic risk.

Systematic Risk: It is the risk generated due to the broader stock market's movements which in turn are due to specific events (for example war or economic recession) occurring in the economic environment.

Non Systematic Risk: It is the risk that derives from the specific characteristics of an individual security or stock. For example non systematic risk exists in the case of a company that goes for bankruptcy or for a company which operations are interrupted by an employee strike or for a company where the managing director is replaced or even for a court case that may affect the financial position of the company.

Efficient Markets: As it was presented previously, when an investor makes an investment, this investor targets two objectives. First to maximize the return on investment (σp) and at the same time to minimize the risk associated with this investment ($k p$). This dual objective is also the main concept analysed in the portfolio theory. With the creation of models such as the CAPM (Capital Asset Pricing Model) an investor is in better position to analyse the market conditions when making an investment. In the case of an efficient market, the interest rate charge for loans is equal with the interest rate offered for deposits, there is no taxation, information costs are zero since everybody can access information, and therefore there is no uncertainty. In reality most markets

are inefficient.

Investment Strategies: These are distinct from one another since in reality no stock market is efficient. Thus, the application of various analytical models assists investors to process data and information and to make more knowledgeable investment decisions. Those investors who rationally wish to achieve returns on investment greater than the returns of the benchmark indices follow certain investment strategies.

Passive Investment Strategy: It is an investment strategy process which simulates portfolios of securities to track index funds.

Active Investment Strategy: An investor creates a portfolio of assets or securities which has different structure or composition from the one of an equity market index. The different structure may be due to different securities included in investor's portfolio or different weights for each of those securities. To apply an active investment strategy, an investor needs to comprehend the basic principles of portfolio theory since the market experience alone is not sufficient to lead to rational investment decisions.

Portfolio Diversification: It is the case for a portfolio with securities of different characteristics, such as different risk levels and different variance in their returns. Furthermore, nowadays with the strong technological advancements already in effect, a well diversified portfolio may include securities that are traded in more than one geographic market.

2. History in Retrospect

To broaden the understanding of risk and return issues, the historical evolu-

tion of academic research surrounding those issues as well as the portfolio in a broader sense is presented below based on year of occurrence:

1952 Harry Markowitz ²(Nobel Prize in Economics): Markowitz depicted the creation of the efficient portfolio frontier where each portfolio located on this frontier generates the highest expected return for a given level of risk. The model that was conceived in order to create the efficient portfolio frontier required complex and time consuming calculations.

1963 William Sharpe ⁴(Nobel Prize): Sharpe simplified Markowitz's model and introduced the Single-Index model, which was easier to use and apply.

1964 William Sharpe and 1965 John Lintner: Each one developed his own version of CAPM model. The Capital Asset Pricing Model underlines that the return of an asset is a linear function of the systematic risk as follows:

$$r_i = r_f + b_i (r_m - r_f)$$

1977 Richard Roll: Developed the asset pricing model (APM), a model that incorporates additional parameters which may affect the return of an investment apart from the market factor.

1960s Eugene Fama⁴: His research focused on the concept of market efficiency and led to significant advancements in Finance and Investments, such as the Stock Index Mutual Funds.

Beginning of 1970s Several decades after the 1929 stock market crash, the

markets entered into a new decade of upheaval with strong price fluctuations, leading to the oil crisis and to the floating exchange rates. The consequent abrupt changes in the majority of key economic indicators (inflation, interest rates, etc.) affected the delicate equity markets and magnified the level of investment risk.

1970 – 1980 The new economic era of higher volatility was the perfect reason for financial engineers to innovate and form new intellectual approaches in calculating market and investment risk.

1972 Chicago Mercantile Exchange: Creation of the first currency futures via which investors could hedge their portfolios and investment positions against unfavourable market movements.

1973 Pricing of futures and options contracts via the Black and Scholes model.

1975 Offering of interest rate futures in an organized trading market

1983 Offering of stock index futures in an organized trading market

1970 – 1980 Trading of call and put options for stock index options, currency options, interest rate Options and future options.

1980 – 1985 A new investment strategy emerges called Portfolio Insurance which was especially common in practice up to the crash of 1987.

1980s Following 1987, new investment products were developed to

assist investors managing risk. Such products were currency and interest rate swaps, commodity swaps and equity swaps.

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CORPORATE DEALS, MERGERS & ACQUISITIONS

IN THE INTERNATIONAL AND GREEK MARKET 1st HALF 2011

“Match Made”, the newsletter on corporate deals published by Valuation & Research Specialists (VRS) shows that internationally, mergers, acquisitions and fund raising were quite significant during the 1st half of 2011 implying some optimism that business opportunities exist in the global marketplace. In the Greek market, most deals were linked to the critical refinancing steps taken by publicly or non-publicly traded companies in order to extend their liquidity levels.

The global corporate deal market saw an improved performance in mergers, acquisitions and fund raising during the period under consideration. US, Britain, Asia and Australia remained the top geographic markets with the most notable deals in terms of value realized in the following sectors: Financial services – banks, energy, high technology, Internet, telecoms, utilities, health care services and media. At the same time, several Greek entrepreneurs appeared in international lists of companies that

succeeded in raising funds to boost their growth strategies.

Internationally, the aggregate value of corporate deals, mergers and acquisitions settled at USD 611 billion during the 2nd quarter 2011 and at USD 1.4 trillion for the 1st half 2011. Private equity backed IPOs amounted to USD 17.2 billion during 2nd half 2011. In the US market, private equity deals ranged between USD 70-80 billion in value during the 2nd half of the year, while venture capital firms raised USD 10.2 billion in the 1st half 2011. In Asia, private equity backed mergers and acquisitions settled at USD 25.4 billion in the 9-month period of 2011. During the same period, in the Australian market, the aggregate value of mergers and acquisitions reached USD 142.8 billion.

In the Greek market, listed and non-listed companies issued new corporate bonds or rolled over their maturing bond loans in an effort to extend critical financing lines, in view of their

strong needs for capital. At the same time, listed companies attempted to issue new shares, via a rights issue, to

raise funds from their own shareholders with some of the efforts ending in partial coverage of those issues.



Anavex successfully completes a Phase 1 clinical trial for ANAVEX 2-73

HOBOKEN, NJ, November 14, 2011

Anavex Life Sciences Corp., (“Anavex”, OTCBB: AVXL) today announced the successful completion of its Phase 1 single ascending dose (SAD) clinical trial of ANAVEX 2-73, the company’s lead drug candidate for the treatment of Alzheimer’s Disease (AD). ANAVEX 2-73 is the first of a new class of oral drugs being studied to potentially treat AD through disease modification rather than focusing only on symptomatic improvement. In this Phase 1 SAD study, the maximum tolerated single dose was defined per protocol as 55-60 mg. This dose is above the equivalent dose shown to have positive effects in mouse models of AD. There were no significant changes in laboratory or electrocardiogram (ECG) parameters. ANAVEX 2-73 was well tolerated below the 55-60 mg dose with only mild adverse events in some volunteers. Observed adverse events at doses above the maximum tolerated single dose included headache and dizziness, which were moderate in severity and reversible. These side effects are often seen with drugs that target central nervous system (CNS) conditions, including AD. “With the successful completion of

this trial, we will immediately begin a multiple ascending dose trial”, said Dr. George Tidmarsh, MD, PhD, Executive Director of Anavex.

“Further analysis of the data is ongoing and we look forward to announcing complete results later this year.

These Phase 1 studies take us an important step closer to Phase 2 trials in patients with Alzheimer’s Disease.”

“Targeting the sigma-1 receptor represents a novel therapeutic avenue with potential for the treatment of

Alzheimer’s Disease. I welcome new treatment approaches to this devastating disease”, said Dr. Jeffrey

Cummings, member of the Anavex Scientific Advisory Board, Professor of Neurotherapeutics and Drug

Development in the Neurological Institute, Cleveland Clinic and

Director of the Cleveland Clinic Lou Ruvo Center for Brain Health, Las Vegas, Nevada and Cleveland, Ohio.

The ANAVEX 2-73 Phase 1 trial was conducted as a randomized, placebo-controlled study. Healthy male volunteers between the ages of 18 and 55 received single, ascending oral doses over the course of the trial. Study endpoints included safety and tolerability together with pharmacokinetic

parameters. Pharmacokinetics includes the absorption and distribution of a drug, the rate at which a drug enters the blood and the duration of its effect, as well as chemical changes of the substance in the body. This study was conducted in Germany in collaboration with ABX-CRO, a clinical research organization that has conducted several Alzheimer's Disease studies, and the Technical University of Dresden.

Drug development of novel compounds prior to marketing authorization involves Phase 1 single and multiple ascending dose studies prior to initiating Phase 2 studies. Phase 2 studies are intended to further assess the safety of the compound as well provide an initial evaluation of activity. Phase 3 trials involve a much larger number of patients and are designed to demonstrate clinical efficacy and further define the safety profile of the compound.

About Alzheimer's Disease

While Alzheimer's disease is most common in people over the age of 65, it can strike adults of any age irrespective of their gender, background or socioeconomic status. According to the Alzheimer's Association an estimated 5.3 million Americans are currently living with Alzheimer's disease. The number of Americans aged 65 and over with Alzheimer's is estimated to reach 7.7 million in 2030. By 2050, between 11 million and 16 million Americans over 65 are expected to have Alzheimer's disease.

About Anavex Life Sciences Corp.

Anavex Life Sciences Corp. (www.anavex.com) is an emerging

biopharmaceutical company engaged in the discovery and development of novel drug targets for the treatment of cancer and neurological diseases such as Alzheimer's, epilepsy and depression. The company's proprietary SIGMACEPTOR Σ Discovery Platform involves the rational design of drug compounds that fulfill specific criteria based on unmet market needs and new scientific advances. Selected drug candidates demonstrate high, non-exclusive affinity for sigma receptors, which are involved in the modulation of multiple cellular biochemical signaling pathways.

Anavex's SIGMACEPTOR Σ -N program involves the development of novel and original drug candidates that target neurological and neurodegenerative diseases (Alzheimer's disease, epilepsy, depression, pain). The company's lead drug candidates exhibit high, non-exclusive affinity for sigma receptors with strong evidence for anti-amnesic and neuroprotective properties. The company believes that oxidative stress, not amyloid-beta, is the cause of Alzheimer's. ANAVEX 1-41 and ANAVEX 2-73 modulate sigma receptors, a unique class of receptor molecules, to guard against oxidative stress and repair cells compromised by its effects. So far, through the advanced pre-clinical phase of development, the compounds have performed extremely well in well-recognized animal models of Alzheimer's disease, underscoring the promise of the company's new alternative approach to the disease. Anavex is a publically traded company under the symbol "AVXL".

Forward-Looking Statements

Statements in this press release that

are not strictly historical in nature are forward-looking statements. These statements are only predictions based on current information and expectations and involve a number of risks and uncertainties. Actual events or results may differ materially from those projected in any of such statements due to various factors, including the risks and uncertainties inherent in drug discovery and development, which include, without limitation, the potential failure of development candidates to advance through preclinical studies or demonstrate safety and efficacy in clinical testing and the ability to file an IND or commence clinical studies. You are cautioned not to place undue reliance on these forward-looking statements, which speak only as of the date hereof. This caution is made under the

safe harbor provisions of the Private Securities Litigation Reform Act of 1995. All forward-looking statements are qualified in their entirety by this cautionary statement and Anavex Life Sciences Corp. undertakes no obligation to revise or update this press release to reflect events or circumstances after the date hereof.

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Social Networks: The Unknown Advertising Power



Introduction

In this new era of social networking, we observe internet advertising spreading and companies trying to reach this growing mass of potential consumers. What we should take into consideration is that internet users visit a huge amount of websites and use at least one major social network such as “Facebook”. They use various sources of information and also expose themselves to advertisements. If we create a brand that is present in the majority of these activities, we will have a great marketing asset under our control.

The most vital point of an Internet campaign is choosing the right advertising vehicle, which may be a website, an email or even a classic advertisement. Of course, considering the options, a company will always prefer to affect people through a trusted website which has the ability to spread the word of a new product or a service.

What we see nowadays is a vast amount of money being spent on the wrong places. Companies should adopt the modern approach of advertisement which requires 24/7 social networking presence and as much user engagement as possible. Companies should not be afraid of the publicity Internet provides. Social network presence is a great asset if it is used wisely and in long term it gives us the ability to build a whole marketing plan around it. Indeed the importance of a website is intertwined with the power of a news publication in a world full of information and advertising opportunities.

Why GeekNews.gr

When we began searching for a new Internet product, we noticed the lack

of sufficient information around technology and cinema news. The need was to create a real news blog that keeps information flow 24/7 and follows global trends. This blog has the ability to affect people through its social network presence and daily news coverage.

When we decided to create GeekNews.gr, we had in mind that it is important to build a website that will be able to tease users with its content. We knew that this website needed to promote Internet culture and the fact that it is being constantly updated, gives us the power to help companies. There are many Greek companies that need a place to advertise their products and services, and we needed to create this supporting platform.

A successful website must give users multiple reasons to visit. The provided information ought to excite visitors so as to help audience growth via word of mouth and social networking suggestions. A respectful website but with static content shouldn't be considered as an advertising choice. On the other hand, a more casual website with thousands loyal visitors, and interesting content, can turn out to be a great investment and a potential media power.

It is important to discover the niche a website targets, but it's more important to have the right promoting strategy and understand the power of articles that inform people and create hype. There are people who need a website which collects news from various sources and distributes them in the Greek language as soon as possible. What we found out during our

social monitoring research was that the "geek" niche is strong in Greece. The next logical step was to give birth to a groundbreaking website that provides everything a geek needs to know. News around technology, movies, music and the latest internet trends. Of course, we give multiple reasons to people outside the 'geek circle' to visit our website, through humorous pictures and info-graphics.

What is GeekNews.gr

GeekNews.gr is the first website to create a unique platform of information, trying to connect people with different needs and interests under a constant flow of news. Everyone cares about technology or movies more or less. The movie market seems to expand year after year with more and more productions taking place; and we are confident that we have created a huge data base of articles that excite visitors. Also, technology is a vital part of our society and as people keep moving towards smart phones, tablets and gadgets in general, GeekNews.gr will keep possessing the power of needed information.

When a Greek tech company needs to spread the word on its new product, there are not many places to reach consumers. Same things affect every cinema-centered company that wants to promote a new movie.

GeekNews.gr launched by affecting the right audience through its social networking presence. We are able to inform people that normally wouldn't care about specific news, and embrace these potential fans of all kinds of products. Now we are confident to say that GeekNews.gr is a powerful media

publication with the ability to support products and inform people about what's important and what's not.

Without any financial help, we launched GeekNews.gr and rapidly achieved a large number of Facebook fans and Twitter followers. We have decided to promote our website only through social networks. What we believe is that with great content comes definite success. People tend to suggest what they think is valuable or interesting and that's where we based our whole strategy. When a website with good appearance publishes a thought-provoking story, readers will share it immediately with their friends. This is a very useful weapon in the social network campaign because as soon as a new visitor enters the website, we must be able to keep him visiting pages with fascinating subjects and that way, we gain awareness and potential fans with no advertising costs.

Of course the power of social networks is not unlimited. Even the best content might not be able to attract visitors if they can find it somewhere else. But what's vital in the Internet business is visitor loyalty. To make this happen, we create good stories that everyone appreciates and that way, we help the website's positive impressions. With a large fan-base it's easy to reach people for any subject and thus promote a product.

Furthermore, we give them the choice to augment our own fan-base by sharing content with friends. Paid advertisement can be very useful but we discovered that it's surprisingly expensive. Nothing can go wrong when

empowering the social network impact. On the contrary, people tend to like brands that care about their customers and expose themselves to the general public.

By following these marketing beliefs, we launched a website which now has a strong core of visitors and is a great case study of how important the social network presence of a product or service is. We are proof that almost everyone can promote a product on social networks with no cost and gain a large audience. It's not an easy job but it's most certainly important. It requires a lot of both energy and faith, but in the end, the true identity of your promotional direction will surface.

Conclusion

Latest tactics suggest the running of contests that aid awareness and attract fans in various social networks. There are people who are potential customers, but haven't heard of your product yet. Through a contest you can grow your fan-base. But that's the easy part. After you make your presence known, you will have to convince those people to remain members of your social network family, so as to keep them posted for offers or news. Your audience must feel that your presence is a part of your company's activities. You shouldn't forget about the dangers of a mediocre social campaign. After all, a Facebook page is your company's reflection to the Internet world and fans do not forget or forgive amateur tactics.

Every company with a decent marketing plan needs to make use of the

power of free social network advertising. It won't be too long until users get automatic recommendations of brands and products based on previous preferences or statistics. Companies should get ready for an era of unregulated Internet manifestation,

by controlling, supporting and promoting their own social network presence.

Most of the time, behind a news blog lies a strong marketing vehicle with fundamentals obeying to modern Internet strategies.

Press Release

Valuation & Research Specialists (VRS) Press Release

August 2011, Athens, Greece



Valuation & Research Specialists (VRS) have agreed with FactSet for the uploading and distribution of VRS reports (equity research reports, valuations of public and non public companies, financial analysis and academic research) via FactSet's platform. Factset is the third provider / distributor of VRS research reports internationally, following VRS agreements with Capital IQ (member of Standard & Poor's) and Thomson Reuters in 2010 and 2006 respectively.

FactSet Research Systems Inc. (www.factset.com) was founded in 1978. The company combines integrated financial information, analytical applications and client service to enhance the workflow and productivity of the global investment community. FactSet is headquartered in Norwalk, Connecticut, US, and is present in North America, Europe and the Pacific Rim. FactSet is publicly traded on the New York Stock Exchange and the Nasdaq.

About "Valuation & Research Specialists" ("VRS")

Valuation & Research Specialists - VRS produces independent equity research for institutional and individual clients, and valuation reports for companies active and/or publicly traded in the European, North American and Asian capital markets.

VRS contributes research to the international platforms of "Thomson Reuters", "Capital IQ" (member of "Standard & Poor's") and "FactSet".

VRS is the expert training advisor of "H&F Analysis" for the "Certificate in Investment Management" and the "Certificate in Corporate Finance" of London's "Chartered Institute for Securities and Investment" ("CISI").

VRS jointly with "International Management Studies" ("IMS"), the Greek center of UK's "Strathclyde University" and "Strathclyde Business School", deliver specialized applied seminars on corporate valuation models and portfolio & risk management models.



*searching the details
developing ideas
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CORPORATE VALUE GROWTH
That is an achievement for VRS



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Every stone has a history and a value



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