The Relationship between Trading Volume, Returns and Volatility: Evidence from the Greek Futures Markets

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Abstract

The relationship between returns, volatility and trading volume has interested financial economists and analysts for a number of years. A widely documented result is the positive contemporaneous relationship between price returns and trading volume. This paper investigates the contemporaneous and dynamic relationships between trading volume, returns and volatility for Greek index futures (FTSE/ASE-20 and FTSE/ASE Mid 40). For FTSE/ASE-20, we find that price volatility does not significantly impact volume's volatility, and also, we conclude that a contemporaneous relationship does not hold. Using GARCH methods, the results show a positive and significant effect, indicating that volume contributes significantly in explaining the GARCH effects. Furthermore, the GMM system suggests that market participants use volume as an indication of prices. For FTSE/ASE Mid 40, the results are mixed. The price volatility significantly impacts volume's volatility, and also, a positive contemporaneous relationship holds. On the other hand, both GARCH and GMM methods confirm that there is no evidence for positive relationship between trading volume and returns. Finally, this study also investigates the dynamic relationship between trading volume and actual returns. For FTSE/ASE-20, the dynamic models show a bi-directional Granger causality (feedback) between volume and actual returns. However, for FTSE/ASE Mid 40, the results indicate that returns do not Granger cause volume and vice versa.

Keywords: *Futures, Trading Volume, Returns, Volatility.*

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1. INTRODUCTION

There are many reasons that traders pay attention to trading volume[1]. Theoretically, low volume means that the market is illiquid. This also implies high price volatility. On the other hand, high volume usually implies that the market is high liquidity, resulting in low price variability. This also reduces the price effect of large trades. In general, with an increase in volume, broker revenue will increase, and also, market makers have greater opportunity for profit as a result of higher turnover. However, traders who wish to participate in movements in the market may use index futures more easily than shares. The existence of index futures allows index arbitrage and risk hedging. Both increase trading volume.

The relationship between returns and trading volume has interested financial economists and analysts for a number of years. In general, previous empirical studies have noted strong positive correlations between trading volume and price volatility/ absolute returns (Karpoff, 1987). In other words, it is concluded that trading volume plays a significant role in the market information. Therefore, the trading volume reflects information about changes and agreement in investors' expectations (Harris and Raviv, 1993).

Most of the previous studies have examined the leading theories (hypotheses) to explain the information arrival process in financial markets. The competing hypotheses are the 'mixture of distributions hypotheses' (MDH) and the 'sequential information arrival hypotheses'. According to the mixture of distributions hypothesis, information dissemination is contemporaneous. In other words, futures prices (and volume) only change when information arrives, and they evolve at a constant speed in event time (Sutcliffe, 1993). The MDH implies only a contemporaneous relationship between volume and (absolute) returns. It is associated with Clark (1973), Epps and Epps (1976), Tauchen and Pitts (1983) and Harris (1986). An important assumption is that the variance per transaction is monotonically related to the volume of that transaction. In general, according to Grammatikos and Saunders (1986), under the MDH framework the correlation between price (returns) and volume should be positive because joint dependence on a common directing variable or event. The MDH initially developed by Clark (1973). He argues that the rate of information arrival implies a positive contemporaneous correlation between volume and volatility. Furthermore, Harris (1987) and Sutcliffe (1993, p.188) report the following implications of this model:

1. *Provided the number of information arrivals is sufficiently large, the central limit theorem can be used to argue for normality in the distribution of price changes and volume.*

[1] Volume is the number of transactions in a futures contract during a specified period of time (Sutcliffe 1993).

2. *For a given number of information arrivals, there is zero correlation between volatility and volume.*
3. *For a given time period, there is a positive correlation between volatility and volume. This is because both are positive functions of the rate of arrival of information during the time period.*
4. *There will be leptokurtosis in the distribution of price changes computed over equal time periods.*

However, the empirical studies by Najand and Yung (1991) and Bessembinder and Seguin (1992, 1993) report evidence against the MDH. In addition, Bessembinder and Seguin (1993) suggest that the volatility-volume relation in financial markets depends on the type of trader.

On the other hand, the sequential arrival of information hypothesis suggests the gradual dissemination of information such that a series of intermediate equilibria exist (Copeland; 1976, Tauchen and Pitts; 1983). This model implies the continuation of higher volatility after the initial information shock rather than spikes in volatility (Wiley and Daigler, 1999). Also, according to Grammatikos and Saunders (1986, p. 326) '*sequential information arrival models imply the possibility of observing lead relations between daily contract price variability and volume*'. The sequential arrival information model argues that each trader observes the information sequentially.

Furthermore, McMillan and Speight (2002, p.2) argue that sequential arrival hypothesis supports a dynamic relationship whereby past volume provides information on current absolute returns, and past absolute returns contains information on current volume. In other words, the dynamic relationship is very important as it gives useful information about trading volume and forecasts of returns and volatility. Recent empirical studies have investigated the dynamic relationship between trading volume and returns. Some theoretical papers suggest 'causality' between changes in volatility and volume. This is due to the fact of the arrival of new (private) information.

In general, both MDH and sequential arrival of information hypotheses support a positive and contemporaneous relationship between volume-absolute returns and assume a symmetric effect for price increases and price decreases for futures contracts (Karpoff, 1987). Note that, in the case of an efficient futures market, neither a contemporaneous relationship nor a dynamic relationship hold.

In this paper we investigate the volatility, returns -volume relationship from two directions: the contemporaneous and causal relationships on the futures markets of the Athens Derivatives Exchange (ADEX).

We look at the price-volume relationship as '*it is related to the role of information in price formation, with volatility and volume providing measures of the significance of the information reflected in the*

market' (Wiley and Daigler, 1999; p.1). Karpoff (1987, pp. 109-110) explains the importance of the price-volume relationship as follows:

1. *The models predict various price-volume relations that depend on the rate of information flow to the market.*
2. *It is important for event studies that use a combination of price and volume data.*
3. *The price-volume relation is critical to the debate over the empirical distribution of speculative prices.*
4. *Price-volume relations have significant implications for research into futures markets. Price variability affects the volume of trade in futures contracts. This has bearing of the issue of whether speculation is a stabilizing or destabilizing factor on futures prices. … The price-volume relation can also indicate the importance of private versus public information in determining investors' demands.*

Our analysis of the relationship between returns/volatility and volume in ADEX may help us to understand whether trading volume provides any information about future returns in futures markets. In other words, the main issue is to identify whether information about trading volume is useful in improving forecasts of returns in a contemporaneous and dynamic context. Also, this study is important since traders and hedgers should identify the factors that influence the trading volume because as the volume increases then the price changes also tend to increase (which leads to a definite increase in margin requirements).

This study seeks to follow the works of Sharma et al. (1996), Gwilym *et al*. (1999), Ciner (2001) and McMillan and Speight (2002). We investigate the relationship between price changes and trading volume for index futures contracts traded in the ADEX, and also, we give an answer to the research question whether volume contains information useful for predicting future price movements. In addition, we study the GARCH effects in our data and test how well the GARCH effects are explained by trading volume. In other words, we investigate the role of the rate of information arrival variable relating to the Greek futures prices. Note that no previous study has tested the relationship between price change (returns) and trading volume in the Greek market.

The paper continues as follows. In Section 2 we review the literature relating to the relationship between the futures price (returns) volatility and volume. Section 3 outlines the methodology and Section 4 presents the Greek Futures Markets and data used in this study. Empirical results are reported and discussed in Section 5, and finally, concluding remarks are made in Section 6.

2. LITERATURE REVIEW

The relationship between returns/ volatility and trading volume in financial markets continues to be of empirical interest. Although the major of existing results suggests that there is a positive relationship between the variables, some other empirical studies (Najand and Yung; 1991 and Bessembinder and Seguin; 1992, 1993) report evidence against the MDH. Next, we review the previous studies about contemporaneous and dynamic relationships between returns/volatility and trading volume.

- Contemporaneous Relationship

I. Return-Volume

As we mentioned above, the MDH suggests that the correlation between price variability and volume should be positive. Previous empirical studies have noted a strong positive relationship. Firstly, Clark (1973) and Epps and Epps (1976) argue that the distribution of futures prices can be explained by the MDH. Epps and Epps (1976) present a theoretical model in which trading volume and absolute returns form a positive function of the amount of disagreement between traders. Then, Copeland (1976) also develops a simple sequential information arrival model in which the information is received by one trader at a time, and each trading on this information before it becomes known to anyone else.

However, the majority of the empirical evidence is summarized in the paper by Karpoff (1987). In particular, Karpoff (1987) cites several reasons why the price-volume relationship is positive (see also Board and Sutcliffe, 1990). Other research papers include Cornell (1981) and Tauchen and Pitts (1983). Cornell (1981) shows a positive correlation between the changes in average daily volume and changes in the standard deviation of daily log price relatives for 14 of the 18 commodities. Also, Tauchen and Pitts (1983) support the MDH and show that the joint distribution of changes in price and volume are modelled as a mixture of bivariate normal distributions. Next we review the previous empirical studies related to the contemporaneous relationship between returns and trading volume.

Ying (1966) suggests that a small (large) volume is usually accompanied by a fall (rise) in price. Cornell (1981) finds positive relations between volume and changes in the variability of prices for 17 futures contracts. In addition, Harris (1983, 1984), Grammatikos and Saunders (1986) and Karpoff (1987) report a positive and contemporaneous correlation between volume and price variability. This kind of correlation appears to be consistent with the MDH (Grammatikos and Saunders, 1986). Also,

Harris (1984) reports that the rate of information flow is a directing variable that leads to a positive contemporaneous change in response to the new information.

Most of recent papers extend the work of Lamoureux and Lastrapes (1990) by investigating the effect of trading volume to the market returns using the generalized autoregressive conditional heteroscedasticity (GARCH) model. They estimate a GARCH model where trading volume is included as an explanatory variable in the conditional variance equation. They find that volume has a positive effect on conditional volatility. Although previous research suggests that volume is a good proxy for information arrival, the opposite may be true for the market.

Sharma *et al*.(1996) examine the GARCH effects in the NYSE. The paper extends the work of Lamoureux and Lastrapes (1990), and shows how the GARCH effects in market returns are explained by market volume. For that reason, the simple GARCH (1,1) model with and without daily volume is considered. Also, Sharma *et al*. (1996) take into consideration the assumption of conditional normality and conditional t-distribution. The results suggest that volume may contribute significantly in explaining the GARCH effects. In other words, the introduction of volume does not eliminate the GARCH effects completely. However, the coefficient of volume is found to be positive and statistically significant.

II. Volatility-Volume

As we mentioned, Karpoff (1987) reviews previous studies on the price-volume relation and concludes that there is a positive correlation between volatility and volume. Lamoureux and Lastrapes (1990) show that the introduction of volume in the conditional variance equation eliminates the GARCH effects. They find that all the other coefficients in the conditional variance equation (i.e. GARCH model) are statistically insignificant when volume is included. In addition, they argue that volume has a positive effect on conditional volatility. However, past residuals do not contribute much information regarding the variance when volume is included. Also, Kawaller, Koch and Koch (1990) find that the daily volume of trading in the S&P 500 futures contract has a significantly positive effect on the volatility. In another study, Board and Sutcliffe (1990) also find a support to the hypothesis of a positive relationship between volatility and volume for the FTSE-100 index. Further, Bessembinder and Seguin (1993) divide volume into expected and unexpected components to examine the relation between price volatility and trading volume for futures markets. In general, the results show a positive relation between volume and volatility. Also, Bessembinder and Seguin (1993) suggest that 'the effect of unanticipated volume shocks on volatility is asymmetric'. As they conclude, their findings are consistent with the hypothesis that volatility is affected by existing market depth.

Under different techniques, Hiemstra and Jones (1994), Gallant *et al*. (1993) and Tauchen et al. (1996) report also a positive correlation between volatility and trading volume. Brailsford (1994) examines empirically the relationship between trading volume and volatility in the Australian Stock market. The study supports the hypothesis that the asymmetric relationship between volume and price changes. Also, the results show a reduction in GARCH coefficients and in the persistence of variance when trading volume is used. Further, Brailsford (1996) use data from Australian stock market in order to examine the relationship between trading volume and stock return volatility and trading volume and conditional volatility. The results from the GARCH (1,1) model are found to be insignificant when the volume is taken into consideration.

Ragunathan and Pecker (1997) focus on the relationship between volume and price variability for the Australian futures market. Following the models developed by Schwert (1990) and Bessembinder and Seguin (1993), they provide strong evidence that unexpected volume has a greater impact on volatility than expected volume.

Hogan et al. (1997) use a bivariate GARCH model to test the relationship between program trading volume and market volatility. Results show that there is a strong positive relationship between trading volume and volatility.

Also, Daigler and Wiley (1999) examine the volatility-volume relation in futures markets. Accordingly, the general public drives the positive volatility-volume relation[2]. In addition, they find that the unexpected volume series is more important than the expected volume series in explaining volatility.

Jacobs and Onochie (1998) examine the relationship between return variability and trading volume in futures markets. A bivariate GARCH-in-mean model is used. The results indicate a positive relationship between trading volume and price volatility.

In addition, Montalvo (1999) examines the Spanish Government Bond Futures Market using the approach proposed by Lamoureux and Lastrapes (1990). Montalvo (1999) suggests that the daily volume and frequency have a positive effect on volatility. Consistently, Gwilym *et al*. (1999) analyse the contemporaneous relationship between volatility and volume for stock index (FTSE-100), short-term interest rate (Short Sterling) and government bond (Long Gilt) futures contracts traded at the LIFFE. The results strongly support a significant positive and contemporaneous correlation between volatility and volume.

[2] Also, Bessembinder and Seguin (1993, p. 38) suggest that the volume-volatility relation depends on the class of traders involved.

Wang and Yau (2000) examine the relationship between trading volume and price volatility for futures markets. The results show a positive relationship between trading volume and price volatility, and a negative relationship between price volatility and lagged trading volume.

Recently, Watanabe (2001) examines the relation between price volatility and trading volume for the Nikkei 225 stock index futures. Following the method developed by Bessembinder and Seguin (1993), this paper shows a statistically significant and positive relation between volatility and unexpected volume. Also, for the period when the regulation increased gradually, Watanabe (2001) suggests that there is no relation between price volatility and volume.

Finally, Pilar and Rafael (2002) analyse the effect of futures on Spanish stock market volatility and trading volume. For this purpose, the GJR model with a dummy variable is used. The results show a decrease in the volatility and increase in trading volume.

- *Dynamic Relationship*

The second part of our empirical analysis examines the dynamic relationship between trading volume and returns. Recently, some empirical studies have explicitly investigated the dynamic relationship between trading volume and returns. Firstly, Epps and Epps (1976) suggest a positive causal relationship between trading volume and volatility (absolute stock returns). Then, Tauchen and Pitts (1983) examine the relationship on the speculative markets and conclude that information arrival causes traders to revise their asset valuations.

Hiemstra and Jones (1994) use linear and non-linear Granger causality methods, and Gallant et al. (1993) and Tauchen *et al*. (1996) use impulse response analysis. Further, Herbert (1995) examines the behaviour of trading volume and natural gas futures price volatility. The results confirm that the volume of trade explains 'better' the variance of the volatility. In addition, it is confirmed that volume does Granger cause price changes.

There have been only a few empirical studies of the relationship between trading volume and volatility for index futures. Merrick (1987) uses daily data of the S&P 500 and NYSE Composite indices for the period from 1982 to 1986 and finds evidence of strong causality for index futures. Kocagil and Shachmurove (1998) investigate the volume-return relationship for real and financial futures contracts. The study uses also a VAR framework to check for causality and feedback relationships among the variables. Almost all values are found to be positive and statistically significant. Also, the causality tests confirm that there is a causality from absolute rate of return to volume. However, Kocagil and Shachmurove (1998) report the absence of causality from past values of volume to returns in futures markets (i.e. presence of efficiency in futures markets).

Further, Gwilym *et al*. (1999) argue that there is strong evidence of bi-directional causality between volatility and volume for five-minute FTSE-100, Short Sterling and Long Gilt LIFFE futures. Recently, McMillan and Speight (2002) examine the dynamic relationship between the returns and volume for equity and bond futures. The dynamic relationship is examined using a VAR methodology. Also, Granger-causality tests are employed, indicating a bi-directional causality between volume and returns series for most futures. In addition, a positive relationship between volume and absolute returns is reported. Similarly, Grammatikos and Saunders (1986) conclude that there is a significant bi-directional causality in five different foreign currency futures traded on the IMM. Also, Malliaris and Urrutia (1998) use tests of long-run relationships and cointegration between price and volume for six agricultural futures contracts. The results show that there is a bi-directional causality between price changes and changes in volume.

Although now several studies have reported that past volume and returns can be used for forecasting purposes (e.g. Gallant et al., 1992) and show a strong causality, other suggest that futures markets are weak-form efficient. In other words, the studies for a wide range of other futures show that there is no causality from lagged volume to returns (McCarthy and Najand, 1993). For instance, Rutledge (1977, 1978) finds weak evidence that futures price variability causes trading volume. Also, Bhar and Malliaris (1998) show evidence of lack of causality between price and trading volume in five foreign currency futures. Only in the case of British Pound they find that the volume causes price. Finally, Walls (1999) finds that the hypothesis that trading volume (price volatility) does not cause price volatility (trading volume) cannot be rejected for any of the electricity futures contracts.

3. METHODOLOGY

Following the previous work of Bhar and Malliaris (1998) and Malliaris and Urrutia (1998), the trading volume is a function of equilibrium futures price and time. That is,

$$V = V(t, F) \tag{1}$$

where V denotes trading volume, F denotes futures price and t denotes time. Assuming that the price F follows an *Ito process* with drift μ and volatility σ, then:

$$dF = \mu dt + \sigma dZ \tag{2}$$

where Z denotes a *standardised Wiener process*. Although (1) is a general model, the model described by equation (2) is favourable as the *Ito's processes* describe better continuous random walks with a drift which leads to the market efficiency. Another application of *Ito's lemma* is given by:

$$dV = \left[V_t + V_p \mu + \frac{1}{2} V_{pp} \sigma^2 \right] dt + V_p \sigma dZ \tag{3}$$

where V_t, V_p and V_{pp} denote partial derivatives.

Models (1) and (3) describe futures prices and show whether they follow a random walk or not. If futures prices follow a random walk, then trading volume also follows a random walk.

Further by taking expectations of (3) we get the following expression:

$$E(dV) = V_t + V_p\mu + \frac{1}{2}V_{pp}\sigma^2 \tag{4}$$

This expression shows that the change in volume depends on V_t, the drift rate μ and the volatility of futures prices σ^2. We can also test the above hypothesis with the following model:

$$E(dV) = at + \beta\mu + \gamma\sigma^2 \tag{5}$$

This model implies the positive relationship between price variability and trading volume. Finally, using stochastic calculus, the volatility of trading volume is given by:

$$Var(dV) = V_p^2\sigma^2 \tag{6}$$

where the volatility of trading volume is a function of the futures price volatility. This hypothesis can be tested by the following expression:

$$Var(dV) = a + \delta\sigma^2 \tag{7}$$

To empirically test equations (6) and (7), we run the following regression:

$$|\Delta V_t| = a + \delta|\Delta F_t| \tag{8}$$

Equation (8) tests the hypothesis whether the price volatility significantly impacts volume's volatility (Bhar and Malliaris[3]; 1998, Malliaris and Urrutia; 1998).

- Contemporaneous Relationship

To analyse the contemporaneous relationship between volatility and volume we follow the recent works of Sharma et al. (1996), Gwilym *et al*. (1999) and McMillan and Speight (2002).

According to Grammatikos and Saunders (1986), there are several measures of volatility[4]. For example, Rutledge (1979) uses the absolute log change from one trading day to the next, and then Tauchen and Pitts (1983) use the square of the first difference of the futures price of adjacent periods. In addition, Karpoff (1987) uses the absolute value of the first difference to measure volatility. In this

[3] Bhar and Malliaris (1998) suggest that volume is related to price volatility and volume volatility is related to price volatility.

[4] Also, Sutcliffe (1993, p. 176) presents some of the definitions of price volatility.

study, to investigate the return (volatility)-volume relationship we estimate return as follows: $RETURN_t = \ln(P_t) - \ln(P_{t-1})$

where P_t is the daily closing futures price. We also measure the volume parameter as follows:

$$VOLUME_t = \ln V_t$$

$$LNVOL_t = \ln \frac{V_t}{V_{t-1}}$$

$$VOL_t = V_t$$

First, a simple OLS model that can be used to regress the daily trading volume on stock index futures returns is given by:

$$R_t = a + bV_t + u_t \tag{9}$$

where V_t is the daily trading volume at time t, R_t is the daily return at time t, and u_t is a random error term.

However, another approach that has been used to explain the return-volume relationship is based on (G)ARCH models. Previous works suggest that ARCH effects capture the properties of the information mixing variable. First, Lamoureux and Lastrapes (1990) assume that the presence of ARCH in returns is due to the MDH. However, their results show that trading volume removes the significance of ARCH and GARCH coefficients in the GARCH (1,1) model, implying that volume is a good alternative for the GARCH process. As a result, the persistence in volatility is reduced. On the other hand, Bessembinder and Seguin (1992, 1993) and Foster (1995) suggest that trading volume is not sufficient to remove the lagged volatility effects in current variance. Furthermore, Brailsford (1996), using the GARCH (1,1) model, concludes that there is a strong support for the above model only when absolute returns are considered.

Following the work of Sharma *et al*. (1996), we study the GARCH effects in our data and examine the effect of volume on return volatility using the GARCH (1,1) model. In other words, we test how well the GARCH effects are explained by trading volume, and also, we examine the effect of trading volume on conditional volatility (see also Lamoureux and Lastrapes, 1990). The conditional variance equation of the GARCH (1,1) model is given by:

$$h_t = \omega + a\varepsilon_{t-1}^2 + bh_{t-1} + \gamma V_t \tag{10}$$

where V_t is the daily trading volume. The model given by Equation 10 includes lagged conditional variance terms and errors. The daily trading volume is used as a proxy variable for the mixing variable (i.e. the number of daily price changes). The GARCH model is introduced by Bollerslev (1986) to account for volatility persistence. The model given above is a simple GARCH (1,1) model that is

found to be parsimonious and easier to identify and estimate the parameters (Enders, 1995). We also select the simple GARCH (1,1) model since many papers argue that the GARCH (1,1) model accounts for temporal dependence in variance and excess kurtosis (Ciner, 2001).

In addition, we examine the contemporaneous relationship between daily trading volume and futures returns using several different techniques. In particular, to test whether the positive contemporaneous relationship between trading volume and stock index futures returns exists, the following GARCH (1,1) model is estimated:

$$R_t = a_0 + a_1 R_{t-1} + a_2 V_t + \varepsilon_t \tag{11.1}$$

$$h_t = \omega + a\varepsilon_{t-1}^2 + bh_{t-1} \tag{11.2}$$

Equation (11.1) presents the mean equation and Equation (11.2) the variance equation. Finally, we analyse the contemporaneous relationships using the methodology proposed by Gwilym *et al*. (1999) and Ciner (2001). We model the series using the equations:

$$|R_t| = \omega + aV_t + \gamma|R_{t-1}| + \varepsilon_t \tag{12.1}$$

$$V_t = \phi + \lambda|R_t| + \mu V_{t-1} + \xi_t \tag{12.2}$$

Gwilym *et al*. (1999) and Ciner (2001) estimate a system of simultaneous equations via Generalized Method of Moments (GMM). Also, Richardson and Smith (1994) test the MDH using a GMM estimator.

Since the system uses volume and absolute value of returns as endogenous variables, it would not possible to use OLS[5]. The GMM is introduced by Hansen (1982). According to the Eviews 3.1 Help '*the idea is to choose the parameter estimates so that the theoretical relation is satisfied as closely as possible*'. In general, GMM approach allows estimation of the contemporaneous relationship whilst avoiding any simultaneity bias and yielding heteroscedasticity and autocorrelation consistent estimates in the process (Gwilym *et al*., p. 595). For that reason, to estimate an equation by GMM we need to list the names of the instruments. In our case, following Gwilym *et al*. (1999) and Ciner (2001), we use the lagged volatility and volume to identify the GMM estimator. In particular, the instrumental variables control for the simultaneity bias and the GMM system controls for possible heteroskedasticity in error terms. We also select the 'Weighting Matrix: Time Series (HAC)' option in order to yield heteroscedasticity and autocorrelation. In addition, the GMM has the advantage of reporting the J-statistic to test the validity of overidentifying restrictions (usually when there are more instruments than parameters).

[5] Since $|R_t|$ is correlated with error term ε_t, then $Cov(|R_t|, \varepsilon_t)$ is not equal to zero, as required by OLS. Similarly for V_t and ξ_t.

According to Ciner (2001), the significance of a and λ shows a contemporaneous relation between trading volume and absolute returns. Also, the significance of the parameter μ indicates that lagged volume contains information about absolute returns. As a result, market traders use trading volume as an indication of market (prices) on previous trading volume (see also Foster, 1995 for details).

- *Dynamic Relationship*

To examine further the relationship between futures volatility and volume, causality tests are employed (for a temporal ordering between the two variables). The dynamic relationship between volatility and volume is examined using Granger Causality tests through the Vector Autoregressive (VAR[6]) methodology. Granger causality is based on the theory that '*if an event x occurs before an event y, then we say that x causes y*'. Suppose that x and y are trading volume and returns, respectively. Then, the following models are used to test for causality between the two variables:

$$x_t = \omega + \sum_{i=1}^{m} a_i x_{t-i} + \sum_{i=1}^{n} b_i y_{t-i} + \varepsilon_t \tag{13}$$

$$y_t = \phi + \sum_{i=1}^{m} c_i x_{t-i} + \sum_{i=1}^{n} d_i y_{t-i} + \xi_t \tag{14}$$

If the b_i (c_i) coefficients are statistically significant then we conclude that returns (volume) cause volume (returns). However, if the F-test (via Wald test) does not reject the hypothesis that the b_i=0 ($c_i = 0$), then the returns (volume) do not cause trading volume (returns). If both b_i and c_i are different from zero, then there is a feedback relation between those two variables. Hence, a bi-directional causality exists and causality runs in both directions. Under the null hypothesis (Ho), x does not Granger-cause y, and alternatively, y does not Granger-cause x. According to Pindyck and Rubinfeld (1998), x causes y if (i) x helps to predicts y, and (ii) y does not help to predict x.

For the estimation of Granger causality tests, we use lags considering the Akaike information criterion (AIC).

[6] The benefit of VAR models is that they account for linear intertemporal dynamics between variables without imposing any *a priory* restrictions.

4. GREEK FUTURES MARKET AND DATA

- *The Athens Derivatives Exchange (ADEX)*

The ADEX is a new Exchange (since August 27, 1999). The most popular products of ADEX include index futures and options on the FTSE/ASE-20 and FTSE/ASE Mid 40, and the bond future contract. During 2000, the increased volatility of futures in FTSE/ASE-20 (30% average) indicates that the market conditions allow for intraday trading. Also, according to the deviations from the theoretical price of the FTSE/ASE-20 index future contract, it may be possible for quasi-arbitrage in the market (as the deviations have reached 5% of the theoretical price).

On the other hand, it is very clear that FTSE/ASE Mid 40 index futures are most successful as the larger part of the daily volume in Athens Stock Exchange is done in middle and low capitalization stocks.

- DATA

Daily closing prices and volume for FTSE/ASE-20 index are used over the period Sept. 1997-August 2001. The FTSE/ASE-20 index was introduced in Sept. 1997, while the FTSE/ASE-20 index futures contract began trading in August 1999 at ADEX.

For FTSE/ASE Mid 40 index, the daily closing prices and trading volume are used over the period Dec. 1999- August 2001. Also, the FTSE/ASE Mid 40 index was introduced in Dec. 1999, while the FTSE/ASE Mid 40 index futures was introduced in January 2000. All data information's were obtained from the official web page of the Athens Derivatives Exchange (www.adex.ase.gr).

Graphical plots of return-volume coefficients are presented in Appendix 1 and Appendix 2 for FTSE/ASE-20 and FTSE/ASE Mid 40, respectively.

5. EMPIRICAL RESULTS

We begin the empirical analysis by first investigating the summary statistics of returns and volume and the unit root tests. First, Table 1 provides the sample summary statistics for FTSE/ASE-20 and Table 2 for FTSE/ASE Mid 40 stock index futures.

<< Table 1- about here >>

<< Table 2- about here >>

It is observed that both FTSE/ASE-20 and FTSE/ASE Mid 40 returns and absolute returns have positive skewness, positive kurtosis and high value of J-B statistic test. This means that the distribution is skewed to the right, and also, that the pdf is leptokurtic. Also, the J-B statistic test suggests that the null hypothesis of normality is rejected. In addition, the results for the trading volume indicate negative skewness, low positive kurtosis and low value of J-B statistic test. Hence, the summary statistics for trading volumes show that the distribution is skewed to the left, and also that the null hypothesis of normality is accepted.

- UNIT ROOT TESTS

The causality tests (and VAR models) assume that the variables (i.e. returns and trading volume) in the system are stationary. Therefore, we test for the stationarity of returns and trading volume series. Note that if the results indicate that the data are nonstationary then we may produce misleading results.

To test log(returns) and log(volume) for a unit root we employ the augmented Dickey-Fuller (ADF) test. The ADF test is given by:

$$\Delta x_t = a_0 + a x_{t-1} + \sum_{i=1}^{n} \delta_i \Delta x_{t-i} \qquad (15)$$

Table 3 shows that the null hypothesis that the futures return series and trading volume series are non-stationary is rejected for both FTSE/ASE-20 and FTSE/ASE Mid 40 stock index futures. Hence, we conclude that the trading volume and return series are both stationary.

<< Table 3- about here >>

I. CONTEMPORANEOUS RELATIONSHIP

- **FTSE/ASE-20**

The first hypothesis investigated in this paper is that suggested in Equation 8, i.e. the volatility of trading volume as a function of price volatility. Table 4 presents the results of this hypothesis for

FTSE/ASE-20 index. It shows that price volatility does not significantly impact volume's volatility. This finding differs with what Malliaris and Urrutia (1998) suggest for agricultural futures.

<< Table 4- about here >>

Table 5 reports the coefficients of regressing futures returns on trading volume using the simple OLS (Equation 9). All the coefficients are positive but not significant. Therefore, we suggest that there is no positive contemporaneous relationship between trading volume and futures returns (in all three cases).

<< Table 5- about here >>

Further, to investigate whether trading volume explains the GARCH effects for futures market returns, GARCH (1,1) model with a volume parameter in the variance equation is estimated. Table 6 reports the results for FTSE/ASE-20 stock index futures. As can been seen, in Panels A and B the parameter γ is positive and statistically significant (i.e. there is a positive effect), indicating also that it is reflective of the contribution of volume in explaining the GARCH effects in futures markets returns. In other words, the volume contributes significantly in explaining the GARCH effects (Sharma *et al*., 1996).

<< Table 6- about here >>

Then, we test whether the contemporaneous relationship between trading volume and futures returns exists using the GARCH (1,1) model with a volume parameter in the mean equation. As reported in Table 7, the coefficients of trading volume are all positive using the GARCH (1,1) model given by Equations (11.1) and (11.2). However, only in one case (Panel B), the coefficient is positive and significant (i.e. there exists a positive contemporaneous relationship between trading volume and returns).

<<Table 7- about here>>

Furthermore, the results from the GMM system for FTSE/ASE-20 stock index futures are presented in Table 8. In all cases, the coefficients a and λ are not significant, and therefore, we conclude that there is no positive contemporaneous relationship between volatility and volume. In addition, the results state that there is a statistically significant relationship between lagged volume and absolute returns. The parameter μ indicates that lagged volume contains information about absolute returns.

Note also that, in all of the cases, the J-test is very small indicating that there exists a good fit of the model to the data.

<< Table 8- about here>>

- **FTSE/ASE MID 40**

Table 9 presents the results of the first testable hypothesis suggested in Equation 8. The coefficient of price volatility is significant, and therefore, we conclude that price volatility significantly impacts volume's volatility. This is consistent with the study of Malliaris and Urrutia (1998) for six agricultural futures contracts.

<<Table 9- about here>>

Then, Table 10 shows the results obtained from the OLS model (Equation 9). As can been seen, in Panels A and C the volume coefficient is positive and significant. So, we conclude that there exists a positive contemporaneous relationship between trading volume and futures returns in FTSE/ASE Mid 40 stock index futures.

<<Table 10- about here>>

Further, Table 11 reports the results obtained from the Equation 10 following the work of Sharma *et al*. (1996). It is obvious that the volume parameters are not statistically significant, and so, trading volume does not contribute significantly in explaining the GARCH effects.

<<Table 11- about here>>

Table 12 reports the results obtained from the GARCH (1,1) model with a volume parameter in the mean equation. The coefficients of trading volume are all positive but not significant. Hence, there is no evidence for positive contemporaneous relationship between trading volume and futures returns in FTSE/ASE Mid 40 index.

<<Table 12- about here>>

Table 13 reports the results from the GMM system. The results for the FTSE/ASE Mid 40 index show that there is no positive and significant contemporaneous relationship between volatility and volume. A further point of note is that the effect of lagged volume is found to be positive (Panels A and C) in the volume equations, suggesting that the knowledge of increased current volume is a predictor of reduced future volume. Also, the fact that the lagged return is positive in the return equations indicates that knowledge of increased current return is a predictor of reduced future return. In addition, the J-test statistics are very small in all of the cases, supporting a good fit to the data.

<<Table 13- about here>>

II. DYNAMIC RELATIONSHIP

As we mentioned above, in this paper we also test whether trading volume leads futures returns, or vice versa. This is the theory behind the Granger-causality test, which is based on the fact that the future cannot cause the present or the past.

In this study our results are mixed. For FTSE/ASE-20, there is strong evidence of bi-directional causality (i.e. reject the null hypothesis of no Granger-causality), and therefore, there is a feedback relation between trading volume and actual returns. Hence, we conclude that FTSE/ASE-20 index may support the sequential arrival of information hypothesis over the MDH, and trading volume helps to predict return and vice versa. These findings are in agreement with those of Clark (1973), Bessembinder and Serguin (1993) and others.

However, for FTSE/ASE Mid 40, the results show evidence of accepting the null hypothesis of no Granger-causality indicating that there is no temporal ordering in the volume-returns relationship. Hence, FTSE/ASE Mid 40 index does not support a dynamic relationship between returns and trading volume. Therefore, we conclude that there is no evidence of greater support to the sequential information arrival. In other words, consistent with weak-form efficiency, we find that there is no

causality from FTSE/ASE Mid 40 returns to volume and volume to returns. This implies that trading volume does not show any predictive power for future returns in the presence of current and past returns, since we deal with heavily traded contracts. In consistent with Campbell *et al.* (1993) and McMillan and Speight (2002), this is also due to the fact that FTSE/ASE Mid 40 index is the most successful and the most frequency traded futures index. Also, this finding is expected since the larger part of the daily volume in Athens Stock Exchange is done in middle and low capitalization stocks.

The empirical results are presented in Table 14 and Table 15 for FTSE/ASE-20 and FTSE/ASE Mid 40 respectively.

<<Table 14- about here>>

<<Table 15- about here>>

6. SUMMARY

The relationship between returns, volatility and trading volume has interested financial economists and analysts for a number of years. A widely documented result is the positive contemporaneous relationship between price returns and trading volume. The two most important theoretical models, which have been used to explain this relationship, include the 'mixture of distributions hypotheses' (MDH) and 'sequential information arrival hypotheses'. Currently empirical results show that the MDH by Clark (1973), Epps and Epps (1976) and Harris (1987), and the sequential information model by Copeland (1976) are used to explain this positive correlation. Also, Karpoff (1987) reviews previous studies on price-volume relation and confirms the positive correlation between volatility (returns) and volume on various financial markets.

First, we investigate the contemporaneous relationship between volume and returns. For FTSE/ASE-20, we find that price volatility does not significantly impact volume's volatility, and also, we conclude that a contemporaneous relationship does not hold. Using GARCH methods, the results show a positive and significant effect, indicating that volume contributes significantly in explaining the GARCH effects (in consistent with Sharma *et al*., 1996), and little support to the MDH or sequential information arrival models. Furthermore, the GMM system suggests that there is a significant relationship between lagged volume and absolute returns, while a positive contemporaneous relationship does not hold. Taken together, these findings indicate that market participants use volume as an indication of prices (Foster, 1995), and that volume and returns do not respond to the same

exogenous variable in the GMM system, the daily flow of information to the market. The latter is in contrast with Ciner (2001).

For FTSE/ASE Mid 40, the results are mixed. The price volatility significantly impacts volume's volatility, and also, a positive contemporaneous relationship holds. These results are in contrast with previous results for FTSE/ASE-20. However, both GARCH and GMM methods confirm that there is no evidence for positive relationship between trading volume and returns.

This study also investigates the dynamic relationship between trading volume and actual returns for Greek index futures. For FTSE/ASE-20, using linear Granger causality tests, we conclude that past volume provides information on current returns, and past returns contains information on current volume. Therefore, the bi-directional causality suggests that speculators pay attention to price changes and changes in trading volume. In other words, the finding of strong bi-directional futures returns-volume causal relationships implies that knowledge of current trading volume improves the ability to forecast futures returns. These results are in line with those of Grammatikos and Saunders (1986), Bessembinder and Seguin (1993), Malliaris and Urrutia (1998), Gwilym *et al*. (1999) and McMillan and Speight (2002), who report a bi-directional relationship between volume and price variability. Furthermore, the fact that there is causality from volume to returns indicates that a financial trader "takes volume to make prices move" (Ciner; 2001, p. 3). Hence, for the FTSE/ASE-20 index futures market we show evidence for the sequential arrival of information hypothesis.

However, for FTSE/ASE Mid 40, we find that there is no causality from volume to returns and returns to volume, consistent with weak-form efficiency. This finding is consistent with McCarthy and Najand (1993), Kocagil and Shachmurove (1998), Bhar and Malliaris (1998), Walls (1999) and Gwilym *et al*. (1999) for daily futures data. They suggest that major US and UK (LIFFE) futures markets are weak-form efficient. The lack of causality (and efficiency) between returns and volume is possibly explained by the fact that the FTSE/ASE Mid 40 index is the most frequency traded stock index in Athens Stock Exchange.

Overall, statistical analysis shows that trading volume and returns do not clear support a positive contemporaneous relationship on Greek futures market. On the other hand, for FTSE/ASE-20, the dynamic models show a bi-directional Granger causality (feedback) between volume and actual returns. However, for FTSE/ASE Mid 40, the results indicate that returns do not Granger cause volume and vice versa.

The results of this study should be useful to financial researchers-analysts, practitioners and derivative (futures) market participants whose success depends on the ability to forecast price movements in the ASE and ADEX.

APPENDIX 1

FTSE/ASE-20

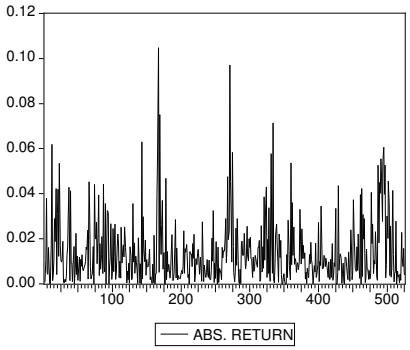

Fig. 1

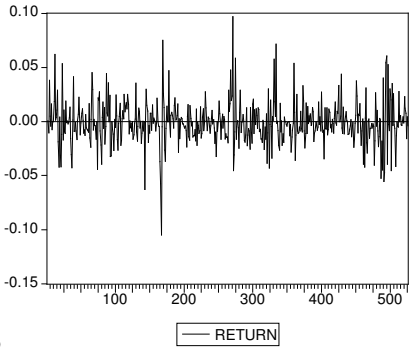

Fig. 2

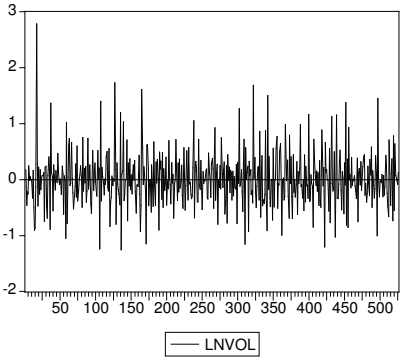

Fig. 3

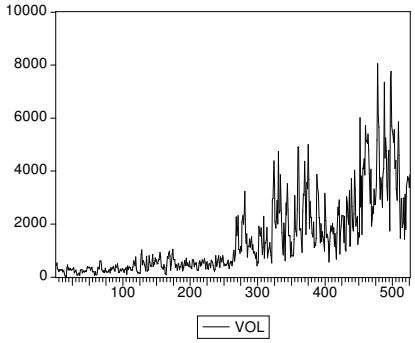

Fig. 4

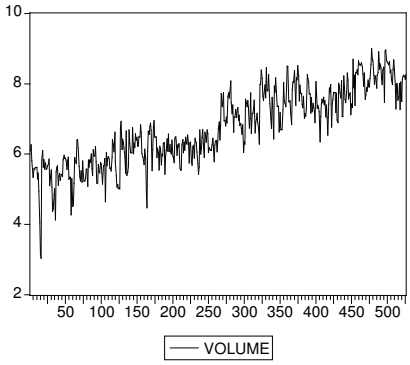

Fig. 5

* Graphical plots of abs. return, return, lnvol, vol and volume for FTSE/ASE-20.

APPENDIX 2

FTSE/ASE MID 40

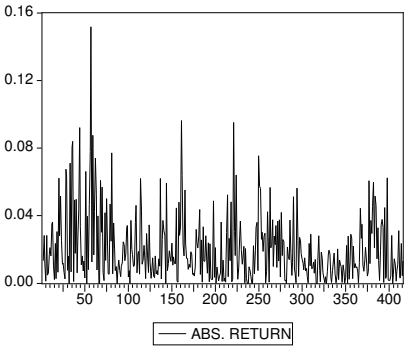

Fig. 1

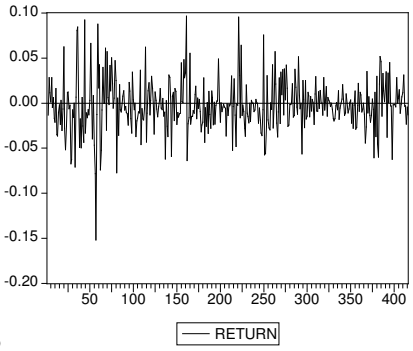

Fig. 2

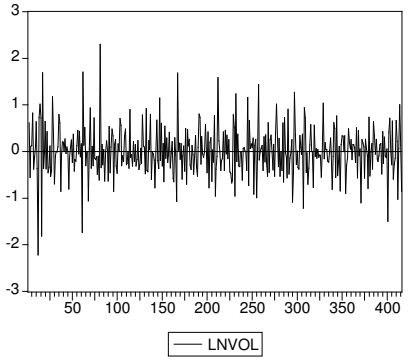

Fig. 3

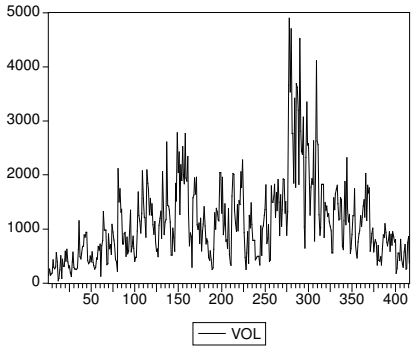

Fig. 4

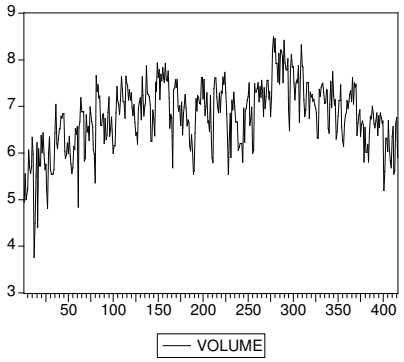

Fig. 5

* Graphical plots of abs. return, return, lnvol, vol and volume for FTSE/ASE Mid 40.

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TABLE 1. Statistics for **FTSE/ASE-20**

FTSE/ASE-20	**RETURN**	**ABS. RETURN**	**TR. VOLUME**
MEAN	-0.001145	0.013647	6.747424
MEDIAN	-0.001726	0.009300	6.665644
MAXIMUM	0.097055	0.104776	8.992682
MINIMUM	-0.104776	0.000000	3.044522
STD. DEV	0.019777	0.014347	1.075815
SKEWNESS	0.325381	2.135955	-0.081702
KURTOSIS	6.690511	9.559634	2.413449
JARQUE-BERA	307.1985	1340.457	8.125462
PROB.	0.000000	0.000000	0.017202

TABLE 2. Statistics for **FTSE/ASE MID 40**

FTSE/ASE MID 40	**RETURN**	**ABS. RETURN**	**TR. VOLUME**
MEAN	-0.002699	0.020070	6.798633
MEDIAN	-0.003161	0.013693	6.866931
MAXIMUM	0.096205	0.151776	8.495970
MINIMUM	-0.151776	0.000000	3.761200
STD. DEV	0.028337	0.020161	0.715681
SKEWNESS	0.102337	1.878317	-0.546412
KURTOSIS	5.840684	8.417987	3.666502
JARQUE-BERA	140.2592	751.6148	28.40049
PROB.	0.000000	0.000000	0.000001

TABLE 3. Unit Root Tests

FTSE/ASE-20 INDEX	ADF (RETURN) Critical Values: 1%: -3.4452 5%: 2.8674 10%: 2.5699	ADF (VOLUME) Critical Values: 1%: -3.4452 5%: -2.8674 10%: -2.5699
LAGS	3	3
ADF	-0.777813	-2.737684
1ST DIFF. ADF	-11.55063	-15.37652
FTSE/ASE MID 40 INDEX	ADF (RETURN) Critical Values: 1%: -3.4483 5%: 2.8688 10%: 2.5706	ADF (VOLUME) Critical Values: 1%: -3.4484 5%: -2.8688 10%: -2.5706
LAGS	2	6
ADF	-1.954468	-3.535182
1ST DIFF. ADF	-12.81365	-

TABLE 4. MODEL: $|\Delta V_t| = a + \delta|\Delta F_t|$

Dependent Variable: $|\Delta V_t|$

Variable	Coefficient	t-Statistic
a	0.3251	17.618*
δ	1.3193	1.2901

* Significant at the 5% level.

TABLE 5. OLS model: $R_t = a + bV_t + u_t$

PANEL A

Dependent Variable: R_t

Variable	Coefficient	t-Statistic
a	-0.0039	-0.6872
VOLUME	0.0004	0.4762

PANEL B

Dependent Variable: R_t

Variable	Coefficient	t-Statistic
a	-0.0011	-1.3472
LNVOL	0.0031	1.6048

PANEL C

Dependent Variable: R_t

Variable	Coefficient	t-Statistic
a	-0.0021	-1.7998*
VOL	6.91E-07	0.9061

* Significant at the 10% level.

TABLE 6. GARCH (1,1) Model: $h_t = \omega + a\varepsilon_{t-1}^2 + bh_{t-1} + \gamma V_t$

PANEL A

Dependent Variable: R_t

Mean Equation	Coefficient	z-Statistic
Constant	-0.0012	-1.8170*
Variance Equation		
ω	3.23E-05	0.4349
a	0.1862	2.3285*
b	0.6491	5.4372*
VOLUME	4.58E-06	0.4453

PANEL B

Dependent Variable: R_t

Mean Equation	Coefficient	z-Statistic
Constant	-0.0017	-2.9354*
Variance Equation		
ω	5.37E-05	2.3791*
a	0.1572	2.6600*
b	0.6842	6.7913*
LNVOL	0.0001	6.0479*

PANEL C

Dependent Variable: R_t

Mean Equation	Coefficient	z-Statistic
Constant	-0.0011	-1.3667
Variance Equation		
ω	0.0002	1.8708*
a	0.1500	1.6401
b	0.6000	2.9508*
VOL	-3.56E-08	-1.4705

* Significant at the 5% or 10% level.

TABLE 7. GARCH (1,1) Model: $R_t = a_0 + a_1 R_{t-1} + a_2 V_t + \varepsilon_t$

$$h_t = \omega + a\varepsilon_{t-1}^2 + bh_{t-1}$$

PANEL A

Dependent Variable: R_t

Mean Equation	Coefficient	z-Statistic
a_0	-0.0015	-0.3164
R_{t-1}	0.1110	2.4283*
VOLUME	6.33E-05	0.0845
Variance Equation		
ω	5.54E-05	2.1993*
a	0.1702	2.3521*
b	0.6833	6.3203*

PANEL B

Dependent Variable: R_t

Mean Equation	Coefficient	z-Statistic
a_0	-0.0012	-1.6922*
R_{t-1}	0.1124	2.4457*
LNVOL	0.0038	2.0897*
Variance Equation		
ω	5.14E-05	2.1855*
a	0.1668	2.3788*
b	0.6953	6.6864*

PANEL C

Dependent Variable: R_t

Mean Equation	Coefficient	z-Statistic
a_0	-0.0014	-1.4298
R_{t-1}	0.1113	2.4407*
VOL	2.08E-07	0.3222
Variance Equation		
ω	5.49E-05	2.1872*
a	0.1689	2.3384*
b	0.6857	6.3398*

* Significant at the 5% or 10% level.

TABLE 8. GMM Models: $|R_t| = \omega + aV_t + \gamma|R_{t-1}| + \varepsilon_t$

$$V_t = \phi + \lambda|R_t| + \mu V_{t-1} + \xi_t$$

PANEL A

Dependent Variable: $|R_t|$

Instrument list: $|R_{t-1}|$ $VOLUME_{t-1}$

Variable	Coefficient	t-Statistic
ω	0.0072	1.4177
VOLUME	0.0006	0.8867
$\|R_{t-1}\|$	0.1414	2.0703*
J-statistic	9.94E-31	

Dependent Variable: VOLUME

Instrument list: $|R_{t-1}|$ $VOLUME_{t-1}$

Variable	Coefficient	t-Statistic
ϕ	0.6133	4.5102*
$\|R_t\|$	5.0864	0.4878
V_{t-1}	0.8993	44.540*
J-statistic	1.56E-26	

PANEL B

Dependent Variable: $|R_t|$

Instrument list: $|R_{t-1}|$ $LNVOL_{t-1}$

Variable	Coefficient	t-Statistic
ω	0.0117	11.618*
LNVOL	-0.0068	-1.0848
$\|R_{t-1}\|$	0.1461	2.0994*
J-statistic	1.68E-31	

Dependent Variable: LNVOL

Instrument list: $|R_{t-1}|$ $LNVOL_{t-1}$

Variable	Coefficient	t-Statistic
ϕ	-0.1070	-0.6643
$\|R_t\|$	8.1852	0.6811
$LNVOL_{t-1}$	-0.2784	-5.3638*
J-statistic	1.68E-30	

PANEL C

Dependent Variable: $|R_t|$

Instrument list: $|R_{t-1}|$ VOL_{t-1}

Variable	Coefficient	t-Statistic
ω	0.010519	8.515980*
VOL	9.57E-07	1.503014
$\|R_{t-1}\|$	0.1293	1.8947*
J-statistic	7.17E-31	

Dependent Variable: VOL

Instrument list: $|R_{t-1}|$ VOL_{t-1}

Variable	Coefficient	t-Statistic
ϕ	-29.755	-0.0971
$\|R_t\|$	20676.29	0.7989
VOL_{t-1}	0.8287	21.698*
J-statistic	5.70E-29	

* Significant at the 5% or 10% level.

TABLE 9. MODEL: $|\Delta V_t| = a + \delta|\Delta F_t|$

Dependent Variable: $|\Delta V_t|$

Variable	Coefficient	t-Statistic
a	0.3412	13.303*
δ	2.0329	1.7229*

*Significant at the 5% or 10% level.

TABLE 10. OLS model: $R_t = a + bV_t + u_t$

PANEL A

Dependent Variable: R_t

Variable	Coefficient	t-Statistic
a	-0.0301	-2.2724*
VOLUME	0.0040	2.0807*

PANEL B

Dependent Variable: R_t

Variable	Coefficient	t-Statistic
a	-0.0026	-1.9393*
LNVOL	-0.0009	-0.2943

PANEL C

Dependent Variable: R_t

Variable	Coefficient	t-Statistic
a	-0.0065	-2.5789*
VOL	3.40E-06	1.7992*

* Significant at the 5% or 10% level.

TABLE 11. GARCH (1,1) Model: $h_t = \omega + a\varepsilon_{t-1}^2 + bh_{t-1} + \gamma V_t$

PANEL A

Dependent Variable: R_t

Mean Equation	Coefficient	z-Statistic
Constant	-0.0020	-1.6002
Variance Equation		
ω	9.28E-05	0.6209
a	0.1494	2.9473*
b	0.7933	14.166*
VOLUME	-6.24E-06	-0.2913

PANEL B

Dependent Variable: R_t

Mean Equation	Coefficient	z-Statistic
Constant	-0.0020	-1.2051
Variance Equation		
ω	0.0001	1.6359
a	0.1507	1.6199
b	0.5949	2.5424*
LNVOL	0.0002	0.5142

PANEL C

Dependent Variable: R_t

Mean Equation	Coefficient	z-Statistic
Constant	-0.0023	-1.8174*
Variance Equation		
ω	1.75E-05	0.6380
a	0.1609	3.2701*
b	0.7948	15.246*
VOL	1.39E-08	0.7012

* Significant at the 5% or 10% level.

TABLE 12. GARCH (1,1) Model: $R_t = a_0 + a_1 R_{t-1} + a_2 V_t + \varepsilon_t$

$$h_t = \omega + a\varepsilon_{t-1}^2 + bh_{t-1}$$

PANEL A

Dependent Variable: R_t

Mean Equation	Coefficient	z-Statistic
a_0	-0.0218	-1.7941*
R_{t-1}	-0.0186	-0.3358
VOLUME	0.0028	1.5776
Variance Equation		
ω	5.52E-05	1.978399*
a	0.1629	2.8997*
b	0.7736	11.684*

PANEL B

Dependent Variable: R_t

Mean Equation	Coefficient	z-Statistic
a_0	-0.0021	-1.6783*
R_{t-1}	-0.0178	-0.3186
LNVOL	0.0006	0.2737
Variance Equation		
ω	5.19E-05	2.0908*
a	0.1599	2.9491*
b	0.7819	12.840*

PANEL C

Dependent Variable: R_t

Mean Equation	Coefficient	z-Statistic
a_0	-0.0047	-2.0606*
R_{t-1}	-0.0218	-0.3937
VOL	2.09E-06	1.1127
Variance Equation		
ω	5.29E-05	1.9899*
a	0.1594	2.9039*
b	0.7804	12.318*

* Significant at the 5% or 10% level.

TABLE 13. GMM Models: $|R_t| = \omega + aV_t + \gamma|R_{t-1}| + \varepsilon_t$

$$V_t = \phi + \lambda|R_t| + \mu V_{t-1} + \xi_t$$

PANEL A

Dependent Variable: $|R_t|$

Instrument list: $|R_{t-1}|$ $VOLUME_{t-1}$

Variable	Coefficient	t-Statistic
ω	0.0521	3.2153*
VOLUME	-0.0051	-2.2019*
$\|R_{t-1}\|$	0.1313	2.4680*
J-statistic	3.10E-27	

Dependent Variable: VOLUME

Instrument list: $|R_{t-1}|$ $VOLUME_{t-1}$

Variable	Coefficient	t-Statistic
ϕ	2.0310	5.0668*
$\|R_t\|$	-3.7133	-0.4780
$VOLUME_{t-1}$	0.7126	17.125*
J-statistic	1.13E-25	

PANEL B

Dependent Variable: $|R_t|$

Instrument list: $|R_{t-1}|$ $LNVOL_{t-1}$

Variable	Coefficient	t-Statistic
ω	0.0174	11.826*
LNVOL	-0.0013	-0.2416
$\|R_{t-1}\|$	0.1317	2.4509*
J-statistic	5.85E-31	

Dependent Variable: LNVOL

Instrument list: $|R_{t-1}|$ $LNVOL_{t-1}$

Variable	Coefficient	t-Statistic
ϕ	-0.1206	-0.5975
$\|R_t\|$	6.1107	0.6049
$LNVOL_{t-1}$	-0.2912	-6.0996*
J-statistic	7.01E-31	

PANEL C

Dependent Variable: $|R_t|$

Instrument list: $|R_{t-1}|$ VOL_{t-1}

Variable	Coefficient	t-Statistic
ω	0.0220	7.8329*
VOL	-4.08E-06	-2.3071*
$\|R_{t-1}\|$	0.1305	2.4619*
J-statistic	1.18E-29	

Dependent Variable: VOL

Instrument list: $|R_{t-1}|$ VOL_{t-1}

Variable	Coefficient	t-Statistic
ϕ	557.1465	2.4108*
$\|R_t\|$	-10108.03	-1.0882
VOL_{t-1}	0.6870	14.1523*
J-statistic	2.44E-29	

* Significant at the 5% level.

TABLE 14. Pairwise Granger Causality Tests (FTSE/ASE-20)

PANEL A

Null Hypothesis:	Obs	F-Statistic	Probability
RETURN does not Granger Cause VOLUME	521	2.68663	0.0307*
VOLUME does not Granger Cause RETURN		3.16840	0.0137*

PANEL B

Null Hypothesis:	Obs	F-Statistic	Probability
RETURN does not Granger Cause LNVOL	521	2.78645	0.0260*
LNVOL does not Granger Cause RETURN		3.33706	0.0103*

PANEL C

Null Hypothesis:	Obs	F-Statistic	Probability
RETURN does not Granger Cause VOL	521	2.00533	0.0925
VOL does not Granger Cause RETURN		2.89476	0.0217*

*Reject the Ho.

TABLE 15. Pairwise Granger Causality Tests (FTSE/ASE MID 40)

PANEL A

Null Hypothesis:	Obs	F-Statistic	Probability
VOLUME does not Granger Cause RETURN	411	2.00146	0.0935
RETURN does not Granger Cause VOLUME		0.81611	0.5154

PANEL B

Null Hypothesis:	Obs	F-Statistic	Probability
LNVOL does not Granger Cause RETURN	411	0.50039	0.7354
RETURN does not Granger Cause LNVOL		0.76051	0.5514

PANEL C

Null Hypothesis:	Obs	F-Statistic	Probability
VOL does not Granger Cause RETURN	411	1.19304	0.3132
RETURN does not Granger Cause VOL		0.27042	0.8969

Theory and Evidence on the Main Factors of Entrepreneurship in Greece

Margarita Papada [1]

Abstract:

Entrepreneurship is directly affecting employment, profitability, and sustainable growth. According to Schumpeter, entrepreneurship is identified to innovation activities under the factors of risk and uncertainty. The main objective of this paper is to provide greater understanding of those factors which determined the role of entrepreneurship. It presents an effort to develop some missing links among theory and practice and moreover to decrease the conceptual noise often present in the discussions on this matter. In addition, this paper tries to specify the main determinant factors, the elements and relations that seem to be essential to the conceptual core of the entrepreneurship. The characteristics of the entrepreneurship process are examined: its nature, sources and some of the factors shaping its development. Particular emphasis is laid on the role of entrepreneurship based on the fundamental distinction between theory and empirical evidence. These concepts recur throughout the paper and particularly in discussions on the nature and specifications of the systems approach. The paper concludes by summarizing some of the major findings of the discussion and pointing to some directions for future research activities.

Keywords: Entrepreneurship, innovation, risk, uncertainty, sustainable growth.

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SOCIAL CAPITAL AND ECONOMIC GROWTH:

THE CASE OF GREECE

by Asimina Christoforou

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Social Capital and Economic Growth: The Case of Greece

Asimina Christoforou*

Abstract:

Social capital refers to the stock of social relations, based on norms and networks of cooperation and trust, that spillover to the market and state to enhance collective action between formal actors and achieve improved social efficiency and growth. Notwithstanding the paucity of available data and references, we shall attempt to evaluate the content and context of social capital in Greece and its capacity to enhance economic growth. The first step towards developing a consistent and integrated framework concerning the nature of social capital and its relationship to socioeconomic performance is to examine the factors that determine the development of social capital. The contribution of this paper is to offer insight on the determinants of social capital in Greece, compared to the European Union (EU). For this purpose, we regress an index of individual group membership, derived from the European Community Household Panel (ECHP), on a set of individual as well as aggregate determinants of social capital.

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I. Introduction

Much research has been dedicated to exploring the determinants of economic growth between countries and regions. The standard economic literature points to such factors as the relative stock of physical and human capital, the technological capacity of the economy, the capability to produce and diffuse knowledge and innovation, the management skills of leadership in business and state, as well as the degree of liberalization of domestic and international markets. Nevertheless, economic analysis has offered less attention to the context of social regulation in which development and reform is promoted. In our analysis we examine the impact of features of social organization, which include trust, norms and networks, and fall under the concept social capital.

Social capital contributes to economic growth by highlighting the importance of cooperation and trust within the firm, the market and the state. The interdependence between decisions of individual agents and the emergence of externalities and common goods, makes cooperation imperative to maximizing social welfare. The superiority of social cooperation has long been documented in economic and social thought. But social capital, as social norms and networks, sustains cooperation by emphasizing its intrinsic value and its pursuit as an end in itself. It is a mixed-motive cooperation, in which individual behavior takes account of its effects on the welfare of others, alongside its own. In this manner, it operates as an internal commitment mechanism to resolving the social dilemma or collective action problems from free-riding and narrow-interested calculation.

Empirical work on social capital, which covers a wide spectrum of social science disciplines, attribute differences between regions and countries in the level and rate of economic and social development to differences in the available stock of social capital. Regions or countries with relatively higher stocks of social capital, in terms of generalized trust and widespread civic engagement, seem to achieve higher levels of growth, compared to societies with low trust and low civicness (e.g. Brown and Ashman, 1996; Heller, 1996; Knack and Keefer, 1997; Krishna and Uphoff, 1999; Ostrom, 2000; Uphoff, 2000; Rose, 2000). According to these studies, social capital contributes to efficiency and growth by facilitating collaboration between individual conflicting interests towards the achievement of increased output and equitable distribution.

Additionally, recent literature has focused on the determinants of social capital. This constitutes the first step towards developing a consistent and integrated framework concerning the nature of social capital and its relationship to socioeconomic performance. A

number of studies have empirically tested the impact of individual- and aggregate-level factors on the components of social capital, that is, on social trust and group membership (e.g. Helliwell, 1996; Brehm and Rahn, 1997; Krishna and Uphoff, 1999; Glaeser et al, 2000; Costa and Kahn, 2001; Rothstein and Stolle, 2001). Some of these tend to emphasize the role of individual factors in determining the incentive of individuals to invest in social capital, such as personal income and education, family and social status; others offer greater weight to the effect of more institutional or systemic factors, such as income inequality, confidence in government, impartiality of policy-making bodies, and prior patterns of cooperation and association amongst individuals in a group.

The contribution of this paper is to offer insight on the determinants of social capital in Greece, compared to the European Union (EU). We begin our analysis by defining social capital in Section II. We adopt a rather multi-disciplinary approach and introduce views that originate from research in social science disciplines other than economics. Our aim is to examine the implications of the literature on the potential of social capital in Greece to support reform and growth. Thus, in Section III we provide a short overview of references on the evolution of Greek civil society and the extent of social participation in policy-making for reform and development. We discover here that a prior civic tradition of clientelism under arbitrary rule, the interference of special-interest groups and the lack of credibility and impartiality from the part of the state created distrust and uncertainty, at the expense of reform and growth. We continue in Section IV to examine the determinants of social capital in Greece and the EU. For this purpose, we regress an index of individual group membership, derived from the European Community Household Panel (ECHP), on a set of individual as well as aggregate factors of social capital. Our empirical findings provide evidence on the impact of both individual and institutional characteristics on group membership. Furthermore, they direct us to possible means of rebuilding patterns of participatory and cooperative behavior, especially in countries with low levels of trust and civicness, such as Greece. We discuss the issue of social capital reconstruction in Section V, where we draw some concluding remarks.

II. Defining social capital

In brief, social capital is a broad term encompassing the social norms and networks facilitating collective action for mutual benefit. But what type of norms and networks constitute social capital? What are their specific features and functions in resolving the

collective action problem and producing mutual benefit? To answer these questions we shall present the main approaches adopted in the literature.

An approach that remains central to social capital research is expressed by the political scientist R. D. Putnam. In his seminal work, *Making Democracy Work* (1993), Putnam conducts a comparative study of Italian regions and attributes the divergence in institutional and economic performance between the North and the South to differences in their relative endowment of what he calls social capital. According to Putnam (1993), social capital includes "the features of social organization, such as trust, social norms and networks that can improve the efficiency of society by facilitating coordinated action'' (p.167). Cooperation is often required between workers and managers, among political parties, between the government and private groups, between firms and voluntary organizations. Social norms and networks "provide defined rules and sanctions for individual participation in organizations" (p.166), and promote reciprocity and cooperation "founded on a lively sense of the mutual value to the participants of such cooperation, not a general ethic of the unity of all men or an organic view of society" (p.168). On the whole, norms and networks provide for an internal mutual commitment mechanism such that "rational individuals will transcend collective dilemmas" (p.167).

However, it is important to distinguish the type of cooperation produced by social capital from that predicted by standard game theory. Putnam states that "game theory underestimates the ability of cooperative human behavior, and actually underpredicts voluntary cooperation" (1993, p. 166). He speaks of a type of cooperation that "articulates the use of pre-existing social connections between individuals to help circumvent problems of imperfect information and enforceability" (p. 169). Pre-existing social connections between individuals range from kinship ties to networks of civic engagement that encompass broader segments of society and support collaboration at community and regional level, such as professional groups, sports clubs, cooperatives, mutual aid groups, rotating credit associations, cultural associations and voluntary unions. The essence of social norms and networks is that they are built up for reasons other than their economic value to participants (Arrow, 2000). Putnam's claim was that membership in associations strengthens political and economic efficiency even though the associations themselves play no role in either the polity or the economy.

In this light, Putnam uses indices of civil society and political participation to measure the stock of social capital. These are indices of participatory behavior and express the extent to which individuals fulfill obligations as citizens (voter turn-out at referenda) and members of social groups (number of professional, cultural and leisure associations). Most of the

empirical literature on social capital continues to use indices of civicness and group membership, along with indices of generalized interpersonal trust, to measure social capital.

But not all types of social connections and organizations have a positive effect on social efficiency and economic performance. As J. Coleman, from the sociological perspective, puts it, although "a group within which there is extensive trustworthiness and extensive trust is able to accomplish much more than a comparable group without that trustworthiness and trust" (1988, p. S101), "a given form of social capital that is valuable in facilitating certain actions may be useless or harmful to others" (p. S98). M. Olson (1971) sets it bluntly when he refers to the activity of special-interest groups. Special-interest organizations for collective action represent a narrow segment of an economy's income-earning capacity and yet manage to redistribute more of society's income to themselves through lobbying and monopolistic competition. These distributional coalitions as Olson calls them make the economy less productive and less socially efficient.

Another question that arises is how norms and networks evolve. The point to note from Putnam's work is the public good nature of norms and networks, which "increase with use and diminish with disuse" (1993, p. 170). Social relationships die out if not maintained and norms depend on regular communication between individuals and groups. Trust between individuals, also mentioned as a component of social capital in numerous studies, "lubricates cooperation. The greater the level of trust within a community the greater the likelihood of cooperation. And cooperation itself breeds trust" (p. 171). Thus, the creation and destruction of social capital is marked by virtuous and vicious cycles. However, such a view does not suffice to explain the emergence or destruction of norms and networks; it ignores the role of factors other than a feedback or path dependency process that affect social capital accumulation. Critics such as M. Levi (1996) point to the role of governments: trust in government is key to generating generalized interpersonal trust and minimizing the adverse effects of narrow-interest organizations. This is achieved through rules and institutions which ensure transparency, fairness and credibility of government actors. Rothstein and Stolle (2001) offer empirical evidence by regressing generalized trust on indicators of the institutional impartiality of government officials.

Others, for instance the economist E. Glaeser, stress the role of individual characteristics, such as income and education, in determining the stock of social capital which individuals invest in to obtain influence, social status and access to networks. The empirical literature confirms the impact of individual characteristics on group membership (e.g. Glaeser et al, 2000; Costa and Kahn, 2001). For instance, higher levels of income and education coincide

with a strong probability for membership, trust and cooperation from the part of the individual. This may lead to the idea that not all individuals may enjoy access to the stock of social capital available in a society, on account of low income or other characteristics that lead to social exclusion and hinder their incentive to cooperate. One of the most important factors viewed in this light is income distribution and poverty: relatively high income inequality, as well as high poverty rates, appear to weaken individual incentives to cooperate and act collectively (Knack, 1999). Our view is that such circumstances have a negative impact on social capital, not only because of absolute poverty, with its adverse effects on the physical ability of individuals to respond to their role as social actors in groups; also because of relative poverty, which creates sentiments of discrimination and injustice, thus leading to distrust towards people, collective action and society as a whole.

Apparently, distrust towards government and organized groups, especially in authoritarian regimes and sectarian societies, may hinder incentives for collective action and the development of social capital. But social capital can be co-produced by state and local societal actors, such as grassroots and regional organizations. According to regional case studies conducted in rural Mexico by J. Fox (1996), a political scientist, the construction of social capital depends on the synergy of state and society: state reformists create political opportunities, following pressure from local groups for political, civil and social rights; local groups produce social energy, shared values and common goals, following support from international development or human rights groups and inspired leaders, who are willing to pay the 'irrational' start-up costs of mobilization. A notable point to be made is that state-society synergy promoted social capital accumulation and equitable growth even in an environment of extreme social divergence and conflict. B. Fine (2001), an economist and critic of the concept of social capital, agrees that social capital cannot be addressed outside of a context of conflict and power relations. A response to this sort of skepticism may come from P. Heller (1996), a sociologist, who conducted case studies in the region of Kerala, India. He observes that the synergy between state and society creates the institutional forms and political processes required for negotiating the group compromises through which redistribution and growth can be reconciled.

III. Social capital in Greece: An overview of the relevant literature

With regards to the stock of social capital in Greece, almost no data is available on the standard trust and civic engagement indicators used throughout the literature.[1] At the national level, only the European Community Household Panel (ECHP), which consists of a sample of households and individuals for each of the EU member-states, includes a question that proxies civic engagement indicators and refers to the membership of respondents in different social groups and organizations (sports or entertainment clubs, local or neighborhood organizations, political parties, etc). In TABLE 1 of the Appendix we depict the proportion of the respondents in each country that claim to be a member of a group. Data has been derived from Wave 6 (1999) of the ECHP. Evidently, levels of group membership vary widely between countries in the EU-15, ranging from 65.1% in Denmark, to a low of 8,9% in Greece.

Thus, Greece has the lowest level of group membership compared to the other EU member-states. This is in line with the argument, developed in studies we turn to later on in this section, that Greek civil society is weak and implies a low stock of social capital and trust. It is also evident from TABLE 1 that countries with lower levels of group membership tend to coincide with countries with lower levels of per capita GDP. By computing the Pearson's correlation coefficient between levels of group membership and per capita GDP in our set of countries, we derive a relatively high and positive coefficient of 0.784, statistically significant at the 1% level.

If our assumption of the positive relationship between social capital and GDP holds true, then the low stock of social capital in Greece may explain conditions of slow reform and economic backwardness. The development of social capital in Greece has been hampered by two factors. The first refers to the economic and political instability, which characterizes most of the country's modern history, and is marked by foreign conquest and intervention, waves of refugees and immigrants, and periods of civil war and dictatorship. The second involves the type of social capital that emerged and managed to prevail in the economy and polity. It was affected by norms and networks based on patron-client relations, nepotism and corruption, which were unable to play a constructive role in promoting economic development and social reform in the country.

[1] One of the most traditional datasets used in the empirical social capital literature, the World Values Survey, includes data for nearly 90 countries around the globe, but not Greece. Moreover, the European Social Survey, as an analogous to the General Social Survey conducted in the US and used widely in the analysis of social capital, was launched in the late 1990's for a set of major European countries, in which Greece has only recently participated.

Events of authoritarian and arbitrary rule, social divisions and political conflict during Greece's modern history, created a sustained impact on contemporary social capital and economic growth. As Lyberaki and Tsakalotos state: "The Ottoman heritage of living under authoritarian, but more importantly arbitrary and volatile set of rules, and the bureaucratic, and often authoritarian but always inefficient state, of the twentieth century have played an important part in this underdevelopment of civil society … One of the results, which we would argue has been particularly important for the economy, is a particular expression of short-termism. Arbitrary and changing rules of the state, and clientelistic ties that are 'here today and gone tomorrow' put a premium on extracting the maximum gain from any situation as quickly as possible and make cooperation with others in horizontal relationships very risky" (2000, p. 10). According to the authors, this partly explains why the Greek economy has been more successful, since at least later Ottoman times, in such areas as commerce, banking, shipping and tourism, and the continuing prevalence of very small-scale family-based firms. These economic activities could be nurtured within smaller groups of family and kin, which, in a low-trust society, offer defense against uncertainty and opportunistic behavior. But these activities and small-scale family establishments were extremely vulnerable to regional and global competition after EEC accession and the liberalization of domestic markets. Thus, they extended to patron-client relations in dealings with the state to gain preferential protection and privileged access to public services, which further inhibited reform and growth.

This brings us to our second factor behind the backwardness of civil society, which identifies with the persistence of clientelistic and paternalistic relations in both the private and public sector in Greece. Despite the restitution of democracy in 1974 and the steps taken towards social, political and economic reform, by expanding constitutional rights and legal protection, and promoting medium- and long-term economic programs, the development of the civil society has been a very slow process. In the post-1974 era, according to Mouzelis and Pagoulatos (2002), new systemic / institutional imbalances were created that undermined what strength civil society was gaining. The authors observe that partitocratic and plutocratic elements were intensified as political parties and economically powerful individuals continued to compete for the control of organized groups, trade unions and non-governmental organizations. Partitocracy, in the form of favoritism (rousfeti) and plutocracy, in the form of intermeshed interests (diaplekomena sumferonta), permeated Greek civil society, and this had adverse effects on economic reform and growth.

Within such a context, state officials and sectional interest groups create such distortion and uncertainty with regards to the allocation of the costs and benefits of a certain reform policy,

that a majority can oppose it even if it will benefit all. To explore this argument Lyberaki and Tsakalotos (2000) present a case study of two reform initiatives in Greece: the first was promoted by the Greek socialist party, PASOK, in the 1980s; the second by the conservative New Democracy in the early 1990s. Despite differences, both initiatives shared the common goal of combating the inefficiency of public bureaucracy, the prevalence of state intervention and mediation through clientelistic relations. However, mechanisms of economic planning and policy proved more difficult to implement, because the Greek social formation was particularly underdeveloped in social capital. As Lyberaki and Tsakalotos note, PASOK's policies were crucially undermined by the role of clientelistic practices in the appointment of personnel and in the use of the new institutions to consolidate its social and electoral base, thus reproducing the practices of the existing public administration. The New Democracy's privatization reform strategy was hardly any more effective, as it failed to gain support, not only from public sector employees (segments of which might be considered extensions of the prior 'protectionist' regime), but also from the Federation of Greek Industries, which although could have been regarded as a natural ally of pro-market reform, it never became a major pro-privatization lobby. Powerful economic interests against reform included public sector suppliers and smaller private companies that feared competition.

In other words, reform initiatives suffered from the absence of state-society synergy relations described in our previous section. State-society synergy relations are crucial to the effective management of reform policy because they secure the collaboration of stakeholders in determining common developmental goals. In Greece, implementation was impaired because social partners who had something to gain or lose from a particular set of measures had not been part of the decision-making process.

But even in the face of regional and global market integration, which appeared to reduce state intervention, the synergy between social partners to build social capital at a local level was crucial to economic reform and growth. Paraskevopoulos (2001) explores this argument by explicitly measuring the stock of social capital in Greece – between the North and South Aegean - and comparing levels of socioeconomic reform and development at the regional level. Based on results of social network analyses, the author observes that both the Dodecanese and the Cyclades prefectures in the Southern Aegean demonstrate a general exchange network between local social actors that is dense and horizontally structured, providing alternative leadership roles and public-private synergies. On the contrary, the prefectures of the Northern Aegean islands (Lesbos, Chios and Samos) are characterized by a weaker local institutional structure due to the less dense and highly centralized relations around the Regional Secretariat, that is, around the local administrative body of the state. The

loose connections between public and private actors and the central role of the state within the general exchange network in this region indicate the operation of vertical structures and thus the low level of collective action for regional development. The weaker institutional capacity of the Northern Aegean compared to the South is also confirmed by qualitative analysis that points to the relatively lower level of voluntary participation in organizations, which also draws from the weak civic traditions inherited from Ottoman times. The author uses this information to explain the divergences observed between the North and South Aegean, and the relative ineffectiveness of local actors in the North to exploit the European Structural Funds and promote development.

The overall conclusion drawn from our analysis is that one of the reasons why post-1974 reform and development were very slow in Greece was the low stock of social capital. A prior civic tradition of clientelism under arbitrary rule, the interference of special-interest groups and the lack of credibility and impartiality from the part of contemporary political institutions impaired the strength of Greek civil society. These were factors that excluded the civil society from the national reform process, and inspired its members with a sense of suspicion and distrust, which permeated all aspects of economic, social and political interaction (Schmitter, 1995). Nevertheless, more research needs to be undertaken to measure the individual and aggregate determinants of social capital in Greece and the impact of dominant norms and networks on socioeconomic development. It is the former of these issues we turn to in the following section.

IV. Determinants of social capital: A comparative study between Greece and the EU

Our present task is to determine the set of individual and aggregate factors that influence social capital in Greece, compared to the EU. For this purpose we conduct a series of regression analyses over a sample of individuals from Greece and the EU (the former 15 member-states, except Luxembourg). The dependent variable representing social capital is measured by the group membership index derived from the European Community Household Panel (ECHP). In the section on social relations, the ECHP questionnaire includes a question which asks individual respondents to declare whether or not they are a member of any club or organization, such as a sport or entertainment club, a local or neighborhood group, a party etc. The variable is dichotomous and takes a value of 1 when the individual declares that he/she is a member of a group, and a value of 0 when he/she is not.

Because of the dichotomous nature of the group membership variable, we estimate the following logistic regression model:

$$P_i (y_i = 1 \mid x_i) = e^{xi\,\beta} / (1 + e^{xi\,\beta}) \Rightarrow L_i = \ln P_i / 1\text{-}P_i = x_i\,\boldsymbol{\beta}$$

Thus, we predict the probability of an individual being a member of a group conditional on a set independent variables $P_i (y_i = 1 \mid x_i)$. The set of independent variables to be included in the present analysis refer to characteristics of the individual, as well as aggregate features of the locality – region or country – in which the individual resides, in order to capture institutional or systemic determinants of group membership. The set of individual factors include personal income, education, working status, age, gender, and marital status, in accordance to the relevant literature on the determinants of social capital. The set of aggregate factors include regional or country dummies, or certain socioeconomic variables, as per capita GDP, unemployment and income inequality. Details on the description of variables and datasets can be found in TABLE 2 in the Appendix, along with some descriptive statistics in TABLE 3.

There is skepticism in the literature of whether group membership, as an indicator of participatory behavior, is an appropriate measure of social capital. These measures were initially used in the social capital literature to empirically examine the nature and impact of social capital in the society and economy (Putnam, 1993; Helliwell, 1996). However, other empirical attempts examining the impact of group membership on economic aggregates, do not confirm statistically significant results (Knack and Keefer, 1997). The argument is that group membership cannot be used as an indicator of social capital, because it encompasses interactions between individuals and social groups that function under different and conflicting motives, conditions and social outcomes. Social capital thus defined becomes a vacuum, and includes members of all types of organized groups and associations. In practice, group membership may overestimate the stock of social capital as it also captures passive forms of membership as well as participation in groups with less socially benign goals.

The standard approach to overcome this problem had been to distinguish between socially beneficial and socially harmful groups, i.e. in heuristic terms between “Putnamian” groups – those with a horizontal network structure and cooperative spirit, which have a positive social impact – and “Olsonian” groups – those with a more or less vertical organizational structure serving special interests at the expense of the common good. But Knack and Keefer (1997), who employ this distinction to explain annual growth in a cross-country study, do not produce statistically significant results for either. One could perhaps speculate that the reason for this finding is that social groups are not purely either “Putnamian” or “Olsonian”: at different

points in time one single group may behave in either way; the same is true for different segments of one group or a class of groups at one point in time. Furthermore, despite the multiplicity of motives and outcomes in the interaction within and between groups, one might be able to draw a common thread through all types of participatory behavior, which is located in the meaning of collective action. In this sense, although some groups representing perceptions and attitudes at the expense of public interest may exist, they may very well trigger the collaboration and synergy between segments of the rest of society to promote generalized norms and networks of reciprocity, equity and fairness. Thus, group membership may still be regarded as a proxy to social capital when viewed as an indicator of collective action towards establishing generalized norms and networks across different groups.

We now turn to our regression results, presented in TABLE 4a and 4b of the Appendix. TABLE 4a records results for Greece and the EU, in which the set of aggregate independent variables are given by regional dummy variables for Greece, and country dummy variables for the EU. TABLE 4b repeats estimation for the same set of individual independent variables for Greece and the EU, but replace aggregate dummy variables with socioeconomic indicators that appear in the literature to be associated with social capital. These indicators have been calculated at the regional level for Greece and at country level for the EU.

The first point worth noting is that amongst all variables included in the analysis, education, and particularly the acquisition of a tertiary education degree, has one of the highest coefficients and is statistically significant at the 1% level for all equations estimated in the present analysis. In Greece, moving to a tertiary level degree from a less than secondary level education degree increases the odds in favor of being a group member by 4.3, and by 1.7, from a secondary education level degree. In the EU, the impact is more moderate, since obtaining a tertiary education degree from having less than secondary level education increases the odds of being a group member by around 2.5. The role of education has been widely documented in the social capital literature. Empirical work based on regression analyses, such as that of Helliwell (1996), Brehm and Rahn (1997), Glaeser et al, (2000), Costa and Kahn (2001), Rothstein and Stolle (2001), confirm the significance of education in enhancing individual incentives to group membership and contributing to the expansion of social capital. Education is viewed as the factor developing opportunities for collective action, either through offering access to social networks and personal acquaintances, or through cultivating values and morals leading to a sense of citizenship and solidarity.

Following education, age is another variable that appears in most empirical work on social capital. The studies mentioned above provide evidence of the significance of age as a

determinant of social capital. Particularly, Glaeser et al. (2000), who examine a sample of individuals from the US, predict an inverted U-shaped profile of social capital over the lifecycle, so that group membership is higher when a person is in his/her 30s or 40s, i.e. during one's working period. Similar conclusions may be drawn for our Greek sample: coefficients are highest for the age group from 36 to 45 years. However, results produced by the EU sample do not offer support to the lifecycle hypothesis in social capital accumulation at the individual level. One observes higher coefficients at the 56 to 65 age group, i.e. the age group around retirement, followed by the youngest age group of 16 to 25, which is still at school or investing in human capital. A possible explanation for behavioral patterns observed in the EU compared to Greece is that youth and retirees are encouraged to take part in social groups and organizations, as established norms regard them as active and productive members of society.

Another variable belonging to the spectrum of individual factors tested in the empirical literature is income. The relationship between income (here personal, net of taxes) and group membership is positive and statistically significant at the 1% level. According to Glaeser et al. (2000) the positive relationship between income and group membership provides evidence that the decision to become a member of a group is not driven exclusively by the opportunity cost of time. Indeed, a number of empirical studies conducted outside the field of social capital research document the importance of social benefits (meeting new people) and moral benefits (helping someone or society in general) in individuals' decisions to undertake voluntary or unpaid work (e.g. Freeman, 1997; Justor and Stafford, 1991). However, it may be argued that the more affluent will have a higher probability to participate, because they are more likely to purchase group membership as leisure or a luxury consumption good. This would have implied the inverse relationship between group membership and employment (paid work), which is not supported by our findings: the employment variable in our regressions has a coefficient with the expected negative sign, but is statistically insignificant in Greece and of negligible magnitude in the EU.

Unlike employment, unemployment seems to be more important in determining the individual's incentive to be a member of a group. Being unemployed creates a stronger disincentive for group membership. Although the magnitude and sign of coefficients appear to be similar between Greece and the EU, their statistical significance varies, as they are significant at the 1% level only in the EU. It might be argued that the unemployed lack income to afford group membership or they spend their plentiful leisure job-seeking and securing a source of minimum income, rather than participating in groups. Additional factors affecting the individual's incentive to participate when facing unemployment might lie in

sentiments of distrust he/she develops towards other social groups and society as a whole, which are considered to have deprived him/her of opportunities for employment and self-development (see Brehm and Rahn, 1997).

Finally, gender and marital status are considered as determinants of social capital. Being male as opposed to be being female appears to increase the probability of group membership. Coefficients for Greece and the EU are statistically significant at the 1% level. It is perhaps the case that our results are not capturing the social capital produced within the home and family, or even within family businesses, quite often in the hands of female co-heads of the household, whereas our group membership variable includes forms of social capital outside the home. Furthermore, even if women participate in the labor force, and are thus exposed to a series of at least work-related social organizations, group membership may not increase, as a result of carrying most household and family obligations, as Costa and Kahn (2001) observe for working women in the US. Evidence of this is provided here from our variable of marriage. By restricting the sample to men and then to women in the EU, the marriage coefficient is positive and twice as high for men (0.185) than women (0.096). Thus, family obligations do not hamper incentives for group membership, but evidently there is a discrepancy between men and women.

Let us turn now to the set of aggregate variables included in our equations. Regression results support the argument that characteristics of the region or country in which the individual resides have a significant impact on his/her incentive to participate in groups. In Equation 1, regional dummies in Greece and country dummies within the EU are statistically significant at the 1% level. In Greece, individuals are more likely to be members of groups if they live in any other region outside that of Attiki, i.e. outside of the capital Athens and its wider suburban area. Being a resident of Central Greece, which includes Ipiros, the Peloponese, the Ionian Islands and Sterea Ellada, increases the probability of being a member of a group. To explain this result one might argue that Central Greece has higher levels of group membership on account of either more favorable socioeconomic conditions or a greater supply of social organizations. But according to data it has the lowest per capita GDP and the highest income inequality amongst all regions, whereas the bulk of organizations tend to concentrate in Attiki (VOLMED, 1997; Panagiotidou 2000). The answer may thus lie in Greece's modern history. The relatively higher stock of social capital observed in parts of Central Greece may be partly due to the fact that these regions had not been under Ottoman rule, which spread distrust and weakened Greek civil society, as we discussed in the previous section.

In Europe, from the results in Equation 1, it is evident that in all other European countries individuals are more likely to be members of groups than in Mediterranean countries. This is line with arguments that social capital and civil society in countries of the South of Europe are underdeveloped. On the other hand, it appears that residents of Nordic countries, which include Denmark, Sweden and Finland, are the most likely to be members of groups, compared to the rest of Europe. The regression coefficients imply an increase in the odss by 4.9, compared to the Meditteranean South. This is also in agreement with features of social regulation in Nordic countries, which is based on the operation of corporatist institutions (see Henley and Tsakalotos, 1993).

The interesting point to note from our findings here is that Germany, despite its social economy (Sozialmarktwirtschaft), which has widely been documented in the literature (see Streeck, 1997), has one of the smallest coefficients. An explanation offered by Gaskin and Smith (1994) is that German civil society developed a distaste towards voluntarism and participation on account of its compulsory nature in Nazi Germany. Thus, norms and networks of cooperation obtained a more institutional or structural form, not captured by our group membership variable. Finally, the Agglosaxon countries portray strong incentives for group membership, despite their market liberalism. Apparently, social groups and organizations of the economy's voluntary sector work to supplement state welfare services, which create an environment termed mixed economy welfare or welfare pluralism. However, there is evidence that lack of cooperation between firms in Britain renders entrepreneurial activity less effective, compared to Germany and Japan (Burchell and Wilkinson, 1997). More importantly, government tactics to allocate the provision of social services to voluntary organizations might provoke competition, which might compl them to compromise their social aims and pursue commercial strategies in order to secure their own survival, as that of the target populations they serve (Salamon, 1993).

The next step was to investigate what socioeconomic characteristics of regions and countries affect the incentive of individuals to participate and become members of groups. Therefore, in Equation 2 we replace regional- and country-specific dummies with aggregate socioeconomic indicators: per capita GDP (as a share of EU per capita GDP), the total unemployment rate and income distribution. In the EU, we observe that per capita GDP, as an index of individual welfare, has a strong positive impact on the individual's incentive to become a member of a group. This result is not far from evidence provided in empirical work, such as that of Knack and Keefer (1997), that detect a positive impact of per capita GDP on trust and civic cooperation. Another aggregate socioeconomic factor widely mentioned in the literature is that of income inequality. Costa and Kahn (2001) find evidence of the impact of income

inequality, controlling for several other indices of social fragmentation, such as ethnicity. In our sample, we observe that for the EU an increase in income inequality has a strong negative effect on individual group membership. It may be the case that as relative income changes to become less equal within the population, individuals may build a sense of isolation and distrust towards society, and thus abstain from group participation. This may also be the case for aggregate unemployment, although to a lesser degree, since the coefficient for unemployment is negative, but smaller.

Although coefficients for the EU are statistically significant at the 1% level, for Greece only the unemployment rate is statistically significant at the 5% level. This may be due to the fact that comparing for only 4 regions in the same country may result in a relatively high correlation between variables, producing collinearity, which affects the statistical significance of coefficients. Thus, a more disaggregated regional distinction within Greece may be required to have wider variation in values of aggregate indices and detect their effects on individual group membership. At this point, we can only comment on the unemployment rate variable, which is twice as high than in EU, in absolute terms, and appears to have a negative impact on group membership.

V. Conclusions

In this paper we attempted to explore the relationship between social capital and economic growth. We can recall from Section II that social capital refers to the stock of social relations, based on norms and networks of cooperation and trust, that spillover to the market and state to enhance collective action between formal actors and achieve improved social efficiency and growth. We examined these hypotheses by focusing on features of social organization in Greece and their effect on economic reform and growth in Section III. The main conclusion was that a tradition of low civicness hampered reform and development as policy-makers failed to take under consideration the role and reaction of wider social groups and promoted projects in which the distribution of costs and benefits created uncertainty and thus social resistance. In Section IV, we investigated the determinants of social capital in Greece, compared to the EU, by regressing a set of individual, as well as institutional variables on an index of social capital, related to the incentive of an individual to become a member of a group. One conclusion drawn from our empirical analysis is that both individual- and aggregate-level factors determine the individual's participatory behavior. Furthermore, the

cross-country analysis of determinants of social capital might shed light on the means to rebuilding norms and networks of trust and cooperation for social well-being.

This brings us to one of the most difficult issues yet to be resolved in the literature: how can a region with low levels of trust and civicness rebuild its stock of social capital, and replace the acts of special-interest groups with generalized norms and networks of reciprocity, trust and cooperation? The practical importance of this issue is evident especially in Greece, where social capital is relatively low.

Based on regression results recorded in Section IV, we observe that in most countries of the EU factors like education and unemployment have a strong impact on the probability of an individual to be a member of a group. Thus, expanding education and employment opportunities would apparently increase the incentive to participate in groups and enhance the stock of social capital. Gender, marital status and age are also variables of equal importance. Women compared to men, are less likely to be members of groups, even after they enter the labor market and are exposed to a series of social and professional organizations. But it is not only women who confront obstacles to participating in social groups on account of traditional perceptions of their social role. In Greece, the working age group appears to be more likely to participate in groups, as opposed to the rest of Europe where younger or elder non-working groups are most likely to be members. Therefore for group membership to increase amongst women, youth and elders, norms and networks propagating the significance of their participation and service to society must be established. However, apart from individual factors, aggregate variables at the regional or country level seem to affect group membership. Although we must be cautious with interpreting results for Greece, given the rather small number of regions, we observed that lower per capita GDP and higher income inequality reduced the probability of group membership in EU, as opposed to Greece. Institutional differences across countries with regards to social capital and participatory behavior in particular were evident in our results. This is indicative of the fact that features of social capital abide to country-specific socioeconomic conditions and historical influences.

On the whole, individual and systemic factors imply that the reconstruction of social capital depends on the expansion of opportunities for social participation and cooperation to wider segments of the society and on changes in the tradition of countries of low trust and weak civil societies. According to regional or country case studies that appear in the social capital literature (e.g. Heller, 1996; Fox, 1996; Petro, 2001), changes in tradition were possible when social stakeholders in the reform process took part in mechanisms of political exchange and debate, and promoted state-society synergy. On the one hand, reformists in state

administration contributed to social capital by securing the right to association and building confidence in public institutions, through impartial, transparent and credible mechanisms of administration. For instance, only recently has the Greek government passed a law for non-governmental organizations, which offered recognition, as well as financial support, and boosted the activities and cooperation of the voluntary sector. On the other hand, local grassroots associations can build social capital from below by representing collective interest and legitimizing market and state practices in terms of social aims and common values. This depends not only on the strengthening of bonds within groups, but also on the bridging of bonds across groups, to create generalized norms and networks and promote the activities of more encompassing groups. For Greece, the weakness of civic society is not located in the lack of mutual bonds within groups as much as in the absence of bridging across local and regional groups.

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APPENDIX

TABLE 1: GROUP MEMBERSHIP IN THE EUROPEAN UNION

(former EU-15, except Luxembourg)

Countries	*Valid sample size*	*Proportion of Group [α] membership*	*Per capita GDP [β] (PPS)*
DENMARK	3983	65.1	25026
UNITED KINGDOM	8662	56.0	21598
FINLAND	7107	55.2	21442
AUSTRIA	6235	47.7	23484
IRELAND	5441	46.2	24133
NETHERLANDS	8916	44.8	23838
SWEDEN	5732	40.9	21620
BELGIUM	4989	37.3	23446
GERMANY	11204	28.9	22712
FRANCE	10680	27.4	20861
SPAIN	13020	24.5	17319
ITALY	15151	23.8	21158
PORTUGAL	11183	18.0	16065
GREECE	9324	8.9	14198
TOTAL ECHP sample	***121627***	***32.4***	*21131*
			r = 0,784 (p = 0,001)

[α] *Source :* European Community Household Panel, Wave 6, 1999 (European Commission).

[β] *Source :* Eurostat (2001), *Eurostat Yearbook: The Statistical Guide to Europe, Data 1989-1999*, General Statistics, Theme 1 (European Commission). Data from year 1999.

TABLE 2: DESCRIPTION AND DATA SOURCE OF VARIABLES

SET OF VARIABLES	DESCRIPTION AND DATA SOURCE
Individual level variables	
Group membership	Dichotomous variable with values $y_i = 1$, if the individual is a member of a group, and $y_i = 0$, if he/she is not member of group. Corresponds to ECHP data, Wave 6, 1999.
Natural log of personal net income	Interval variable of personal income of individuals, net of taxes. To assure comparability across European countries values in national currency were transformed in terms of purchasing power standards (PPS). In regressions, income was entered as natural log. Data from ECHP data, Wave 6, 1999.
Highest level of education completed	Set of dummy variables for completing less than secondary level - used as the baseline, for secondary level, and tertiary level education. Data derived from ECHP data, Wave 6, 1999, where it appears as an ordinal variable.
Working status	Set of dummy variables for being employed, for being unemployed, and being inactive, which was used as the baseline. Data from ECHP data, Wave 6, 1999, where it appears as an ordinal variable.
Age	Set of dummy variables for following age groups: 16-25, 26-35, 36-45, 46-55, 56-65, 66-75, 76-85. The latter age group was chosen as the baseline. Appears as an interval variable in the ECHP data, Wave 6, 1999.
Gender	Dichotomous variable with values $y_i = 1$ for male, and $y_i = 0$ for female. Data from ECHP data, Wave 6, 1999.
Marital status	Dichotomous variable with values $y_i = 1$, if married, and $y_i = 0$, if otherwise. Appears as ordinal variable in original from ECHP data, Wave 6, 1999.
Region of birthplace and residence	Dichotomous variable with values $y_i = 1$, if born in a region and lived there ever since, and $y_i = 0$, if lived in other region or country. Appears as ordinal variable in original ECHP data, Wave 6, 1999.
Aggregate level variables	
Greek Regions	Set of dummy variables for 4 regions, according to NUTS I level of regional classification: North (GR1), Central Greece (GR2), South (GR4), and Attiki (GR3). Data in ECHP data, Wave 6, 1999. North includes Thraki, Macedonia, and Thessaly; Central is Ipiros, Peloponese, Ionian Islands, Sterea Ellada, excluding Attiki; South is Crete and Aegean Islands; and Attiki is the prefecture of the capital city Athens.
European Countries	Set of dummy variables for member-states of former EU-15, with the sole exception of Luxembourg: Nordic countries (Denmark, Sweden, Finland); Agglosaxon countries (UK, Ireland); Benelux (Belgium, Netherlands); France; Austria; Germany; Mediterranean countries (Italy, Greece, Spain, Portugal). Data in ECHP data, Wave 6, 1999.
Natural log of per capita GDP	Gross domestic product at market prices. Current series in purchasing power standards (PPS) per head. Expressed as share of EU-15. In regressions, entered as natural log. For cross-European regressions, data from Eurostat (2001), *Eurostat Yearbook: The Statistical Guide to Europe, Data 1989-1999*, General Statistics, Theme 1, European Commission. For cross-regional regressions within Greece, data from Eurostat (2001), *Regions statistical yearbook, 2001*, European Commission.
Unemployment Rate	Total unemployment rate of men and women. Data for 1999. For cross-European regressions, data from Eurostat (2001), *Eurostat Yearbook: The Statistical Guide to Europe, Data 1989-1999*, General Statistics, Theme 1, European Commission. For cross-regional regressions within Greece, data from Eurostat (2001), *Regions statistical yearbook, 2001*, European Commission.
Income distribution	The ratio of the total income received by the 20% of the country's population with the highest income - top quintile, to that received by the 20% of the countries lowest income - lowest quintile; income should be understood in terms of equivalized household income. Data for 1999 from Eurostat (2002), *General Statistics: Structural Indicators*, European Commission, http://europa.eu.int/comm/eurostat .

TABLE 3: DESCRIPTIVE STATISTICS OF VARIABLES

SET OF VARIABLES	GREECE			EU-15		
	Mean	**Std. Deviation**	**N**	**Mean**	**Std. Deviation**	**N**
Group membership ($y_i = 1$, if member of group) ($y_i = 0$, if not member of group)	0.0909	0.2876	9324	0.3496	0.4768	121627
Natural log of personal net income	8.6816	1.0629	7174	9.0310	1.1439	110210
Highest level of education completed Set of dummy variables for:						
Less than secondary level	baseline	baseline	baseline	baseline	baseline	baseline
Secondary level	0.2978	0.4573	9570	0.2931	0.4552	130240
Tertiary level	0.1189	0.3237	9570	0.1851	0.3884	130240
Working status Set of dummy variables for:						
Employed	0.4312	0.4953	9574	0.5224	0.4995	130803
Unemployed	0.0510	0.2200	9574	0.0526	0.2231	130803
Inactive	-	-	-	-	-	-
Age Set of dummy variables for:						
16-25	0.1614	0.3679	9413	0.1576	0.3643	129819
26-35	0.1664	0.3724	9413	0.1925	0.3942	129819
36-45	0.1646	0.3708	9413	0.1868	0.3898	129819
46-55	0.1558	0.3627	9413	0.1675	0.37343	129819
56-65	0.1143	0.3514	9413	0.1330	0.3396	129819
66-75	0.1461	0.3532	9413	0.1097	0.3125	129819
76-85	-	-	-	-	-	-
Gender ($y_i = 1$, if male) ($y_i = 0$, if female)	0.4781	0.4995	9574	0.4812	0.4997	131386
Marital status ($y_i = 1$, if married) ($y_i = 0$, if otherwise)	0.6490	0.4773	9574	0.5901	0.4918	127694
Greek Regions Set of dummy variables for:						
North	0.3581	0.47946	9423			
Central	0.2738	0.44493	9423			
South	0.1317	0.3382	9423			
Attiki	-	-	-			
European Countries Set of dummy variables for:						
Nordic countries				0.1553	0.3622	131386
Agglosaxon countries				0.1080	0.3104	131386
Benelux				0.1465	0.3536	131386
France				0.0813	0.2733	131386
Austria				0.0475	0.2128	131386
Germany				0.0859	0.2802	131386
Mediterranean countries				-	-	-
Region of birthplace and residence	0.7504	0.4328	9222	0.7596	0.4273	93290
Natural log of per capita GDP	4.1242	0.1496	9423	4.5944	0.2018	131386
Unemployment Rate	11.4477	1.5163	9423	8.4979	3.8289	131386
Income distribution	5.9533	0.5461	9423	4.6117	1.0524	131386

TABLE 4a: REGRESSION RESULTS

Dependent variable y_i: Group membership, binary	**GREECE**		**EU-15**	
Independent variables x_i	$\beta =$ $\partial[\ln P_i/1\text{-}P_i] / \partial x_i$	$e^{\beta} =$ $[P_i/1\text{-}P_i]_1 / [P_i/1\text{-}P_i]_0$	$\beta =$ $\partial[\ln P_i/1\text{-}P_i] / \partial x_i$	$e^{\beta} =$ $[P_i/1\text{-}P_i]_1 / [P_i/1\text{-}P_i]_0$
Constant	-7.215*** (0.562)	0.001	-2.855*** (0.074)	0.058
Natural log of personal net income	0.319*** (0.059)	1.376	0.093*** (0.008)	1.097
Education: less than secondary level	-	-	-	-
completed secondary level	0.900*** (0.112)	2.459	0.399*** (0.018)	1.491
completed tertiary level	1.471*** (0.123)	4.355	0.723*** (0.019)	2.060
Working status: employed	-0.212 (0.139)	0.809	0.020 (0.021)	1.020
unemployed	-0.534* (0.291)	0.586	-0.439*** (0.038)	0.645
inactive	-	-	-	-
Age: 16-25	0.942*** (0.356)	2.565	0.271*** (0.041)	1.312
26-35	1.193*** (0.325)	3.297	0.090* (0.039)	1.094
36-45	1.449*** (0.322)	4.259	0.296*** (0.039)	1.344
46-55	1.325*** (0.318)	3.764	0.296*** (0.039)	1.344
56-65	1.235*** (0.310)	3.438	0.326*** (0.037)	1.385
66-75	0.813** (0.310)	2.254	0.220*** (0.037)	1.246
76-85	-	-	-	-
Male	0.277*** (0.095)	1.320	0.491*** (0.014)	1.546
Married	-0.001 (0.107)	0.999	0.135*** (0.016)	1.161
Region: North	0.432*** (0.114)	1.540		
Central	0.789*** (0.118)	2.201		
South	0.431*** (0.149)	1.539		
Attiki	-	-		
Region: Nordic countries (Denmark)			1.598*** (0.022)	4.945
Agglosaxon countries (UK, Ireland)			1.257*** (0.023)	3.514
Benelux (Belgium, Netherlands)			0.975*** (0.023)	2.651
France			0.294*** (0.027)	1.341
Austria			1.160*** (0.031)	3.190
Germany			0.181*** (0.027)	1.199
Mediterranean countries (Italy, Greece, Spain, Portugal)			-	-
N	6796		103884	
Pseudo R^2 (Cox-Snell index)	0.066		0.143	

TABLE 4b: REGRESSION RESULTS

Dependent variable y_i: Group membership, binary	**GREECE**		**EU-15**	
Independent variables x_i	$\beta =$ $\partial[\ln P_i/1-P_i] / \partial x_i$	$e^{\beta} =$ $[P_i/1-P_i]_1 / [P_i/1-P_i]_0$	$\beta =$ $\partial[\ln P_i/1-P_i] / \partial x_i$	$e^{\beta} =$ $[P_i/1-P_i]_1 / [P_i/1-P_i]_0$
Constant	-3.687 (4.204)	0.025	-10.250 (0.526)	0.000
Natural log of personal net income	0.339*** (0.061)	1.403	0.091*** (0.009)	1.095
Education: less than secondary level	-	-	-	-
completed secondary level	0.898*** (0.113)	2.456	0.515*** (0.020)	1.674
completed tertiary level	1.457*** (0.124)	4.291	0.997*** (0.022)	2.710
Working status: employed	-0.219 (0.142)	0.803	-0.005 (0.025)	0.995
unemployed	-0.469 (0.293)	0.626	-0.411*** (0.047)	0.663
inactive	-	-	-	-
Age: 16-25	0.938** (0.366)	2.554	0.206*** (0.047)	1.228
26-35	1.195*** (0.328)	3.304	-0.031 (0.045)	0.970
36-45	1.453*** (0.323)	4.277	0.214*** (0.045)	1.239
46-55	1.317*** (0.320)	3.732	0.265*** (0.044)	1.304
56-65	1.241*** (0.310)	3.459	0.328*** (0.042)	1.388
66-75	0.826** (0.311)	2.284	0.199*** (0.041)	1.221
76-85	-	-	-	-
Male	0.273*** (0.096)	1.314	0.477*** (0.017)	1.612
Married	0.007 (0.108)	1.007	0.146*** (0.019)	1.157
Region of birthplace and residence (born in a region and lived there ever since)	-0.220** (0.095)	0.802	0.072*** (0.020)	1.075
Natural log of regional per capita GDP share (EU base, PPS, 1999)	-0.925 (0.774)	0.396	2.025*** (0.099)	7.573
Unemployment (1999)	-0.083** (0.039)	0.920	-0.044*** (0.002)	0.957
Income distribution (SQ5/SQ1)	0.275 (0.220)	1.317	-0.192*** (0.015)	0.825
N	6674		77798	
Pseudo R^2 (Cox-Snell index)	0.069		0.129	

Statistical significance at 1% level ***, 5 % level **, 10% level *.
Standard errors in parentheses.

Effects of sociodemographic and economic factors on food expenditure in a prefecture of Greece

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ABSTRACT

During the last decades many sociodemographic and economic changes have taken place in the Greek countryside. These changes are in parallel with the new trends in household expenditure, such as decreased food expenditure, increased ready food consumption, decreased number of different food items consumed at home and a shift from time-intensive traditional foods to time-saving foods. The aim of this paper is to analyze food expenditure patterns in a prefecture of Greece with special emphasis on some selected characteristics that determine the living conditions of the Greek household. A door-to-door questionnaire survey was conducted to collect primary data for this study. The questionnaire gathered information on food expenditure, income and major sociodemographic characteristics (i.e. age, education level, household size, region of residence, number of earners, occupation etc) of 316 randomly selected married households. Regression models were used to estimate the impact of the above characteristics on the demand for food (food at home and food away from home). Income appeared to be the most important variable explaining the demand for food among Greek consumer units. Other sociodemographic characteristics such as age, education level, household size, presence of children, region of residence were also significant in explaining the demand for food.

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1. Introduction

During the last decades many sociodemographic and economic changes have taken place in the Greek countryside. Nowadays, the Greek countryside is characterized by the declining importance of agriculture, the increasing female participation in the labor market and the decreasing household size.

More specifically, even though in the Greek countryside the basic socioeconomic unit remains the farm household, only a small proportion of households are solely dependent on agriculture for their livelihoods. On the other hand, the largest proportion of households is mainly dependent on non-agricultural activities (Brangeon and Jégouzo, 1993; Gidarakou, 1999; Hill, 1999; Möhlendick and Muñoz-Torres, 1993) that have an effect on the income level and its sources.

Furthermore wives' work decisions are the major determinant of the Greek household's prosperity. Female participation in the labor market has grown rapidly since the 1970s due to industrialization and higher education (Shapiro and Shaw, 1983; Biddlecom and Kramarow, 1998; Pencavel, 1998; Zandvakili, 2000 and Dolado *et al*., 2001). Consequently, agriculture changed to a male principal occupation and young women searched for work in the services sector. Despite the fact that most women do not work in agriculture, they live however in households where agriculture is still among their activities.

The female labor force participation is associated not only with increased earning capacity but also with increased autonomy and greater decision-making capacity within the household. The presence of a female decision maker generally increases the share of the household budget allocated to food and children goods (Kennedy and Peters, 1992; Lloyd and Gage-Brandon, 1993; Browning *et al.*, 1994; Handa, 1996; Thomas, 1996; Lundberg *et al.,* 1997 and Levin *et al.*, 1999).

The growth of female labor force has as a result the decreasing number of children and consequently the decreasing household size (Shapiro and Shaw, 1983).

All these changes are in parallel with the new trends in household expenditure, such as decreased food expenditure (Clements and Chen, 1996), increased ready food consumption (McCracken and Brandt, 1987; Park and Capps, 1997), decreased number of different food items consumed at home (Lee, 1987) and a shift from time-intensive traditional foods to time-saving foods (Senauer *et al.*, 1986 and Jae *et al.*, 2000).

Since understanding of the consumer behavior is important for making economic policy decisions involving pricing, production and marketing, the aim of this paper is to analyze food

expenditure patterns in a prefecture of Greece with special emphasis on some selected characteristics that determine the living conditions of the Greek household.

2. Materials and Methods

Data and Sample

A door-to-door questionnaire survey was conducted to collect primary data for this study (September 1999 – February 2000). The questionnaire gathered information on food expenditure, income and major sociodemographic characteristics of Greek households. A total of 316 randomly selected married households were surveyed in the prefecture of Fthiotida.

Model

Consumer demand theory postulates that a household chooses among consumer goods with a goal of maximizing utility subject to a budget constraint (Cragg, 1971). Thus, the household acts to solve the constrained utility maximization problem:

$$y_i = g(x_i, b) \quad (1)$$

where $\mathbf{y_i}$ is the expenditure for a consumer good i, **x** is a vector of independent variables and **b** is a vector of parameter estimates.

Since price information is usually not available in cross-sectional data, it was assumed that all households face the same relative prices.

Because food expenditure at home used in this study had no zero spending, Ordinary Least Squares (OLS) regression analysis was used. Conversely, a large proportion of the sample reported zero consumption of ready to eat food during the survey period. For this reason, a double-hurdle model was used. The double-hurdle model specifies a participation equation, $X\alpha + \mu$, and a consumption equation, $Y\beta + \varepsilon$, such that consumption, C, is modeled as:

$$C = Y\beta + \varepsilon \quad \text{if } X\alpha + \mu > 0 \text{ and } Y\beta + \varepsilon > 0 \quad (2)$$
$$= 0 \quad \text{otherwise}$$

where X and Y are vectors of explanatory variables, α and β are vectors of parameters, and μ and ε are the error terms.

Variables

Two expenditure categories were used as dependent variables in the regression analysis: food at home and ready to eat food. Food at home included food purchased and prepared by

the consumer unit for its own use. Ready to eat food included food purchased by the consumer unit at restaurants, cafes and fast-food establishments.

Sociodemographic variables used as independent variables in the regression analysis included age of household head, spouses' education level, household size, presence of children, region of residence, number of earners, male household manager, ownership of a farm and working wife. Economic variables used in the regression analysis included monthly total income.

Table 1: List of variables

Variable	Description	
Food expenditure	Continuous	
Ready to eat food expenditure	Continuous	
Age of household head	Continuous	
Household size	Continuous	
Presence of children	Categorical	1 if have; 0 otherwise
Education level of husband	Categorical	Low (no school, elementary school) Middle (middle school, high school) High (university)
Education level of wife	Categorical	Low (no school, elementary school) Middle (middle school, high school) High (university)
Urban region of residence	Categorical	1 if true; 0 otherwise
Monthly total income (€)	Continuous	
Number of earners	Continuous	
Male household manager	Categorical	1 if true; 0 otherwise
Ownership of a farm	Categorical	1 if have; 0 otherwise
Working wife	Categorical	1 if true; 0 otherwise

3. Results and Discussion

Characterization of the Sample of Greek Population Dataset

The average household head was 45 years old and the average household consisted of four individuals, ranging from one to eight members (Table 2).

Thirty two percent of the husbands reported that they have finished elementary school and 13% middle school. Twenty nine percent have attended high school while a low percentage (12%) has received a higher education. Fourteen percent belonged to another education category. Similar was the picture of the wives' education level. Thirty two percent of the wives have finished elementary education, 35% have attended high school, while 14% have attended middle school. Seven percent belonged to another education category (Table 3).

The average number of earners was two (Table 2), since a high percent of women's sample (63%) participate in the labor force (Table 4). More specifically, 44% of wives was self-employed in a non rural sector, while only 2% was self-employed in the rural sector. This

finding means that in general country life has become less attractive for women, for whom rejection of the prospect of working in agriculture means parallel prospect of searching for work in the services sector. Similarly, 43% of husbands was self-employed in a non-rural sector, 24% was self-employed in the rural sector, while 19% and 9% was public and private employees, respectively (Table 3).

As it is said above, rural activities, even though they are not the main activity in the countryside, they may be a secondary one. So, 32% of husbands and 20% of wives had a second occupation, mainly in the rural sector (83% and 92% respectively) (Table 3).

Sixty percent of households owned farms. The highest percent of the sample (51%) had an agricultural farm**,** 44% had an agricultural and livestock farm**,** while only 6% had a livestock farm (Table 4).

As for household income, 33% of the sample reported that its monthly total income is €1,174-1,761, 23% reported € 587-1,174, 17% reported € 1,761-2,348 and 14% reported €2,348-2,935 and 9% reported € >2,935 (Table 5).

Finally, both spouses managed the household's budget (70%), while in the 30% of the households the husband had the budget control (Table 4).

Table 2: Means of the sociodemographic variables for households of the sample

Variables	Means
Age of household head	45
Household size	4
Number of earners	2

Table 3: Proportions of the sociodemographic variables for spouses of the sample

Variables	Husband (%)	Wife (%)
Education level		
No school	1	1
Elementary school	32	32
Middle school	13	14
High school	29	35
University	12	12
Other education category	14	7
Occupation		
Self-employed in a rural sector	24	2
Self-employed in a non rural sector	43	44
Public employee	19	14
Private employee	9	13
Family enterprise's assistant	3	28
Second occupation	32	20

Table 4: Proportions of the sociodemographic variables for spouses of the sample

Variables	%
Working wife	63
Farm	60
Agricultural farm	51
Livestock farm	6
Agricultural and livestock farm	44
Male household manager	30

Table 5: Proportions of the economic variables for households of the sample

Variables	%
Monthly total income (€)	
0-587	4
587-1,174	23
1,174-1,761	33
1,761-2,348	17
2,348-2,935	14
> 2,935	9

Parameter Estimates for Food Expenditure

According to the regression analysis age of the household head and the spouses' education level do not affect on food expenditure.

On the contrary, household size was a significant and positive factor in food expenditure, consistent with the results of Cage (1989) and Kalwij *et al*. (1998). More specifically, food expenditure is positively related to increases in the number of household members. This change in food expenditure increases at a decreasing rate as household size increases and becomes negative when household size becomes large.

Regarding urbanization, the results indicate that if the household is located in an urban area, then food expenditure is larger than in other regions (rural or semi-urban), a result consistent with the results of Cage (1989). Households in rural and semi-urban areas decrease the share of the household budget allocated to food because of owning a farm. Farm plays a negative role in food expenditure, because of the household's auto-consumption.

Male household manager was a significant and negative factor in food expenditure. Consistent with previous studies (Kennedy and Peters, 1992; Lloyd and Gage-Brandon, 1993; Handa, 1996; Thomas, 1996 and Levin *et al.*, 1999), a female household manager generally increases the share of the household budget allocated to food.

In addition, the number of earners was a positive factor in food expenditure. According to Cage's study (1989) as the number of earners increases, food expenditure also increases. Income was also, as expected, a positive factor in food expenditure.

In accordance with Browning and Meghir (1991) that pointed out that consumption cannot be separable from woman labor supply, it was found that wife's labor participation play a significant role in food expenditure. More specifically, households with working wives spend less on food expenditure than households with nonworking wives.

Parameter Estimates for Participation and Consumption of Ready Food

The findings of this research suggest that in Greece, household characteristics are significantly related both to the decision to consume ready food and the decision about how much ready food to consume.

Characteristics describing the household spouses play a significant role in determining the probability of consuming ready food. Households with older household heads were less likely to consume ready food than households with younger household heads, a result which is consistent with the result of McCracken and Brandt (1987), Park and Capps (1997) and Lazaridis (2000). Furthermore, having children was associated with greater probability of consuming ready to eat food compared with families who had no children.

As expected, families living in an urban area were likely to buy more convenience foods. Conversely, Lazaridis (2000), using data from Greek National Statistical Service, found that living in an urban area was a significant and negative factor in both the participation and consumption decision to eat ready food. On the other hand, region of residence was not a significant factor in ready food consumption levels in our study.

Consistent with the studies by Park and Capps (1997) and Lazaridis (2000), families headed by male in the higher education category (12 years or more) were likely to buy more ready food than the others. However, education level of wife was not a significant factor in either the participation or consumption decision.

Income was not also a significant factor in the ready food participation decision. However, it was a positive factor for ready food expenditures, consistent with previous studies (McCracken and Brandt, 1987; Park and Capps, 1997 and Lazaridis, 2000).

Contrary to previous studies (Lazaridis, 2000) but consistent with others (Jae *et al*., 2000), the wife's labor force participation was negatively related to buying ready food. Families with a wife in the labor force were less likely to buy ready food than their counterparts. Hacklander (1978) and Sexauer (1979) found that households with working wives ate out more often but concluded that their food shopping behavior was not very different from households with nonworking wives. However, the number of earners was a

significant and positive factor in the decision to consume ready food, but not in ready food expenditures.

Finally, the household's ownership of a farm was not related to the consumption of ready food, but it was a negative factor for ready food's expenditures. More specifically, farm households decrease the share of the household budget allocated to ready to eat food than non-farm households.

Table 6: Regression analysis of food expenditure patterns

Independent Variables	Dependent Variables		
	Food at home	Food away from home	
		Participation decision	Consumption decision
Constant	-18580	2,0681***	24932
	(-0,82)	(3,57)	(0,89)
Age of household head	1265,6	-0,04599***	339
	(1,32)	(-5,16)	(0,29)
Age of household head squared	-14,82	_____	-3,07
	(-1,47)		(-0,23)
Household size	22717***	-0,19364**	-19243
	(3,43)	(-1,97)	(-1,57)
Household size squared	-1751***	_____	1942
	(-2,20)		(1,40)
Presence of children	_____	1,0953***	15038*
		(3,48)	(1,74)
Education level of husband (low education)			
Middle education level	4198		3340
	(0,99)		(0,69)
Higher education level	7503	0,7674**	-1049
	(1,11)	(2,08)	(-0,15)
Education level of wife (low education)			
Middle education level	9609**		3471
	(2,07)		(0,65)
Higher education level	10057	-0,1155	6028
	(1,39)	(-0,32)	(0,78)
Urban region of residence	7538**	0,4851**	-18
	(2,12)	(2,15)	(-0,00)
Monthly total income (€)	2740**	-0,01082	4894***
	(2,20)	(-0,15)	(3,51)
Number of earners	6888**	0,4870***	1216
	(2,55)	(2,99)	(0,40)
Male household manager	-8322**	-0,1215	-2172
	(-2,31)	(-0,61)	(-0,54)
Ownership of a farm		-0,1988	-9013**
	_____	(-0,96)	(-2,39)
Working wife	-8375***	-0,6923***	612
	(-1,88)	(-2,65)	(0,12)
F-statistic	13,65		7,7
Adjusted R-squared statistic	34,7		2,13
Log – Likelihood		-141,511	

Note: t – statistics in brackets
*** p<.0001, ** p<.005, * p<.01

4. Conclusions

The aim of this study was to analyze food expenditure patterns in the Greek prefecture of Fthiotida with special emphasis on some selected characteristics that determine the living conditions of the Greek household.

The average age of the household head was 45 years old and the average household consisted of about four members. The education level of both spouses was low, since most persons of the sample reported that they had received primary education. In addition, the most spouses were self-employed in a non-rural sector, supporting the shift to non-agricultural activities. Furthermore, farm, in combination with the second occupation of the husband in the rural sector, had a positive effect on the income level.

As for role of economic and demographic characteristics in food expenditure and ready to eat food, it is found that:

1. The economic characteristics of the household in the Greek countryside determine the food expenditure. Income is the most important factor of food expenditure and ready to eat food.
2. The increasing household size, including children, decrease the economic power of the household, having a positive effect, at a decreasing rate, on food expenditure and the decision to participate in ready food market.
3. The ownership of a farm, in combination with the urbanization of the area of residence, determines food and ready food expenditures.
4. Male household manager has a negative effect on food expenditure supporting the different role of spouses.
5. The education level of spouses and the age of household head do not effect the general food consumption of the household in the countryside.

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THE EVOLUTION OF CORPORATE GOVERNANCE IN GREECE

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THE EVOLUTION OF CORPORATE GOVERNANCE IN GREECE

Abstract

The paper provides a comprehensive overview of corporate governance developments in Greece. The Greek capital market has been transformed largely during the last years into a developed and contemporary market. However, the development path has been experiencing many difficulties and problems. The Greek companies are held by a small number of large families (concentration of ownership) and the corporate governance mechanisms are still far from adequate. New regulations and voluntary actions have been initiated aiming on the transformation of the corporate governance system. The main effort is to restore public confidence and to enhance transparency.

Introduction

Agency theory and corporate governance

Corporate governance has been a widely discussed issue among academics, international organizations and the business world. Agency theory is the fundamental reference in corporate governance. The agency problem of separation of ownership and control, as posed by Berle and Means (1932) refers to the inherent conflicting interests of managers and owners. Both product and capital markets are not operating under full and symmetric information, resulting on managers pursuing their own interests at the shareholders' expense. In addition, complete contracts cannot be sufficiently written between managers and owners without extensive cost (Hart and Moore, 1990; Hart 1995). Therefore, corporate governance mechanisms can be seen as solving an adverse selection and a moral hazard problem, reducing agency cost (Tirole, 1999). Shleifer and Vishny (1997), define corporate governance as the way in which the suppliers of finance to corporation assure adequate returns on their investments. In many countries, where most of the companies are not widely held, the agency problem arises between controlling shareholders and weak minority shareholder (Becht, 1997).

The divergence of managers and owners can be reduced through some control mechanisms, like incentive structures (e.g. managerial equity ownership), the board of directors, the market for corporate control, and monitoring by large shareholders, (Shleifer and Vishny, 1986; Jensen and Murphy, 1990; Maug, 1998). However, monitoring by large shareholders is associated with a serious disadvantage: concentrating ownership is possible to results on conflicting relationship between strong blockholders and weak minority shareholders (Becht, 1997). On the other hand, the board of directors is supposed to oversee and control management's actions, safeguarding shareholders' interests. In other words, the board is acting as agent of shareholders' interests. Corporate governance mechanisms should ensure that efficient board process and structures are in place, like directors' independence, appropriate background and competencies of the directors, sufficient flow of information to the directors by management etc.

The shareholder and stakeholder models

Two models of corporate governance have been identified, the shareholder and the stakeholder model (Zingales, 1997; Shleifer and Vishny 1999). Market control, dispersed share ownership and competition characterize the "shareholder" or "outsider" model. The

agency problem of corporate governance is between opportunistic actions of decision managers and shareholders (Fama and Jensen, 1983). The latter usually use their exit options if they disagree with the management or if they are disappointed by the company's performance, signaling - through share prices reduction - the necessity for managers to improve firm performance (Hirschman, 1970). Hostile takeover bids are the ultimate means to replace management. The corporate governance framework is shaped by stock exchange listing requirements and a wide range of regulations and laws, concerning insider trading restrictions, market-based contests for control, accounting reports and fair disclosure and board members' independence. The ultimate goal is to protect the interests of outside (minority) shareholders (Roe, 1994; Gelauff and Broeder, 1997).

During the last decades, the rise in institutional holdings in both the US and the UK have led the institutional investors to challenge corporate management and board of directors on a number of questionable issues (Coffee, 1991; Brancato, 1997; Gillan and Starks, 1998; Maug, 1998,). Rather than sell their shares when they disagree with management (exit option), institutional investors act as a pressure group for corporate changes and reforms (voice option). Shareholder activism is primarily directed against companies that (i) expropriate the rights of shareholders, (ii) institute a series of anti-take-over devices, and (iii) underperform in terms of the overall market or individual industry averages. Social responsibility issues have also been addressed by active social investing funds. The empirical evidences regarding the outcomes of shareholder activism are mixed. Although there are evidence of improvement in short-term market performance after activism (Gillan and Starks, 2000; Bizjak and Marquette, 1998; De Guercio and Hawkins, 1999; Carleton et al., 1997), the studies find little positive causal relationship between shareholder activism and long-term market performance (Gillan, 1995; Wahal, 1996; Smith, 1996; Karpoff et al., 1996, Opler and Sokobin, 1995). Increased shareholder activism is emerging in some Continental European countries, although high costs, cumbersome procedures and unequal voting rights create an unfavorable environment (Davis and Lannoo, 1998).

An alternative "stakeholder" or "insider" model, found in continental Europe and Asia, is characterized by concentrated ownership, cross-shareholdings or vertical pyramid holdings, long-term, committed investors and relatively modest importance of the stock market and the market for corporate control (Maher and Andersson, 1999; Becht and Mayer, 2001). Large shareholders influence management by voice, usually through informal and private meetings. The agency problem of corporate governance is, therefore, posed as how to align the interests of strong share blockholders and weak minority shareholders. Stakeholder theory suggests board representation by many stakeholder constituencies (e.g. customers,

suppliers, employees, and local community representatives). Although the stakeholder approach encourage cooperation and commitment, is not easy to identify an appropriate maximization utility function (like profit-maximization function in the shareholder model). In this way, stakeholder approach has been widely criticized (Maher and Andersson, 1999). The new stakeholder model is trying to overcome this problem, providing a quite narrow definition of what constitutes a stakeholder (Maher and Andersson, 1999).

Corporate governance actions: voluntary codes and regulatory reforms

A number of financial scandals and corporate failures in the 1980s in the US and the UK boosted the debate on how best to make managers accountable to shareholders. Corporate collapses such as Maxwell, BCCI and Barings, and vast executive compensation increases resulted on a variety of domestic and international initiatives to restore public confidence. These initiatives consisted of a set of voluntary principles and regulations on corporate governance. Increasing attention in corporate governance is also associated by the common belief that a sound corporate governance regime enhances market liquidity and efficiency. Institutional investors according to the investor opinion survey released by McKinsey & Company are prepared to pay a premium for companies exhibiting high governance standards (McKinsey & Company, 2002). Premiums averaged 12-14% in North America and Western Europe, 20-25% in Asia and Latin America, and over 30% in Eastern Europe and Africa. More than 60% of investors state that governance consideration might lead them to avoid individual companies with poor governance.

The publication of the Cadbury Report in 1992 introduced several new corporate governance guidelines, while the initial impetus was given by the Principles and Recommendations of the American Law Institute (1984) and the Treadway Commission (1987) in the US. Moreover, supranational authorities, like the OECD and the World Bank, developed a set of voluntary principles and recommendations driving the attention for a minimum respect of basic corporate governance rules worldwide. These developments encouraged other countries to look into the necessity of establishing relevant voluntary corporate governance codes. In the European Union a total number of 35 corporate governance codes have been developed from a variety of entities, ranging from government authorities and stock exchange-related committees, to business, investor and academic associations (Weil, Gotshal and Manges, 2002). Different priorities and needs are reflected in the countries' codes. Although national corporate governance codes reflect different cultural, legal and economic patterns and frameworks, they also share significant similarities. The

convergence of corporate governance codes is best described by the OECD Principles of Corporate Governance (1999), which are intended to sufficiently apply to whatever national legal regime. The OECD principles covers five areas: (i) The rights of shareholders; (ii) The equitable treatments of shareholders; (iii) The role of stakeholders; (iv) Disclosure and transparency; and (v) The responsibilities of the board. The principles emphasize on the fair treatment of all shareholders, including minority shareholders, the inefficiencies created by the use of anti-take-over devices, the application of high quality internationally recognized accounting standards, and the auditors' and board directors independence.

The introduction of the Euro has had significant implications for the capital markets, such as a larger marketplace with a unified currency usually attracts more capital. Moreover, the Enron and other corporate failures, as well as difficulties in European companies, have brought corporate governance in the heart of the EU's policy concern. In November 2002 the High Level Group of Company Law Experts, chaired by Jaap Winter, presented the Final Report of the Group on a Modern Regulatory Framework for Company Law in Europe (Winter Report, 2002). The Group addressed a number of issues related to corporate governance and proceeded with a set of recommendations to the European Commission. According to the report, the EU should not strive to create a single European code of corporate governance, as the underlying company law in member-sates is not harmonized in key areas. However, the EU should actively co-ordinate the corporate governance efforts of member-states through their company laws, securities laws, listing rules and codes, in order to facilitate convergence. Member-states are to be required to participate in the co-ordination process by the EU, although it is crucial to be a voluntary convergence process with a strong involvement of market participants.

Throughout the last five years, many countries established various regulations and started to review their company law. Discussions focus on how to protect minority shareholders, enhance transparency and disclosure of information, improve board functions and structures, limit the rule of anti-take-over devices, and improve auditing process. In many cases, the new regulations and laws are based on the previously developed voluntary corporate governance codes.

The Greek capital market over the last years: an overview

Legal system overview

The Greek companies (limited liabilities companies, the equivalent of *sociétés anonyme*s) are governed by Law 2190/1920 (the Appendix contains a list of all laws and presidential decrees covering the Greek capital market). In addition, listed companies are governed by Law 3016/2002. The general meeting of shareholders is the main decision-making organ of the company. A unitary board structure is applied, where shareholders directly elect the directors through the shareholder general meeting. The board, by law, combines supervisory and management functions, but generally delegate day-to-day management to hired executive managers. Although, under the law, the board has quite lot discretion power, a company's bylaws may impose stricter limits and guidelines. The board must be made up of at least three members and is required to meet at least once a month. For the listed companies, at least 1/3 of the total directors must be non-executive, of which at least two must be independent.

Under Law 2190/1020 directors and senior managers are prohibited to receive loans by the company. Article 23 of Law 2190/1920 prohibits directors to engage professionally, on their own behalf or on behalf of others, in activities covered by the objectives of the company in which they are directors and be general partners in a partnership that pursues the same objectives as the company they serve as directors. This restriction may be lifted only through permission by the general meeting of shareholders.

The developments of the capital market

The Greek capital market has been transformed largely during the last four years. Three new markets were established, the Athens Derivatives Exchange, the New Market for small and innovative firms and the Market for Emerging Markets. At the same time, the new electronic trading system (OASIS) in the Athens Stock Exchange expanded the possibilities for efficient and transparent transactions. The Capital Market Commission, the main regulatory authority of the Greek capital market, completed a wide range of institutional changes. Commission's regulatory activities were mainly directed at the protection of investors, the enhancement of market transparency, the protection of the systems of trading and clearing, the enactment of codes of conducts and the assurance of the smooth function of the capital market.

However, the Greek capital market has been experiencing a cycle of self-fulfilling expectations during the second and third quarters of 1999. At the end of the year 1999 the ASE General Index realized a total annual increase of 102.2%. Due to the rise of share prices of listed companies the total ASE capitalization recorded an annual increase of 194.7% (from €67,024.8 millions in 1998 to €197,537 millions in 1999), among the highest in the OECD countries. The total value of transactions increased from €41,708.1 millions in 1998 to €173,027 millions in 1999, realizing an increase of 194.7%. An increasing number of companies raised funds through the capital market. The total funds raised through initial public offerings (IPO's) amounted to €1,842.3 millions in 1999 against €1,157.2 millions in 1998 and €59.0 millions in 1997, corresponding to an increase of 59.2% and 3,022.5% respectively. Listed companies raised €8,128.0 millions in 1999, an amount that was 472.9% higher than in the previous year (see table 1).

The massive entrance of individual and institutional investors in the capital market, mostly through placements on small-and-medium-capitalization stocks, increased rapidly both stock prices and liquidity in the second and third quarters of 1999. Prosperity and wealth appeared to be created. This prosperity and wealth led investors (demand side) to buy more creating further rises in stock prices. While the standard theory of stock valuation suggest that a stock should sell for the discounted present value of the stream of future returns, stock prices appreciation was both unjustifiable and unsustainable. Investors proceeded to short-term speculative placements and in a state of euphoria were betted, in full certainty that stock prices will increase further. The cycle of self-fulfilling expectations resulted on a significant divergence between actual prices and prices justified by corporate fundamentals (equilibrium prices). However, the manic phase always has an end. A virtuous circle spirals upward until there remain no people coming in to buy stocks at ever-higher prices. A phase of self-feeding panic occurs, characterized by extensive liquidation of securities. The Greek capital market's severe underperformance in 2000, 2001 and 2002 has been largely resulted on the previous speculative process. The ASE General Index realized an annual decrease of 38.8% in 2000, 23.5% in 2001 and 32.5% in 2002. Both the total value of transactions and the ASE capitalization decreased. In 2002, the total values of transaction in the ASE decreased by 38.9% and 85.7% in relation to 2001 and 1999 respectively. Total market capitalization during 2002 amounted to €65,759.7 millions showing a decrease of 47.4% and 66.7% in relation to 2001 and 1999 respectively.

Throughout history, many speculative bubbles have been evidenced[1]. However, what make the bubble more complicated are its social impacts. The group, not the individual, gives birth to a speculative bubble, making the task of improving judgment and confidence more difficult. The speculative events in the Greek capital market during 1999 led the Capital Market Commission and the state to take an active role, introducing rules, regulations and codes of conduct. All these measures were aiming at the protection of investors against market abuse, the improvement of the transparency of the market and the establishment of appropriate business ethics.

Box

The Greek capital market has been experiencing a large development during the last years. However, the development path has been proved quite volatile. After the cycle of self-fulfilling expectations during the second and third quarters of 1999 and the severe underperformance in the following years, the investors' confidence have been reduced. Corporate governance is still far from adequate, such as ownership concentration of the listed companies is still high (family companies), self-regulation has been proven insufficient and state-owned companies have not yet fully exposed to competition. New laws and regulations introduced to restore public confidence, to protect (minority) shareholder rights and to improve corporate governance mechanisms. Moreover, corporate governance debate has been largely debated among academics and the business world, resulting on many voluntary activities (e.g. corporate governance codes, rating actions).

[1] The first speculative bubble took place in Holland from 1620 to 1637 and involved rare and collectible tulips. Since then, it is well known the speculative short life of the South Sea Company in England (1711-1720), the Florida real estate craze (1924-1926), the speculative bubble during 1926-1929 in the US stocks, the "tronics" stocks (1962) and the crash of 1987 (Galbraith, 1993).

Table 1

The growth of the capital market in Greece, 1995-2002

Year	ASE General Index % annual change*	Number of listed companies in the ASE		Total ASE capitalization		Total value of transaction in the ASE		Total funds raised through IPO's		Total funds raised through share capital increases		Net profits of the ASE companies**	
		Number	*% Annual change*	*Amount (mil €)*	*% Annual change*	*Amount (mil €)*	*% Annual change*	*Amount (mil €)*	*% Annual change*	*Amount (mil €)*	*% Annual change*	*Amount (mil €)*	*% Annual change*
1995	5.2	212	9.3	11,814.8	12.5	4,140.1	11.4	66.4				1,072.4	5.2
1996	2.1	232	9.4	17,446.2	47.7	5,849.3	41.3	326.1	391.1%	130.5		2,008.4	87.3
1997	58.5	244	5.2	28,793.3	65.0	17,081.4	192.0	59.0	-81.9%	1,475.3	1,030.5%	2,144.6	6.8
1998	85.1	267	9.4	67,024.8	132.8	41,708.1	144.2	1,157.2	1,861.4%	1,418.8	-3.8%	2,640.2	23.1
1999	102.2	309	15.7	197,537.0	194.7	173,027.0	314.9	1,842.3	59.2%	8,128.0	472.9%	6,109.5	131.4
2000	-38.8	342	10.7	117,956.3	-40.3	101,675.8	-41.2	2,557.9	38.8%	8,682.9	6.8%	5,558.0	-9.0
2001	-23.5	353	3.2	96,949.5	-17.8	40,529.8	-60.1	1,075.6	58.0%	427.0	-95.1%	4,300.0	-22.6
2002	-32.5	350	-0.9	65,759.7	-47.4	24,771.0	-38.9						

Source: Capital Market Commission, Annual Report (1999, 2000, 2001, 2002), ASE

** The results are based on the following relation: $(X_t / X_0)^{(1/t)} - 1$, where X_0 and X_t represent the closing prices of the ASE General Index at the year-base 0 and year t, respectively.*

*** After-tax net profits*

Corporate governance structures in Greece: recent developments

Overview

Corporate governance failures have been identified as one of the key reasons of the Greek capital market's underperformance during the last three years. Specific corporate abuses reduced investors' confidence in corporations, such as they had (the investors) flocked to the stock market during the last years. Investor protection reform and measures to enhance market's transparency are supposed to be key-elements in order to restore public trust. La Porta et al. (1999) underline and analyze the importance of a legal approach to corporate governance. They state that when outside investor's (minority shareholders) rights are protected through the enforcement of regulations and laws (e.g. disclosure and accounting standards, the rights to vote for directors and to call extraordinary shareholders' meetings) the investors are willing to finance firms, encouraging the development of equity markets. Even if there are significant variations in law and regulations between countries, it is empirically documented that strong investor protection is associated with effective corporate governance (La Porta et al., 1998, 1999). In this way, investor protection affects the real economy, accelerating economic growth[2]. In Greece, new regulations introduced to restore pubic confidence, to protect (minority) shareholders rights and to improve corporate governance mechanisms. The Capital Market Commission's rules and the new law on corporate governance mandate a number of corporate governance standards. The rules mandate independent internal controls over financial reporting, require timely and reliable information and disclosure for important corporate events, mandate non-executive and independent directors to the boards, set new framework for takeover bids and impose high administrative sanctions and fines in case of non-compliance.

In parallel with the regulatory actions, corporate governance has been largely debated among academics and the business world, resulting on many voluntary activities. The Committee on Corporate Governance in Greece (under the coordination of the Capital Market Commission) and the Federation of Greek Industries have developed voluntary corporate governance codes. Moreover, the University of Athens has recently established a rating system for the ASE listed companies based solely on corporate governance criteria. Finally, the Athens Stock Exchange announced in July 2002 the voluntary qualitative criteria covering corporate governance, transparency and communication with investors (see table 3).

The voluntary corporate governance code

In Greece, the issue of corporate governance was first raised in 1998, when the Athens Stock Exchange and the ASYK SA (Capital Market Development of Systems and Support) conducted a relevant study. In April 1999 the Capital Market Commission, expressing its interest in the establishment of efficient corporate governance practices, was set up the Committee on Corporate Governance (CCG) in Greece. The CCG introduced in October 1999 a White Paper, titled: "Principles of Corporate Governance in Greece: Recommendations for its Competitive Transformation". The voluntary corporate governance code was developed in collaboration with all relevant agents in the Greek economy and was made on the basis of internationally accepted corporate governance practices. The principles and best practice rules incorporated were closely modeled according to OECD Principles on Corporate Governance (OECD, 1999).

The Greek code contains 44 recommendations compiled on seven main categories:

- The rights and obligations of shareholders (e.g. encourages voting by institutional investors and discourages multiple voting procedures and the issuance of non-voting privileged shares).
- The equitable treatment of shareholders (e.g. transactions based on insider information or undertaken for private benefit should be prohibited).
- The role of stakeholders in corporate governance (e.g. encourage active participation between corporations and stakeholders).
- Transparency, disclosure of information and auditing (e.g. full, timely and detailed disclosure of information, establishment of an Internal Audit Committee consisting solely of non-executive directors).
- The board of directors (e.g. maximum board size of 13, with a majority of non-executive directors, external advice to directors).
- The non-executive members of the board of directors (e.g. definition of independence, compensation of non-executive directors should be comparable to the time they devote for board meetings, compensation should be reported separately in the corporation's annual report).

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[2] The linkage between financial development and economic growth has been well documented by Rajan and Zingales (1998), Carlin and Mayer (1999) and Beck et al. (1999). The latter find that financial development can enhance savings, increase real investments and improve resource allocation.

- Executive management (e.g. performance-based compensation for executives, compensation committee to review management compensation, appointment of the CFO in the top management team).

Establishment of a law making committee on corporate governance

In 2000 the voluntary corporate governance code was culminated among the business world. At the same time, the Ministries of National Economy and Development were set up a law making committee on corporate governance (Rokkas Committee). There were developed a hot discussion on the amendment of corporate law, characterized by the controversy between the representatives of the Federation of Greek Industries (FGI) and the State. The FGI was opposed most of the proposed amendments and stated that corporate governance has to be adopted on a voluntary basis. The new Bill was finalized and published two years later.

Two major rules by the Capital Market Commission

A major contribution during 2000 to the enhancement of transparency and disclosure regarding the behavior of listed companies in the capital market has been the enactment of Capital Market Commission rule: "A code of conduct for companies listed in the Athens Stock Exchange and their affiliated persons" (CMC Rule 5/204/2000). The code sets behavior standards for ASE listed companies and specifies duties and obligations of companies' major shareholders, the members of the board of directors, the executive management or other individuals or legal entities relating to them. In general, according to the code, each company shall ensure the prompt disclosure of information or fact occurring in its domain of activity, which are not accessible by the public and which may cause significant fluctuation in the price of its shares. Furthermore, the code specifies the organization, structures and internal operation mechanisms necessary for best serving shareholders' interests and investor interests in general. The aim is to eliminate uncertainty in the market on corporate affairs and avoid speculation by company insider or other persons that may have inside information.

<u>Reporting requirements and transactions pre-announcement obligations</u>

According to the code the listed companies shall immediately disclose to the public the following facts:

- Corporate decisions regarding essential changes in the company's business activity, assets and capital structure (e.g. conclusion or termination of important co-operations or

business alliances, substantial international initiative, debt/equity proportions and profitability).

- Corporate decisions or agreements made for the participation in a merger, de-merger or takeover procedure, acquisition or assignment of shares corresponding to at least 5% of the company's share capital, in which the listed company or the members of its board of directors or its shareholders own a stake of at least 10%.
- Corporate decisions for changes in the composition of the board of directors or senior management and for the distribution and payment of dividends, new issues of shares, distribution, registration, waiver and conversion of shares.
- Corporate decisions for changes in important elements set forth in the most recent Prospectus or in the Annual Bulletin, including any commitments undertaken for the uses of the funds raised through the market.

Additionally, the code imposes specific transactions pre-announcement obligation. Company shareholders, owing at least 10% of any class of shares, who intend to purchase, within the next three months or less, shares of the same class corresponding to at least 5% of the company's share capital, or intend to transfer shares of the same class corresponding to at least 5%of the company's share capital, shall disclose the whole transaction. Especially they have to disclose the intended volume and the time period of the transaction, as well as the Investment Company through which the transaction is to be executed and the underwriters of the relevant notice.

An important element to the financial disclosure is the requirement for the listed companies to publish an Annual Report and a cash flow statement. The cash flow statement is structured along international accounting standards and constitutes the first step of implementing International Accounting Standards (IAS) in Greece (Capital Market Commission, 2000).

Internal audit investor services obligations

Listed companies are obligated to form an internal audit department. The code specifies terms and conditions for the department's independence. The chief of the internal audit department shall be appointed by the company's board of directors, reports to the board and meets fit and proper criteria for appointment.

The code sets the duties and responsibilities of the internal audit department, which include, but not limited to, the following:

- The monitoring of compliance with obligations set forth in the rule and with commitments included in the company's Prospectuses and business plans.
- The monitoring of the legitimacy of remuneration and other benefits accruing to management and of the company's relationships and transactions with connected companies, as well as with other companies in the share capital of which the members of the board of directors or shareholders own a stake of at least 10%.

The code also requires independent external auditor to provide the regulation authorities their view regarding the effectiveness and efficiency of the internal audit department.

Listed companies are also obligated to form an investor services department, with the responsibility of providing information regarding corporate issues, the exercise of investors rights, the course of their business and the progress of their financial statement.

The other major contribution during 2000 on the enhancement of corporate governance mechanisms has been the new framework for takeover bids (CMC Rule 1/195/2000). The rule was modeled along the recommendation made by the relevant European Directive and the relevant legislation in other EU member-sates. The rule sets terms of a public takeover bid towards the shareholders of the target-listed company, for the acquisition of the company's shares. Furthermore, the rule defines the procedures for the public call by a person or a company for bidding for the target company's stock.

The voluntary principles of corporate governance by the Federation of Greek Industries

In August 2001 the Federation of Greek Industries (FGI) introduced the Principles of Corporate Governance for all companies, but especially for the companies listed on the Athens Stock Exchange. Compliance with the Principles is voluntary. The main recommendations include:

- The establishment of board level committees consisting of a majority of non-executive directors.
- The implementation of internal control by a specific department or individual

Comments

The FGI Principles do not address the issue of equal/fair treatment of shareholders and the rights of stakeholders. They do not also contain any provisions dealing specifically

with the protection of shareholders' rights, the ratio of non-executive directors, the compensation of non-executive directors and the separation between the CEO and the board chair.

Corporate governance rating system by the University of Athens

In March 2002 the Center of Financial Studies of the University of Athens was presented its corporate governance rating methodology, in the Athens Stock Exchange. The research team, with a grant by the Athens Stock Exchange, was set up a Special Advisory Committee on Corporate Governance, consisting of members of all the relevant authorities (the Capital Market Commission, the Athens Stock Exchange, the Federation of Greek Industries, the Athens Chamber Commerce & Industry, the Union of Institutional Investors, the Hellenic Bank Association and the Union of Brokerage Firms). The research work proceeded with results on the evaluation of the level of corporate governance of companies listed on the ASE (see the next chapter for details).

The new law on corporate governance

The major development in Greece in 2002 was the law on corporate governance introduced by the Greek Ministry of National Economy and based on the initial plan of Rokkas Committee (Law 3016/2002: "On corporate governance, board remuneration and other issues"). The law, which was released in May 2002, laid down fundamental corporate governance obligations and was intended to force transparency and investor's confidence. The main requirements according to the new law are as follows:

Composition of board of directors

The number of non-executive board members should not be lower than one third (1/3) of the total number of board members. At least two independent non-executive directors should exist in the board of directors. Compliance with this provision is not mandatory, if representatives of the shareholders minority are appointed and participate as members in the board.

During their tenure, the independent non-executive board members are not allowed to own more than 0.5% of the company's share capital and to have a relation of dependence with the corporation or persons associated with it.

Non-executive directors' remuneration

The remuneration and other compensation of non-executive board members are determined according to Inc. Law No. 2190/ 1920 and are proportional to the time they devote to the board meetings and the fulfilment of the responsibilities delegated to them according to this Law. The total of the remuneration and other compensation of non-executive board members should be reported in the annex of the annual financial statements.

Internal auditing

The existence and operation of an audit department is a prerequisite for the approval of initial public offering of company shares or other securities. Auditing is performed by the appropriate department. Auditors are independent in performing their responsibilities, do not report to any other company department and are supervised by one to three (1-3) non-executive board members.

Share capital increase

In case of capital increase by means of cash injection, the board is obligated to submit a report to the shareholder meeting referring to the general directions of the investment plan of the company, as well as an assessment of the use of capital raised in the previous share capital increase, if this has taken place during the previous three years. Any important deviations in the use of capital raised may be decided upon by the board of directors by a three quarter majority of its members and must be approved by a general ghareholder meeting.

Qualitative criteria by the Athens Stock Exchange

A few moths later, in June 2002, the Athens Stock Exchange announced the qualitative criteria covering corporate governance, transparency and communication with investors. Such qualitative criteria have been developed following a study by the R&D department of the Athens Stock Exchange and were finalized in consultation with listed companies and the associations that represent them. Application of these criteria is optional and they are additional to the requirements that listed companies are under an obligation to fulfill, according to the legislation currently in force. The criteria are as follows:

- Establishment and content of corporate website covering the four subject areas: company organization, corporate profile, and financial and stock market data.
- Organization, by an Investor Relations Unit, of road shows and additional activities.
- Features of corporate governance

- Free float ratio (25% for the Main Market and 20% for the Parallel Market).

Each of the above four groups of criteria, covered by a relevant questionnaire, represent recommendations that contribute mainly to listed companies' more effective communication with investors. The adoption of the criteria is at the discretion of the listed companies (without prejudice to the existing legal requirements relating to corporate governance).

Although the ASE states clearly that the adoption of the above qualitative criteria is voluntary, it releases on a continuous basis a table of listed companies, according to their degree of compliance. Table 2 presents the companies that proceeded to qualitative actions as of 03/20/2003).

Table 2

Listed companies that proceeded to qualitative actions according to the ASE criteria

Albio Holdings SA	National Bank of Greece SA
Alpha Bank SA	Liberis Publication SA
Coca-Cola Hellenic Bottling Company SA	Elgeka SA
F.H.L.H. Kyriakides Marbles-Granites SA	Hellenic Stock Exchange Holdings SA
FORTHnet SA	Commercial Bank of Greece SA
Fourlis Holdings SA	Themeliodomi SA
Lavipharm SA	Athens Medical CSA
MLS Multimedia SA	Iktinos Hellas SA
Notos Com Holdings SA	Minoan Lines
Sato SA	Mochlos SA
Unisysten SA	Plaisio Computers SA
Titan Cement Co SA	Technical Olympic SA
Silver & Baryte Ores Mining Co SA	EFG Eurobank Ergasias SA
Germanos SA	Bank of Piraeus SA
Delta Holdongs SA	Cosmote Mobile Communications SA
Lambrakis Press SA	Motor Oil (Hellas) Corinth Refineries SA
Cyprus Bank Ltd.	

Source: Athens Stock Exchange www.ase.gr

Table 3
The evolution of corporate governance in Greece

Date	Corporate governance activity
1998	The Athens Stock Exchange conducts a study on corporate governance
1999, April	OECD Principles on Corporate Governance
1999, October	Corporate governance code (voluntary) by the Committee on Corporate Governance in Greece (under the coordination of the Capital Market Commission)
2000	The Ministries of National Economy and Development set up a law making committee on corporate governance (Rokkas Committee)
2000, July	Capital Market Commission rule: "Tender offers in the capital market for the acquisition of securities (CMC Rule 1/195/2000)
2000, November	Capital Market Commission rule: "A code of conduct for companies listed in the Athens Stock Exchange and their affiliated persons" (CMC Rule 5/204/2000).
2001, August	Principles of Corporate Governance by the Federation of Greek Industries
2002, March	A corporate governance rating system is presented by the Center of Financial Studies of the University of Athens (a project funded by the Athens Stock Exchange)
2002, May	Law 3016/2002: "On corporate governance, board remuneration and other issues"
2002, July	The Athens Stock Exchange establishes qualitative criteria covering corporate governance, transparency and communication with investors

Ownership structure and voting rights in the Greek listed companies

In Greek listed companies, like in other European countries, ownership is concentrated. Large families usually control most of the companies and members of the controlling families are usually serve as the top manager. In addition, the State controls large percentages of votes in a significant number of listed companies. Large capitalization firms display a more dispersed ownership and control than medium and small capitalization firms. Therefore, the agency problem arises as a conflict between "strong blockholders and weak minority owners", rather than between "strong managers and weak owners". Anglo-Saxon ownership model describes the latter conflicting relations, Continental Europe ownership model the former (Becht, 1997; Becht and Roell, 1999).

Table 4
Ownership dispersion of the ASE listed companies

	ASE Main Market	ASE Parallel Market	New Market	Total Market	FTSE-20 companies	FTSE-40 companies
Ownership dispersion	48.74%	30.42%	25.05%	47.22%	54.04%	44.40%
Number of major shareholders*	653	317	4	974	52	101
Capitalization (mil of €)	91,500	8,204	46	99,750	55,411	15,630

Source: Capital Market Commission, Research Division (2001) www.hcmc.gr
** Shareholders owning a stake of at least 5% of the company's share capital*

The Research Division of the Capital Market Commission calculated the ownership dispersion of the listed companies in September 2001. When the major shareholder is defined as the shareholder owning at least 5% of the company's share capital, average ownership dispersion of listed companies is 47.22%. The results indicate that competition for control at the company level is little. In total, in September 2001, there were 370 stocks that were held by 974 major shareholders. There are, on average, few major shareholders per listed company (approx. 3). However, the large capitalization companies (FTSE-20) present a higher degree of dispersion of ownership than the middle capitalization companies (FTSE-40). In the former, ownership dispersion is 54.04% (52 major shareholders), in the latter 44.4% (101 major shareholders). This trend is justified by the results.

The high degree of ownership concentration is consistent with the results in most other Continental Europe countries. In Italy, Bianchi et al. (1997) showed that the largest shareholder in listed companies held on average 48% of total voting rights, while the largest three shareholders held 62%. Bloch and Kremp (1997) reported a significant degree of concentration of ownership (56%) for listed firms in France. A study by Facio and Lang (2000), in a sample of 3,740 companies in five Western European countries (France, Spain, Italy and UK) documented a small degree of ownership dispersion (38.3% of companies are widely held). They also reported significant ownership concentration within a small number of families (families control 43.9% of Western European companies).

Corporate governance rating methodologies for the ASE listed companies

The Center of Financial Studies of the University of Athens (2002) has been developed a corporate governance rating methodology for the companies listed on the ASE. The effort was to produce an important policy tool for all the relevant parties. In particular, the rating system aimed:

- To produce useful policy-making results of aggregated data for the relevant authorities (e.g. the Athens Stock Exchange, the Greek Capital Market Commission).
- To provide an independent and reliable tool for all investors who believe that a thorough examination of corporate governance practices will lead to increased long-term shareholder value. The importance of this increases in a framework of an open capital market with "demanding" international investors.
- To provide a comprehensive and specific rating regarding all corporate governance criteria for each company.

The companies' corporate governance behaviour was assessed in 2001 through the following main corporate governance criteria:

- The rights and obligations of shareholders (e.g. respect of the one-share one-vote principle, anti-takeover devices, voting right restrictions, voting issues, shareholder proposals and voting procedures).
- Transparency, disclosure of information and auditing (e.g. quantity and quality of the disclosed information, accounting standards and auditing, information on major shareholders of the company).
- The board of directors (e.g. independent directors, division between the role of chairman and chief executive, succession planning, election of the board, director remuneration, and the workings and authorities of board committees).
- Executive management (e.g. the duties and responsibilities of the CEO and the executive management, executive remuneration).
- Corporate governance commitment, the role of stakeholders and corporate social responsibility (e.g. presence of company-owned specific corporate governance guidelines, awareness on social responsibility and philanthropy).

The five main criteria were composed of a total of 37 of partial indicators. The final outcome was based on the answers, through face-to-face interviews, of 120 listed companies

which together represented more than 85% of the capitalization of the market (see table 5). The conclusions of the study are summarized as follows:

- The systematic evaluation of corporate governance is feasible in Greece both at the level of methodology and the level of interest of the majority of the listed companies.
- The companies showed particular interest in comparing the results of their own evaluation with the optimum grading and mean average. Therefore, a benchmarking tool resulted.
- The Greek capital market, on average, seems to have a relevantly satisfactory compliance level with the principles of corporate governance, but possible changes in the methodology may change this conclusion to a large extent.
- The adoption of an active policy of compliance to the international "good practices" had started by certain Greek companies, but sooner or later all should realize this. The companies with a low degree of compliance are at risk to have a reduced demand for their shares, despite their profitability.
- Corporate governance policy is a dynamic process. A good rating on a particular time moment does not mean long-run security.

Table 5
Corporate governance overall rating index

Main indicators	Number of sub-indicators	Weighted coefficient	Rating %	Rating index (out of 100)
The rights & obligations of shareholders	6	20	18.17	**90.9**
Transparency, disclosure of information & auditing	9	30	21.56	**71.9**
The board of directors	12	25	16.82	**67.3**
CEO and executive management	5	15	10.77	**71.8**
Corporate governance commitment, stakeholders and corporate social responsibility	5	10	3.04	**30.4**
Total	37	100		**70.4**

The research team based on the study's results, made basic and advanced recommendations to the relevant authorities and to the companies as well. The basic recommendations include:

- The use of the modern technology to improve the exercise of the rights of the minority shareholders.
- Clarification and improvement on the legal framework covering stock option plans.

- Improvement in the journalistic coverage of the listed companies.
- Rationalization of board meetings.
- The use of Internet and email by listed companies to communicate with shareholders.
- The use of English language in all the company's annual and interim reports, press releases and other brochures.
- Analysis, by the management team, of any deviation from previously announced goals.
- The appointment of a sufficient number of independent non-executive directors (the number of the independent directors has to be identified on an ad hoc basis, according to the company's special needs).
- Board's involvement on corporate social responsibility's issues.
- Comprehensive examination of potential conflicts of interest within auditing mechanisms (internal and external audit).

The advanced recommendations include:

- The use modern technology to facilitate the holding of shareholder's meeting.
- Periodic reexamination of board size
- Establishment of board committees
- Development of written corporate governance guidelines by the listed companies.
- Evaluating board and CEO's performance
- New board members embodiment and orientation
- Performance-related remuneration schemes for the executive management

Discussion and concluding remarks

The Greek capital market has been transformed largely during the last 6 six years. Corporate governance has been widely discussed among the business world and the relevant regulatory authorities. The voluntary and regulatory initiatives were proposed or adopted in response to external and internal forces. Internally, in mid 1999 the Greek capital market faced an extensive share price overvaluation episode. The crisis resulted on a significant decline of the share price in the last quarter of 1999. Listed companies alone were unable to restore public confidence. Reduced corporate accountability and insufficient disclosure practices induced massive liquidation by investors. Externally, the upgrading the Greek capital market into a mature one has had significant implications. Institutional investors with an "emerging market" profile proceeded on substantial liquidation of their portfolio. However, the Greek capital market was unable to attract long-term, committed institutional

investors. The latter, usually investigate extensively the governance structures (e.g. voting practices, board composition and accounting standards) of the companies where they plan to put their funds, and they decide on the basis of the available information. Without enough information of sufficient quality they will not invest. Self-regulation by individual companies on disclosure matters has been proven insufficient. In this framework, the main regulatory actions addressed issues like corporate transparency, disclosure of information and independent auditing. In this way, it is hoped that the Greek capital market will be proved an attractive investment option where the (minority) shareholder rights are sufficiently protected and exercised.

However, board structures and practices need further improvement. The ownership concentration of the listed companies is still high, resulting on strong ties between the main shareholder and the management team. At the same time, internationally recognised board structures, such as board committees, directors' independence and qualifications, and directors' education, have not been adequate established. In this way, the board is mostly acting as a passive organ in the company where follows the decisions of the management. Non-executive board members, rather than act as shareholders' agents, do not efficiently supervise the management. Even if the rules mandate specific requirements, its difficult in practice to identify whether the board is operating under these rules. To enhance directors' responsibility by rule it could provide a solution. The Winter Report recommends that directors should be personal liable for the consequences of a company's failure in case where they did not react properly. However, efficient board structure and procedures is also a matter of self-regulation. Listed companies have to realise that a well-functioned board is a comparative advantage in a competitive business world.

Regarding voting rights, although all shares of the same class are equal (one-share-one-vote principle), preference shares (voting or non-voting) give some exceptional rights to their owners, including preferential payment of the first dividend, preferential repayment of the contribution in the case of liquidation and the right to collect a cumulative dividend for financial years during which no dividend was declared. In addition, voting by institutional investors can be proven very crucial. In Greece, institutional investors usually follow a passive voting for management and they rarely provide sufficient information for their investment policy to beneficiaries. Institutional investors need to re-examine their strategy and focus on well-governed companies. Full disclosure and comprehensive explanation of their voting policies to their beneficiaries will help in this direction.

The political forces that set the rules have also affected the developments of corporate governance in Greece. In Continental European countries and in Greece too, employment protection is high, in a sense that the State is charged with the task of sustaining a social pact between social parties. Market for corporate control, however, cannot efficiently operate when a new controlling shareholder is unable to break up employment contacts. In this way, the frequency of corporate control change (through take-overs) is negatively correlated with the degree of employment protection (Shleifer and Summers, 1988; Pagano and Volpin, 1999).

In addition, privatisation of stated-owned corporations through public offerings of shares had been delayed for many years in Greece because of the strong negative reaction of the trade unions. However, it is widely recognised that privatisation of state-owned corporations improves corporate governance. Privatised companies are made potentially targets for hostile take-overs, influencing directly the management's quality. Demanding institutional investors, as part of the new ownership structure, mandate high transparency and corporate governance standards in order to ensure appropriate returns on their investments. This policy is also motivated by their index-based investment strategy, resulting on committed, long-term institutional shareholders. Until 1996, the stated-owned companies in Greece were operated under a totally protective regime. The government was appointed the board of directors and the top management. The main corporate goal departed largely from profit maximisation. Low profits, losses, underinvestment and low product quality was the case in most Greek stated-owned corporations. Although a new law was enacted in 1996, mandating state-owned corporations to operate like other private companies, there are many problems to be solved. CEO and board members' selection is still not independent from political interventions and preferences, especially for listed companies where the dispersion of ownership is very low and the state is the dominant shareholder. Contemporary corporate governance mechanisms have not been introduced yet (e.g. board committees, competent directors, performance-based compensation scheme) reducing stock attractiveness.

On the other hand, some previously state-owned companies have been exposed to competition and operate under contemporary corporate governance practices. The latter has been mainly motivated by the fact that these companies are also listed in foreign stock exchanges and their ownership structure is quite dispersed, containing a large portion of demanding institutional investors. However, government's decisions pose again serious

questions. For example, the government's intention to create a golden share[3] (e.g. in the Hellenic Telecommunications Organisation) raised significant controversy. The European Commission has largely criticised the use of golden shares and six EU member-states (Portugal, Italy, Spain, France, Belgium and UK) have been taken to court.

Finally, the Greek capital market has to actively co-ordinate its corporate governance efforts with the other countries in order to facilitate mutual learning and convergence. The creation of a single corporate governance code would not work in practice, as the company law in EU member-states is not harmonised yet.

[3] A share that has voting rights capable of exercising a veto over specified or significant changes to the constitution or articles of association of a company. The term came into common usage through the 1980s to refer to the government's continuing interest in companies, which it had privatized. The golden share supposedly protects a privatized company from being taken over, but some people say it was designed to protect the management from the real competitive world.

Appendix

Laws and Presidential Decrees covering the Greek Capital Market

Law/Presidential Decree (P.D.)	Government Gazette	Title
Law 3632/1928	17/26-7-1928	"Stock Market Securities"
Law 148/1967	A 173	"Measures on capital market enhancement"
Law 876/1979	A 48 12-3-1979	"Amendment and completion of provisions concerning the development of the capital market"
P.D. 348/1985	125 / 4-7-85	"Determination of conditions for the edition, audit & publication of the Prospectus to be published for securities listing in the A.S.E."
P.D. 350/1985	126 / 4-7-85	"Listing requirements in the Athens Stock Exchange and issuers duties and obligations"
P.D. 360/1985	129	"Financial information to be published periodically by companies listed in the A.S.E."
Law 1806/1988	A 207	"Amendment of legislation concerning the Securities Exchanges and other provisions"
P.D. 489/1989	209	"The Parallel Market in the A.S.E."
Law 1892/1990	A 101	"Modernization and development of the capital market and other provisions"
Law 1969/1991	A 167	"Portfolio Investment Companies, Mutual Funds, and other provisions aiming at the modernization and improvement of the Capital Market Commission"
P.D. 50/1992	22 / 14-2-92	"The mutual recognition of the prospectus to be published for the listing of securities in a Stock Exchange in compliance with Directive 87 / 345 / EEC"
P.D. 51/1992	22 / 14-2-92	"Information to be published on cross-shareholdings by ASE listed companies in accordance with Directive 88 / 627 / EEC"
P.D. 52/1992	22 / 14-2-92	"Conditions for the edition, audit & publication of the Prospectus to be published for public offerings of securities in accordance with Directive 89 / 298 / EEC"
P.D. 53/1992	22 / 14-2-92	"On confidential information in accordance with Directive 89 / 592 / EEC"
P.D. 14/1993	6 / 1-2-93	"Amendment of P.D. 409 of 12-28-11-1986 on "Amendment of Greek Company law" to EU Legislation and particularly the provisions of the First Directive 68 / 151 / EEC of the 9-3-1968 Council, the Second Directive 77 / 91 / EEC of the 13-12-1976 Council, the Fourth Directive 78 / 660 / EEC of the 25-7-1978 Council and partly of the Seventh Directive 83 / 349 / EEC of the 13-6-1983 (Government Gazette A 191)"
P.D. 96/1993	42 / 23-3-93	"Amendment of Greek Legislation to the provisions of the Directive 88 / 361 / EEC and 92 / 122 /EEC on capital mobility"

Law/Presidential Decree (P.D.)	Government Gazette	Title
P.D. 433/1993	183 / 7-10-93	"Amendment and addition of the P.D. 348 / 1985 (Government Gazette 125 A) of Law 1969 / 91 (Government Gazette 167 / A) and of P.D. 50 / 1992 (Government Gazette 22 A) in compliance with the provisions of Directive 85 / 611 / EEC for the co-ordination of legislative, regulatory and administrative clauses concerning particular organizations of collective investments in securities and of Directive 90 / 211 / EEC for the amendment of Directive 80 / 390 / EEC concerning the mutual recognition of the prospectuses for the disposition of securities to the public as prospectuses of listing in the A.S.E."
Law 2166/1993	A 137	"Incentives for the development of companies, arrangements in direct and indirect taxation and other provisions"
Law 2198/1994	A 43	"Increase in wages of public servants in general, loans of the public sector and development in the Bank of Greece of a System Supervising the Transactions of Dematerialized Securities and other provisions"
Law 2275/1994	A 238/29-12-1994	"Ratification of five loan contracts (31-12-1993 and 6-7-1994) between the Hellenic Public Sector and the Bank of Greece and other provisions"
Law 2324/1995	A 146/17-7-1995	"Amendment of legislation concerning Securities Exchanges, the organization of the Capital Market Commission, the Deposits' Guarantee System and other provisions"
P.D. 82/1996	66 / 11-9-96	"Nominalisation of company shares participating in public works"
P.D. 401/1996	269 / 10-12-96	"Establishment and operation of the Money laundering Commission of article 7 of Law 2331 / 95"
Law 2374/1996	A 32	"Listing of Hellenic Telecommunication Organization S.A. in the Athens Stock Exchange and other provisions"
Law 2396/1996	A 73	"Investment services in the securities field, capital adequacy of investment services firms and credit institutions and shares' dematerialization"
Law 2414/1996	A 135	"Development of Public Companies and Organizations and other provisions"
Law 2459/1997	A 17	"Abolition of tax obligation and other provisions"
Law 2471/1997	A 46	"Ratification of the Act of 18-11-1996, additional restrictions for the Capital Market and other provisions"
Law 2515/1997	A 154	"Practice of Accountant-Tax Consultants, operation of the Body of Charter Accountants and other provisions"
Law 2526/1997	A 205	"Development of the S.A. named "Public Company of Securities S.A." and other provisions"
Law 2533/1997/chapter A & B	A 228/11-11-1997	"Derivatives Exchange and other provisions"

Law/Presidential Decree (P.D.)	Government Gazette	Title
P.D. 100/1998	96 / 5-5-98	"Defining of depreciation coefficients"
Law 2642/1998	A 216	"Record of companies concerning shipbuilding, transformation, repair and conservation of ships and other provisions"
Law 2651/1998	A 248/3-11-1998	"Amendment of Stock Market legislation, merger of Thessaloniki Water Supply Organization and Thessaloniki Sewerage Organization and other provisions"
Law 2733/1999	A 155/30-7-1999	"Development of New Market in the ASE, general amendments of the Capital Market, the Public Companies and Organizations, the Corinth Canal S.A. and other provisions"
Law 2742/1999	A 207/7-10-1999	"Land-planning and perpetual development and other provisions"
Law 2744/1999	A 222/25-10-1999	"Amendments concerning Public Water Utility and other provisions"
Law 2778/1999	A 295/30-12-1999	"Real Estate Mutual Funds - Investment Companies investing in Real Estate and other provisions"
Law 2789/2000	A21 / 11-2-2000	"Amendment of Greek legislation to the Directive 98/26/EC (19-5-1998) of the European Parliament and the European Council"
Law 2836/2000	A 168/24-7-2000	"Completion of Capital Market Commission regulation, amendments concerning the Public Real Estate Company, insurance compensations, Value Added Tax, investing gold and other provisions"
Law 2842/2000	A 207/27-9-2000	"Additional measures implementing Regulations 1103/1997, 974/98 and 2866/98 of the European Council concerning the introduction of euro"
Law 2843/2000	A 219/12-10-2000	"Modernization of Stock Market Trading, listing of companies investing in ocean shipping on the Athens Stock Exchange and other provisions"
Law 2874/2000	A 286/29-12-2000	"Reinforcement of employment and other provisions"
P.D. 60/2001	51 / 16-3-01	"Amendment of company Law 2190 / 1920 to the Directive 92 / 101/ EEC of 23th November 1992 as amended by 77 / 91 / EEC (L347 / 64 / 28-11-92)"
P.D. 74 /2001	64/2-4-01	"Amendment of Law 2844 / 2000 (Government Gazette 220 A / 2000) "Contracts on transferable securities or claims subject to publicity and other contracts"
Law 2892/2001	A 46/9-3-2001	"Reductions in the taxation of capital and other provisions"
Law 2937/26-7-2001	A 169/26-7-2001	"Amendment and completion of capital adequacy requirements of Investment Companies and credit institutions, adjustments concerning Thessaloniki Water Utility and Sewerage Company S.A. and other provisions"
Law 2954/2-11-2001	255/2-11-2001	"Tax adjustments, Mutual Funds, completion of Stock Market legislation and other provisions"

Law/Presidential Decree (P.D.)	Government Gazette	Title
Law 2992/20-3-2002	A 54/20-3-2002	"Measures on capital market enhancement and other provisions"
Law 3016/14-05-2002	A 110/17-5-2002	"Corporate governance and other provisions"
P.D. 25 /2003	26/6-2-2003	"Organization chart of Capital Market Commission"

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NATIONAL AND KAPODISTRIAN UNIVERSITY OF ATHENS
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EUROPEAN STOCK MARKET INTEGRATION AND ECONOMIC GROWTH: A THEORETICAL PERSPECTIVE

By

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European Stock Market Integration And Economic Growth

By

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Abstract

This theoretical approach investigates the effects of stock market integration on the process of economic growth in the countries of European Union. If European stock markets have become more integrated with world capital markets and especially US markets, we would expect to see them play a fundamental role on the development of European financial sector and promote economic growth. More integrated and liquid European equity markets make investment less risky and easier of access because they allow investors to acquire equity and sell it quickly and cheaply as soon as they need immediate access to their savings. At the same time, companies enjoy permanent access to capital raised through equity issues. More liquid and deep European stock markets improve resource allocation by facilitating longer-term, more profitable investments and enhance prospects for growth in the wider region of Europe and in every member-country, including Greece.[1]

1. Introduction

One of the most enduring debates in finance during the last decade is whether stock market integration causes economic growth or whether increased economic growth is a consequence of financial development. This issue had been extensively studied nearly three decades ago by Shaw (1973) and McKinnon (1973), who resulted in significant evidence that financial development promotes economic growth, mainly through a raise in the level of saving and investment. Their 'financial liberalisation' thesis argued that government restrictions on the financial system restrain the quantity and quality of investment.

Goldsmith (1969) reported a significant relationship between the level of financial development, defined as intermediary assets divided by GDP and economic growth. A number of subsequent studies have used the growth regression framework in which, the average growth rate in per capita output across countries is regressed on a set of variables controlling for initial conditions and country characteristics as well as measures of financial market development [King and Levine (1993a), Atje and Jovanovic (1993), Levine and Zervos (1996), Harris (1997) and Levine and Zervos (1998)]. Also Asteriou and Price (2000), looking for evidence for the role of financial development in the UK growth process, found that the causal direction runs from the

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development of the financial sector to the real sector development (measured by real GDP per capita).

All of the above studies deal with issues of causality and unmeasured cross country heterogeneity in factors such as saving rates that may cause higher growth rates and greater financial sector development (Caselli et. al, 1996). A number of different techniques have been adopted to investigate these issues, such as (a) initial values of financial variables (King and Levine, 1993), (b) instrumental variables (Harris, 1997) and, (c) cross-industry variations in growth that should be not susceptible to country specific factors [Demirguc-Kunt and Maksimovic (1996) and Rajan and Zingales (1998)].

Granger causality tests have been widely used in studies of financial markets in order to indicate the causal direction that characterizes financial development and economic growth. The same technique has been used in several studies of the determinants of economic growth including government expenditures (Conte and Darrat, 1988); price stability (Darrat and Lopez, 1989); money supply (Hess and Porter, 1993); savings (Carroll and Weil, 1994) and exports [(Jin and Yu, 1995), (Rahman and Mustafa, 1997).

A more difficult question arises with respect to whether the forward-looking nature of stock prices could be driving apparent causality between stock market and growth. Current stock market prices should represent the present discounted value of future profits. In an efficient equity market, future growth rates will, therefore, be reflected in initial prices (Filer, Hanousek and Campos, 1999). This argues for using market capitalisation and liquidity rates, especially turnover (value of trades in the stock exchange over market capitalisation) as the primary measures of development, purging the spurious causality effect because higher prices in anticipation of greater growth would affect both the numerator and the denominator of the ratio.

In summary, a large literature emphasises the positive influence of the development of a country's financial sector on the level and the rate of economic growth. The argument is that the services that a well-functioning financial sector provides, such as efficient capital allocation, lower transaction costs and easier access to world capital markets for firms and individual investors, have a supportive influence on the rate of economic growth. Section 1, in this paper, is referring to the way that stock markets influence economic growth. In Section 2, there is an overview of the most important models that examine the impact of stock markets integration to the economic growth of a country. Section 3 describes the present picture of European stock exchanges and, finally, Section 4 is referring to the evolution of Athens Stock Exchange (ASE) during last decade.

2. The contribution of stock markets to economic growth

There is a lot of worldwide discussion about the relation of the stock markets and the economic growth of a country. It is very interesting to see in what way a stock market can help or even speed up the economic growth of a country. The main reasons for this phenomenon are that stock exchanges:

- Increase liquidity and constitutes a mechanism for diversification of risk (risk management device), therefore making market participants more prone to invest.
- Improve the flow of information about activities of companies, which results to the improvement of corporate control and eventually to better corporate governance. In other words, the organisational and managerial structure of the corporations becomes more effective.
- Give the possibility to society's savings to direct to alternative investment ways that are more productive. Existence of an exchange increases the stock of funding available for riskier investment projects prerequisite to economic growth. In general, it can be said that stock markets contribute to both capital accumulation and technological innovation.

3. The globalisation of capital markets

Stock exchanges should be harmonised with the international rules and regulations. The current trend is the globalisation of stock exchanges either in terms of alliances or of electronic links between them. The liberation of capital movement is also an important factor for future development of the financial markets. They should focus in a specific client target group either institutional or retail investors. Thus, it is very important to adopt the right strategy and formulate the appropriate rules in order to attract the targets investors' group. Also, stock exchanges should establish sound supervisory structures, like, for example, clearness and transparency. It is very important for the European stock exchanges to take into consideration the work already made in this field by the respective U.S. markets.

3.1. The conditions of stock markets integration

Globalisation can be defined as the integration of capital markets throughout the world into an international capital market to which all participants (investors, financial institutions, exchanges, listed companies, lenders, borrowers etc) have an easy access in it and where prices are determined by the international demand and supply.

The factors that led to the acceleration of the integration process are:

- *Deregulation or liberalisation of markets and the activities of market participants.*
  Global competition has forced governments to deregulate (or liberalise) various aspects of their financial markets so that their financial enterprises can compete effectively around the world. More specifically, for the capital markets sector, the deregulation is consisted of two parts:
  1. Markets deregulation (i.e. the minimisation of the capital market rules). Market deregulation is consisted of measures that can drive through the liberation of capital markets and strengthen the competition at an international level. For example, measures upon transaction control investments in foreign countries, taxation rules, rules of a stock exchange etc.
  2. Institutional deregulation (i.e. the minimisation of financial institutes' rules). Institutional deregulation consists of measures for raising the competitiveness between various financial institutions. For example, measures for the reduction of some of the banks' privileges, abolition of separating lines among financial institutions, etc.
- *Technological advance.* The vast development in the areas of information and telecommunication networks technology is helping to overcome the obstacles of cross border trading by making it simple, fast, cheap, reliable and with no need for many intermediaries.
- *Economies of scale.* As with any industrial and commercial environment, economies of scale apply to the operation of stock markets. The bigger the markets, the more cost-effective they tend to be. This tendency is translated into lower costs of trading investors. Comparative costs of share dealing show that the corresponding fees in US are almost three times lower on average than UK.
- *Changing equity cultures.* Changing equity cultures is another reason for globalisation. Private investors are on the increase worldwide. It has been estimates that private investors hold some 50% of European stocks.
- *The Euro.* With the introduction of the common currency, stock markets are now able to quote prices in a single currency. This also makes clearing and settlement easier leading to integration.
- *International diversification of portfolios.* International diversification reduces significantly the systematic risk of a portfolio. The systematic risk is associated with the national market as a whole and cannot be diversified at a national level.
- *The attempt of capital markets to open their borders.* This fact helps international investors to attract new capital.

However, the steps toward integration are not always easy. There are numerous obstacles and difficulties. The major obstacles are related to the following six reasons:

- Governments and other national authorities do not want to lose a part of their control over financial markets.
- Capital markets, especially smaller ones, are sceptical to merge or co-operate with others due to their fear that they will lose a significant part of their existing market.
- The luck of trust between both parties for co-operation.
- Differences between national regulations, procedures and cultures.
- Small- or mid-capitalisation listed companies that are 'globalisation avert' for many reasons.
- Various political reasons.

3.2. Stock exchange quality characteristics

In order for a stock exchange to be able to support the economic growth of a country, it is very important to follow some quality characteristics. Therefore, the following issues must be addressed when we talk about a competitive stock exchange:

- *Efficiency:* The extent to which information available each time to the public is reflected to current prices. It refers to the fairness of prices but to the extent that investors have equal chance to form the correct expectations.
- *Liquidity***:** The degree to which a market is liquid, meaning how easily trades are conducted in that market or, in other words, how easy it is to convert a security into cash. Liquidity components are the following:
    1. *Depth:* The size of a financial investment that can be traded at a given price.
    2. *Breadth:* The difference between the fair price and the actual traded price. It is usually measured by the width of the Bid/ Offer spread that is the difference between the lowest sell price and the highest buy price. A high spread suggests an ineffective price discovery process because it implies that buyers have a very different opinion from sellers, therefore it is difficult to make trades.
    3. *Resilience:* The spread with which prices return to their initial "equilibrium" level after they change, in response to a trade by investors. This formulates a quality characteristic because investors can have at any time the "fair" value of a security.
- *Transparency:* The concept of transparency in a stock market includes the following elements.
    1. *Fairness:* The markets must be free from fraud and manipulation. Thus adequate mechanism for promoting fidelity between buy and sell side must exist.

2. *Information Dissemination:* A cornerstone prerequisite for the good function of the stock exchange.
3. *Simplicity:* The rules and structures of the stock exchange must be as simple as possible according to the targets aimed at.
4. *Equal Treatment:* Different investors and companies, given their different features, must be equally treated regarding the access to the stock exchange and its markets.
5. *Stock dispersion:* Adequate stock dispersion ensures a large number of trading parties and therefore, the more effective price determination and a lower probability of manipulation.
6. *Inside information:* Access and use of private (or inside) information is strictly prohibited in order to avoid price manipulations.
7. *Protection:* The means by which investors are protected from market manipulations, inefficiencies and failures. Especially, kinds of services provided are important, both in terms of offering protection for the less aware and of offering facilities to encourage participation from individuals.

- *Cost-Efficiency:* Transaction costs include all the commissions, fees and operating costs which have to be paid by a customer involved in a deal. These costs increase with the number of parties involved and the inefficiency of the procedures (e.g. fax is more expensive and takes more time than e-mail), and with the costs of the trading systems involved.
- *Market Access:* Who can see the trading bids and asks and who can actually trade. Viewing is available to all market participants but access is limited to stock exchange members.
- *Orderly Markets:* Reduced price volatility is a prerequisite in order to boost confidence in stock market institutions and to avoid excessive levels of risk. The management of periods of turbulence and protection of investors in periods of potential market disorder is a crucial point.
- *Innovation:* Innovation in products, rules and technology formulates a quality characteristic because it strengthens the competitive advantage of a stock exchange.
- *Effective use of technology:* A stock exchange should effectively use the advanced technology available in order to ensure high performance.

Even though the above difficulties exist, integration seems to be the future in the worldwide financial sector. The major consequences of capital markets integration will be the vast and inevitable rise of competitiveness in all levels (countries, financial institutions, stock exchanges), a new and common financial regulatory framework for all the countries in European Union, mergers and co-operations between stock exchanges, 24-hour trading, the dominance of

large stock exchanges against the smaller ones and finally, the possibility of lower levels of investor protection.

3.3. Legal structure of European stock exchanges

Historically, exchanges had two kinds of ownership structures: exchanges owned by the state or exchanges owned by their members. The main changes of ownership structure took place in Europe where the privatisation of stock exchanges started a few years ago. In Europe the percentage of members in stock exchanges decreased significantly, while other institutions (like banks, insurance companies, pension funds etc) saw their part in ownership increasing. In recent years, a number of stock exchanges have changed their legal organisation in order to be more flexible and to compete better with other international markets. The main reason that forces stock exchanges to alter their legal structure is the economical integration, which was accelerated in the last years.

Furthermore, the heavy investment programs are necessary for the continuous development of technology and the modernisation of markets that require new amounts of capital. In order to attract this new capital, many stock exchanges have decided to go public (demutualisation of stock exchanges). Recent examples include Deutsche Boerse, which was floated on 5th of February 2001 and Euronext, which was decided to go public on May 2001, while previous stock exchanges that had already gone public were the Italian, the Amsterdam Stock Exchange and Stockholm. Athens Stock Exchange (ASE) was listed on its main market in August 2001. Finally, London Stock Exchange (LSE) announced its intention to go public by the end of 2001.

The change to the legal structure also responds to the objective of enlarging the stock exchanges' governance structure by including a portion of outside ownership as opposed to inside ownership represented by the members.

4. Stock market integration and economic growth

4.1. Impact on economic development

Recently there has been a significant revival of interest concerning the relationship between financial development and growth. New studies have provided theoretical and empirical underpinning that earlier research lacked: financial development can be shown to have not only level effects, but also growth effects. Two of the most substantial works is that of Levine and Zervos (1998) and Rajan and Zingales (1998).

In their article Levine and Zervos (1996, 1998a, 1998b) find that liquidity rates in stock markets, as it is calculated by the ratio of Value of Trades to Gross Domestic Product (GDP) and by Turnover (the ratio of Value of Trades to the percentage of capitalization in a stock exchange), as well as the level of stock markets' integration with the world capital markets (Korajczyk, 1996) are positive and significantly correlated with present and future rates of economic growth, capital accumulation and an increase of productivity growth. The increase of liquidity rates in stock markets constitutes an important indication of the increase of real per capita income and accumulation of natural capital.

Stock markets may affect economic activity through the creation of liquidity. Liquid equity markets make investment less risky-and, as a consequence, more attractive- because they allow savers to acquire an equity and to sell it quickly and cheaply, if they need immediate access to their savings or want to alter their portfolios. At the same time, firms enjoy permanent access to capital raised through equity issues. By facilitating longer-term, more profitable investments, liquid markets improve the allocation of capital and enhance prospects for long-term economic growth. Also, by making investment less risky and more profitable, stock market liquidity can also lead to more investment. In other words, investors will come in markets if they can easily leave.

Levine and Zervos consider three measures of market liquidity. The first commonly used measure is the total value of shares traded on a country's stock exchange as a share of GDP. Averaged over a long time, the value of equity transactions as a share of national output is likely to vary with the ease of trading, meaning that if it is very costly or risky to invest, there will not be much investing. It is interesting to mention that countries that had relatively liquid stock markets in 1976 (Hong Kong, Australia, Canada, United Kingdom, United States, Japan, Singapore, Taiwan) in 1976, tended to grow much faster over the next 20 years than countries with very illiquid markets (Argentina, Belgium, Spain, Luxemburg, Greece, Sweden).

The second measure of liquidity is the value of traded shares as a percentage of total market capitalisation (the value of stocks listed on an exchange). This turnover ratio measures trading relative to the size of the stock market. Finally, the third measure is the value-traded-ratio divided by stock price volatility. Liquid markets should be able to handle heavy trading without large price swings.

The basic conclusion that emerges from the statistical work of Levine and Zervos is that stock market development explains future economic growth. Multiple regression procedures suggest that stock market liquidity helps forecast economic growth even after controlling for a variety of

non-financial, economic, social, political and policy factors that may affect economic growth and, even after using instrumental variable estimation procedures, various periods and different country samples. Empirically, it is not the size of volatility that matters for growth but the ease with which shares can be traded.

4.2. Financial dependence and growth

The study of Rajan and Zingales (1998) led to the conclusion that financial development facilitates economic enlargement through the reduction of cost of external financing of companies. Specifically, they indicate that industrial sectors of economy, that are more depended on external sources of financing are much more developed in countries with more developed financial sectors. In other words, it is implied that, ceteris paribus, an industry such as Plastic Products, which is technologically more dependent on external funding, should develop relatively faster than Pottery, which requires little external finance, in countries that are more financially developed. To the extent that financial-market development (or the lack of it) is determined by historical accident or government regulation, the existence of a well-developed market in a certain country represents a source of comparative advantage for that country in industries that are more dependent on external finance.

The paper suggests that financial development may play a particularly beneficial in the rise of new firms. If new firms are considered to be the source of innovative ideas, then financial development can enhance innovation and thus, promote growth in indirect ways. Similarly, the cost imposed by a lack of financial development can also be a factor in determining the size composition of an industry as well as its concentration. This suggests that an additional indirect channel through which financial development could influence economic growth is by disproportionately improving the prospects of young firms. If these are typically innovators, then in a way we face Schumpeterian "creative destruction" that would not even get initiated in countries with less-developed markets.

4.3. Measures of stock market integration

Numerous papers test whether emerging stock markets are integrated into the world markets [Errunza and Losq, 1989; Bekaert, 1995; Harvey, 1995]. To examine whether integration is important for economic development requires country-specific measures of the degree of integration. If markets are financially integrated, capital should flow across borders to equalise the price of risk. However, if the markets are not integrated, because of possible capital controls or other constraints, then the price of risk may differ across markets. Korajczyk (1996) estimates

deviations from the law of one price of risk using the International Arbitrage Pricing Model (IAPT). He finds that market segmentation is larger for emerging countries than developed countries. Also market segmentation decreases through time for many countries, suggesting a reduction in the barriers to capital flows.

Using Korajczyk's measure of market integration, as well as measures of stock market size, liquidity, volatility, concentration and institutional development for forty-four developed and emerging markets from 1986 to 1993, Demirguc-Kunt and Levine (1996) find that large markets tend to be less volatile, more liquid and less concentrated in a few stocks than smaller markets. In addition, internationally integrated markets tend to be less volatile. Furthermore, institutionally developed markets with strong information disclosure laws, international accounting standards and unrestricted capital flows, have larger and more liquid markets.

Levine and Zervos (1995) show that countries, which liberalised restrictions on capital and dividend flows, showed a market improvement in the functioning of their stock exchanges. Interestingly, while the results show that price volatility rises immediately after capital control liberalisation, the analysis of Demirguc-Kunt and Levine implies that, in the long term, stock return volatility is lower in countries with more open capital markets. They also examine the interaction between stock market development and financial intermediaries. They find that as countries grow and reach higher levels of income, stock markets and non-bank financial institutions develop rapidly. As stock markets and non-banks grow in importance, banks represent a correspondingly smaller share of the overall financial system. In other words, they find that across countries, the level of stock market development is positively correlated with the development of financial intermediaries. Thus, stock markets and financial institutions are generally complements; they grow simultaneously.

5. The picture of European stock exchanges

The first steps towards the integration of European stock exchanges concerned institutional regulations, as the concession to financial institutions to operate outside the national borders and the enactment of common criteria for the investors' protection. Many enterprises started operating in more than one countries of EU, even after collaborations with other foreign organizations or after mergers and acquisitions. The three basic factors that will finally determine the future of European stock exchanges will be the progress of sophisticated technology, the rising competition between the exchanges and the regulation harmonisation progress.

With the introduction of Euro, which increased the transparency of prices through their expression to a common unit of measurement and constituted a huge step to the integration process, investors inside and outside EU, consider the European capital market as a single market. However its present structure lacks against investors' demands. European capital market is segmented with a lot of national stock exchanges and clearing houses, in contradiction of U.S. capital market where a lot fewer stock exchanges dominates and there is only one clearing house. This situation deters the effective exploitation of modern technology and investments for all the financial institutions of the market, as the volume of transactions does not have the critical size or latent productivity is being observed in the market (Greenwood and Jovanovic, 1999). In Europe there are more than 30 national stock exchanges, almost 12 different transaction systems and approximately 20 national and 2 international institutions of clearing and settlement that prevents the creation of an effective stock market in Euro zone. Because of the particularly restrictive institutional framework, national institutions dominate clearing and settlement. However, there is a great tendency for the development of a central co-contractor in the stock market in order to simplify financial management for those who participate in the market, to increase liquidity of transactions and to decrease the cost of clearing and settlement.

The great segmentation of European capital markets also appears from the existence of different prices that prevail for the same financial products that are being traded in different countries. It can also be seen from the different accounting standards existing between country-members, making the comparison between financial results of enterprises particularly difficult, as well as from the pension funds' programs, which are limited in the national borders. As a result there is an increase in the cost of capital, which leads European firms to seek for new sources of capital in international stock exchanges.

Table 1 provides a more complete picture of the existing resemblance and differences that prevail in European capital markets and shows the difficulties of the unification process. We can observe a great variety of trading systems, in the platforms and in the technology used, hence also in their effectiveness. Transaction hours differ and this has consequences in the information flow between markets. Supervisory bodies are different and the way that surveillance is being held differs between stock exchanges. Clearing systems and tax arrangements are dissimilar and the same stands also for dividend and transaction issues.

The transparency of prices that the single currency involves and the liberalisation of capital markets that it is accompanied by the integration of stock markets are expected to minimise the differences at least in tax arrangements. There is significantly less variety in investment products and the time margins of settlement in each stock exchange.

Table 2 presents evidence about listing requirements in a stock exchange. For example, capitalisation rates, capitalisation rate as percentage of GDP of a country and statistics for the Value of Trades and liquidity rates of a market, which is the rate of Value of Trades in a particular market to the capitalisation rate of that market. In general terms, the listing requirements of new companies do not differ significantly between stock exchanges, as for example, the three-year operation of a company with published balance sheets and, the minimal dissemination of its shares that it is publicly held (25%). Other conditions differ between stock markets, like the minimal initial capital of a company required for its import in the stock exchange. Also, differences exist comparing to U.S. and Tokyo stock exchanges. The capitalisation rate of a market as percentage of GDP reflects how mature European stock markets are. In Table 2, we observe that the differences between countries are very significant and except some extreme cases like Austria (13,2%) and Switzerland (214,5%), the remainder European stock exchanges range between 41,3% for Oslo and 156% for Helsinki. The corresponding rate for Athens Stock Exchange is 71,1%. These percentages tend to decrease because of the bending tendencies of share prices after 2000.

As far as liquidity rates are concern, London Stock Exchange demonstrates the higher rate of 0,83%, followed by the Spanish stock exchange, Euronext and Stockholm with liquidity rates of 0,72%, 0,68% and 0,65%, respectively. Athens Stock Exchange demonstrates a liquidity rate of 0,18%. The higher the liquidity rate is, the more effective the market is and the diffusion of information in this.

The introduction of Euro together with the changes in the investment behavior acted catalytically in the European stock exchange integration. The increasing cross-border transactions led to the creation of a more unified structure of European capital markets. Also the collection of information in the disposition of fewer but more powerful investment companies transmits power from stock exchanges to other participants of the market. Finally, technological improvements concerning the easier access of a capital market allow henceforth the easier transportation of capital liquidity from one market to the other and also the implementation of cheaper transactions.

European Stock exchanges seek to become more competitive in the new environment, establishing European platforms of products, strengthening the need for unified structures, for the reduction of cost through the use of common technology in transaction systems, clearing and settlement. However, each stock exchange maintains its own directions for the effective

operation of its market, transparency, safety, reliability and information of its investors, promotion of new products, differentiation of its revenues and rationalisation of its operation.

Today sovereign poles in European and international level are the London Stock Exchange, Euronext, Deutsche Boerse, New York Stock Exchange and NASDAQ. Each of them has traced its strategy regarding technological development and other interconnections, the mix of services that offer, the attraction of other investment companies, its emergence as a financial centre in its area and its specialisation. Each one has positive principles in terms of market, capitalisation, vertical or horizontal integration, product mix, technology and specialisation subjects but also points of skepticism on collaboration issues.

Medium and small stock exchanges seem to chose two different strategic ways concerning their future: Some exchanges are trying to unite all the other exchanges in their common geographical region. Stockholm Stock Exchange, for example, tries to be the larger market in the Scandinavian region through NOREX (Nordic Exchanges). NOREX Exchanges are trying to hold their blue chips into their countries by facilitating access for trading and clearing and settlement to foreign investors. Other stock exchanges prefer to merge in large alliances finding the best conditions for them. They have two targets a) they try to be compatible with the international standards of trading and settlement and b) they try to become larger at least into their own country in order to achieve better conditions in the case of merging with other exchanges. Finally, smaller stock exchanges try to protect themselves from the competition of the larger markets, which can be realised in three ways:

- Direct listing of a blue chip company in a foreign large stock exchange.
- Dual listing of a blue chip company in a foreign large stock exchange.
- Takeover of the listed companies from large multinational companies.

On the other hand there are alternative electronic systems of trading. They are created with the initiative of institutional investors and stock exchanges (as Virt - X and Tradepoint) and technological institutes (GL - Trade). They provide the appropriate conditions of membership and offer lower transaction costs from the traditional stock exchanges. Participants in them are either members of official stock exchanges or collaborators with some of their members. They maintain book of commands, they operate through matching orders and allocate internal clearing and settlement, where this is feasible. They absorb liquidity from the traditional stock exchanges, they offer quick order satisfaction, absence of intervention and investment anonymity that are important factors for investors which investigate for the cheapest transactions.

5.1. The evolution of Athens Stock Exchange

In the above analysis it was presented the most important trends in the European stock markets. The Greek stock market has succeeded in a rather short period of time to provide remarkable results concerning its development and maturity process. In order to converge with the other developed European capital markets, new institutions, products and processes were prepared and incorporated in its internal operation, Already, it is expected the implementation of four important measures (the qualitative and organisational upgrade of editing, segregation of competences between ASE and Capital Market Commission, transition in the regime of International Accounting Standards, code of Stock Exchange legislation) that are going to complete the institutional armouring of the market.

The latest years were realised important steps promoting significant reforms and energies. The most important are:

- The creation of the Parallel Market
- The dematerialisation of securities
- The change in the legal form of Athens Stock Exchange, that functions henceforth as Limited Liability Company
- The introduction of derivative Stock Exchange products
- The reduction of transactions cost
- The creation of electronic secondary market of titles of fixed income
- The development of an integrated electronic system of transactions (OASHS)
- The perceptible improvement of transparency, the control of the market and the dissemination of information
- The strengthening of the market surveillance
- The collaboration with Financial Times for the creation of Common Indicators FTSE / ASE and the promotion of ASE, particularly abroad.

The double effect of the appearance of large economic unions, particularly after the introduction of the single currency and mainly the free floating of capital worldwide, force the small regional markets to lose progressively great amounts of liquidity rates, because of the flight of domestic capital that is invested in bigger markets or via repurchases of domestic companies from foreigner companies and parallel listing in bigger stock exchanges.

An important reason for the decrease of liquidity in the running period is owed in the reduction of securities prices and in the unwillingness of investors to contract transactions. The economic situation is unfavourable for all markets worldwide (reduction of transactions 70-80%) and it is

estimated to last at least as long as the economic crisis. The basic problem of liquidity in the domestic market constitutes up most priority for the Greek capital market. In the recent years the modernising interventions, the important reduction of transactions and clearing costs, the intense extraversion and the organisational recomposition for the introduction of the ASE Group share for trading, aimed in the preparation for some strategic collaboration. In the direct plans of the Greek stock exchange it is included the creation of new markets and the introduction of new products and processes, the further reduction of transactions cost and clearing cost, as well as the reduction of the systemic risk of the market and, finally, the intense extraversion for the increase of liquidity and the achievement of alliances, even with the neighbouring countries or with the developed western markets.

In the frame of development of technological infrastructure of ASE a lot of work is being realised:

- Basic infrastructure and improvement of provided services. The main work of this category is:
    - The upgrade and extension of Network of Stock Exchange Transactions
    - The ASE - HUB.
- Various projects that will make the Greek market more accessible and compatible with the developed European stock markets. The more important achievements in this category are:
    - The integration of company Order Data Link (ODL)
    - The implementation of the second phase of the development of OASHS (Integrated System for Automatic Electronic Trading).
    - The development of SAT (System of Immaterial Securities).

Finally, the aiming collaboration with neighbouring markets is mutually advantageous. The Balkan stock markets are still in infantile stage and their absolute priority is to install functional central systems of clearing and transactions and to improve their organisation, the provided information and their transparency. The Greek stock exchange is willing to contribute in this effort, estimating that its leading role in the area would help realise its developing projects.

6. Conclusion

National stock exchanges are led in various forms of alliances and mergers with other financial institutions in order to increase their effectiveness and their competitiveness in an international level. Both results are positive for investors and for the economy in general. First, investors have the possibility of securities trading, easier and with lower cost. Second, for enterprises, profit

lies in the fast pumping of capital from the markets. Each movement and initiative is not an easy matter, mainly because it should create and not remove value from a stock market. Any collaboration – alliance – should ensure the existence of remote members in a bi- directional relation. Also should provide networking of the stock exchange through information suppliers, exploitation of its comparative advantage, effective structure of operation of local market and efficient listed companies that direct local and international demand to national shares, maintaining the existed liquidity and strengthening national economy.

Besides the several talks about future mergers and co-operations, each European stock exchange tries hard to raise its portion of the European capital market pie. This raise could be very critical for each exchange, especially these days, where the economical integration is a reality. The stronger a stock exchange is, the better its position will be at the negotiations with the other exchanges for future alliances.

From all the above, the question of how the future of the European stock exchanges will be towards the globalisation opportunities and threats, still remains. However, one think is certain for now: The last seven years the European capital markets are going through a very important transitional period. There is a lot of interest and actions around Europe that concern the future of stock markets and it is a common belief that the day that things will get a more permanent look is not far away.

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APPENDIX

Table 1. Institutional data of European stock exchanges

Exchange	Types of Securities Traded	Trading System	Trading Hours	Supervisory Body	Clearing & Settlement Organization	Settlement Cycle	Taxes on Dividends & Capital Gains
Athens	(1)Shares, Rights (2)Bonds (3)Futures and Options on Indices	Integrated System for Automatic Electronic Trading (Screen Based)	11:00 – 16:00 10:00 – 14:00 09:45 – 15:30	(1-3)Capital Market Commission (2)Minister of National Economy	(1-2)Central Securities Depository (CSD) (3) Derivatives Exchange Clearing House (ADECH)	T+3 T+3 T+1	Capital Gain: None Dividends: None Residents T-Bills: 10%, Bonds: 15% **Non-Residents** T-Bills: 10%, Bonds: 15%
Copenhagen Stock Exchange	(1) Bonds (2) Equity Futures and Option (3) Shares, Warrants	SAXESS (electronic trading) CLICK (telephone trading) SAXESS	09:00 – 17:00 (all securities)	Danish Financial Supervisory Authority and Danish Securities Council	VP-Vaerdipapir Centralen SECUR	T+3 2 days for treasury bills T+0 for futures and options	Dividends: 30 -40% tax Capital Gains: Less than 3 years held: 50-56% tax More than 3 years held: 30-40%
Deutsche Boerse AG	Shares, Bonds, Warrants, Exchange Traded Funds	Floor Trading (Xontro)/ Xetra (Screen-based)	09:00 – 20:00	The market supervisory of German Federal securities supervisory body(BAFin)	Clearstream International	T+2	Residents: Dividends/Interests: 30% Non-Residents: Interests: not taxable Dividends: not taxable
Euronext Amsterdam	Equities, Bonds, ETF, Investment Funds Warrants **Derivatives**	NSC-VE NSC-VW **SWITCH**	09:00 – 17:30	Securities Board of the Netherlands (AFM)	Clearing: Clearnet SA Settlement: Negicef	T+3	Residents: 1,2% capital tax yearly on capitals>17.600 euro Non-Residents: depending on tax treaties
Euronext Brussels	Equities, Warrants, Bonds, **Derivatives**	NSC-VE NSC-VW NSC-VE BTS	09:00 – 17:30	CBF/EBMA (Banking and Finance Commission,Euronext Brussels Market Authority	Clearing: Clearnet SA Settlement: CIK	T+3	Dividends: 15% or 25% Interests: 15% No tax on Capital Gains
Euronext Lisbon	Equities, Bonds,Rights, Warrants, ETFs **Derivatives**	Continuous trading system (LIST) SEND (screen-based)	08:00 – 16:30 16:45 – 17:15	Securities Market Commission (CMVM)	Securities Settlement: Interbolsa Financial Settlement: Central Bank	T+3	Dividends Residents and non-Residents: 15% of 50%of the dividend Individuals:12-40% Companies: 25-30% Capital gains on shares: 10% for residents, non-residents: exception
Euronext Paris	Equities, Warrants, Bonds, ETFs **Derivatives**	NSC-VE NSC-VW NSC-VE NSC-VO	09:00 – 17:30	CMF/ COB	Clearing: Clearnet SA Settlement: Euroclear France	T+3	Dividends are declared as revenue and taxed accordingly. Capital gains above 50.000 euro are taxed at 26%
Helsinki Exchanges	Shares, Rights, Bonds, Warrants **Derivatives**	HETI (for shares, screen-based) SOMIInfo	09:00 –19:00 CET	Financial Supervisory Authority	Helsinki Securities and Derivatives Exchange, ClearingHouse Ltd.	T+3	Dividends: 0% Interests: 29% for capital gains
Irish Stock Exchange	Equities, Warrants, Bonds, Preference shares	ISE-XETRA	07:50 – 16:00	Central Bank Of Ireland	CREST (Equities)	T+3	Taxed under Income & Corporation tax regime Dividend tax at 24% of all Irish registered companies
Italian Exchange	Shares, Warrants, Rights, Bonds Government & non-Government Bonds Equity Derivatives	MTA MOT IDEM	Liquid shares 8:00-17:30 Less liquid shares 8:00 -15:30 9:15-17:30	CONSOB	Cassa di Compensazione e Garanzia; Monte Titoli	T+3	Capital gains: 12.5% Foreign investors are exempt from capital taxation Dividends: Domestic investors: 12.5% Foreign investors: 27%
London Stock Exchange	UK & International Equities, Options, Gilts and Fixed Interest	SETS, SEAQ, SEATS Plus(inc AIM), SEAQ Internation.	8:00-16:35 8:00-16:30 8:00-16:30 Variable	Financial Services Authority (FSA)	CREST/ Euroclear/ Cedel/Local Systems	T+3 (T+1 for Gilts and Fixed Interest)	Dependent on taxpayer- at taxpayer's marginal rate of taxation
Bourse de Luxembourg	Shares, Warrants, Bonds	SAM (screen-based) MFX & MCD	10:00 – 16:00	Commission for the Supervision of the Financial Sector	International Clearing Systems recognized by the Luxembourg Stock Exchange	T+3	Withholding tax: 25%on dividends paid by domestic companies On bonds (domestic and international): none

Bolsa de Madrid	Shares, Fixed Income, Warrants, Public Debt, Certificates	SIBE (screen-based)	08:30-17:35	C.N.M.V. (Comision Nacional del Mercado de Valores)	SCLV (Servicio de Compensacion y Liquidacion de Valores)	T+3	20% Withholding tax for residents and non-residents investors.
Oslo Bors	Shares, Warrants, Bonds Options and Futures	SAXESS (screen-based) OM's (screen-based)	10:00-16:00	Oslo Bors, The Banking, Insurance and Security Commission of Norway	- NOS	T+3	**Dividends:** Residents: no tax Non-Residents:15-25% **Capital gains:** Residents:28% Non-Residents: none
Stockholms Borsen	Equities, Warrants, Sox-bonds, ETF, Rights **Derivatives**	SAXESS CLICK	09:30-17:30	Stockholms Borsen (SB) & Swedish Financial Supervisory Authority	Swedish Central Securities Depository (VPS)	T+3	0-30% withholding tax on dividends & interest paid on SEK denominated securities to non-residents. Tax reductions depend on bilateral tax treaties.
SWX Swiss Exchange	Equity products, Rights, Warrants, Bonds, Options	Fully integrated electronic trading system (EBS)	09:00-17:30	SWX Swiss Exchange/ Swiss Federal Banking Commission	SIS SegaIntersettle	T+3	Withholding tax: 35% (effective double taxation agreements) No capital gains tax
Wiener Borse	Shares, Equity instruments, Bonds Warrants Options, Futures	Xetra (screen-based) OM (screen-based)	09:15-17:30 09:00-17:30	The Financial Market Authority (FMA)	OeKB (Osterreichische KontrollBank AG) OTOB Clearing	T+3 T+1	25% for resident (for non-resident

Source: FIBV

Table 2. Market statistics 2001 of European and international in million USD$

Exchange	Foundation Date	Listing requirements	Market Capitalization 2001 in $	Country's GDP rate in $	Market Capitalization as GDP rate 2001	Market Capitalization as GDP rate 2000	Value of Share Trading 2001 in $	Market liquidity 2001[2]
Europe								
ATHENS (TSV)	1876	• Minimum capital of Pta.200 million (12 million euro) • Three years annual accounts published • At least 25% of shares placed with members to the public	83.4	117.2	71.1%	96.0%	150,5	0,18%
COPENHAGEN (REV)	1871	• Activity not less than 3 years • Shares must be distributed on not less than 500 shareholders • The company's shares must be freely negotiable	85.1	161.5	52.6%	68.9%	290,6	0,34%
DEUTSCHE BOERSE (TSV)	1585	• Minimum portion of shares widely held: 25% • Company's minimum age: 3 years • Company's equity value a minimum of EUR 1.25 million	1 071.7	1 853.4	57.8%	67.8%	5 698,2	0,53%
EURONEXT (REV)	1999	**Amsterdam:** • Minimum track record of three years • At least 3 profitable financial year • At least 10% of shares placed with members to the public **Brussels**: • Market capitalization: EUR15 m. • Three years audited annual accounts published • Shares in public hands must represent at least EUR 5 million **Paris:** • At least 25% of shares placed with members to the public • Three years annual accounts published	1 843.5	1 921.3**	95%	115.1%	12 518,9	0,68%
HELSINKI (TSV)	1912	• At least 25% of shares placed with members to the public and 10% of its votes • Three years annual accounts published • Market value 35 million euro.	190.4	121.7	156%	242.1%	729,2	0,38%
IRISH (TSV)	N/A	• Three years audited annual accounts published • At least 25% of shares placed with members to the public	75.2	102.4	73%	85.9%	89,9	0,12%
ITALY (REV)	1808	• Free transferability of all shares • Free float shares equal to at least 25% of capital • Market capitalization of at least 5 million euro	527.4	1 088.8	48.4%	71.5%	2 818,3	0,53%
LISBON (TSV)	1769	• Three years annual accounts published • Sound financial and economic situation	46.3	109.8	42.1%	57.8%	111,7	0,24%
LONDON (REV)	1801	• Minimum market capitalization: 700,000 sterling • Trading record at least 3 years • At least 25% of shares placed with members to the public	2 164.7	1 421.9	152%	184.3%	17 986,2	0,83%

[2] Market liquidity 2001 = Value of Shares Trading 2001/ Market Capitalization 2001

** Total of France, Belgium and Netherlands's GDP.

LUXEMBOURG (TSV)	1928	• Three years annual accounts published • Market value at least 50 m. Lux francs(13 million euro) • At least 25% of shares placed with members to the public	23.7	19.2	123%	179.0%	2,8	0,011%
OSLO (REV)	1819	• Market value of the shares: at least NOK 300 million • Company operated at least 3 years (annual reports published) • At least 25% of shares placed with members to the public	69.4	168.0	41.3%	41.3%	252,1	0,36%
SPAIN (REV)	1831	• Minimum capital of Pta.200 million (12 million euro) • Profits in the 2 previous years • At least 25% of shares placed with members to the public	468.2	583.1	80.2%	90.3%	3 368,9	0,72%
STOCKHOLM (REV)	End 18th century	• Company operated at least 3 years (annual reports published) • At least 25% of shares placed with members to the public and 10% of its votes • Market value at least SEK 300 m.	236.5	218.8	108%	144.5%	1 546,9	0,65%
SWISS EXCHANGE (REV)	1850	• Capitalization of at least CHF 25 million • Company operated at least 3 years (annual reports published) • At least 25% of shares placed with members to the public	527.3	245.8	214.5%	328.4%	2 379,7	0,45%
VIENNA (TSV)	1771	• Company sales exceed EUR 5 million • Steady growth in the past • Projects for next 12 months are defined	25.2	189.6	13.2%	15.8%	31,2	0,12%

Source: FIBV, IMF and OECD

• **NOTE ON TURNOVER STATISTICS**

Stock exchanges use different definitions and calculation methods to compile turnover statistics.

TSV exchanges count as turnover only those transactions which pass through their trading systems or which take place on the exchange's trading floor.

REV exchanges include in their turnover figures all transactions subject to supervision by the market authority (transactions by member firms, and sometimes non-members, with no distinction between on- and off- market and transactions made into foreign markets reported on the national market).