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SYMMETRICAL AND ASYMMETRICAL RELATIONSHIP BETWEEN EXCHANGE RATE AND STOCK EXCHANGE INDEX RETURN VOLATILITIES IN TURKEY

Ömer ÖZÇİÇEK*

Abstract
The recent increase in financial market liberalizations has increased the foreign capital flow to stock markets. As a consequence, the relationship between the exchange rate and the stock price is being taken more seriously. Theoretically, the change in exchange rate could affect stock prices or developments in stock market could affect the exchange rate. A different approach to this subject is to investigate the relationship between volatilities. This study shows that in Turkey this relationship is both ways and is not affected by foreign capital flow. Furthermore, the relationship is asymmetric. The effect shows itself usually under unfavorable circumstances, when stock prices drop or exchange rate increases.

I. Introduction

In free market economies financial markets have a very important function. A major function is to channel savings into the most efficient investment opportunities. This function has become more important since the increase in the financial liberalization that has occurred during the globalization process. As a consequence a lot of research has been going on about this subject. A part of this research is about the relationship between stock market and some macroeconomic variables. In this paper the causality relationship between stock market and exchange rate volatilities is analyzed.

The desire of increased globalization has increases international trade and foreign investment. As a consequence, the supply and demand of foreign currency has increased and the importance of the relationship between exchange rate and stock prices has increased.

There are different theories explaining the relationship of these two markets. The microeconomic approach claims that the net worth of firms will change as a consequence of the effect of exchange rate change on import and exports. Thus, according to this view exchange rate affects the stock prices.

* Asst. Prof. Ömer Özçiçek, University of Gaziantep, İİBF, Department of Economics, 27310 Gaziantep.
Tel: 342 317 2075, Fax: 342 360 1402, e-mail: ozcicek@gantep.edu.tr

According to another view the causality runs from stock market to currency market. According to the portfolio view of exchange rate determination the increase (decrease) in stock value will increase the demand for currency which will increase (decrease) the interest rate. An increase (decrease) in interest rate will increase (decrease) the demand for local currency which will appreciate (depreciate).

Since in these two theorems the causalities are in opposite directions, the determination of the direction of causality became an empirical question. For instance, Abdalla and Murdinde (1997) conclude that there are two way causalities in three developing Asia countries and in one country there is causality from exchange rate to stock market. Granger et al (2000) shows that in five of the nine Asian countries there is a two way causality, in two countries there is no causality and in the other two the causality is in opposite directions. Nieh and Lee (2001) could not find a cointegration relationship between exchange rate and stock indices in the G7 countries. Doong and Wand (2005) concludes that in two of the four developing Asian countries there are two way causalities and in two countries there is no causality. Bahmani-Oskooee and Domaç (1997) using monthly Turkish data found a two way causality relationship between Turkish stock market index and exchange rate. Kasman (2003) using daily data shows that there is a two way relationship between the Turkish stock exchange indices (İMKB 100, industrial, financial and services) and dollar exchange rate.

Some studies have analyzed this subject by studying the relationship between exchange rate and stock market volatilities. The joint movement of the market could reflect information flow. Events do not only affect returns but also volatilities. Furthermore, the study of volatility, which is accepted as a measure of risk and its source, will be important especially to portfolio investors and policy makers. Research on volatility has reached different results.

Kanas (2000) estimates EGARCH models for the six most developed countries and founds that except for Germany there is a statistical relationship between the volatilities and the causality is from stock market volatility to exchange rate volatility. Apergis and Rezitis (2001) show that for the USA and the UK the causality runs from exchange rate volatility to stock market volatility. Chen and Shen (2004) estimate a bivariate switching autoregressive model for Taiwan and shows that the volatilities of the two markets are not independent from each other. Chowdhury et al. (2006) estimates the GARCH models of stock market index, industrial production, inflation and exchange rate for Bangladesh. Using the estimated volatilities in a VAR model Chowdhury et al. (2006) could not find a statistical relationship between stock market and exchange rate volatilities.

Similar studies have been done for Turkish markets. Kasman (2004) performed Granger causality test on volatility measures of İMKB 100 and exchange rate obtained from GARCH models, and found that the İMKB 100 volatility causes exchange rate volatility. Erdem et al. (2005) in an EGARCH framework show that the İMKB 100 and industrial stock index volatilities cause the exchange rate volatility. But Erdem et al. (2005) do not investigate the reverse causality. Furthermore, these two studies did not take into account the two financial crises that Turkey experienced.

This study has important differences than the others. First of all the contemporary effect of stock market indices and exchange rate volatilities is investigated. Furthermore, the asymmetric effect of an increase or decrease in the stock marker or exchange rate is investigated. Another difference is the volatility measure, which is based on unconditional standard deviations calculated from daily series. The results show that the effect of exchange rate volatility on stock market volatility is stronger, and the relationship is stronger when the exchange rate or stock market drops.

II. Variables and Stationarity Analysis

Growth rates are calculated by taking the difference of natural logarithm values of Istanbul Stock Exchange (ISE) National 100 (U100), financial, industrial, service indices and total volume, and exchange rate (Turkish Lira per USA dollar, EXR).[1] Then, the monthly unconditional standard deviations of the variables are calculated. The volatility measure is the coefficient of variation, which is obtained from dividing the standard deviation to the mean.

$$STD = \sqrt{\frac{1}{n-1}\sum_{j=1}^{n}(x_j - \bar{x})^2}$$

A crisis dummy (KRZ) is defined that takes the value 1 in April 1994 and February 2001. As in Wang and Shen (1999) portfolio investment variable, which is a possible factor effecting the stock market and exchange rate, is also included. Before moving on to any regression analysis, we apply the augmented Dickey-Fuller test (ADF)[2] to decide whether the variables are stationary or not. As Table 1 shows only the portfolio investment is not stationary in the levels and the therefore the difference (dPORT) is going to be used in the regression anaylsis.

[1] The time series are available at the Republic of Turkey Central Bank's web site.
[2] The lag length is determined by starting at 18 lags and lowering the lag length until the last coefficient's t statistics in above 1.65.

Table 1: ADF Unit Root Test

	Level	Difference
EXR	-5.74	-
U100	-3.73	-
FINANCIAL	-9.75	-
INDUSTRIAL	-7.81	-
SERVICE	-7.92	-
PORT	-1.41	-4.04

Note: 1% Significance level is -3.47

III. Empirical Analysis

To investigate the relationship among the variables we first perform a Granger Causality test similar to Kasman (2004). The results are presented in Table 2 (2 lags are used in estimation). The result that stock market index volatilities affect exchange rate volatility is strongly supported. Exchange rate volatility affects U100 and financial index volatility is only supported at the 10% significance level and the other two variables are not affected. This result is consistent with Kasman (2004). Furthermore there is no relationship with the volume volatility.

Table 2: Granger Causality Test

Null Hypothesis	Observation number	F Statistic	p Value
U100 does not GC EXR	221	13.65	2.6E-06
EXR does not GC U100		2.37	0.096
FINANCIAL does not GC EXR	185	19.51	2.1E-08
EXR does not GC FINANCIAL		2.36	0.097
INDUSTRIAL does not GC EXR	185	13.51	3.4E-06
EXR does not GC INDUSTRIAL		2.22	0.11
SERVICE does not GC EXR	113	5.99	0.003
EXR does not GC SERVICE		1.48	0.23
VOLUME does not GC EXR	221	0.56	0.55
EXR does not GC VOLUME		1.65	0.19

$$Y_t = C + \delta \cdot KRZ_t + \beta_1 Y_{t-1} + \beta_2 Y_{t-2} + \alpha_0 X_t + \alpha_1 X_{t-1} + \alpha_2 X_{t-2} + \varepsilon_t$$

To further investigate the relationship between the volatilities of exchange rate and ISE variables the crisis dummy variable and the current value of the explanatory variable are included to the model. Thus there are three variables in the regression analysis, dependent variable (Y), crisis dummy variable and the explanatory variable. The lag lengths are chosen to be 2 by using AIC and SIC.

First when we look at the models in Table 3 with the volatilities of the stock market variables as the dependent variable and exchange rate volatility as the explanatory variable (X), we see that the crisis variable is insignificant. The coefficients of the lagged dependent variables are mostly positive and significant. This can be interpreted as a shock to stock index volatilities lasts for two more months. There is no statistical relationship between volume and exchange rate volatilities. For the other variables the coefficient of the contemporary exchange rate variable is positive and significant. The first lags are negative but insignificant; the second lags are negative and significant at the 5% level. The last row presents the F test and the p value of the null hypothesis $\alpha_1=\alpha_2=0$. When we compare these results with Table 2 we see that, except in SERVICE, the coefficients of lagged EXR are significant at the 5% level, and in SERVICE at the 6% level.

Table 3: ISE Indices Equations

	U100	FINANCIAL	INDUSTRIAL	SERVICE	VOLUME
KRZ	-0.01 (-0.95)	-0.01 (-0.66)	-0.02 (-1.37)	-0.01 (-0.36)	0.18 (1.32)
Y(-1)	0.39** (5.87)	0.42** (5.65)	0.41** (5.55)	0.36** (3.74)	0.12 (1.83)
Y(-2)	0.15 (2.04)	0.15 (1.83)	0.20** (2.49)	0.18 (1.73)	0.21** (3.24)
EXR	0.42** (2.69)	0.38** (2.33)	0.47** (2.72)	0.65* (2.03)	-1.47 (-1.02)
EXR(-1)	-0.08 (-0.98)	-0.09 (-1.02)	-0.09 (-0.95)	-0.25 (-1.59)	1.23 (1.65)
EXR(-2)	-0.23** (-2.77)	-0.21** (-2.42)	-0.25** (-2.79)	-0.35* (-1.92)	-0.69 (-0.92)
$\alpha_1=\alpha_2=0$	4.37 %4.7	3.44 %3.4	4.34 %1.4	2.81 %6	1.75 %18

Table 4 presents the result when exchange rate volatility is the dependent and the ISE index volatilities are the explanatory variable. Sincethe LM tests of the OLS estimation show the existence of autocorrelation[3], the error term is modelled with GARCH effect. When EXR is the dependent variable, the crises variable is strongly significant except in the SERVICE case. This shows that during a crises period exchange rate volatility significantly increases. Furthermore the coefficients of two lagged values of EXR are positive and significant. When we combine this fact with the results in Table 3, we can conclude that there is no relationship between exchange rate and volume volatilities. The contemporary value coefficients of stock index volatilities are positive and significant. When we look at the lagged values we see that the coefficients are negative but, they are insignificant for U100 and only one coefficient is significant in each equation for the other indices (in FINANCIAL the second lag is at the 5%, in INDUSTRIAL the first lag at the 5% and in SERVICE the second lag at the 10% level). Thus looking at the significant coefficients in Table 3 and 4, we can deduct that there are two way causalities.

Thus, there is a positive relationship between contemporary values of the ISE and exchange rate volatilities. An increase (decrease) in the exchange rate volatility happens at the same month with an increase (decrease) in stock market index volatilities. The effects of lagged values are negative and the results are stronger from exchange rate volatility to stock market. A possible factor effecting the foreign currency and stock market is foreign capital. Whang and Shen (1999), in their study for Taiwan, found that foreign capital flow affects the exchange rate and stock market volatilities at the same time. To investigate a similar situation for Turkey, when we add the net portfolio flow variable (dPORT) and its two lags to the above equation none of the coefficients are significant.

[3] This problem could not be solved by adding more lags.

Table 4: Exchange Rate Equations

	U100	FINANCIAL	INDUSTRIAL	SERVICE	VOLUME
KRZ	0.08** (24.2)	0.09** (39.5)	0.08** (30.2)	0.08 (0.62)	0.08** (24.5)
EXR(-1)	0.24** (6.44)	0.25** (6.33)	0.34** (13.8)	0.31** (14.8)	0.33** (15.3)
EXR(-2)	0.32** (11.5)	0.27** (14.8)	0.25** (10.1)	0.37** (14.1)	0.24** (10.6)
Y(0)	0.07** (2.63)	0.09** (3.94)	0.12** (4.94)	0.03* (1.89)	-0.002 (-0.76)
Y(-1)	-0.06 (-1.35)	-0.04 (-1.10)	-0.07** (-2.23)	-0.02 (-1.00)	-0.004 (-1.01)
Y(-2)	-0.006 (-0.18)	-0.08** (-2.77)	-0.04 (-1.40)	-0.03* (-1.89)	-0.003 (-1.23)
$\alpha_1=\alpha_2=0$	0.96 %38	4.60 %1.1	4.19 %1.7	4.84 %1.0	2.07 %12.3

Note: At the ** %5; * %10 level significant.

The relationship between volatilities could be different when exchange rate increases or decreases. To investigate such a situation two dummy variables are defined: The d_+ dummy variable that takes the value 1 when exchange rate increases and 0 otherwise, and similarly the d_- dummy variable that takes the value 1 when exchange rate decreases. When these variables are multiplied with the exchange rate volatility ($EXR_+=EXR\times d_+$ and $EXR_-=EXR\times d_-$) the volatility is separated to the volatility when exchange rate increases and decreases parts.

Table 5 presents the estimated coefficients and the t-statistics for the model when ISE index volatilities are the dependent variable. When exchange rate increases (TL depreciates) there is a relationship between exchange rate and stock index volatilities. But there is no significant relationship when the exchange rate decreases. Again there is no relationship with VOLUME. When the exchange rate increases there is a contemporary positive relationship between exchange rate and stock index volatilities. As in Table 3, the first lag of EXR_+ is insignificant; the second lag is negative and significant. This supports the view that the relationship in Table 3 is due to exchange rate increases.

The situation when the exchange rate is the dependent variable is given in Table 6. Here too, two dummy variables are defined that takes the value one when the stock index value increases or decreases. Using these dummies the volatilities are separated into two parts, volatility when the stock index increases and the volatility when the stock market decreases. Due to the

presence of autocorrelation, the error terms are modelled as GARCH processes. The crises variable is positive and strongly significant. During an increase or decrease in stock market indices there is a significant contemporary positive relationship between exchange rate and stock index volatilities. But when we look at the lagged coefficients, we see that even though a strong relationship is present when the stock market decreases, however when the stock indices increase, except for U100, the index volatilities do not effect the exchange rate volatility (or the effect is very weak). From these results, it can be deduced that the effect is stronger when the stock indices decrease. In addition the second lag of the VOLUME variable is negative and significant.

In an asymmetric model there is a two way relationship between exchange rate and ISE indices volatilities. But this relationship occurs during unfavorable situations (when exchange rate increases of stock market decreases) and the relationship is stronger from exchange rate to the stock market.

Table 5: Asymmetric ISE Indices' Equation

	U100	FINANCIAL	INDUSTRIAL	SERVICE	VOLUME
KRZ	-0.01 (-0.76)	-0.01 (-0.57)	-0.02 (-1.22)	-0.01 (-0.49)	0.23 (1.61)
Y(-1)	0.39** (5.70)	0.41** (5.47)	0.41** (5.45)	0.34** (3.49)	0.12 (1.75)
Y(-2)	0.14* (1.95)	0.15* (1.78)	0.19** (2.44)	0.17 (1.60)	0.23** (3.47)
EXR_+	0.39** (2.43)	0.37** (2.16)	0.45** (2.50)	0.73** (2.11)	-1.95 (-1.33)
$EXR_+(-1)$	-0.07 (-0.77)	-0.08 (-0.80)	-0.08 (-0.84)	-0.27* (-1.68)	1.02 (1.33)
$EXR_+(-2)$	-0.19** (-2.06)	-0.18* (-1.90)	-0.23** (-2.24)	-0.38* (-1.95)	-0.27 (-0.33)
EXR_-	0.33 (1.29)	0.30 (0.98)	0.44 (1.36)	0.60 (1.07)	0.47 (0.20)
$EXR_-(-1)$	-0.30 (-1.36)	-0.16 (-0.61)	-0.19 (-0.67)	-0.74* (-1.69)	-2.37 (-1.17)
$EXR_-(-2)$	-0.19 (-0.88)	-0.24 (-0.94)	-0.17 (-0.66)	-0.70 (-1.44)	-0.30 (-0.15)

IV. Conclusion

Previous two studies about the relationship between exchange rate and stock market Volatilities in Turkey have reached different conclusions. According Kasman (2004) the causality runs from U100 to exchange rate volatility. Erdem et al. (2005) concludes that stock market index volatility effects exchange rate volatility. Erdem et al. (2005) did not investigate the reverse causality. But these two studies did not include the contemporary values of the explanatory variables.

Tablo 6: Asymmetric Exchange Rates Equations

	U100	FINANCIAL	INDUSTRIAL	SERVICE	VOLUME
KRZ	0.08 (23.8)	0.08 (28.6)	0.08 (26.8)	0.08 (64.3)	0.08 (23.2)
EXR(-1)	0.35** (13.7)	0.35** (12.8)	0.33** (11.0)	0.35** (13.0)	0.22** (14.2)
EXR(-2)	0.21** (7.81)	0.28** (9.46)	0.27** (9.17)	0.26** (9.72)	0.37** (14.9)
Y_+	0.09** (3.99)	0.08** (2.55)	0.11** (3.81)	-0.01 (-0.40)	-0.003 (-1.53)
$Y_+(-1)$	-0.10** (-5.12)	-0.05 (-1.62)	-0.06* (-1.84)	-0.02 (-1.07)	-0.003 (-1.19)
$Y_+(-2)$	-0.05** (-1.97)	-0.06 (-1.44)	-0.06 (-1.60)	-0.01 (-0.61)	-0.005* (-1.90)
Y_-	0.16** (8.37)	0.14** (5.35)	0.15** (7.09)	0.03** (2.27)	-0.001 (-0.48)
$Y_-(-1)$	-0.09** (-3.97)	-0.08** (-2.65)	-0.06* (-1.72)	-0.05** (-2.03)	-0.001 (-0.43)
$Y_-(-2)$	-0.03 (-1.27)	-0.05 (-1.36)	-0.05 (-1.31)	-0.01 (-0.57)	-0.01** (-3.49)

One of the important findings of this study is that there is a strong relationship between exchange rate and stock market volatilities in the same month. But the volatilities are not affected by foreign portfolio flow. Another finding is that the effect of an increase or decrease of the stock market index or exchange rate is not the same. The effect is stronger when the stock market decreases or exchange rate increases (unfavorable condition). Two way causality is supported. This shows that the international competition effect of an exchange rate change on firms (microeconomic view) and the effect of stock market change on exchange rate (portfolio view) are supported. Finally there is no evidence on the relationship between stock market and exchange rate volatilities.

References

Abdalla, I. S. A., V. Murinde, "Exchange Rate and Stock Price Interactions in Emerging Financial Markets: Evidence on India, Korea, Pakistan, and Philippines," Applied Financial Economics, 7, 1997, pp. 25–35.

Apergis, Nicholas, Anthony Rezitis, "Asymmetric Cross-Market Volatility Spillovers: Evidence From Daily Data on Equity and Foreign Exchange Markets," The Manchester School Supplement, 69, 2001, pp. 81-96.

Bahmani-Oskooee, M., İlker Domaç, "Turkish Stock Prices and Value of Turkish Lira," Canadian Journal of Development Studies, 43, 1997, pp. 139-150.

Chen, S., C. Shen, "Price Common Volatility or Volume Common Volatility? Evidence Taiwan's Exchange Rate and Stock Markets," Asian Economic Journal, 18, 2004, s

Chowdhury, Shah Saeed Hassan, Abu Taher Mollik, M. Selim Akhter, "Does Predicted Macroeconomic Volatility Influence Stock Market Volatility? Evidence from the Bangladesh Capital Market," Working Paper 2006.

Doong, Shuh-Chyi; Sheng-Yung Yang; Alan T Wang, "The Dynamic Relationship and Pricing of Stocks and Exchange Rates: Empirical," Journal of American Academy of Business, Cambridge, 7 2005, pp. 118-123.

Erdem, Cumhur, Cem Kaan Arslan, Meziyet Sema Erdem, "Effects of Macroeconomic Variables on Istanbul Stock Exchange Indexes," Applied Financial Economics, 15, 2005, pp. 987–994.

Granger, Clive W. J., Bwo-Nung Huang, Chin-Wei Yang, "A Bivariate Causality Between Stock Prices and Exchange Rates: Evidence from Recent Asian Flu," The Quarterly Review of Economics and Finance, 40, 2000, pp. 337–354.

Kanas, Angelos, "Volatility Spillovers Between Stock Returns and Exchange Rate Changes: International Evidence," Journal of Business, Finance and Accounting, 27, 2000, pp. 447-467.

Kasman, Saadet, "The Relationship Between Exchange Rates and Stock Prices: A Causality Analysis," Dokuz Eylül Üniversitesi Sosyal Bilimler Dergisi, 5, 2003, pp. 70-79.

Kasman, Saadet, "Hisse Senedi Getirilerinin Oynaklığı ile Makroekonomik Değişkenlerin Oynaklığı Arasındaki İlişki," İMKB Dergisi, 8, 2004, pp. 1-10.

Morley, Bruce, Eric C. Pentecost, "Common Trends and Cycles in G-7 Countries Exchange Rates and Stock Prices," Applied Economics Letters, 7, 2000, pp. 7-10.

Nieh, Chien-Chung, Cheng-Few Lee, "Dynamic Relationship Between Stock Prices and Exchange Rates for G-7 Countries," The Quarterly Review of Economics and Finance, 41, 2001, pp. 477–490.

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EFFECT OF OPENNESS ON ECONOMIC GROWTH IN HIGH INCOME OECD COUNTRIES: 1953-2004

Sefer ŞENER[*] & Ercan SARIDOĞAN[**]

Abstract
In a globalizing world, economic growth of the countries is deeply affected by international economic relationships. Therefore, openness has become the one of the most important factor affecting economic growth of the nations. On the other hand, it is very important to determine the optimal time and level of openness for obtaining benefit from international trade. The terms of trade among the countries depend on their power of the competitiveness. In this study, It is analyzed the effect of openness on economic growth for high-income OECD countries according to the World Bank classification for the period 1953-2004 by using panel time series econometric techniques. It is observed that openness affect economic growth positively in these countries and in the given period.

I. Introduction

In a globalizing world, it is very important to design efficient economic policies and relations for a country with the world economy to sustain stable economic growth. In this context, the openness of an economy is the one of the most important factors of both international trade and economic growth for the relevant country.

[*] Asst. Prof. Sefer Şener, Çanakkale Onsekiz Mart University, Department of Economics, Biga/Çanakkale.
Tel: 0 535 4609167 E-Posta: sefersener@yahoo.com
[**] Dr. Ercan Sarıdoğan, Research Assistant, Marmara University, Department of Economics, Ressam Namık İsmail sk. No.1, Bahcelievler/İstanbul.
Tel: 0212 507 99 25 –1339 E-Mail ercan-saridogan@marmara.edu.tr
Key words: Openness, Economic Growth, Economic History, Panel Causality, Panel Cointegration

In the international trade theories[1], the gains from international trade depend on the countries' power of the competitiveness. The power of the competitiveness depends on factor endowments of the countries on the one hand, and technological power on the other hand. In the growth models, the effect of international trade on economic growth mostly has positive effect.

The main determinant of economic growth in all growth models is technological change. The Neo-classical model -Solow-Swan (1956)- in growth models accepting labor and capital as basic input, unexplainable part of economic growth in the model is attributed to changes in technology and called as a "Solow residual". However the technological change in the model was assumed as a random, exogenous factor. On the other hand, endogenous growth models -Arrow (1962), Romer (1986, 1990, 1994), Mankiw-Romer-Weil (1992), Barro (1991), Lucas (1988), Grossman-Helpman (1991, 1994)- argue that technology and labor productivity development could be internalized by applying technology driven policies. In this context, it is argued that technology and productivity could be enhanced through efficient management process of human capital, research and development investments, education, government expenditures and externalities. On the other hand, one of most important factor affecting technological change is international trade level, openness level. In this context the role of international trade and openness on economic growth depends on stimulating these technology driven factors for these countries. Technological change from international trade can be separated into two parts; first, international competitiveness affects better technology production, and second international cooperation among the countries or firms affect diffusion of the technological change positively.

International trade has important effects on domestic capital accumulation, power of competitiveness, technological change, efficient allocation of sources and economic growth. The level and direction of these

[1] There has been huge debate how the countries' gains from international trade differentiate under the different trade conditions. Some approaches are established to explain this situation. Merchantilist Doctrine claimed that the prosperity of a nation depends on the bullion earned from international trade and a positive balance of trade. Adam Smith developed Absolute advantage theory and D. Ricardo reformulated Smith's theory, as a Comparative Advantage Theory, Heckscher-Ohlin model, explaining international differences in factor endowments of the countries. Leontief Paradox, Linder's Country Similarity Theory, Vernon's International Product Life Cycle Theory, Porter's Theory Of National Competitive Advantage, new trade theories of Krugman (1979, 1980), Grossman-Helpman (1993) are the theoretical approaches to explain the dynamics of international competitiveness and gains among the countries.

effects on the macroeconomic fundamentals of country depends on the power of competitiveness of the country. Hence, international trade may have positive effects for a country; there are also negative effects for some countries in terms of weakness of technological competitiveness.

Stensnes (2006) stated that with other underlying assumptions, however, endogenous growth models could also predict a positive and universal relationship between openness and growth, irrespective of initial technology. Specifically, if knowledge spillovers are global in scope, trade can serve as an important vehicle for technological progress. Most theorists seem to support an optimistic view on the capacity of trade capacity to diffuse knowledge. Nevertheless, the conclusion from this review of trade and growth theory is that there exists no clear theoretical relationship between growth and openness in the existing literature. With ambiguous theoretical predictions, the relationship must ultimately be determined by empirical studies.

The strategy of international trade policy of a country is very important to compete with other countries and to sustain economic development. It is the best strategy for a country to determine the optimal level and timing of trade liberalization in order to obtain maximum gain from international trade[2].

In this study, it is reviewed the studies in the literature for the subject in the first section. It is presented the panel time series econometric techniques, evaluated the results and recommended the policies in the second section.

II. Literature Review on Openness and Economic Growth

In the literature there have been many competing studies analyzing the effects of openness on economic growth for with different methodologies, different periods and different countries.

Dollar (1992) analysed whether outward-oriented economies grow faster than inward-oriented economies or not. Dollar argues that outward orientation allows countries to use external capital to finance development, and that the export growth associated with outward orientation is a catalyst of technological advancement. Dollar claimed that trade liberalization, devaluation of the real exchange rate, and maintenance of a stable real exchange rate could dramatically improve growth performance in many poor countries.

[2] Detail analyse of the countries liberalization policies, see Sachs and Warner (1995).

Sachs and Warner (1995) claimed that trade liberalization is the motor that drives global integration. They stated that open economies tend to converge, but closed economies do not. They stated that the channels through which trade affects growth are increased specialisation, more efficient resource allocation, and knowledge diffusion through trade and sharpened domestic competition.

Frankel and Romer (1995) investigated that whether trade causes growth or not by considering geographic factors as main variable. They found that the variation in trade that is due to geographic factors could serve as a natural experiment for identifying the effects of trade. They claimed that trade raises income. The relation between the geographic component of trade and income shows that a rise of one percentage point in the ratio of trade to GDP increases income per person by at least one-half percent. Trade appears to raise income by spurring the accumulation of physical and human capital and by increasing output for given levels of capital. The results also suggest that within-country trade raises income. The estimates suggest that within-country trade, like international trade, raises income both through capital accumulation and through income for given levels of capital.

Hoeffler (2002) re-examined Sachs and Warner's result and he found that the results are consistent with only if, using their model specification and estimation method. He suggested that their ordinary least squares estimation suffers from both endogeneity and omitted variable bias.

Harrison (1995) stated that one difficulty in measuring the impact of trade policies on growth is that trade policy itself may be a function of other variables, including growth. Studies that have tried to identify the causal relationship between GDP growth and growth in exports or imports have had mixed results. His review of the literature on openness and economic growth reveals two important considerations. First, despite the voluminous literature on this topic, the debate is by no means resolved. Many studies do reveal a positive relationship between various measures of openness and growth. But nagging problems remain. Methodological shortcomings make it difficult to link performance outcomes with policies per se causality tests and micro-level analyses yield mixed results. Second, it should be evident that no independent measure of so-called "openness" is free of methodological problems. In addition, international price comparisons cannot disentangle the impact of domestic market imperfections (such as oligopolistic marketing channels for imported goods) from trade policy interventions.

Harrison (1996) analyzed that a variety of openness measures to test the association between openness and growth. He found that although the correlation across different types of openness is not always strong, there is

generally a positive association between growth and different measures of openness. The strength of the association depends on whether the specification uses cross-section or panel data (which combines cross-section and time series). For industrializing countries, which have exhibited significant fluctuations in trade regimes over time, long-run averages may not serve as very meaningful indicators of policy.

Ben-David and Loewy (1997) investigated the impact of international trade on income convergence and economic growth. They stated that while the traditional trade literature addresses the impact of trade on the equalization of factor prices, it does not necessarily imply that incomes should converge as well. These countries tend to surround themselves with greater walls of protection, which also act as a buffer that limits knowledge spillovers to them. Hence, they stated that the income gap between these countries and the developed world continues to exist until the barriers start to come down.

Grossman and Helpman (1988) developed a multi-country, dynamic general equilibrium model of product innovation and international trade to study the creation of comparative advantage through research and development and the evolution of world trade over time. In the model, firms must incur resource costs to introduce new products and forward-looking potential producers conduct R & D and enter the product market whenever profit opportunities exist. Trade has both intra-industry and inter-industry components, and the different incentives that face agents in different countries for investment and savings decisions give rise to inter-temporal trade. In this model, the evolution of comparative advantages depends on the evolution of factor-endowment of the countries, which is affected innovation of product and international trade of these products.

Edwards (1998) investigated relationship between openness and total factor productivity growth. He used nine indexes of trade policy to investigate whether the evidence supports the view that total factor productivity growth is faster in more open economies. He found that more open countries experienced faster productivity growth.

Rodrik and Rodriguez (2000) analyzed the effects of trade policies on economic growth. They found little evidence that open trade policies - in the sense of lower tariff and non-tariff barriers to trade- are significantly associated with economic growth.

Vamwakadis (2002) stated that looking at historical evidence from 1870 to the present; he found no support for a positive growth-openness connection before 1970. In fact, the correlation is negative for the period

1920-1940. Cross-country growth regressions estimated for the period 1920-1990 suggest that the positive correlation between openness and growth is only a recent phenomenon.

Yanikkaya (2003) demonstrated that trade liberalization does not have a simple and straightforward relationship with growth using a large number of openness measures for a cross section of countries over the last three decades. He found that the regression results for numerous trade intensity ratios are mostly consistent with the existing literature. However, contrary to the conventional view on the growth effects of trade barriers, his estimation results show that trade barriers are positively and, in most specifications, significantly associated with growth, especially for developing countries.

Stensnes (2006) examined the effects of trade liberalization on economic growth by special emphasizing the role of institutional factors. He proposed that good institutions of conflict management are a contingent and mediating factor that can help to explain data heterogeneity. Without such institutions, countries that integrate with world markets become vulnerable to external shocks, possibly unleashing domestic conflicts and uncertainty detrimental to growth. This hypothesis is given empirical support by analyzing an interaction variable between openness and institutions, integrated in a growth regression for a sample of 94 countries. He found that the interaction variable is positive, significant and robust to a standard list of control variables. For countries with the least developed institutions of conflict management, greater openness is ceteris paribus found to reduce growth rates. He stated that the results reveal the inadequacies of a 'one size fits all' approach to trade liberalization, and indicate that complementary institutional reforms may be necessary if a country is to reap the full growth effects of openness.

III. Econometric Application

In this study we mainly focused on the effects of openness on economic growth in high-income OECD countries for the period 1953-2004 by applying panel time series econometric techniques for data from Penn World Table V.6.2.

There is also debate how to measure openness[3] in the literature. Yanikkaya (2003) stated that the most serious problem facing researchers today is the lack of a clear definition of what is meant by "trade liberalization"

[3] Detail analyse of measuring opennes see, Dolar (1992), Harrison (1996), Edwards(1993), Rodrik (2001), Yanikkaya (2003).

or "openness". Over time, the definition of openness has evolved considerably from one extreme to another. Even today it is not unambiguous as to what describes "openness".

Sachs and Warner (1995) stated that a country is classified as 'closed' if it meets any of the following five criteria: C1) average tariff rates of 40% or more C2) non-tariff barriers cover 40% or more of trade C3) a socialist economy C4) a state monopoly on major exports C5) a black-market exchange rate depreciated by 20% or more relative to the official exchange rate, on average, during the 1970s or 1980s. They claimed that an open economy is one in which none of five conditions applies.

Penn World Table Version 6.2 we used in our study defines openness (OPENC) as follows:

Exports plus Imports divided by GDP is the total trade as a percentage of GDP. The export and import figures are in national currencies from the World Bank and United Nations data archives. Note that when the export and import figures and GDP are expressed in real values, the value of OPENC will be the same because the price level (conversion factor) for domestic currency and exports and imports is the same.

3.1. Panel Unit Roots

Standard unit root tests have lower power than the unit root tests developed for panel data. One of the advantages of panel unit root tests is that their asymptotic distribution is mostly standard normal. This is in contrast to individual time series unit roots which have non-standard asymptotic distributions (Baltagi and et al, 2006). The logic behind the use of a panel unit root test is to combine the information from time series with the information from cross-sectional units. The addition of cross-sectional variation to time series variation improves estimation efficiency, leading to smaller standard errors and, consequently, to higher t-ratios (Erlat and Özdemir, 2003). Some of the panel unit roots are developed by Hadri (1999), Breitung (2000), Fisher-type tests using ADF and PP tests (Maddala and Wu (1999) and Choi (2001)), Levin, Lin and Chu (2002), and Im, Pesaran and Shin (2003). Some of deficiencies of these tests resulted in development of the new panel unit root tests in the literature by Chang (2002), Choi (2002), Phillips and Sul (2003), Bai and Ng (2004), Breitung and Das (2005), Choi and Chue (2007), Moon and Perron (2004), and Smith *et al*. (2004) (Pesaran, 2007). We consider the panel unit root tests developed by the Levin, Lin and Chu (2002), Breitung (2000), Im, Pesaran and Shin (1997 and 2003), and Maddala and Wu (1999).

3.2. Panel Cointegration

Cointegration theory was first suggested by Granger (1981), extended by Engle-Granger (1987) and Engle-Yoo (1987) and others. Johansen (1988, 1991 and 1994) developed a model to solve multiple cointegration relationships. Although cointegration theory developed is the one of the most useful tool in the econometric techniques. Time series of some economic variables is not too long to apply cointegration test. In this situation, it is more useful to integrate cross-section dimension with time-series dimension, which leads to panel cointegration tests.

There are several panel cointegration tests in the literature. There are mainly two different approaches for the panel cointegration tests, residual-based and maximum-likelihood-based. McCoskey and Kao (1998), Kao (1999), Pedroni (1995, 1997, 1999) propose residual-based, while Groen and Kleibergen (1999), Larsson and Lyhagen (1999) and Larsson, Lyhagen and Lothgren (2001) propose maximum-likelihood-based panel cointegration test statistics (Karaman, 2004).

Pedroni (1995, 1997, 2001) examined the properties of spurious regressions and residual-based tests for the null of no cointegration for both homogeneous and heterogeneous panels and studied special conditions under which tests for the null of no cointegration with homogeneous slope coefficients are asymptotically equivalent to raw panel unit root tests. Pedroni (2004) examined the tests for the null of no cointegration for panels with heterogeneous dynamics and heterogeneous slope coefficients. He also studied both between dimension and within dimension residual based test statistics. He stated that each of these tests is able to accommodate individual specific short-run dynamics, individual specific fixed effects and deterministic trends, as well as individual specific slope coefficients. Pedroni (1999) stated that panel cointegration techniques are intended to allow researchers to selectively pool information regarding common long-run relationships from across the panel while allowing the associated short-run dynamics and fixed effects to be heterogeneous across different members of the panel. The test procedure as follows Pedroni (1999):

1. First step is to compute the regression residuals from the hypothesized cointegrating regression (1.1) by including desired intercepts, time trends, or common time dummies in the regression and collect the residuals $\hat{e}_{i,t}$ for later use. Pedroni (1999) stated that a set of common time dummies can be included to capture disturbances which may be shared across the different members of the panel so that the remaining disturbances can be taken to be independent across individual members.

$$y_{i,t} = a_i + \delta_i t + \beta_{1i} x_{1i,t} + \beta_{2i} x_{2i,t} + ... + \beta_{Mi} x_{Mi,t} + e_{i,t} \quad (1.1)$$

$$t = 1,....., T;\ i = 1,...., N;\ m = 1,...., M\ ,\ \text{where}$$

T: number of observations over time,
N: the number of individual members in the panel,
M: the number of regression variables
a_i: Member-specific intercept; fixed-effects parameter, which of course is also allowed to vary across individual members.
$\delta_i t$: Deterministic time trends, which are specific to individual members of the panel

2. Difference the original series for each member, and compute the residuals for the differenced regression:

$$\Delta y_{i,t} = b_{1i} \Delta x_{1i,t} + b_{2i} \Delta x_{2i,t} + ... + b_{Mi} \Delta x_{Mi,t} + \eta_{i,t} \quad (1.2)$$

3. Calculate $\hat{L}^{2}_{11i}$ as the long-run variance of $\hat{\eta}_{i,t}$ by using any Kernel estimator.

Where $$\hat{L}^2_{11i} = \hat{\Omega}_{11i} - \hat{\Omega}'_{21i} \hat{\Omega}^{-1}_{22i} \hat{\Omega}_{21i} \quad (1.3)$$

$\hat{\Omega}$ is any consistent estimator of Ω_i

$$\Omega_i = \lim_{T \to \infty} E \left[T^{-1} \left(\sum_{t=1}^{T} \Delta z_{i,t} \right) \left(\sum_{t=1}^{T} \Delta z_{i,t} \right)' \right] \quad (1.4)$$

$$\Delta z_{i,t} = \left(\Delta y_{i,t} - \Delta y'_{i,t} \right)' \quad (1.5)$$

4. Using the residuals, $\hat{e}_{i,t}$ of the original cointegrating regression, estimate the appropriate autoregression, choosing either of the following forms (a) or (b):

a) For the non-parametric statistics (all tests except test 4 and test 7)

estimate, $\hat{e}_{i,t} = \hat{\gamma}_i \hat{e}_{i,t-1} + \hat{u}_{i,t}$, use the residuals to compute long-run variance of $\hat{u}_{i,t}$, denoted $\hat{\sigma}_i^2$.

b) For the parametric statistics (test 4 and test 7),

estimate $\hat{e}_{i,t} = \hat{\gamma}_i \hat{e}_{i,t-1} + \sum_{k=1}^{K_i} \hat{\gamma}_{i,k} \hat{\Delta e}_{i,t-k} + \hat{u}^{*}_{i,t}$, use the residuals to compute the simple variance of $\hat{u}^{*}_{i,t}$, denoted $\hat{s}^{*2}_{i}$. Seven test statistics calculated by Pedroni as follows:

Test 1: Panel ν-statistic:

$$T^2 N^{3/2} Z_{\hat{\upsilon} N,T} \equiv T^2 N^{3/2} \left(\sum_{i=1}^{N} \sum_{t=1}^{T} \hat{L}^{-2}_{11i} \hat{e}^2_{i,t-1} \right)^{-1}$$

Test 2: Panel ρ-statistic:

$$T \sqrt{N} Z_{\hat{\rho} N,T}^{-1} \equiv T \sqrt{N} \left(\sum_{i=1}^{N} \sum_{t=1}^{T} \hat{L}^{-2}_{11i} \hat{e}^2_{i,t-1} \right)^{-1} \sum_{i=1}^{N} \sum_{t=1}^{T} \hat{L}^{-2}_{11i} \left(\hat{e}_{i,t-1} \Delta \hat{e}_{i,t} - \hat{\lambda}_i \right)$$

Test 3: Panel t-statistic (non-parametric):

$$Z_{t\,N,T} \equiv \left(\tilde{\sigma}^2_{N,T} \sum_{i=1}^{N} \sum_{t=1}^{T} \hat{L}^{-2}_{11i} \hat{e}^2_{i,t-1} \right)^{-1/2} \sum_{i=1}^{N} \sum_{t=1}^{T} \hat{L}^{-2}_{11i} \left(\hat{e}_{i,t-1} \Delta \hat{e}_{i,t} - \hat{\lambda}_i \right)$$

Test 4: Panel t-statistic (parametric):

$$Z^{*}_{tN,T} \equiv \left(\tilde{s}^{*2}_{N,T} \sum_{i=1}^{N}\sum_{t=1}^{T} \hat{L}^{-2}_{11i}\, \hat{e}^{*2}_{i,t-1} \right)^{-1/2} \sum_{i=1}^{N}\sum_{t=1}^{T} \hat{L}^{-2}_{11i} \left(\hat{e}^{*}_{i,t-1} \Delta \hat{e}^{*}_{i,t} \right)$$

Test 5: Group ρ-statistic:

$$T\, N^{-1/2}\, \tilde{Z}_{\tilde{\rho}\, N,T-1} \equiv T\, N^{-1/2} \sum_{i=1}^{N} \left(\sum_{t=1}^{T} \hat{e}^{2}_{i,t-1} \right)^{-1} \sum_{t=1}^{T} \left(\hat{e}_{i,t-1} \Delta \hat{e}_{i,t} - \hat{\lambda}_{i} \right)$$

Test 6: Group t-statistic (non-parametric):

$$N^{-1/2}\, \tilde{Z}_{t\, N,T-1} \equiv N^{-1/2} \sum_{i=1}^{N} \left(\hat{\sigma}^{2}_{i} \sum_{t=1}^{T} \hat{e}^{2}_{i,t-1} \right)^{-1/2} \sum_{t=1}^{T} \left(\hat{e}_{i,t-1} \Delta \hat{e}_{i,t} - \hat{\lambda}_{i} \right)$$

Test 7: Group t-statistic (parametric):

$$N^{-1/2}\, \tilde{Z}^{*}_{tN,T} \equiv N^{-1/2} \sum_{i=1}^{N} \left(\sum_{t=1}^{T} \hat{s}^{*2}_{i}\, \hat{e}^{*2}_{i,t-1} \right)^{-1/2} \sum_{t=1}^{T} \left(\hat{e}^{*}_{i,t-1} \Delta \hat{e}^{*}_{i,t} \right)$$

where

$$\hat{\lambda}_i = \frac{1}{T} \sum_{s=1}^{k_i} \left(1 - \frac{s}{k_i + 1} \right) \sum_{t=s+1}^{T} \hat{\mu}_{i,t}\, \hat{\mu}_{i,t-s}, \;;$$

$$\hat{s}_i^{2} \equiv \frac{1}{T} \sum_{t=1}^{T} \hat{\mu}^{2}_{i,t}, \;; \hat{s}_i^{*2} \equiv \frac{1}{T} \sum_{t=1}^{T} \hat{\mu}^{*2}_{i,t}, s_{N,T}^{*2} \equiv \frac{1}{N} \sum_{i=1}^{N} \hat{s}_i^{*2},$$

$$\hat{L}^{2}_{11i} = \frac{1}{T} \sum_{t=1}^{T} \hat{\eta}^{2}_{i,t} + \frac{2}{T} \sum_{s=1}^{k_i} \left(1 - \frac{s}{k_i + 1} \right) \sum_{t=s+1}^{T} \hat{\eta}_{i,t}\, \hat{\eta}_{i,t-s} \;;$$

$$\sigma^{2}_{N,T} = \frac{1}{N} \sum_{i=1}^{N} \hat{L}^{-2}_{11i}\, \hat{\sigma}_i^{2} \;;\; \hat{\sigma}_i^{2} = \hat{s}_i^{2} + 2\hat{\lambda}_i,$$

$$\Delta y_{i,t} = \sum_{m=1}^{M} \hat{b}_{mi}\, \Delta x_{mi,t} + \hat{\eta}_{i,t} \;;$$

$$; \hat{e}_{i,t} = \hat{\gamma}_i\, \hat{e}_{i,t-1} + \hat{u}_{i,t} \;; \hat{e}_{i,t} = \hat{\gamma}_i\, \hat{e}_{i,t-1} + \sum_{k=1}^{K_i} \hat{\gamma}_{i,k}\, \Delta \hat{e}_{i,t-k} + \hat{u}^{*}_{i,t}$$

5. In this step, calculate the relevant panel cointegration statistics by using Pedroni test statistics.

Pedroni (1999) stated that he derived the asymptotic distributions and explored the small sample performances of seven different statistics. Of these seven statistics, four are based on pooling along the within-dimension, and three are based on pooling along the between-dimension. A consequence of this distinction arises in terms of the autoregressive coefficient, γ_i, of the estimated residuals under the alternative hypothesis of cointegration. For the within-dimension statistics the test for the null of no cointegration is implemented as a residual-based test of the null hypothesis H_0 : $\gamma_i = 1$ for all i, versus the alternative hypothesis H_1 : $\gamma_i = \gamma < 1$ for all i, so that it presumes a common value for $\gamma_i = \gamma$. By contrast, for the between-dimension statistics the null of no cointegration is implemented as a residual-based test of the null hypothesis H_0 : $\gamma_i = 1$ for all i, versus the alternative hypothesis H_1: $\gamma_i < 1$ for all i, so that it does not presume a common value for $\gamma_i = \gamma$ under the alternative hypothesis. Thus, the between-dimension-based statistics allow one to model an additional source of potential heterogeneity across individual members of the panel. Seven test statistics distributed normally can be compared to appropriate critical values, and if critical values are exceeded

then the null hypothesis of no cointegration is rejected implying that a cointegration relation between the variables exists.
Pedroni (1999) expressed that under the alternative hypothesis, the panel variance statistic diverges to positive infinity, and consequently the right tail of the normal distribution is used to reject the null hypothesis. Consequently, for the panel variance statistic, large positive values imply that null of no cointegration is rejected. For each of the other six test statistics, these diverge to negative infinity under the alternative hypothesis, and consequently the left tail of the normal distribution is used to reject the null hypothesis. Thus, for any of these latter tests, large negative values imply that the null of no cointegration is rejected.

3.3. Panel Causality

Although we show the relationship among the variables by using panel cointegration techniques, this result does not show us the direction of the relationship among the variables. In this case, the direction of the relationship among the variables are analysed by using causality techniques. Causality analysis was introduced by Wiener (1956), and developed by Granger (1969), Sims (1972) and others. Granger (1969) defined the causality: If, $\sigma^2(X \mid U) < \sigma^2\left(X \mid \overline{U\text{-}Y}\right)$, Y_t, is causing X_t, if we are better able to predict X_t, using all available information than if the information apart from Y_t had been used. On the other hand, the time dimension restrictions of variables negatively affect the performance of the test. Holtz-Eakin, Newey and Rosen (1988, 1989) presented a simple method of estimating vector autoregression equations using panel data. They stated that the key to its simplicity is the fact that estimation and testing have straightforward GLS interpretations-no nonlinear optimization is required. Holtz-Eakin et al test procedure as follows:

$$y_{it} = \alpha_0 + \sum_{j=1}^{m} \alpha_j y_{it-j} + \sum_{j=1}^{m} \delta_j x_{it-j} + \psi_t f_{yi} + u_{it}$$
$$x_{it} = \beta_0 + \sum_{j=1}^{m} \beta_j y_{it-j} + \sum_{j=1}^{m} \phi_j x_{it-j} + \varphi_t f_{xi} + v_{it} \qquad (2.1)$$

where y_{it} and x_{it} are the two cointegrated (C(1,1)) variables. i=1,…,N represents cross-sectional panel members, and u_{it} and v_{it} are the disturbance terms. This model includes two individual effect terms (f_{xi} and f_{yi}) for the i. panel member. Coefficients in (2.1) are the indicators of the linear projection of y_{it} on a constant, past values of y_{it} and x_{it}, and the individual effects f_{xi} and f_{yi} (Holtz-Eakin et al, 1988).

OLS estimates of the model (2.1) will be biased because of the correlation between the lagged dependent variables and the error terms. Holtz-Eakin et al (1988) stated that it is well known that in models with lagged dependent variables it is inappropriate to treat individual effects as constants to be estimated. By differencing we remove the fixed effect terms. The new model is

$$\Delta y_{it} = \sum_{j=1}^{m} \alpha_j \Delta y_{it-j} + \sum_{j=1}^{m} \delta_j \Delta x_{it-j} + \Delta u_{it} \qquad (2.2)$$

$$\Delta x_{it} = \sum_{j=1}^{m} \beta_j \Delta x_{it-j} + \sum_{j=1}^{m} \phi_j \Delta y_{it-j} + \Delta v_{it} \qquad (2.3)$$

In this specification the disturbance term Δu_{it} is correlated with the Δy_{it} in eq 2.2. and the disturbance term Δv_{it} is correlated with the Δx_{it} in eq 2.3. Simultaneity problem occurs in this specification. In addition, heteroscedasticity is expected to be present because in the panel data heterogeneous errors might exist with different panel members. A 2SLS instrumental variable procedure, which produces consistent estimates of the parameters, is used in estimating the model to deal with these problems. Assuming u_{it} and v_{it} are serially uncorrelated, more lagged values of y_{it} and x_{it} can be used as instruments in the 2SLS instrumental variable estimation procedure. Then, to test for the causality, the joint hypotheses

$$\delta_1 = \delta_2 = \cdots = \delta_m = 0$$
$$\phi_1 = \phi_2 = \cdots = \phi_m = 0$$

for eq 2.2. and 2.3., respectively. The test statistic follows a χ^2 distribution with $(k-m)$ degrees of freedom. Holtz-Eakin et al (1988) stated that the importance of testing for the appropriate lag length prior to causality testing, an issue of considerable importance in short panels. In the absence of such tests, no inferences concerning causal relationships can be drawn. They also claimed that use of inappropriate methods to deal with individual effects in the VAR context can lead to highly misleading results. Arellano and Bond (1991) claimed that generalized method of moments (GMM) estimator produce more efficient and consistent estimators compared with other procedures in dynamic panel data models.

3.4. Panel unit root test Results

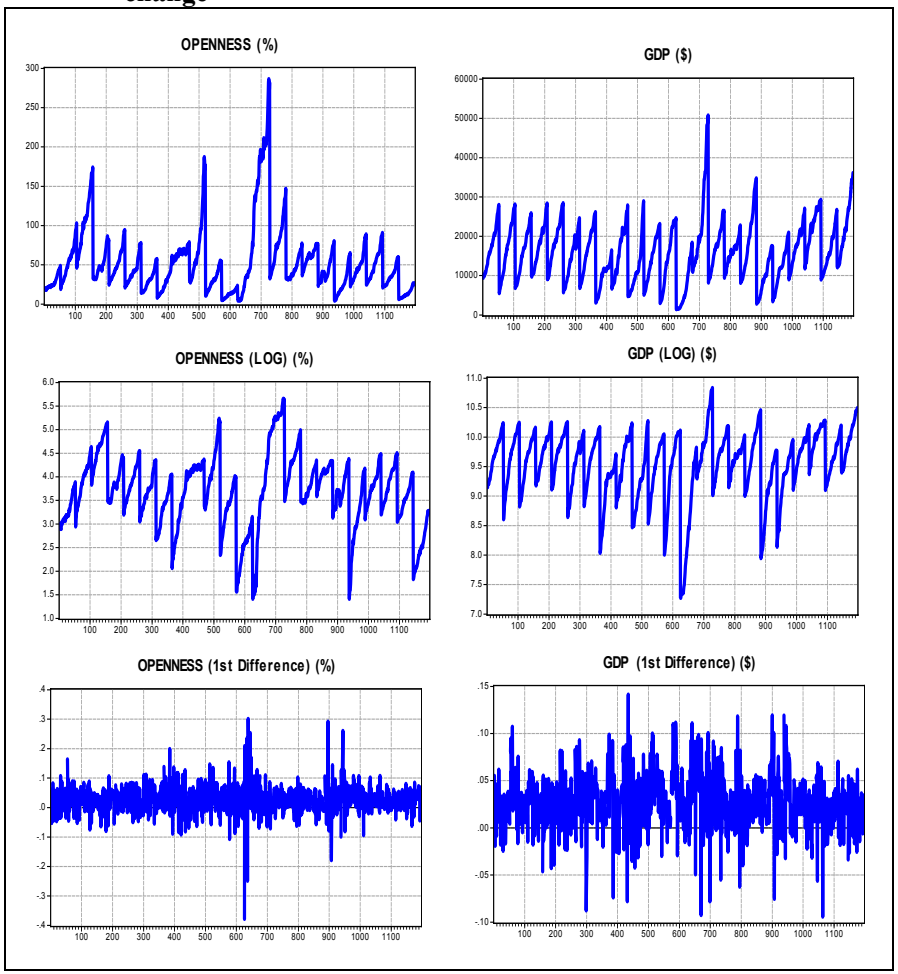
Figure 1 shows the graph of the openness and economic growth variables for 22 high-income OECD countries for the period 1953-2004.

Table 1: Panel Unit Root Test Results

	Levin Lin & Chu		**Im, Peasaran & Shin**		**ADF-Fisher**	
Variable	Level	Difference	Level	Difference	Level	Difference
Log Openness	-1,74*	-21,71**	-1,02	-39,71**	49,1	958,67**
Log RGDP	-1,82*	-25,29**	1,79	-32,93**	28,21	745,18**
*Significant at %5 significance level with trend and intercept, **Significant at %1 significance level						

Panel unit root test results show that all variables are stationary in first difference at %1 significance level.

Figure 1: Graphs of Variables in Level, Logarithms ($) and Per Cent change



Source: Penn World Table v.6.2.

3.5. Panel Cointegration Results

In order to analyze the cointegration relationship among the variables we use the techniques developed by Pedroni (1995). The results in Table 2 shows that there is a panel cointegration among GDP and Openness variables for the 22 high income OECD countries for the period 1953-2004.

Table 2: Computed panel statistics Results for the Variables from the Pedroni Panel Cointegration Test

Alternative hypothesis: common AR coefs. (within-dimension)					
		Statistic	**Prob.**	Weighted Statistic	Prob.
Panel v-Statistic		9.842175*	**0.0000**	4.605253	0.0000
Panel rho-Statistic		-44.55666*	**0.0000**	-41.81782	0.0000
Panel PP-Statistic		-23.74955*	**0.0000**	-22.32784	0.0000
Panel ADF-Statistic		-23.26743*	**0.0000**	-22.02008	0.0000
Alternative hypothesis: individual AR coefs. (between-dimension)					
		Statistic	**Prob.**		
Group rho-Statistic		-38.35154*	**0.0000**		
Group PP-Statistic		-29.75484*	**0.0000**		
Group ADF-Statistic		-27.85617*	**0.0000**		
Sample: 1953 2004 Included observations: 1196 Cross-sections included: 23 Null Hypothesis: No cointegration Trend assumption: No deterministic intercept or trend Lag selection: Automatic SIC with a max lag of 10 Newey-West bandwidth selection with Bartlett kernel Notes: All reported values are asymptotically distributed as standard normal. The variance ratio test is right-sided, while the other Pedroni tests are left-sided. A * indicates the rejection of the null of unit root or no cointegration at the 0.05 level of significance.					

According to panel group FMOLS[4] results, panel cointegration coefficient for the variables in Table-3 shows that openness affects economic growth positively.

[4] For details about FMOLS methodology, see Pedroni (2000).

Table 3: Panel Group FMOLS Results

Dependent variable : RGDP
Independent variable OPENNESS
Coefficient : 84.36
t-stats : 5.61
common time dummies included
N = 22 , T = 52 , max-lag = 3

3.6. Panel Causality Results

Panel Causality results in Table 4 indicates that openness variable is causes of the economic growth, which means that open economies grows faster than non-open economies in high-income countries.

Table 4: Panel Pairwise Granger Causality Tests Result

Lags: 1			
Null Hypothesis:	**Obs**	**F-Statistic**	**Prob.**
D_OPENNESS does not Granger Cause D_RGDP	**1150**	**1149**	**0.0000**

4. Conclusion

In this study, we analyzed the effects of openness on economic growth in high-income OECD countries between the years 1953-2004. A country as a global economic player has to be powerful for international competitiveness in order to obtain gains from international trade. If an economy has this kind of qualification for international trade, then, openness affects economic growth positively. Openness can affect economic growth both diffusion of new technologies across the countries and high-pressure of competition. Furthermore openness provides new-global markets for the countries. Panel time series econometric applications show that the openness causes and affects economic growth in high-income OECD countries.

Under these circumstances, in order to challenge the pressure of international competitiveness countries have to design efficient economic policies in microeconomic, macroeconomic and institutional levels as providing the advantages not only technological advances but also lowering costs. Otherwise, trade liberalization, which is not optimal in terms of timing

and level results in losses than gains. It will be necessary much effort especially for the developing countries designing and introducing these economic policies, to achieve the advantages in international competitiveness. There are different advantages and disadvantages of different countries in terms of production, costs, geography, natural sources, quantity and qualification of human capital and technological level. Countries take their positions according to their prosperity in international trade, the division of labour. In order to achieve better positions, they have to improve their abilities compared to other countries. As a result, when it is considered from historical perspective, countries have to develop social, economic and political policies in order to challenge international competitiveness.

References

Aghion, P., Howitt, P., "A Model of Growth Through Creative Destruction", Econometrica, 60.2, 1992, pp. 323-351.

Arellano, M., "Panel Data Econometrics", Advanced Texts in Econometrics 1st Ed., Oxford University Press Oxford, 2003.

Arellano, M., Bond, S. R., "Some Tests of Specification for Panel Data: Monte Carlo Evidence and an Application to Employment Equations", Review of Economic Studies, 58, 1991, pp. 277–297.

Arellano, M., Bover, O., "Another Look at the Instrumental Variable Estimation of Error-Components Models", Journal of Econometrics, 68, 1995, pp. 29–51.

Baltagi, Badı H., Bresson, Georges, Pirotte, Alain, "Panel Unit Root Tests and Spatial Dependence", J. Appl. Econ., 22, 2007, pp. 339–360.

Barro, R. J, "Economic Growth in a Cross Section of Countries", Quarterly Journal of Economics, 106.2, 1991, pp. 407-443.

Choi, I., "Unit Root Tests for Panel Data", Journal of International Money and Finance, 20, 2001, pp. 249–272.

Dollar, D., "Outward-Oriented Developing Economies Really Do Grow More Rapidly: Evidence From 95 Ldcs, 1976–1985", Economic Development and Cultural Change 40 1992, pp. 523–544.

Edwards, S., "Openness, Trade Liberalization, and Growth in Developing Countries", Journal of Economic Literature, 31, 1993, pp. 1358–1393.

Edwards, S., "Openness, Productivity and Growth: What Do We Really Know?" Economic Journal 108, 1998, pp. 383–398.

Erlat, Haluk, Özdemir, Nilüfer, "A Panel Approach to Investigating the Persistence in Turkish Real Exchange Rates", 2003, http://www.luc.edu/orgs /meea/volume5/herlat.pdf, Erişim Tarihi: 07.09.2007.

Frankel, J. A., Romer, D., "Does Trade Cause Growth?", American Economic Review, 89, 3, 1999, pp. 379–399.

Granger, C. W. J., "Some Recent Developments in a Concept of Causality", Journal of Econometrics, 39.1, 1988, pp. 199-211.

Granger, C. W. J., "Investigating Causal Relations By Econometric Models and Cross-Spectral Methods", Econometrica, 37, 1969, pp. 424–438.

Grossman, G. M., Helpman, E., "Comparative Advantage and Long-Run Growth" American Economic Review, 80, 1990, pp. 796–815.

Grossman, G. M., Helpman, E., G. M. "Endogenous Product Cycles", Economic Journal 101, 1991, pp. 1229–1241.

Grossman, G. M., Helpman, E., "Endogenous Innovation in the Theory of Growth", Journal of Economic Perspectives, 8.1, 1994, pp. 23-44.

Grossman, Gene M., Helpman, Elhanan, **"**Product Development and International Trade", The Journal of Political Economy, Vol. 97, No. 6, 1988, pp. 1261-1283.

Harrison, A., "Openness and Growth: A Time Series, Cross-Country Analysis for Developing Countries", Journal of Development Economics, 48, 1996, ss. 419–447.

Holtz-Eakin, D., Newey, W., Rosen, H. S., "Estimating Vector Autoregressions With Panel Data", Econometrica, 56, 1988, pp. 1371–1395.

Holtz-Eakin, D., Newey, W., Rosen, H. S., "The Revenues-Expenditure Nexus: Evidence From Local Government Data", International Economic Review, 30., 1989, pp. 415–429.

Im, K. S., Pesaran, M. H., Shin, Y., "Testing for Unit Roots in Heterogeneous Panels", Journal of Econometrics, 115, 2003, pp. 53–74.

Im, K. S., Pesaran, M. H., Shin, Y., "Testing for Unit Roots in Heterogeneous Panels", Dae Working Papers Amalgamated Series No.9526, University of Cambridge, 1995.

Karaman, Deniz Dilan, "Comparison of Panel Cointegration Tests", 2004, 16th EC2 Conference, İstanbul, 2005, http://www.riskturk.com/ec2/listofparticipants.htm, Erişim Tarihi : 07.09.2007.

Kao, C., "Spurious Regression and Residual-Based Tests for Cointegration in Panel Data", Journal of Econometrics, 90. 1999, pp. 1–44.

Krugman, Paul R., "Increasing Returns, Monopolistic Competition, and International Trade", Journal of International Economics, 9, 1979, pp. 469-79.

Krugman, Paul R., "Scale Economies, Product Differentiation, and the Pattern of Trade", American Economic Review 70, 1980, pp. 950-9.

Levin, A., Lin, C. F., Chu, C. S., "Unit Root Tests in Panel Data: Asymptotic and Finite-Sample Properties", Journal of Econometircs, 108, 2002, pp. 1–24.

Lucas, R. E., "On the Mechanics of Economic Development", Journal of Monetary Economics, 22 , 1988, pp. 3–42.

Lucas, R. E. Jr., "Why Doesn't Capital Flow From Rich to Poor Countries?", American Economic Review, 80.2., 1990, pp 92-96.

Maddala, G. S., Wu, S., "A Comparative Study of Unit Root Tests With Panel Data and a New Simple Test", Oxford Bulletin of Economics and Statistics, 61, pp. 631–652.

Mankiw, N. G., Romer, D., Weil, D. N., "A Contribution to the Empirics of Economic Growth", Quarterly Journal of Economics, 107, 1992, pp. 407–437.

Mccoskey, S., Kao, C., "A Residual-Based Test of the Null of Cointegration in Panel Data", Econometric Reviews, 17, 1988, pp. 57–84.

Pedroni, P., "Panel Cointegration; Asymptotic and Finite Sample Properties of Pooled Time Series Tests With an Application to the PPP Hypothesis", Indiana University Working Papers in Economics, No. 95–013, 1995.

Pedroni, P., "Fully Modified OLS for Heterogeneous Cointegrated Panels and the Case of Purchasing Power Parity", Indiana University Working Papers in Economics 96-020, 1996.

Pedroni, P., "Panel Cointegration; Asymptotic and Finite Sample Properties of Pooled Time Series Tests, with an Application to the PPP Hypothesis: New Results", Working Paper, Indiana University, 1997.

Pedroni, P., "Critical Values for Cointegration Tests in Heterogeneous Panels With Multiple Regressors", Oxford Bulletin of Economics and Statistics, 61, 1999, pp. 653– 670.

Pedroni, P., "Fully Modified OLS for Heterogeneous Cointegrated Panels", Advances in Econometrics, 15, 2000, pp. 93–130

Pedroni, P., "Panel Cointegration; Asymptotic and Finite Sample Properties of Pooled Time Series Tests, with an Application to the PPP Hypothesis Revised Working Paper", Indiana University, 2001.

Pedroni, P., "Panel Cointegration: Asymptotic and Finite Sample Properties of Pooled Time Series Tests with an Application to the PPP Hypothesis: New Results", Econometric Theory, 20.3, 2004, pp. 597–627.

Pesaran, M. Hashem, "A Simple Panel Unit Root Test in the Presence of Cross-Section Dependence", J. Appl. Econ., 22, 2007, pp. 265–312.

Rodriguez F., Rodnick, D., "Trade Policy and Economic Growth: A Skeptic's Guide to the Cross-National Evidence", 2001, Http://Www.Ksg.Harvard.Edu/ Rodrik/Skepti1299.Pdd .

Romer, P. M., "Increasing Returns and Long-Run Growth", Journal of Political Economy, 94.5, 1986, pp. 1002-1037.

Romer, P. M., "Endogenous Technical Change", Journal of Political Economy, 98, 1990, ss. S71–S102.

Romer, P. M., "The Origins of Endogenous Growth", Journal of Economic Perspectives, 8.1, 1994, pp. 3-22.

Sachs, J. D., Warner, A. M., "Economic Reform and the Process of Economic Integration", Brookings Papers of Economic, 1995, ss. 1–118.

Sims, C. A., "Money, Income, and Causality", American Economic Review, 62, 1972, pp. 540–552.

Solow, R. M., "A Contribution to the Theory of Economic Growth", Quarterly Journal of Economics, 70, 1956, pp. 65-94.

Summers, R. A., Heston, Bettina, Aten, Penn World Table Version 6.2, Center for International Comparisons of Production, Income and Prices at the University of Pennsylvania, 2006, Http://Pwt.Econ.Upenn.Edu /Php_Site/Pwt62/Pwt62_Form.Php, Accessed 22/09/2006.

Tieslau, Margie, Lee, Junsoo, "Panel Cointegration Tests", Non-stationary Panel Time Series Study group, http://www.cba.ua.edu /~jlee/ npt.htm, online date, 06/08/2007.

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THE DESIGN OF A REGULATORY REGIME TO ACHIEVE HIGH QUALITY REGULATION: AN EVALUATION OF TURKEY'S REGULATORY SYSTEM

Ali Alp *
Saim Kılıç **

Abstract
Regulation is one of the most important tools for government to achieve its social and economic policy objectives. Since it has a great impact on social and economic life of a country, regulation has been an area of political debate and economic research in every country. In the literature, three general theories exist on the origin of and the rationale for government regulation: the public interest theory, the Chicago theory of regulation and the public choice theory. Once the rationales for government intervention have been identified, then the question of how desired regulatory outcomes can be achieved at lower cost arises. The answer to the question is heavily concerned with the regulatory design, no matter which theory is considered. This paper focuses on the regulatory design and ways of better regulation making processes. It is possible to identify a general framework that provides a rigorous and systematic approach to improve quality of both new and existing regulations. This framework includes the use of regulatory impact assessment along with a comprehensive public consultation process and a systematic consideration of alternatives to regulation as well as administrative burden reduction and simplification plans. Countries' experiences seem to indicate that, if appropriately designed, this framework would be valuable to achieve good regulation. The paper also aims to elaborate on the Turkey's regulatory system and evaluate its effectiveness. Even though Turkey's regulatory environment has significantly changed mainly due to the pressures of external forces (namely IMF, World Bank, OECD and the European Union), it still has some weaknesses.

* Assoc. Prof. Ali Alp, Finance and Accounting at TOBB Economics and Technology University.
** Saim Kılıç, PhD at the University of Gazi, Turkey and Senior Expert at the Capital Markets Board of Turkey. He writes here in a personal capacity and the views expressed in this paper are not necessarily those of the Capital Markets Board of Turkey.
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I. Introduction

Regulation is one of important tools for government to achieve its social and economic policy objectives. Since it has a significant impact on life of citizens and operations of enterprises, many researches have been done on the motives for and impact of regulation, and the process by which it is produced. Those works mainly contributed to the debate on the regulation from academic perspective. However, examining practical aspect of regulation could also support policy-makers in achieving the desired regulatory outcomes and reducing the risk of regulatory failures. This paper aims to discuss perceptions of what governments are doing to improve the quality of regulation and ways of better regulation making processes.

Moreover, in this paper, the particular attention will be directed towards the analysis of Turkey's regulatory system. Turkey is a developing country and traditionally dominated by the bureaucratic central administration. An OECD report (2002c) indicates that costs and inefficiencies associated with regulations and lobbying activities in Turkey could be potentially significant. In addition, the newly started membership negotiations with the EU require Turkey to harmonise its legislation with the EU *Acquis* which are more than 80,000 pages long. Therefore, it is important for Turkey to have a sound and efficient regulatory framework in which the risk of capture and all costs of regulation are minimised.

Within this framework, the rest of the paper is organised as follows. Section 2 develops a general framework for the overall design of regulatory institutions and processes to improve the quality of regulations by particularly considering countries' practices. Section 3 assesses Turkey's regulatory regime. In this section, we first outline Turkey's recent regulatory system, and then identify main problems and policy responses to the problems. Section 4 concludes.

II. Design of a Regulatory Regime to Improve Quality of Regulations

In the literature, three general theories exist on the origin of and the rationale for government regulation: the public interest theory, the Chicago theory of regulation and the public choice theory (Den Hertog, 1999). The public interest theory explains that regulation seeks to achieve efficiency in the allocations of scarce resources and to protect public interest by correcting 'market failures' resulting from various reasons such as natural monopolies, imperfect competitions, externalities, public goods, continuity and availability of services, inadequate or asymmetric information, unequal distribution of wealth, scarcity and rationing, and coordination problems (Posner, 1974; Goran and Hagg, 1997; Baldwin and Cave, 1999; Den Hertog, 1999; Hantke-

Domas, 2003). The Chicago theory of regulation, exemplified by Stigler (1971), Peltzman (1976) and Becker (1983), suggests that regulation is supplied in response to the demands of interest groups. Stigler (1971) claimed that "as a rule, regulation is acquired by the industry and is designed and operated primarily for its benefit" (p. 3). Regulated industries demand regulation because by being 'politically influential' they would benefit from the advantages of a particular regulation such as direct subsidies, entry restrictions, suppression of substitutes and complements, and setting favourable prices (Goran and Hagg, 1997; Den Hertog, 1999). Peltzman (1976) extended Stigler's theory in which he explained why no single interest group captures regulatory body. Finally, Becker (1983) focused on results of the competition among pressure groups for political influence. His central argument was that the competition limits the amount of transfer among interest groups and leads to the least-cost pattern of regulation (Peltzman, 1989; Den Hertog, 1999; Guerin, 2003). Lastly, the public choice theory focuses on rent seeking behaviour and its costs. It says that even after the achievement of monopoly power by interest group, scarce resources will be wasted because the interest group will protect its monopoly rights against possible threats from potential competitors and disadvantaged consumers. It also recognises that politicians and bureaucrats are self-interested and this causes regulatory capture. Thus, the public choice theory holds that the sum of rent seeking activities of interest groups, politicians and bureaucrats is wasteful and does not create net value (Tullock, 1967; Buchanan, Tollison and Tullock, 1980; McCormic and Tollison, 1981; Tollison, 1988; Rowley, Tollison and Tullock, 1988; Den Hertog, 1999, Dudley, 2005).

Once the rationales for government intervention have been identified, then the question of how desired regulatory outcomes can be achieved at lower cost arises. The answer to the question is heavily concerned with the regulatory design, no matter which theory is considered. In the case of the public interest theory, although regulation is intended to protect a wide range of public interests and to improve economic efficiency without great cost, there is no guarantee that this will occur in practice. It is possible that government intervention gives rise to redundant costs, losses and inefficiencies on society and business. Therefore, it is necessary to make a cost-benefit analysis of regulation (Posner, 1974; Den Hertog, 1999). The regulatory design is even more important for the private interest theories (i.e. the Chicago theory of regulation and the public choice theory) because it becomes necessary to explore what institutional and procedural arrangements can best constrain consequences of regulatory capture and inefficiencies of

rent seeking activities (Ogus, 2002). In particular, the regulatory design is more important for developing countries. The reason is that it is sensible to assume that regulatory capture applies even more to those countries where democratic system is weak. In the developing societies regulation is traditionally imposed as a result of political-bureaucratic process rather than as a result of demands of citizens. Furthermore, in these countries the accountability of politicians and bureaucrats is relatively poor. Those factors increase the vulnerability of the public sector to be captured by the interests of pressure groups (Demirbas, 2005).

That is why when deciding regulation, it is necessary to consider all potential consequences of government intervention. The success of this decision lies to a great extent in the ability of government to contrive a well-designed regulatory system (Dumez and Jeunemaitre, 1997; Dudley, 2005). Therefore, the key objective of a regulatory design regime is to reduce the risk of government failures (Guerin, 2003). It also aims at improving the regulatory quality so as to increase the benefits of citizens, to reinforce the respect and effectiveness of the rules, to cut unnecessary costs on the community and business that cost them time and money, to minimise market distortions, to create the right incentives for business, and to remove barriers to adoptability and innovation (AGPC, 2005; EC, 2005a). It is, however, important to note that there is no 'correct' or 'single' regulatory design to adopt in developing a regulatory quality regime. The appropriate path to regulatory design will mainly depend on the institutional, political, cultural, social, and legal characteristics of a particular country concerned. Nevertheless, it would be useful to take a broader perspective to try to see how regulatory design can be used to improve quality of regulation. To this end, regulatory design could be divided into three main categories: the design of regulatory institutions, the design of regulatory processes and the design of instruments for improving existing regulations.

The design of regulatory institutions is related to the delegation of policy-making authority. Delegation refers to the transfer of policy making power from elected politicians to a 'nonmajoritarian' institution such as independent regulatory agencies, self-regulators and local authorities (Elgie, 2006). In the literature, there are a number of explanations as to why governments delegate the policy making authority to these institutions. Most of the explanations are mainly dominated by a transaction-cost approach (Elgie, 2006). According to this approach, governments delegate regulatory power because by doing so transaction costs may be reduced. For example, governments can benefit from acknowledged experts and professionals in response of highly complex policy problems. This would increase the efficiency of regulations. Moreover, it can help governments to establish a

credible commitment to policy outcomes. Governments try to show that they are not involved in decision-making process and thereby policy making may be more optimal. These explanations have been already tested and evidence has shown that there is a considerable support for both explanations. Thus, the desire to make efficient policy decisions and credible commitments explains in large part why governments delegate the power to such institutions (Elgie, 2006).

The delegation matters to regulatory outcomes, because the nature of them can influence not only the style of regulation and the strategies employed, but also the success of the regulation implemented (Baldwin and Cave, 1999). However, in practice, it is not easy to decide how to delegate this power among institutions. First of all, each of these regulatory institutions has its strengths and weaknesses. As pointed out by Baldwin and Cave (1999), it can be, for instance, said in general terms that central government tends to be strong on coordination with government and accountability to the parliament but weak on neutrality and expertise; independent agencies strong on expertise and combining functions but weak on accountability; local authorities strong on local democratic accountability and local knowledge but weak on sustained scrutiny; self-regulators strong on specialist knowledge and support of industry but weak on accountability and serving public interest. Therefore, the answer of how the power of making rules are delegated to regulatory institutions heavily depends on the characteristics of country considered and the kind of market failure that needs to be solved.

Moreover, as discussed by Estache and Martimort (1999), how institutional design could minimise the risk of capture is still controversial issue. It is traditionally believed that politicians tend to be more captured by interest groups than professionals and thereby the regulators must be appointed on the basis of professional rather than political criteria. However, this view recently has been challenged by the public choice theory and so-called "Life-Cycle" view. As mentioned earlier, according to the public choice theory, bureaucrats are also interested in their well-being and this leads them to be captured by interest groups (Dudley, 2005). In addition, the Life-Cycle view states that regulatory institutions follow a so-called life-cycle. Institutions begin by serving the public interest and then become overly bureaucratised. This view further explores the capture problem by identifying three types of regulatory employees. The first type is the 'careerists' who are more likely to move to the sector they regulate. The second type is the 'professionals' who come from the industry they are meant to regulate. The third type is the 'politicians' who see their civil service as a stepping stone.

According to this view, the first two groups are more likely to be captured by industry and therefore shifting the balance of powers towards the 'politicians' within the institutions itself is optimal, which is not consistent with the traditional view (Estache and Martimort, 1999).

The design of policy making-process is a procedural framework for making rules and decisions. The policy-making process also matters to regulatory quality. On one hand, it must seek to ensure that the rules and decisions are not only justifiable in terms of government intervention, but also serves the public interest goals and constrains diversions to private interests. On the other hand, the openness, length and instruments of process must be appropriate and proportionate; otherwise it will generate substantial administrative costs and some delays (Ogus, 2002).

One of the instruments for better regulation-making process is regulatory impact analysis. Regulatory impact analysis (RIA) is a decision-making tool, a method of systematically and consistently examining and measuring the likely benefits, costs and effects of proposed regulation, and of communicating the information to decision-makers (OECD, 1997). The objective, design, and role in administrative structure of an RIA process differ amongst countries and amongst regulatory policy areas. The exact detail of the most appropriate RIA process depends heavily on the administrative, legal and constitutional framework of the country. However, it would be useful to describe the main steps which structure the preparation of policy proposals.

First step in RIA is to identify the problem and to outline alternatives available for addressing the problem. A traditional strategy for regulation to respond to a problem is the 'command and control' regulation in which the force of law is used to achieve policy objectives (Baldwin and Cave, 1999). This type of regulation relies on prescribing rules and standards and on using sanctions to enforce compliance. The main strength of the command and control regulation is the relative ease of monitoring and enforcement as the use of the law allows regulators to act forcefully and to take a stand clearly and immediately against possible breaches. Thus, regulators are seen as highly protective of the public. That is why, traditionally, it has been a dominant strategy for regulation (Baldwin and Cave, 1999). However, there are also weaknesses in the command and control regulation. It is generally viewed as less cost effective, producing unnecessarily complex and inflexible rules, stifling innovation and inviting enforcement difficulties (Baldwin and Cave, 1999; Dudley, 2005). These weaknesses have increased the consideration of the use of a number of regulatory alternatives. Well-known examples of alternatives to classic regulation are performance-based regulation, market-based incentives, self-regulation, co-regulation, disclosure regulation, guidelines, and voluntary approaches (Baldwin and Cave, 1999; OECD,

2002a; EC, 2005c; Dudley, 2005). Each of these approaches has different characteristics. Therefore, choosing the right regulatory methods depends on the problem to be solved.

Second step in RIA is to assess the economic, social and environmental impacts of each alternative by using quantitative analysis such as cost-benefit analysis. The level and depth of analysis are determined by the likely impacts of the proposed action. The more significant a proposal is likely to be, the greater the effort of quantification and monetisation that will generally be expected. Analysing and comparing impacts of regulation options is the most difficult task in the RIA process as it is not always easy to quantify and monetise all economic, social and environmental costs and benefits. For this reason, in practice, many countries do not adopt a rigorous cost-benefit analysis but instead those countries have adopted a more flexible impact analysis system including cost-effectiveness analysis, multi-criteria analysis, risk analysis and sensitivity analysis (OECD, 2004).

Next step in RIA process is public consultation. Consultation can be defined as an interaction between bodies responsible for regulation and parties that are likely to be effected by or interested in the proposed regulation to permit the latter to contribute their views, experience and expertise (Mandelkern, 2001). It provides regulators with a cost-effective source of data that can be essential in determining whether a regulation is practicable and in designing compliance and enforcement strategies (OECD, 2005).

Finally, RIA compares all negative and positive impacts of each alternative and proposes a recommended approach; and outlines policy monitoring and evaluation mechanism (AGPC, 2005; EC, 2005c).

It is also worth noting that compliance and monitoring strategies are included in the regulatory design to ensure that RIA procedures are implemented properly by regulators. An important element of control strategies is to establish a compliance authority. Such compliance authority not only monitors and reports on the compliance with country's regulatory policy requirements, but also provides the regulators with technical assistance, training, and consultation on drafting RIAs, and advise whether a RIA is required or not and, if so, whether the analysis contained within each RIA meets the requirements (OECD, 2004).

The design of instruments for improving existing regulations is also essential to achieving better regulation. The commonly used instrument is to measure and reduce administrative burden. Governments pay special attention to the administrative burden since it is recognised as a significant brake on business innovation and growth. Available evidence suggests that the gross

administrative burdens of regulation are economically significant. For example, the OECD estimated that in 1998 the cost to small and medium sized business in Australia arising from labour market, taxation, and environmental regulations was 17 billion US dollars. The Netherlands concluded that administrative burden for businesses amounts to 16.4 billion euros on a yearly basis or about 3.6 per cent of the Dutch GDP. In Denmark the total amount of administrative burdens amount to approximately 4.5 billion euros, equivalent to 2.4 per cent of Danish GDP. Administrative burden in the UK is estimated to cost around 20-40 billion pounds (AGPC, 2005; SCM Networks, 2005; BRTF, 2005).

It is, therefore, important to constantly make efforts to ensure that regulations do not impose unnecessary administrative burdens on businesses. Various national governments have prioritised reducing administrative burdens on business and have set up cost reduction targets. Amongst others the Netherlands, Denmark and Norway have set a reduction target of 25 per cent of the overall administrative burdens (SCM Networks, 2005).

Administrative burdens can be simply defined as the costs imposed on businesses when complying with the reporting and information obligations arising from government regulation. The European Commission (2005b) defines the administrative costs as "the costs incurred by enterprises, the voluntary sector, public authorities and citizens in meeting legal obligations to provide information on their action or production, either to public authorities or to private parties. Administrative costs are to be taken in a broad sense, including the costs of labelling, collecting, organising, storing, maintaining, reporting, and monitoring to provide the information and registration".

The Standard Cost Model (SCM) which was first adopted in the Netherlands in 2003 is the most widely applied methodology today for measuring administrative burdens. The OECD proposed a methodology for measuring compliance burdens across OECD members and referred to the SCM as one possible starting point (EC, 2005b; SCM Networks, 2005). It has recently been introduced to various extents in Belgium, Denmark, Estonia, France, Hungary, Italy, Poland, Norway, Slovenia, South Africa, Sweden and the UK (BRTF, 2005; AGPC, 2005; EC, 2005b). The Dutch SCM is an activity-based measurement making it possible to follow the development of the administrative burdens (SCM Networks, 2005). The model relies on detailed data about the time needed to comply with each information requirement imposed by legislation. Estimates of the time needed are usually based on interviews from a sample of companies and to some extent on simulation and/or information from a sample of companies (EC, 2005b). The basic formula of the SCM is,

Administrative Burden = Σ P * Q, where;
P (Price) = Tariff * Time
Q (Quantity) = Number of businesses * Frequency

In the formula, the tariff is the hourly rate of the person in business who deals with the information obligation. It includes all on-costs, and where appropriate, the cost of external contracts. Time is the number of hours it takes to fulfil the information and reporting obligation. The number of businesses refers to those the information obligation applies. The frequency is the number of times per year each business fulfils the obligation (AGPC, 2005).

After measuring administrative burden with the SCM, generally simplification plans take place to meet the cost reduction target. Simplification intends to ensure that existing legislation is clear, understandable, up-to-date, and user-friendly. In this context, simplification can be defined as a tool of making existing regulation clearer to understand and easier to apply and to comply with by taking away unnecessary, outdated, and over burdensome provisions whilst maintaining the original purpose and preserving the regulation (Mandelkern, 2001).

On a final note, the tool of reducing administrative burden is fundamental to improving both existing and new regulations. However, in the case of making new regulations, administrative costs are not considered as a separate issue but as one among several types of regulatory costs faced by business, by the community, and by public authorities. Research from the US shows that, on average, administrative costs represent around 30 per cent of total regulatory costs (EC, 2005b; BRTF, 2005). Therefore, it must continue to form a part of impact assessment analysis for new regulations.

III. An Evaluation of Turkey's Regulatory Quality Regime

a) Recent Developments in Regulatory Environment

Over last five years, Turkey's regulatory environment has significantly changed. The first factor that has affected regulatory environment in Turkey is its efforts towards European Union membership (OECD, 2002c). Joining the EU has become one of Turkey's highest priorities. Turkey signed an Association Agreement with the European Community in 1964, and submitted an application for membership in 1987. The EU recognised Turkey as a candidate state to join the EU in December 1999 on the basis of the same criteria as other candidate states (OECD, 2002c). In December 2004 the EU

decided to open accession negotiations with Turkey on 3 October 2005 and set out framework for starting accession negotiations.

Turkey has launched many important reforms related to both the Copenhagen political criteria for accession negotiation and the EU *Acquis* since 2001. The Turkey's National Programmes (Government of Turkey, 2001 and 2003) and the EU's annual Regular Reports on Turkey (EC, 2002; 2003; 2004 and 2005d) have played crucial role in this process by providing a wide raging agenda of political and economic reform. The National Programmes endorsed in March 2001 and revised in July 2003 by the Turkish Government set the priorities and commitments for aligning Turkey's regulatory structure to the EU *Acquis* and practices in EU member states. In addition, Regular Reports have regularly assessed Turkey's situation and prospects with respect of the political and economic criteria for membership. These two key elements have enabled Turkey to adopt and implement a number of significant constitutional, legal, economic, social and administrative law and regulations to align Turkey's legal and administrative environment to the EU requirements (OECD, 2002c).

The second important factor affecting regulatory environment in Turkey is the economic and financial crisis occurred in February 2001. The crises made the regulatory reforms seen as an essential element in the range of policy responses needed to restore economic stability and growth. The Government in May 2001 approved a comprehensive economic programme called Strengthening the Turkish Economy which intended to improve and restructure economic, financial and administrative capacities by adopting new structural reforms (OECD, 2002c).

Another driver which is closely related to the second factor mentioned above is fulfilment of stand-by arrangements with the International Monetary Fund (IMF) and World Bank recommendations (OECD, 2002c). Since 2002, two 3-year stand-by arrangements with the IMF have been made to support Turkey's economic program with the Fund financing of total 27.5 billion dollars. Before these arrangements came into effect, a number of steps including adoption of new pieces of legislation had been considered in the letter of intent by Turkey. Moreover, structural benchmarks, and periodic review procedures have been identified for each disbursement of the IMF financing. This has forced Turkey to adopt and implement a range of significant laws and regulations to fulfil the stand-by arrangements. Similarly, the World Bank which has given financial and technical assistance has also wanted Turkey to do some structural reforms and to consider its recommendations.

Finally, the OECD has encouraged Turkey to take actions particularly towards regulatory reform policy which would be beneficial for liberalisation of network industries, advocating competition policy, opening external and internal markets to trade and investment. To this end, a review for Turkey was carried out by the OECD under the OECD's regulatory reform programme, and as a result of this review, a report on the OECD Review of Regulatory Reform in Turkey (OECD, 2002b) was published in 2002. Also a Background Report on Government Capacity to Assure High Quality Regulation (OECD, 2002c) was prepared for this report, which analyses the institutional set-up and use of policy instruments in Turkey, and includes the country specific policy recommendations developed by the OECD during the review process.

The OECD report (2002c) recommends steps to be taken to improve the capacities to make new regulations and to keep existing regulations up-to-date. In this report the OECD advises Turkey to implement a step-by-step programme for regulatory impact assessments, to improve transparency by establishing legal requirements for consultation procedures during the preparation of regulations, to promote the systematic consideration of regulatory alternatives, to reduce administrative burdens by establishing a central registry of administrative procedures and business licences, and by initiating a comprehensive review of existing regulations, and to draw particular attention to compliance and enforcements of regulations.

Those factors mentioned above have been major forces in shaping Turkish regulatory system. First of all, Turkey has faced an increasing volume of laws and regulations. For instance, between January 2001 and December 2005 the Turkish Parliament has adopted 830 new laws or an average of 166 laws per year. More importantly, these laws contain many significant constitutional provisions, international treaties, and fundamental codes. If other sources of regulations such as decrees-having force of law, decisions of the Council of Ministers, regulations, by-laws, and communiqués are also taken into consideration, this number will be enormous.

Secondly, Turkey has established independent regulatory agencies and remodelled existing ones to regulate and supervise specific sectors. In particular, their establishment has been part of stand-by arrangements with IMF and of EU accession efforts as well as the need for adjusting the insufficient governance structures built following the privatisation of public monopolies. Each regulator is built via specific legislation, which defines competence of the bodies, states regulatory objectives and grants them independence in decision-making. This is done through statutory appointment procedures, administrative, human recourses, and through budgetary autonomy (OECD, 2002c). Besides the Capital Markets Board, the Radio and

Television Supreme Council and the Competition Board which are introduced in 1982, 1994 and 1997 respectively, the most notable of the newly established regulatory agencies are the Banking Regulation and Supervision Board, and the Telecommunication Board starting their activities in 2000; the Energy Market Regulatory Board, and the Sugar Board in 2001; the Public Procurement Board, and the Tobacco, Tobacco Products and Alcoholic Beverages Market Regulation Board in 2002. They are granted statutory rights to produce secondary legislation such as codes, standards, circulars, by-laws, communiqués, and qualified binding decisions which have impact on business and on the economy. As a result, these regulatory agencies have not only started to play crucial role in specific sectors where they are regulate and supervise, but also Turkey's regulatory system and rule-making process.

Thirdly, Turkey has started to launch some regulatory reform initiatives to improve regulatory environment particularly by considering the OECD recommendations. In this framework, the Public Administration Law endorsed by the Parliament in July 2004 intended to introduce a regulatory impact assessment process. It was, however, referred back to the Parliament for reconsideration by the President on the grounds that it conflicted with constitutional provisions related to the unitary character of the state. Currently the Parliament is still in the process of reviewing the legislation. Meanwhile, the Council of Ministers in February 2006 issued a by-law on Rules and Principles on Preparation of Legislation to avoid possible delays stemming from reconsideration process by the Parliament. This By-Law introduces a formal regulatory impact assessment process which will come into force from February 2007, and prescribes a framework for preparation of laws, decrees having the force of law, regulations, by-laws and other regulatory actions. Moreover, with regard to administrative burdens, procedures for setting up a company have been reduced, and business environment for small and medium sized enterprises has been simplified. Furthermore, in January 2006, the Prime Ministry Legislation Development and Publication Unit started to carry out a review of 'regulation' ("*tüzük*") to simplify and, if appropriate, to abolish inapplicable or ineffective ones. In addition, recently a few training programmes, seminars and workshops for civil servants on regulatory impact assessment and simplification of existing regulations have been introduced.

b) General Assessment and Policy Recommendations

After the use of regulatory impact assessment for new regulations and newly established governmental units had been introduced with the draft Law of Public Administration as one of the fundamental principles of public administration in 2003, it was criticised by commentators for several reasons.

The first argument against RIA process in Turkey has an ideological reason behind. Bayramoglu (2003), for example, claims that it is a tool to build the legislation and public decision-making process on the basis of the capitalism and international competition rules. Another important argument was that doing RIA to develop such a policy is costly and also time-consuming. Bayramoglu (2003) refers to the reports prepared both by the US Congressional Budget Office and OECD to make this point. Bayramoglu (2003) notes a section of one report on Regulatory Impact Analysis indicating that: Costs at Selected Agencies and Implications for the Legislative Process by the US Congressional Budget Office in 1997 concluded that the assessment takes to much time (i.e. three years on average), is very costly (i.e. 570,000 US dollars on average in some cases), and sometimes is not reliable as there is difficulty to collect good quality data. Bayramoglu (2003) also states that the OECD estimated that the costs of impact assessment are approximately equal to 10 per cent of a country's GDP, when it is implemented in all areas of public administration.

These arguments mentioned above tend to refuse the use of RIA process as a whole. However, we disagree with them for several reasons. Regulation is totally unavoidable as it allows governments to meet important economic, social, and environment goals. That is why discussions about regulation focus on whether the objectives of regulation can be achieved with lower cost to the community and business. As noted earlier the OECD review reports suggest that, if appropriately designed, the use of RIA along with a comprehensive public consultation process and a systematic consideration of alternatives to regulation would be valuable to achieving desired outcomes. The tool of regulatory impact assessment ensures that regulation is only used when appropriate and that the regulation used is of high quality. Of course, and similar to other systems, if regulatory quality system is not designed well, it could fail and even impose further bureaucratic burden on the policy making process. One of the strengths of RIA is its flexibility, however, making it possible to design a system that takes into consideration the constitutional, legal, cultural, and political features of the relevant country (Mandelkern, 2001; EC, 2005c). Moreover, creating such a system is not an alternative to welfare state. In contrast, making targeted, transparent, and accessible regulations would enable the government to implement the principles of social state in an efficient and effective way. In addition, and with regard to concerns about the cost and length of doing RIA, it is also necessary to take into account the RIA benefits to decide if it is costly. Available surveys suggest that, when it is done well, the costs of doing RIA will be significantly outweighed by the benefits. For example; in 1987 the US Environmental

Protection Agency found that 15 RIAs cost 10 million US dollars to be conducted but they resulted in an estimated net benefit of about 10 billion US dollars (OECD, 1997). Similarly, the tool of measuring administrative burdens offers an outstanding return. The Dutch government expects a GDP increase of 6.7 billion euros by spending 35 million euros on administrative burden reduction (BRTF, 2005). The measures already implemented by the end of 2005 in the Netherlands have reduced the administrative burden by 1.7 billion euros (Ministry of Finance of the Nederland, 2005). The UK government also estimates that administrative burden reduction would result in a potential 16 billion pounds increase in GDP for an expenditure of some 35 million pounds (AGPC, 2005; BRTF, 2005). Also, as mentioned earlier, a consideration of principle of proportionate analysis, which suggests that the depth and scope of the RIA will be determined by the likely impacts of the proposed action, would save cost and time. Therefore, RIA can be a powerful tool to boost regulatory quality if it is well designed and implemented. This suggests that it is important to develop a RIA structure which seeks to ensure that a regulation achieves its objectives in the most effective and efficient manner.

In this context, it would be useful to identify main strengths and weaknesses of Turkey's RIA policy that will be in place in 2007 and possible policy options for addressing the problems. The EU accession negotiations are still a major force in Turkey's current regulatory quality environment. The negotiations process will further accelerate not only the adoption of new rules and reviews of existing regulations to bring Turkish legislation in line with 33 chapters of EU *Acquis* but it will also accelerate regulatory quality reforms. First of all, the screening process which intends to examine Turkey's plans for adopting and implementing them has already started and is expected to last until autumn 2006. After a chapter is screened, and if the EU decides it will be negotiated, new regulations would be adopted and/or existing legislation will be changed in response of the negotiation outcomes (EC, 2005d). Secondly, the European Council decision on Accession Partnership with Turkey in 2006 (EC, 2005e) identifies "pursuing reform of public administration and personnel policy in order to ensure greater efficiency, accountability and transparency" as short term priority in area of public administration (p.6). This will clearly enable Turkey to develop a programme to review, simplify and modify existing laws, rules and regulations. In formulating negotiations with the EU and in implementing the EU *Acquis* it might be beneficial to adopt a general approach that does not impose obligations beyond what it is required by directives unless this is necessary to achieve their statuary objectives and is justified by cost- benefit analysis prepared by government and related private sector.

Another major strength of Turkey's regulatory system is the existence of the newly established independent regulatory agencies. First of all, these agencies have expertise. Secondly, their statutory independence, to large extent, prevents political interference, encourages a longer-term perspective, and facilitates public consultation. Most importantly, their enforcement function enables them to benefit from industry feedbacks and increases their credibility. Those factors obviously help to build a better regulation.

On the other hand, there are some weaknesses despite recent important initiatives towards achieving good regulatory practices. As stated earlier, a RIA process recently has been introduced by a by-law. According to the by-law governmental departments are required to undertake a regulatory impact assessment for proposals of 'laws' and 'decrees having force of law' that are likely to impact more than 10 million new Turkish Lira. There is, however, no formal requirement to carry out RIA for the preparation of subordinate regulations such as by-laws, regulations, communiqués and specific regulatory decisions. This is major weakness in RIA process since it is resulted in an exclusion of regulations of the independent regulatory agencies from doing RIA. In other words, Turkish current regulatory quality regime does not represent a `whole-of-government` policy on regulatory quality.

In fact, a RIA process is also essential for secondary regulations of independent regulatory agencies. First of all, as the name suggests, independent regulators have been established to particularly regulate and supervise various sectors such as banking, capital markets, energy, telecommunication, competition, public procurement, television, radio, sugar, alcohol and tobacco. Therefore, there is more need to develop a regulatory quality policy for these regulators than for other governmental departments. Secondly, the sectors that they are responsible for regulating and licensing are more vulnerable to the impacts and administrative burden stemming from the legislation. Thirdly, in comparison with the primary law-making procedure, independent regulatory agencies' secondary legislation making procedure is less subject to quality control. In the case of primary legislation, there are many steps to be undertaken, which ensure quality control. Draft laws are prepared within the line ministry and submitted to the Prime Minister Office. The General Directorate of Laws and Decrees checks the constitutionality, consistency with existing legislation and legal quality of draft law, and consults with relevant ministers and public agencies if not done by the minister.

Then, they are discussed in the meeting of the Council of Ministers, and submitted to the Parliament. A relevant parliamentary standing committee examines the draft laws and reports to the General Assembly suggesting approval, amendments, or repeal. After endorsed by the General Assembly, they are sent to the President. The President may refer the law back to the Parliament for reconsideration within fifteen days. If the law is re-approved without changes, the President must promulgate it (OECD, 2002c). On the contrary, there is no such a step-by-step quality control procedure for secondary legislation of independent regulatory agencies. According to the laws that have established these agencies regulations in form of by-laws and communiqués are sent to the Prime Minister Office for publication in the Official Gazette after having been approved by the Board of the independent regulatory agency. Specific regulatory decisions are not published in the Official Gazette at all but in the weekly bulletins of independent regulatory agencies.

Therefore, it is necessary to include the independent regulatory agencies in the RIA process. There are two options for achieve this. The first option is to modify the by-law that recently has introduced the RIA for primary regulations. Another option is to adopt a new law for independent regulatory agencies. Our opinion is that the latter seems to be the best policy option in response to the issue. The reason is that the current type of regulation that has granted the independent regulatory agencies power and independence in decision-making process is law. Therefore, introducing such a RIA process affecting their power and independence requires a ratification of law, rather than by-law that has lower hierarchy.

It is crucial that the new law that will set up a step-by-step RIA structure for independent regulators would give a clear and concise definition and scope of RIA; require the use of RIA for only the most important regulations in order to avoid wasting time and resources; explain which methods of analysis are used by regulator in what circumstances; require the systematic consideration of alternatives to regulation that encourage innovation, and the principle of proportionality; and identify monitoring and compliance measures. The Law also would require the independent regulators to prepare a Better Regulation Action Plan that force them to set a reduction target on the overall administrative burdens on regulated business and community and to launch a simplification and modernisation program for existing regulation, in medium term.

Another major weakness is related to political willingness and the way of introducing the RIA process. Maximum political and bureaucratic commitment is the necessary first step to implement the RIA across the whole administration. This means that all regulators must recognise that the use of

RIA and other tools is essential for achieving the desired objectives. As mentioned in OECD report (2002c), given the Turkish legal system and the hierarchy of regulations, a ratification of law is probably the best way to achieve this. Therefore, it seems that implementation of the RIA process established by a by-law, which is less enforceable than law, will be significantly challenging in the years to come.

IV. Conclusion

We believe that drawing the lessons from countries' practices would also support policy-makers in achieving the desired regulatory outcomes and reducing the risk of regulatory failures. Therefore, in contrast to the usual academic perspective this paper focused on practical dimension of regulation.

It is sensible to assume that government intervention is justifiable only if the total benefit of regulation to community and business are greater than the total cost of regulation. The cost of regulation includes various costs associated with formulating, implementing, administrating and enforcing the regulation as well as losses and other inefficiencies associated with regulatory capture and rent-seeking behaviour. Evidence shows that the total cost of regulation is economically significant. Some countries estimated that the annual cost of regulations is around 10-12 per cent of GDP (BRTF, 2005). That is why, the discussions about regulation now focus on whether the desired outcomes can be achieved with lower costs on the community and business.

It seems that one effective way dealing with potential negative effects of government intervention is to contrive a well-designed regulatory system. However, there is no one single or one correct regulatory design to adopt in developing a regulatory quality regime. This is firstly because the regulatory design covers a wide range of issues including the delegation of policy making power among institutions, the degree of decentralisation of regulators, the selection process of bureaucrats, the timing of intervention, the policy making process and procedures, the communication channels within the governmental departments and with the community, the use of regulatory strategies, and the ex-post instruments for improving existing regulations, all of which are potentially controversial. Second and more importantly, while a particular regulatory design may be effective in one circumstance or in one country, there is no guarantee that it will work equally in another. Thus, the appropriate path to regulatory design will mainly depend on both the characteristics of relevant country concerned and the nature of the problem at hand.

On the other hand, even if it differs amongst countries, it is possible to identify a general framework that provides a rigorous and systematic approach to improve quality of both new and existing regulations. This framework includes the use of regulatory impact assessment along with a comprehensive public consultation process and a systematic consideration of alternatives to regulation as well as administrative burden reduction and simplification plans. Countries' experiences seem to indicate that, if appropriately designed, this framework would be valuable to achieve good regulation that meets its objectives successfully and avoids costs and unintended consequences. For example, the tool of measuring administrative burdens with the Dutch standard cost model offers an outstanding benefit. The Dutch government expects an increase in GDP of 6.7 billion euros by spending 35 million euros on administrative burden reduction. The UK government also estimates that administrative burden reduction would result in a potential 16 billion pounds increase in GDP for an expenditure of 35 million pounds (BRTF, 2005). In this context, what countries further need to do is to develop a credible and suitable methodology for measuring all costs and all benefits associated with regulation. However, we recognise that this is challenging and will take time due to the practical difficulties.

Moreover, in this paper, we have attempted to evaluate the Turkish regulatory system by considering its existing constitutional, political, cultural, and legal structure. We observe that, over the last five years, Turkey's legislation has faced a remarkable change in terms of scope and volume because of a number of drivers such as Turkey's efforts towards the EU membership, recent economic crises, and stand-by arrangements with IMF and World Bank. In addition, Turkey has recently launched important initiatives such as introducing a formal RIA process and establishing new independent regulatory agencies towards improving regulatory quality regime. However, there are some weaknesses currently characterising the legal environment as well. One of the major weaknesses is that the regulatory system does not represent a whole-of-government policy on regulatory quality policy. More specifically, the independent regulatory agencies are not obligated to do RIA when making secondary regulations. Since they are at the heart of Turkish regulatory system, we believe that it is necessary to extend the RIA process to the independent regulators. The best option to achieve this is to adopt a new law for independent regulatory agencies. We also recommend in medium term that the independent regulators should be required by law to prepare a Better Regulation Action Plan that sets a reduction target on the overall administrative burdens on business and to launch a simplification and modernisation program for existing regulation.

Finally, we think that a ratification of law rather than a by-law, which is enforceable than law, is the best possible option to introduce a RIA process in order to ensure maximum commitment to implement the RIA across the whole administration.

References

AGPC, *Regulation and Its Review 2004-05*, Annual Report Series, Canberra: Australian Government Productivity Commission, 2005.

Alp, A., *Uluslararası Mali Piyasalardaki Gelişmeler ve Türkiye (Developments in the International Financial Markets and Turkey)*, 2002, İstanbul: İMKB Yayınları

Baldwin, R., Cave, M., "*Understanding Regulation: Theory, Strategy and Practice"*, Oxford: Oxford University Press, 1999.

Bayramoglu, S., *Kamu Yönetimi Reformu ve Düzenleyici Etki Analizi (Tasarı madde 5-c hükmü) [Public Administration Reform and Regulatory Impact Assessment], 2003*. [Online]; available from www.kamuyonetimi.org/ktml2/files/ uploads/pdf/deason.pdf; accessed 20 March 2006.

Becker, G. S., "*A Theory of Competition Among Pressure Groups for Political Influence*", The Quarterly Journal of Economics, XCVIII(3), 1983, pp.371-400.

BRTF, Better Regulation Task Force (2005), *Regulation — Less is More: Reducing Burdens, Improving Outcomes*, BRTF Report to the Prime Minister, London: Better Regulation Task Force.

Buchanan, J. M., Tollison, R. D., Tullock, G., *Toward a Theory of the Rent-Seeking Society*, College Station: Texas A&M University Press, 1980.

Demirbas, D., *Environmental Performance, Public Interest Theory and Economic Theory of Regulation: The Case of Turkish SMEs with a Logit Model*, Presented at the Annual Conference of the European Public Choice Society (EPCS 2005), 2005, Durham: University of Durham, 31st March-3rd April 2005.

Den Hertog, J., "*General Theories of Regulation*" in B. Bouckaert and G. De Geest (eds), *Encyclopaedia of Law and Economics*, Cheltenham: Edward Edgar, 1999, pp. 223-270.

Dudley, S. E., *Primer on Regulation*, Washington D.C.: George Mason University Mercatus Policy Series, 2005.

Dumez, H., Jeunemaitre, A., "*Financial Regulation: From Economic Analysis to Practical Experience*" in A. Jeunemaitre (eds), Financial Markets Regulation: A Practitioner's Perspective, Basingstoke: Macmillan Press, 1997, pp. 3-24

EC, Commission of the European Communities *2002 Regular Report on Turkey's Progress towards Accession,* COM (2002) 700 final, Brussels: EC, 2002.

EC, Commission of the European Communities, *2003 Regular Report on Turkey's Progress towards Accession*, Brussels: EC, 2003.

EC, Commission of the European Communities, *2004 Regular Report on Turkey's Progress Towards Accession*, COM (2004) 1201 Final, Brussels: EC, 2004.

EC, Commission of the European Communities, *Communication on Better Regulation for Growth and Jobs in the European Union,* COM (2005) 97 Final, Brussels: EC, 2005a.

EC, Commission of the European Communities, *Minimising Administrative Costs imposed by legislation: Detailed outline of a possible EU Net Administrative Cost Model,* Commission Staff Working Paper Working Document, SEC (2005) 175, Brussels: EC, 2005b.

EC, Commission of the European Communities, *Impact Assessment Guidelines*, SEC (2005)791, Brussels: EC, 2005c.

EC, Commission of the European Communities, *Turkey 2005 Progress Report*, COM (2005) 561 final, Brussels, 2005d.

EC, Commission of the European Communities, *Proposal for a Council Decision on the Principles, Priorities and Conditions contained in the Accession Partnership with Turkey*, COM (2005) 559 final, Brussels: EC, (2005e).

Elgie, R., "*Why Do Governments Delegate Authority to Quasi-Autonomous Agencies? The Case of Independent Administrative Authorities in France*", Governance: An International Journal of Policy, Administration, and Institutions, Vol.19, No.2, 2006, pp.207-227

Estache, A., Martimort, D., "*Politics, Transaction Costs and the Design of Regulatory Institutions"*, World Bank Working Papers Articles (WPS 2073), Washington DC: World Bank, 1999.

Goran, P., Hagg, T., "*Theories on the Economics of Regulation: A Survey of the Literature from a European Perspective*", European Journal of Law and Economics, 4, 1997, pp.337-370

Government of Turkey, *National Programme for the Adoption of the Acquis,* Ankara: AB Genel Sekreterligi, 2001.

Government of Turkey, *2003 Turkish National Programme for the Adoption of the Acquis,* Ankara: AB Genel Sekreterligi, 2003.

Guerin, K., "*Encouraging Quality Regulation: Theories and Tools"*, Working Paper 03/24, Wellington: New Zealand Treasury, 2003.

Hantke-Domas, M., "*The Public Interest Theory of Regulation: Non-Existence or Misinterpretation?*" European Journal of Law and Economics, 15, 2003, pp.165–194

International Monetary Fund, Turkey: Report on the Observance of Standards and Codes—Fiscal Transparency Module, IMF Country Report No. 06/126, 2006, Washington DC: IMF.

Kaymak, H., "*Düzenleyici Etki Analizi*" [Regulatory Impact Assessment], *Maliye Dergisi*, 146, 2004, pp.107-130.

Kizilcik, R., "*Düzenleyici Etki Analizi*" [Regulatory Impact Assessment], *Türk İdare Dergisi*, 446, 2005, pp.79-100.

Mandelkern Group on Better Regulation Final Report, 2001. [Online]; available from; http://www.europa.eu.int/comm/secretariat_general/impact/docs/mandelkern.pdf; accessed 15 March 2006.

McCormick, R. E., Tollison, R. D., *Politicians, Legislation, and the Economy*, Boston: Martinus Nijhoff, 1981.

Ministry of Finance of the Nederlands, *Reducing Administrative Burdens: Now Full Steam Ahead*, Dutch Cabinet Letter 2005, Amsterdam: Ministry of Finance, 2005.

Ogus, A., "*Regulatory institutions and structures*", Annals of Public and Cooperative Economics, 73:4, 2002, pp. 627-648

OECD, *Regulatory Impact Analysis: Best Practices in OECD Countries*, 1997, Paris: OECD.

OECD, *Regulatory Polices in OECD Countries: From Interventionism to Regulatory Governance, Annex II: Regulatory Alternatives*, 2002a, Paris: OECD.

OECD, *The OECD Review of Regulatory Reform in Turkey*, 2002b, Paris: OECD.

OECD, *OECD Reviews of Regulatory Reform, Regulatory Reform in Turkey: Government Capacity to Assure High Quality Regulation*, 2002c, Paris: OECD.

OECD, *Regulatory Impact Analysis (RIA) Inventory*, 2004, Paris: OECD.

OECD, *Regulatory Impact Analysis in OECD Countries, Challenges for Developing Countries*, 2005, Paris: OECD.

Peltzman, S., "Towards a More General Theory of Regulation", *Journal of Law and Economics*, 19, 1976, pp.211-240.

Peltzman, S., "*The Economic Theory of Regulation After a Decade of Deregulation*", Brookings Papers on Economic Activity: Microeconomics, Vol.1989, 1989, pp.1-41.

Posner, R., "*Theories of Economic Regulation*", Bell Journal of Economics and Management Science, 5, 1974, pp.335-358

Radelli, C. M., Francesco, F. D., *Indicators of Regulatory Quality,* 2004.[Online]; available from http://europa.eu.int/comm/enterprise/regulation/better_regulation /impact_assessment/docs_concluding_conference240105/radaelli_finalreport_executivesummary.pdf; accessed 30 March 2006.

Rowley, C. K., Tollison, R. D., Tullock, G., *The Political Economy of Rent-Seeking*, Boston: Kluwer Academic Publishers, 1988,

SCM Networks, *International Standard Cost Model Manuel: Measuring and reducing administrative burden for business, 2005,* [Online]; available from http://www.oecd.org/dataoecd/32/54/34227698.pdf; accessed 20 March 2006.

Stigler, G., "*The Theory of Economic Regulation*", Bell Journal of Economics and Management Science, 2, 1971, pp.3-21

Tollison, R. D., *"Public Choice and Legislation",* Virginia Law Review, 74, 1988, pp. 339-71.

Tullock, G., *"The Welfare Costs of Tariffs, Monopolies, and Theft"*, Western Economic Journal, 5, 1967, pp.224-32.

Banking Law, Turkey. [Online]; available from http://www.bddk.org.tr/turkce/ mevzuat/bankalar kanunu/bankacilik_kanunu.htm; accessed 1 March 2006.

Capital Market Law, Turkey. [Online]; available from www.cmb.gov.tr; accessed 1 March 2006.

Competition Law, Turkey. [Online]; available from http://www.rekabet.gov.tr/word/ ekanun.doc; accessed 1 March 2006.

Draft Law Related to Regulatory and Supervisory Agencies. [Online]; available from http://www.basbakanlik.gov.tr/sour.ce/index.asp?wpg=9260FB83-A81D-4F1C-B0DE-C03A5D88E82A; accessed 15 March 2006.

Electricity Market Law, Turkey. [Online]; available from http://www.epdk.gov.tr/english /regulations/electricity.htm; accessed 21 March 2006.

Mevzuat Hazırlama Usul ve Esasları Hakkında Yönetmelik [By-Law on Rules and Principles on Preparation of Legislation]. [Online]; available from http://www.basbakanlik.gov.tr /docs/kkgm/duyuru/20060217-4.htm; accessed 1 March 2006.

Petroleum Market Law, Turkey. [Online]; available from http://www.epdk.gov.tr/ english/regulations/petroleum.htm; 21 March 2006.

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DETERMINATION OF EFFECT OF INTELLECTUAL CAPITAL ON FIRM VALUE VIA VALUE ADDED INTELLECTUAL COEFFICIENT METHODOLOGY: AN EMPIRICAL STUDY ON ISE-LISTED MANUFACTURING FIRMS

M. Başaran ÖZTÜRK[*]
Kartal DEMİRGÜNEŞ[**]

Abstract
This study aims to determine the effect of intellectual capital on firm value. The relationships among profitability, productivity and market-to-book value ratio that are considered to be the main performance indicators are analyzed via Value Added Intellectual Capital (VAIC) methodology developed by Ante Pulic within a multiple regression model. The data consists of 30 Istanbul Stock Exchange (ISE) listed manufacturing firms during the period of 2000-2002. In spite of some limitations, the findings of the study shed light on the relationship between intellectual capital and firm value. According to the results, capital employed efficiency (CEE) and structural capital efficiency (SCE) are significantly related to profitability, productivity and market value. However, human capital efficiency (HCE) is significantly related to only market-to-book value ratio.

I. Introduction

Though corporate performance is a concept frequently used by distinct groups such as shareholders, academicians, strategists and managers, it is obvious that a generally accepted definition of it has not been depicted yet. This is probably due to the fact that firm performance is related with a wide range of inter-related subjects such as capital structure decisions and market returns.

[*] Asst. Prof. M. Başaran Öztürk, Niğde University, Accounting & Finance.
Tel: (388) 225 20 20 Fax: (388) 225 20 14 E-Mail: mbozturk@nigde.edu.tr.
** Kartal Demirgüneş, Research Assistant, Niğde University, Accounting & Finance.
Tel: (388) 225 20 21 Fax: (388) 225 20 14 E-Mail: kdemirgunes@nigde.edu.tr.
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Labor force and capital are considered to be the main production factors in neo-classical economy. However, these production factors occasionally fail to come out some economical consequences in today's business environment dominated by knowledge-intensive firms. Due to growing importance of knowledge (and knowledge-based assets) compared with other production factors', the role of knowledge-intensive intangible assets is becoming more vital in today's contemporary business structures (Brooking, 1998).

In the elapsed time from Adam Smith up to now, firms have been conceived as organizations that gather resources from investors, employees, suppliers etc. and use them to produce products/services for customers. In this point of view, corporate performance has been evaluated according to returns they have generated as a result of their consumption level of the mentioned tangible resources (Donaldson and Preston, 2001). In latter approaches, it has been defended that firm itself and its stakeholders (such as investors, employees, suppliers, creditors, clients, governmental and non-governmental organizations etc.) construct strict relationships that have mostly been beneficial for all the mentioned parties. Firm, in these approaches, has been considered as a complete organization consisting of both tangible and intangible assets. Thus, corporate performance has been a function of managing firm's tangible and intangible assets effectively (Turnball, 2002).

However, in today's contemporary approaches about performance evaluation, the value added seems to be one of the most popular and viable approaches. The value added approach, which is coherent with value maximization objective of financial management, can also be called as value creation approach. According to Sveiby (2003), value added is a reasonable and reliable performance evaluation tool in order to overcome the deficiencies of traditional performance evaluation measures.

Traditional performance evaluation approaches may sometimes be insufficient to meet expectations of new economical system in which knowledge is the dominant production factor. In traditional approaches, value added generated by intangible assets is mostly disregarded. Thus, it is necessity to introduce new and divergent evaluation approaches that will be used by knowledge-intensive firms operating in the new economical system. Seen from this aspect, Value Added Intellectual Coefficient (VAIC) developed by Ante Pulic is a promising approach (methodology) for performance evaluation that overcomes the above-mentioned insufficiencies of traditional approaches by considering the effects of both tangible and intangible assets on revenues.

The aim of this study composed of six sections is to determine the effect of intellectual capital on firm value. After the Introduction (first) section, literature review is presented in the second section. In the third

section, the main assumptions and fundamentals of VAIC are given. In the fourth and fifth sections of the study, data, methodology and the results of multiple regression analysis are presented. Finally, in the sixth (last) section of the study, findings and suggestions are given.

II. Literature Review

As from the beginning of the 1980s, due to growing importance of intellectual capital in value creation, studies on the measurement of this elastic type of capital and the determination of its role in value creation process has gained acceleration. Especially in 1990s, intellectual capital has become an important field of study for a wide of professionals dealing with mergers & acquisitions and corporate re-structuring. In this point of view, intellectual capital can be seen as an important determinant of corporate performance.

Despite the importance of the subject, the number of studies examining the effect of intellectual capital on firm value is limited. Firer and Williams (2001), in their empirical study based on data of 75 Johannesburg Stock Exchange listed companies, have found out that there exists a significant positive relationship between corporate performance and structural capital (a component of intellectual capital consisting of physical assets). Another finding of their study is that there is not any significant relationship between corporate performance and human capital (another important component of intellectual capital mostly generated from human capabilities). In a survey study consisting of 71 respondent İstanbul Stock Exchange listed firms, Bozbura and Toraman (2004) have determined significant relationships between market-to-book value ratio and human capital. Besides, human capital has also been in a significant relationship with structural capital. In Wang and Chang (2004)'s empirical study using data of Taiwan Stock Exchange listed telecommunication firms in the period of 1997-2001, the possible relationships between corporate performance and intellectual capital components have been analyzed. It has been found out that intellectual capital components except human capital are significantly related with corporate performance. Another finding of the study is that though the effect of human capital on performance is indirect, its effect on the other intellectual capital components is remarkably direct. Later on, the findings of Chen et al. (2005)'s study based on data of, again, Taiwan Stock Exchange listed firms in the period of 1992-2002 has shown that intellectual capital is an important factor affecting the profitability and growth potential. Finally, Bollen et al. (2005) have analyzed the performance of Frankfurt Stock Exchange listed pharmaceutical firms and found out that there is a significant relationship

between corporate performance and firm's intellectual assets. Furthermore, intellectual capital comprised of these intellectual assets has positive effects of corporate performance.

III. Value Added Intellectual Coefficient (VAIC) Methodology

Value Added Intellectual Coefficient (VAIC) by Ante Pulic is an analytical methodology based on simple assumptions and capable of measuring intellectual capital that firms own. VAIC gives a new interpretation to measurement and management of knowledge and considers firms as dynamic and consistently changing sub-systems (Bornemann, 2003). Introducing the VAIC methodology, Ante Pulic aimed to integrate and adopt firms to changing environmental circumstances emanated from dynamic structure of knowledge economy (Schneider, 2003).

The main advantage of VAIC is its simplicity. Without detailed investigations and analyses about the firm subject to analysis, it takes into account the concept value added and allows comparable analyses among sub-divisions, firms and national economies.

Value Added Intellectual Coefficient of a firm is calculated in three steps. In the first and second steps, total value added created by the firm and value added creation coefficients of firm's resources individually are calculated, respectively. In the third step, these coefficients are summed and the total sum of these coefficients is the Value Added Intellectual Coefficient of the firm in subject.

3.1. Calculation of Value Added

Value added, in brief, is the difference between output and input (Pulic, 1998, 1999, 2000; Pulic and Bornemann, 2003).

(1) $$VA = OUT - IN$$

Where;
VA = Value Added,
OUT = Output; and
IN = Input.

Output, here indicating performance as the result of input (that is, knowledge), is the total income generated from products/services sold on the market. Moreover, input is the sum of all expenses undergone by the firm. The most remarkable point of VAIC is that it considers staff (labor) expenses (total wages and salaries to employees) not as a component of cost because of their vital role in value creation process (Pulic, 2003a). Monetary total after deducting input from output is the total value added created in the concerned period.

Firer and Williams (2002) calculates value added in a different way. In their calculation, value added is the sum of interest expenses, depreciation expenses, dividends, corporate taxes, equity of minority shareholders in net income of subsidiaries, profits retained for the mentioned fiscal year and total wages and salaries to employees (Firer and Williams, 2002).

However, in this study, value added is calculated by Economic Value Added (EVA) methodology developed by Stern & Stewart Co.'s founders, Joel Stern and G. Bennett Stewart. Currently, EVA is a widely used performance evaluation tool by many global firms.

Though EVA is considered to be a new methodology from financial perspective, as its origin is founded on residual income, it is indeed an archaic performance evaluation metric having a past down to 1980s. The concept residual income has also been named as economic profit as it focuses on the net present value of expected cash flows in the future and takes interest expenses, in other words financial costs, into consideration (Bromwich and Walker, 1998). Economic profit can be calculated in the following way:

(2) $$y_t = kV_{t-1} = C_t - D_t = V_t + C_t - V_{t-1}$$

Where;
y_t = Economic Profit,
k = Interest Rate,
V_{t-1} = The Present Value of Expected Cash Flows in the Beginning of Period t,
V_t = The Present Value of Expected Cash Flows in the End of Period t,
C_t = Net Cash Flows in the Mentioned Period,
D_t = Depreciation Expenses in the Mentioned Period.

$$(D_t = V_{t-1} - V_t)$$

EVA is a re-formulized form of residual income. EVA can be defined as monetary amount of economic value created by a firm by considering the both debt and equity costs (weighted average cost of capital), and, in brief, can be calculated by subtracting cost of capital from net operating profit after taxes (Ercan et al., 2003). Calculation of EVA can be done in two ways:

(3) $$EVA = NOPLAT - (WACC \times CE)$$

(4) $$EVA = (ROI - WACC) \times CE$$

Where;
EVA = Economic Value Added,
NOPLAT = Net Operating Profit Less Adjusted Taxes,
WACC = Weighted Average Cost of Capital,
CE = Invested Capital and
ROI = Return On Investment.

Invested capital is the sum of net working capital and tangible assets for the mentioned period. Weighting of WACC is due to market values of debt and equity and in the calculation of cost of debt, interest rate in the market and the effect of it on taxes are considered.

The fundamental logic of Pulic's value added calculation lies in determination of net output generated by the firm. Similarly, EVA has the same logic: net EVA outcome is calculated by subtracting cost of investment from its return. The main reason of preferring EVA in value added calculations in this study is that EVA calculation is more suitable for Turkish accounting standards and can easily be done by using data gathered from fundamental financial statements.

It is hard to say that the mentioned input-output relationship in Pulic's methodology is totally reflected in Turkish accounting standards. The difficulty in obtaining robust information about total wages and salaries to employees from financial statements of Turkish firms constrains VAIC implementations. Besides, the importance of these expenses in value creation processes is mostly disregarded and they are considered as cost, not as investment.

3.2. Calculation of Efficiency Coefficients

In the second step of VAIC, value added creation efficiencies of resources that firm uses in order to create value are calculated. As value added is an outcome of physical, financial and intellectual capital, the relative proportions of these capital forms are of basic importance. Thus, aiming to create as much as more value added using given amounts of physical, financial and intellectual capital, firms should have to consider optimal amount of capital and optimal number of employees.

Value added intellectual coefficient is a composite sum of capital employed efficiency (CEE), structural capital efficiency (SCE) and human capital efficiency (HCE) (Firer and Williams, 2002). Here, CEE, SCE and HCE are indicators of value added efficiencies of capital employed (financial capital), structural (physical) capital and human (intellectual) capital, respectively. The calculations about these indicators are presented below.

Calculation of Capital Employed Efficiency Coefficient:
Pulic, calculates capital employed efficiency coefficient by dividing value added to capital employed.

(5) $$CEE = VA(EVA) / CE$$

Where;
CEE = Capital Employed Efficiency Coefficient,
VA = Value Added and
CE = Capital Employed.

Calculation of Human Capital Efficiency Coefficient:
According to Pulic, the basic indicator of human capital is total amount of wages and salaries to employees. Consequently, human capital efficiency coefficient is calculated by dividing value added to total wages and salaries to employees.

(6) $$HCE = VA(EVA) / HC$$

Where;
HCE = Human Capital Efficiency Coefficient,
VA = Value Added and
HC = Total Wages and Salaries.

Calculation of Structural Capital Efficiency Coefficient:
In the first step of structural capital efficiency coefficient calculation, the amount of structural capital of the firm has to be determined. Here, structural capital is the remaining amount of capital after deducting human capital from value added created by the firm.

(7) $$SC = VA(EVA) - HC$$

Where;
SC = Structural Capital,
VA = Value Added and
HC = Total Wages and Salaries.

Based on the empirical findings of the previous studies, Pulic asserts that in value creation process where intellectual capital is the dominant factor, there has to exist an inverse correlation between human capital and structural capital. Therefore, the formula for structural capital efficiency coefficient calculation should be different than formulas for capital employed efficiency and human capital efficiency coefficient calculations. Structural capital efficiency coefficient is calculated by dividing structural capital to value added.

(8) $$SCE = SC / VA(EVA)$$

Where;
SCE = Structural Capital Efficiency Coefficient,
SC = Structural Capital and
VA = Value Added.

3.3. Calculation of Value Added Intellectual Coefficient
After the calculation of CEE, SCE and HCE coefficients of a firm, they are summed and the result is value added intellectual coefficient of the mentioned firm.

(9) $$VAIC = CEE + HCE + SCE$$

According to Pulic's methodology, in VAIC calculation, CEE, HCE and SCE are calculated, respectively. However, in this study, firstly CEE and then SCE and HCE are calculated. This is a result of some -before mentioned- limitations of financial statements prepared according to Turkish accounting standards. As human capital regarded in VAIC with total wages and salaries to employees cannot be precisely figured out from financial statements in Turkey, SCE coefficient is calculated before HCE coefficient.

Physical assets like land, land improvements, buildings, plant, machinery, equipment and vehicles, as they are taken under tangible fixed assets in balance sheet, are considered to be physical assets by many academicians (See also, Bontis, 1998; Brooking, 1998; Bart, 2001). In this context, SCE and HCE are calculated as given:

(10) $$SCE = SC / VA(EVA)$$

In HCE calculation, firstly the value of human capital has to be known. According to Firer and Williams (2002), structural capital can be calculated by subtracting total wages and salaries from value added:

$$SC = VA(EVA) - HC \quad (11)$$

$$HC = VA(EVA) - SC \quad (12)$$

$$HCE = VA(EVA)/[VA(EVA) - SC] \text{ and} \quad (13)$$

$$HCE = VA(EVA)/HC \quad (14)$$

Another marked point of the study is the assumption about the calculation of weighted average cost of capital, a very necessary component for economic value added calculation. As a result of lack of complete knowledge about factors affecting debt-equity structure and costs of debt and equity, it is hard to determine weighted average cost of capital precisely. Therefore, in this study, weighted average cost of capital is assumed to be 6%, 8% and %10 and EVA calculations are done considering these ratios.

IV. Data and Methodology

Data of the study consists of information gathered from financial statements and fact books of 30 ISE-listed firms in the period of 2000-2002. In this study, relationships among components of VAIC and fundamental corporate performance indicators (profitability, productivity and market-to-book value) are analyzed in order to determine the effect of intellectual capital on firm value. Numerical values used in variable calculations are adjusted over US dollar to decrease the effect of inflation on financial statements.

4.1. Dependent, Independent and Control Variables

In the study, three dependent variables are used related to profitability, productivity and market valuation (market-to-book value). These variables are return on assets (ROA), asset's turn over (ATO) and market-to-book value (MB) ratios. ROA is calculated by dividing net income by book value of total assets; ATO, dividing total revenue by book value of total assets and MB, dividing the market value of equity to book value of equity.

The independent variables of the study are main components of VAIC. These are CEE, HCE and SCE, respectively.

Furthermore, firm size, leverage ratio and earning capacity of equity are used as control variables denoted by LCAP, Lev and ROE, respectively. LCAP is natural logarithm of market value of the related firm. Lev is calculated by dividing total debt by book value of total assets and ROE, dividing net income by book value of equity.

4.2. The Model

The multiple regression model is given below:

$$\text{Dependent Variable ROA, ATO or MB)}_i = a_i + \beta_{i1}CEE_i + \beta_{i2}SCE_i + \beta_{i3}HCE_i + \beta_4 LCAP_i + \beta_{i5}Lev_i + \beta_{i6}ROE_i + \varepsilon_i$$

Where;

ROA_i = Ratio of Net Income Divided by Book Value of Total Assets for Firm *i*,

ATO_i = Ratio of Total Revenue to Book Value of Assets for Firm *i*,

MB_i = Ratio of Market Value of Equity to Book Value of Equity for Firm *i,*

CEE_i = Ratio of Value Added to Financial Capital for Firm *i*,

SCE_i = Ratio of Structural Capital to Value Added for Firm *i,*

HCE_i = Ratio of Value Added to Human Capital for Firm *i*,

$LCAP_i$ = Natural Logarithm of Market Value for Firm *i*,

Lev_i = Total Debt Divided by the Book Value of Total Assets for Firm *i,*

ROE_i = Ratio of Net Income Divided by Book Value of Total Equity for Firm *i*,

$\beta_{i1\text{-}6}$ = Coefficients of Variables 1 thru 6 and

ε_i = Residual Term.

V. Empirical Findings

In this section of the study, results of the multiple regression models and their discussion are given.

5.1. Results of the Regression Analyses

Results of regression analyses are given in Table 5.1. and Table 5.2.

Results of ROA Models:

The results of the multiple regression models indicate that in the mentioned period under all weighted average cost of capital assumptions (WACC=6%, 8% and 10%), the independent variables seem to be highly correlated with ROA, especially in 2001 and 2002.

Table 5.1: Statistics in Brief

Model	*R*	R^2	*Adj.* R^2	*Std. Error*	*F*	*Sig.*
$ROA_{2000\text{-}EVA6}$	0,833	0,694	0,602	0,0352	7,554	**0,000**
$ROA_{2001\text{-}EVA6}$	0,985	0,971	0,962	0,0140	109,966	**0,000**
$ROA_{2002\text{-}EVA6}$	0,994	0,987	0,984	0,0101	302,213	**0,000**
$ROA_{2000\text{-}EVA8}$	0,871	0,759	0,687	0,0312	10,256	**0,000**
$ROA_{2001\text{-}EVA8}$	0,977	0,954	0,941	0,0174	69,627	**0,000**
$ROA_{2002\text{-}EVA8}$	0,994	0,987	0,984	0,0101	292,659	**0,000**
$ROA_{2000\text{-}EVA10}$	0,862	0,743	0,666	0,0322	9,648	**0,000**
$ROA_{2001\text{-}EVA10}$	0,976	0,953	0,939	0,0176	67,854	**0,000**
$ROA_{2002\text{-}EVA10}$	0,988	0,976	0,969	0,0100	137,774	**0,000**
$ATO_{2000\text{-}EVA6}$	0,748	0,560	0,428	0,3754	4,246	**0,006**
$ATO_{2001\text{-}EVA6}$	0,688	0,473	0,315	0,4567	2,996	**0,030**
$ATO_{2002\text{-}EVA6}$	0,529	0,280	0,093	0,4002	1,493	0,225
$ATO_{2000\text{-}EVA8}$	0,742	0,550	0,415	0,3796	4,080	**0,008**
$ATO_{2001\text{-}EVA8}$	0,516	0,266	0,046	0,5392	1,208	0,343
$ATO_{2002\text{-}EVA8}$	0,502	0,252	0,057	0,4080	1,290	0,301
$ATO_{2000\text{-}EVA10}$	0,722	0,521	0,377	0,3918	3,625	**0,013**
$ATO_{2001\text{-}EVA10}$	0,515	0,265	0,044	0,5396	1,201	0,346
$ATO_{2002\text{-}EVA10}$	0,730	0,533	0,393	0,3284	3,807	**0,011**
$MB_{2000\text{-}EVA6}$	0,804	0,646	0,540	1,4876	6,079	**0,001**
$MB_{2001\text{-}EVA6}$	0,806	0,649	0,544	0,9792	6,171	**0,001**
$MB_{2002\text{-}EVA6}$	0,528	0,279	0,091	1,2451	1,483	0,228
$MB_{2000\text{-}EVA8}$	0,866	0,750	0,675	1,2505	9,988	**0,000**
$MB_{2001\text{-}EVA8}$	0,820	0,672	0,573	0,9474	6,820	**0,000**
$MB_{2002\text{-}EVA8}$	0,722	0,521	0,396	0,0153	4,163	**0,006**
$MB_{2000\text{-}EVA10}$	0,763	0,582	0,456	1,6171	4,632	**0,004**
$MB_{2001\text{-}EVA10}$	0,784	0,615	0,499	1,0263	5,318	**0,002**
$MB_{2002\text{-}EVA10}$	0,748	0,559	0,427	0,9878	4,225	**0,007**

The results of the analyses also show that Lev and ROE are two statistically significant explanatory factors affecting ROA. This result seems to be valid for all periods and under all WACC assumptions. Here, Lev is statistically negatively while ROE is statistically positively significant. In other words, any increase in debt level may result as decrease in ROA, or vice versa.

Table 5.2: The Coefficients of Variables in Models

Model	*Constant*	*CEE*	*SCE*	*HCE*	*LCAP*	*Lev*	*ROE*
$ROA_{2000\text{-}EVA6}$	0,156	-0,049	0,085	0,042	-0,071	**-0,508**	**0,834**
$ROA_{2001\text{-}EVA6}$	0,041	**0,137**	-0,034	**0,087**	0,052	**-0,508**	**0,747**
$ROA_{2002\text{-}EVA6}$	0,019	**0,049**	-0,024	0,004	0,021	**-0,243**	**0,858**
$ROA_{2000\text{-}EVA8}$	0,158	**-0,322**	**0,271**	0,117	-0,086	**-0,451**	**0,950**
$ROA_{2001\text{-}EVA8}$	-0,005	0,067	0,047	0,026	0,083	**-0,439**	**0,757**
$ROA_{2002\text{-}EVA8}$	0,014	**0,055**	0,007	0,006	0,025	**-0,245**	**0,861**
$ROA_{2000\text{-}EVA10}$	0,115	-0,255	**0,223**	-0,053	-0,041	**-0,480**	**0,965**
$ROA_{2001\text{-}EVA10}$	0,013	0,064	0,042	0,044	0,071	**-0,473**	**0,771**
$ROA_{2002\text{-}EVA10}$	0,041	-0,003	-0,016	**0,099**	0,008	**-0,360**	**0,806**
$ATO_{2000\text{-}EVA6}$	-2,166	0,253	-0,010	-0,235	**0,322**	**0,389**	0,265
$ATO_{2001\text{-}EVA6}$	-0,408	**0,644**	-0,061	0,170	0,165	-0,066	-0,017
$ATO_{2002\text{-}EVA6}$	0,009	0,375	-0,216	-0,040	0,136	0,122	-0,043
$ATO_{2000\text{-}EVA8}$	-1,895	0,166	0,027	-0,194	**0,303**	**0,364**	0,318
$ATO_{2001\text{-}EVA8}$	-0,433	0,398	-0,048	-0,364	0,161	0,059	-0,013
$ATO_{2002\text{-}EVA8}$	0,172	0,410	-0,106	-0,097	0,094	0,157	0,048
$ATO_{2000\text{-}EVA10}$	-1,965	0,048	-0,001	0,061	**0,306**	**0,399**	0,383
$ATO_{2001\text{-}EVA10}$	0,445	0,144	-0,036	0,435	0,062	-0,009	0,158
$ATO_{2002\text{-}EVA10}$	-0,494	**0,715**	-0,039	0,063	0,250	-0,057	-0,221
$MB_{2000\text{-}EVA6}$	-6,068	**-0,501**	-0,055	**0,882**	0,228	0,070	0,356
$MB_{2001\text{-}EVA6}$	-11,671	**-0,264**	-0,153	0,176	**0,578**	**0,377**	-0,030
$MB_{2002\text{-}EVA6}$	-8,214	-0,247	0,183	0,143	**0,443**	0,042	0,074
$MB_{2000\text{-}EVA8}$	-0,005	-0,315	0,039	**0,933**	**0,354**	**0,209**	0,255
$MB_{2001\text{-}EVA8}$	-16,186	-0,026	-0,020	**0,383**	**0,750**	**0,438**	-0,043
$MB_{2002\text{-}EVA8}$	-3,465	**-0,376**	**-0,573**	0,105	0,223	0,191	0,118
$MB_{2000\text{-}EVA10}$	-16,228	0,318	-0,111	**-0,838**	**0,490**	**0,299**	-0,186
$MB_{2001\text{-}EVA10}$	-16,135	0,144	-0,089	-0,274	**0,761**	**0,433**	-0,177
$MB_{2002\text{-}EVA10}$	-7,084	-0,147	0,102	-0,005	**0,516**	-0,228	**-0,557**

Note: Values in bold represent significant relations.

In respect of relationships among ROA and the components of VAIC (CEE, SCE and HCE), under different WACC assumptions it has been observed that CEE, SCE and SCE have significant effects on ROA. In the mentioned period, any increase in CEE, SCE or HCE seems to result as increase in ROA. However, this effect is not constant and is limited during the whole period.

Results of ATO Models:
The results of the related analyses show that during the period 2000-2002, the independent variables are not statistically significant explanatory factors affecting ATO. However, this result may change only in WACC assumption of 6%.

Results of MB Models:
In the period of 2000-2002, under all WACC assumptions the independent variables seem to be statistically significant explanatory factors affecting MB. In context of control variables, LCAP and Lev are statistically positively significant explanatory factors while ROE is negatively significant factor affecting MB. Here it can be concluded that firm value increases due to increase in debt level. Another result of analyses about MB models is that CEE and SCE are statistically negatively significant explanatory factors affecting MB, while HCE is a statistically positively explanatory factor. However, this result is valid in WACC assumptions of 6% and 8%. When WACC is assumed to be 10%, HCE has negative effects on MB.

5.2. Discussion of Findings

In respect of dependent variables of the study (ROA, ATO and MB), it is seen that there does not exist remarkable changes by means of average values in the mentioned period (See, Table 5.3.). According to figures in Table 5.3., it is seen that ROA has increased about 3% in 2001 and 2002 compared with year 2000. This is the only indicator pointing that the destructive effects of 2001 Financial Crisis have begun to negative and a recovery period has begun. However, in the same period, ATO ratios have been under sector averages (See, Turkish Republic Central Bank Sectoral Balance Sheets). This may probably be a consequence of decreasing the purchasing power of public because of the crisis and of deferment of investments until the uncertainty disappears. The market-to-book value figures have also declined in the mentioned period. Average market-to-book value figure was 2,51; 2,15 and 1,74 in 2000, 2001 and 2002, respectively. This downfall in MB may be considered as the result of lack of foreign funds import and new direct investments because of the uncertainty of the financial crisis.

Table 5.3: Mean Values for ROA, ATO and MB

Dependent Variables	2000	2001	2002
$ROA_{Average}$ (%)	7,015	10,679	10,439
$ATO_{Average}$	1,183	1,173	1,172
$MB_{Average}$	2,510	2,150	1,740

The average figures about the control variables of the study are given in Table 5.4. The average leverage ratio has decreased about 3% in 2002, while it has been about the same in 2000 and 2001. This seems to be another indicator of that firms have been reluctant to debt financing and have been in an attempt to postpone investments in the mentioned period. Another supportive fact of this argument is that ROE average figures have increased by 3% and 6% in 2001 and 2002 compared to 2000.

Table 5.4: Mean Values for LCAP, Lev and ROE

Control Variables	2000	2001	2002
$LCAP_{Average}$	17,634	17,462	17,451
$Lev_{Average}$ (%)	46,894	47,703	43,844
$ROE_{Average}$ (%)	14,011	19,819	17,187

In respect with economic value added created by the sample firms, the highest amount of value added has been created in 2000. Though this amount has decreased in 2001, it has again increased in 2002 (See, Table 5.5). As the weighted average cost of capital increases related with any increase in the cost of debt and the cost of equity, it can be concluded that the cost of debt and the cost of equity figures have been the highest in 2001 and the lowest in 2000.

Table 5.5.: Total and Mean Values for EVA

Economic Value Added	2000 ($)	2001 ($)	2002 ($)
$EVA_{WACC6TOTAL}$	187.667.477	121.585.841	148.026.721
$EVA_{WACC6AVERAGE}$	6.950.647	4.503.179	4.934.224
$EVA_{WACC8TOTAL}$	162.891.751	90.123.748	123.950.258
$EVA_{WACC8AVERAGE}$	6.033.028	3.337.917	4.131.675
$EVA_{WACC10TOTAL}$	138.116.024	58.661.655	99.873.797
$EVA_{WACC10AVERAGE}$	5.115.408	2.172.654	3.329.127

In respect with the independent variables, interesting arguments can be derived from the study. The figures about the independent variables by the period of 2000-2002 of which their sum is the value added intellectual coefficient of the firm are given briefly in Table 5.6.

Table 5.6: The Values for CEE, SCE, HCE and VAIC

Independent Variables	2000	2001	2002
CEE_{EVA6}	0,21758	0,09390	0,13436
CEE_{EVA8}	0,19758	0,14252	0,11437
CEE_{EVA10}	0,18075	0,05391	0,09437
SCE_{EVA6}	4,98287	12,50231	7,49063
SCE_{EVA8}	1,67147	349,76217	6,98828
SCE_{EVA10}	16,87295	1,74999	13,99945
HCE_{EVA6}	0,88368	-0,08119	0,04805
HCE_{EVA8}	5,08419	0,16177	0,32299
HCE_{EVA10}	-0,21406	1,03932	3,50599
$VAIC_{EVA6}$	**6,08416**	**12,51502**	**7,67304**
$VAIC_{EVA8}$	**6,95324**	**350,06646**	**7,42564**
$VAIC_{EVA10}$	**16,83964**	**2,84322**	**17,59981**

According to VAIC methodology, the higher the value added intellectual coefficient is, the better the efficiency of value added by a firm's total resources is (Ercan et al., 2003). In this perspective, under the assumption that WACC is 6%, the highest amount of value added is created in 2001, 2002 and 2000, respectively. This result is also stable under the assumption that WACC is 8%. However, under the assumption that WACC is 10%, the highest amount of value added is created in 2002, 2000 and 2001, respectively. Thus, it should not have to be forgotten that VAIC methodology of Ante Pulic is mostly valid for knowledge-intensive (intangible assets-intensive) firms, especially operating in service industries and of that, the

human capital plays the dominant role in business structures. As the sample of this study consists of tangible-assets intensive firms from an emerging market, it should be considered as usual not to find out statistically significant relationships between value added and intellectual capital. Thus, it is possible to conclude that there may exist some kind of paradox between value added calculations of Ante Pulic's VAIC methodology and Stern Stewart's Economic Value Added approach.

The results of the study show that ROE, Lev, CEE and SCE are statistically significant explanatory variables of ROA. Besides, HCE's effect on ROA is considerably limited and its effect on ROA may change under different WACC assumptions. The second dependent variable, ATO is statistically affected from market value (LCAP) and Lev. Any increase in Lev may cause increase in ATO, or vice versa. Here, it can be concluded that leveraging up to a given level may positively affect the amount of value added created by the firm. Besides, another variable relatively affecting ATO is CEE. In other words, any increase in investments of firm may result as an increase in ATO, or vice versa. In respect of variables affecting MB, the results of the analyses show that CEE, HCE, SCE, LCAP and Lev are statistically significant explanatory factors.

VI. Conclusion

As result of periodic comparisons, it is seen that variables affecting market values of Turkish manufacturing firms differ cyclically. In general, the fundamental variables affecting all of the independent variables are mostly control variables of the model, not the basic independent variables. The variable affecting all of the dependent variables is related to leverage (Lev). Besides, ROE and LCAP are also statistically significant explanatory variables of dependent variables. Any increase in leverage affects profitability negatively, while it affects ATO positively. In addition, there seems to be some differences among variables affecting MB and variables affecting the other two dependent variables, ROA and ATO. The most affective variables on MB are CEE and HCE. Here, CEE's effect is negatively, while HCE's effect may differ under different WACC assumptions. According to the assumption that WACC is 6% or 10%, the effect of HCE on MB is negative, while according to the assumption that WACC is 8%, the effect of HCE on MB is positive. In this point of view, it can concluded that the most optimal weighted average cost of capital is 8% for the sample firms under three different WACC assumptions.

According to the findings of the study, in general it can be concluded that in respect with the components of VAIC, the variables affecting ROA, ATO and MB are mostly CEE and SCE. HCE is only related to MB, in general. This result may be regarded as that intellectual capital, here related to human capital, is not yet an explanatory variable affecting corporate performance.

The firms operating in Turkey, in general, are tangible-assets (structural capital) intensive ones. The amount of income is mostly related to structural and financial capital and the effect of these kinds of capital is remarkably high for these firms. Besides, the amount of intellectual capital and related investments is mostly little. Because of the fact that Turkey is an emerging market and thus, entry to capital markets is limited for most of firms, it is hard to gather appropriate funds for intellectual capital and related investments. In addition, as Turkey has passed through a destructive financial crisis during the period of the study (2000-2002), firms have slow down or cancelled their planned investments, especially about human capital ones. All these factors may be referred as the underlying reasons of that the intellectual capital investments in Turkey remain very small in amount.

The limited number of observations within a limited range of firms from only one country, using a new approach in value added calculation (EVA) different from value added calculation in VAIC and the assumptions about weighted average cost of capital are the limitations of this study. In future, it is recommended to use more accurate value added calculations as value added is one of the most basic components of VAIC methodology. In spite of these limitations, the results of the study seems to be provide valuable insights into the relationship between intellectual capital and firm value.

It is not a desirable result to disregard intellectual capital and related investments for Turkish firms, while Turkey is in a progress of entrance to international markets as an emerging economy. To scope out this problem, the studies related to intellectual capital and human capital improvements should have to be supported. Moreover, research & development activities are another important subject of study in this field. With great emphasis on R&D, the labor and capital-intensive firms should be transformed into knowledge-intensive firms in order to create more value added and value.

References

Bart, Christopher K., *"Measuring the Mission Effect in Human Intellectual Capital"*, Journal of Intellectual Capital, Vol. 2, No. 3, 2001, p. 320.

Bontis, Nick, *"Intellectual Capital: An Exploratory Study That Develops Measures and Models"*, Management Decision, 36/2, 1998, p. 65.

Bollen, Laury, Vergauwen, Philip, Schnieden, Stephanie, "*Linking Intellectual Capital and Intellectual Property to Company Performance*", Management Decision, Vol. 43, Iss. 9, 2005, pp. 1161-1185.

Bornemann, Manfred, *"Empirical Analysis of the Intellectual Capital Potential of Value Systems in Austria According to the VAIC Method"*, www.measuring-ip.at, 2003.

Bozbura, F. Tunç, Toraman, Ayhan, "*Türkiye'de Entellektüel Sermayenin Ölçülmesi İle İlgili Model Çalışması ve Bir Uygulama*", İTÜ Dergisi, Cilt 3, Sayı 1, 2004, ss. 55-66.

Bromwich, H., Walker, M., *"Residual Income: Past and Future"*, Management Accounting Research, 9, 1998, p. 394.

Brooking, Annie, *Intellectual Capital: Core Asset for the Third Millennium Enterprise*, International Thomson Business Press, 1998, p. 12.

Chen, M. Cheng, S., Hwang, Y., "*An Empirical Investigation of the Relationship Between Intellectual Capital and Firms' Market Value and Financial Performance*", Journal of Intellectual Capital, Vol. 6, No. 2, 2005, pp. 159-176.

Donaldson, T., Preston, L. E., *"The Stakeholder Theory of the Corporation: Concepts, Evidence and Implications"*, The Academy of Management Review, Vol. 20, Iss. 1, 2001.

Ercan, M. Kamil, Öztürk, M. Başaran, Demirgüneş, Kartal, *Değere Dayalı Yönetim ve Entellektüel Sermaye*, Gazi Kitabevi, 2003.

Firer, Steven, Williams, S. M., *"Intellectual Capital and Traditional Measures of Corporate Performance"*, www.measuring-ip.at, 2002.

Harrison, Suzanne, Sullivan, Patrick, *"Profiting from Intellectual Capital: Learning from Leading Companies"*, Industrial and Commercial Training, Vol. 32, 2000, p. 139-140.

Pulic, Ante, *"An Accounting Tool for IC Management"*, www.measuring-ip.at, 2003.

Pulic, Ante, *"Measuring the Performance of Intellectual Potential in the Knowledge Economy"*, www.measuring-ip.at, 1998.

Pulic, Ante, *"MVA and VAIC Analysis of Randomly Selected Companies from FTSE 250"*, www.measuring-ip.at, 2000.

Pulic, Ante, *"MVA and VAIC Analysis"*, www.measuring-ip.at, 1999.

Pulic, Ante, Bornemann, Manfred, *"The Physical and Intellectual Capital of Austrian Banks"*, www.measuring-ip.at, 2003.

Ray, Russ, *"Economic Value Added: Theory, Evidence, A Missing Link"*, Review of Business, Summer, 2001, p. 66.

Schneider, Ursula, *"The Austrian Approach to the Measurement of Intellectual Potential",* www.measuring-ip.at, 2003.

Sveiby, K. E., *"Methods for Measuring Intangible Assets"*, www.sveiby.com.au, 2003.

Türkiye Cumhuriyeti Merkez Bankası Sektör Bilânçoları, İmalat Sektörü, 2000–2002, s. 9.

Turnball, S., *"Corporate Governance: Its Scope, Concerns and Theories"*, Corporate Governance: An International Review, Vol. 5, Iss. 4, 2002, p. 180-190.

Wang, Wen-Ying, Chang, Ching-Fu, "*The Impacts of Intellectual Capital on Performance: An Empirical Investigation of the Taiwan Semiconductor Industry*", The International Journal of Accounting Studies, Vol. 39, 2004, pp. 89-117.

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GLOBAL CAPITAL MARKETS

The world economy continued to expand in the first quarter of 2007. Growth in the United States slowed in the first quarter mainly driven by falling housing prices. Activity in most other countries continued to expand strongly. In the Euro area, growth has remained above trend as domestic demand is taking a more central role in the expansions. Asian countries sustained their growth due to the falling oil prices, reducing inflationary pressures, buoyant external economic environment, and continuous solid growth in exports. In Japan, the economic growth abated as a result of increases in corporate investment and private consumption. Emerging market countries have continued to expand robustly at around 8 %, led by rapid growth in China, India and Russia.

Performances of most equity markets started out strong in the first two months of 2007. Expectations of continued solid economic growth and fading inflation concerns contributed to buoyant global financial conditions in the early 2007. However, in the months of February and March, equity markets experienced volatility, with some corrections taking place at the end of February and the middle of March.

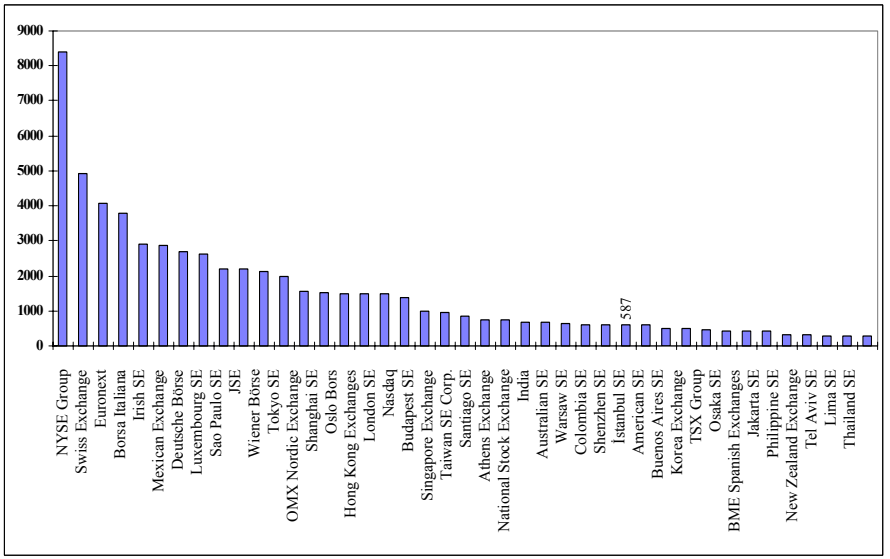
The performances of some developed stock markets with respect to indices indicated that DJIA, FTSE-100, Nikkei-225 and DAX changed by 0.4%, 3.5%, 0.4% and 8.3% respectively at April 3rd, 2007 in comparison with the December 29, 2006. When US $ based returns of some emerging markets are compared in the same period, the best performer markets were: China (24.1 %), Malaysia (16.9 %), Turkey (16.9 %), Poland (15.3 %) and Pakistan (14.2 %). In the same period, the lowest return markets were: India (-5.9 %), Saudi Arabia (-5.0 %) and Venezuela (-4.8 %). The performances of emerging markets with respect to P/E ratios as of end-April 2007 indicated that the highest rates were obtained in China (26.9), Chile (26.2), Malaysia (25.5), Taiwan (25.4), and Jordan (23.4) and the lowest rates in Thailand (8.7), Venezuela (11.6), Pakistan (12.3), Hungary (12.7) and Brazil (13.0).

Market Capitalization (USD Million, 1986-2006)

	Global	Developed Markets	Emerging Markets	ISE
1986	6,514,199	6,275,582	238,617	938
1987	7,830,778	7,511,072	319,706	3,125
1988	9,728,493	9,245,358	483,135	1,128
1989	11,712,673	10,967,395	745,278	6,756
1990	9,398,391	8,784,770	613,621	18,737
1991	11,342,089	10,434,218	907,871	15,564
1992	10,923,343	9,923,024	1,000,319	9,922
1993	14,016,023	12,327,242	1,688,781	37,824
1994	15,124,051	13,210,778	1,913,273	21,785
1995	17,788,071	15,859,021	1,929,050	20,782
1996	20,412,135	17,982,088	2,272,184	30,797
1997	23,087,006	20,923,911	2,163,095	61,348
1998	26,964,463	25,065,373	1,899,090	33,473
1999	36,030,810	32,956,939	3,073,871	112,276
2000	32,260,433	29,520,707	2,691,452	69,659
2001	27,818,618	25,246,554	2,572,064	47,150
2002	23,391,914	20,955,876	2,436,038	33,958
2003	31,947,703	28,290,981	3,656,722	68,379
2004	38,904,018	34,173,600	4,730,418	98,299
2005	43,642,048	36,538,248	7,103,800	161,537
2006	54,194,991	43,736,409	10,458,582	162,399

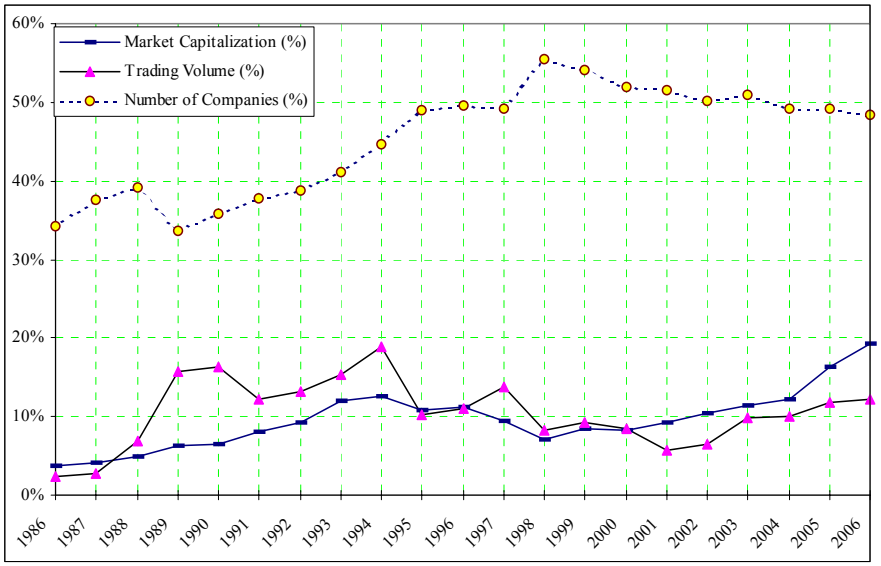
Source: Standard & Poor's Global Stock Markets Factbook, 2007.

Comparison of Average Market Capitalization Per Company (USD Million, March 2007)



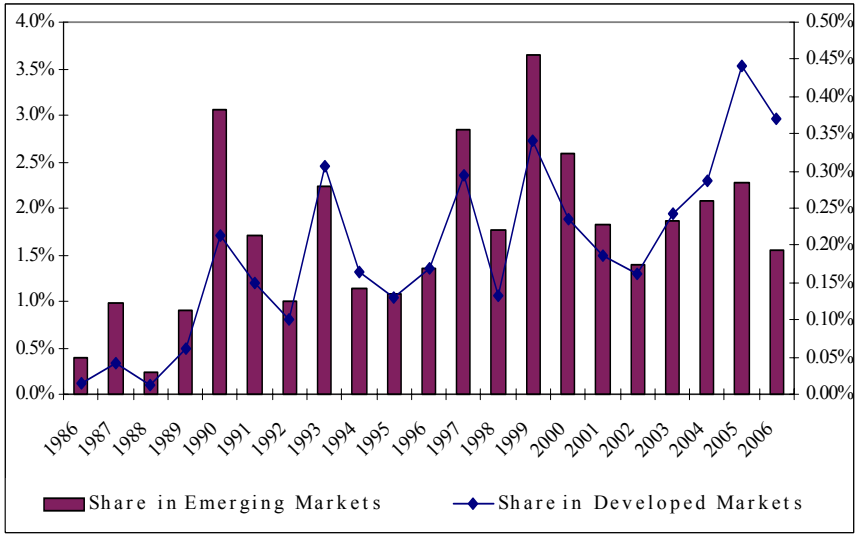
Source: FIBV, Monthly Statistics, March 2007.

Worldwide Share of Emerging Capital Markets (1986-2006)



Source: Standard & Poor's Global Stock Markets Factbook, 2007.

Share of ISE's Market Capitalization in World Markets (1986-2006)



Source: Standard & Poor's Global Stock Markets Factbook, 2007.

Main Indicators of Capital Markets (March 2007)

	Market	Monthly Turnover Velocity (March 2007) (%)	Market	Value of Share Trading (millions, US$) Up to Year Total (2006/1-2007/3)	Market	Market Cap. of Share of Domestic Companies (millions US$) March 2007
1	Shenzhen SE	312,6%	NYSE Group	6.335.460	NYSE Group	15.467.745,0
2	NASDAQ	269,1%	NASDAQ	3.317.680	Tokyo SE	4.737.540,4
3	Deutsche Börse	186,7%	London SE	2.679.183	NASDAQ	3.906.898,8
4	Shanghai SE	180,6%	Tokyo SE	1.674.625	Euronext	3.882.199,1
5	BME Spanish	179,7%	Euronext	1.248.505	London SE	3.842.567,0
6	Borsa Italiana	170,5%	Deutsche Börse	1.054.735	Deutsche Börse	1.756.025,3
7	Korea Exchange	154,6%	BME Spanish	709.663	TSX Group	1.749.649,8
8	Oslo Børs	147,6%	Shanghai SE	652.092	Hong Kong	1.734.117,4
9	NYSE	142,5%	Borsa Italiana	510.723	BME Spanish	1.393.605,6
10	Taiwan SE Corp.	137,5%	OMX Nordic	470.329	Shanghai SE	1.297.377,9
11	OMX Nordic	136,4%	Swiss Exchange	458.289	Swiss Exchange	1.258.552,9
12	Istanbul SE	136,3%	TSX Group	340.721	Australian SE	1.200.715,7
13	London SE	130,6%	Shenzhen SE	333.496	OMX Nordic	1.194.433,7
14	Tokyo SE	125,9%	Hong Kong	327.339	Borsa Italiana	1.066.187,7
15	Swiss Exchange	125,0%	Korea Exchange	322.273	Korea Exchange	842.443,4
16	Euronext	119,0%	Australian SE	283.854	Bombay SE	815.608,2
17	Budapest SE	94,2%	Taiwan	191.628	JSE	793.318,8
18	Australian SE	90,3%	Oslo Børs	136.759	Sao Paulo SE	784.389,9
19	TSX Group	76,3%	American SE	134.170	India	774.726,8
20	Hong Kong Exchanges	64,5%	India	118.916	Taiwan	589.475,5
21	India	64,2%	Sao Paulo SE	99.953	Singapore	435.974,5
22	Irish SE	63,4%	JSE	90.283	Mexican Exchange	373.698,5
23	Thailand SE	63,1%	Singapore	78.134	Shenzhen SE	358.896,9
24	Singapore Exchange	61,0%	Istanbul SE	61.088	Oslo Børs	300.797,1
25	Athens Exchange	57,0%	Bombay SE	57.860	American SE	281.481,0
26	Wiener Börse	52,7%	Osaka SE	57.639	Bursa Malaysia	278.044,7
27	Cairo & Alexandria	51,5%	Bursa Malaysia	47.569	Athens	209.211,6
28	New Zealand	49,9%	Athens	38.093	Wiener Börse	206.868,3
29	JSE	47,8%	Wiener Börse	31.815	Osaka SE	205.097,5
30	Jakarta SE	47,7%	Irish SE	31.557	Istanbul SE	185.364,3
31	Sao Paulo SE	47,4%	Mexican Exchange	29.151	Santiago SE	184.756,4
32	Tel Aviv SE	47,4%	Tel Aviv SE	23.388	Tel Aviv SE	182.274,5
33	Warsaw SE	46,1%	Warsaw SE	20.704	Warsaw SE	175.908,5
34	Bursa Malaysia	46,0%	Thailand SE	20.342	Irish SE	170.928,3
35	Cyprus SE	35,7%	Jakarta SE	17.544	Thailand SE	144.812,4
36	Osaka SE	33,1%	Cairo & Alexandria	10.481	Jakarta SE	140.288,1
37	Mexican Exchange	29,9%	Budapest SE	10.271	Cairo & Alexandria	96.193,1
38	Bombay SE	29,4%	Santiago SE	8.998	Luxembourg SE	91.205,6
39	Colombia SE	28,0%	Philippine SE	6.092	Philippine SE	76.710,7
40	Philippine SE	24,5%	New Zealand	5.369	Colombia SE	57.920,7
41	Santiago SE	20,0%	Colombia SE	4.215	Lima SE	51.815,1
42	Ljubljana SE	18,7%	Lima SE	2.582	Buenos Aires	51.473,5
43	Tehran SE	16,1%	Tehran SE	1.951	New Zealand	46.502,7
44	Lima SE	15,9%	Cyprus SE	1.579	Tehran SE	41.356,7
45	Colombo SE	14,8%	Buenos Aires	1.429	Budapest SE	39.837,0

Source: FIBV, Monthly Statistics, March 2007.

Trading Volume (USD millions, 1986-2006)

	Global	Developed	Emerging	ISE	Emerging / Global (%)	ISE/Emerging (%)
1986	3,573,570	3,490,718	82,852	13	2.32	0.02
1987	5,846,864	5,682,143	164,721	118	2.82	0.07
1988	5,997,321	5,588,694	408,627	115	6.81	0.03
1989	7,467,997	6,298,778	1,169,219	773	15.66	0.07
1990	5,514,706	4,614,786	899,920	5,854	16.32	0.65
1991	5,019,596	4,403,631	615,965	8,502	12.27	1.38
1992	4,782,850	4,151,662	631,188	8,567	13.20	1.36
1993	7,194,675	6,090,929	1,103,746	21,770	15.34	1.97
1994	8,821,845	7,156,704	1,665,141	23,203	18.88	1.39
1995	10,218,748	9,176,451	1,042,297	52,357	10.20	5.02
1996	13,616,070	12,105,541	1,510,529	37,737	11.09	2.50
1997	19,484,814	16,818,167	2,666,647	59,105	13.69	2.18
1998	22,874,320	20,917,462	1,909,510	68,646	8.55	3.60
1999	31,021,065	28,154,198	2,866,867	81,277	9.24	2.86
2000	47,869,886	43,817,893	4,051,905	179,209	8.46	4.42
2001	42,076,862	39,676,018	2,400,844	77,937	5.71	3.25
2002	38,645,472	36,098,731	2,546,742	70,667	6.59	2.77
2003	29,639,297	26,743,153	2,896,144	99,611	9.77	3.44
2004	39,309,589	35,341,782	3,967,806	147,426	10.09	3.72
2005	47,319,584	41,715,492	5,604,092	201,258	11.84	3.59
2006	67,912,153	59,685,209	8,226,944	227,615	12.11	2.77

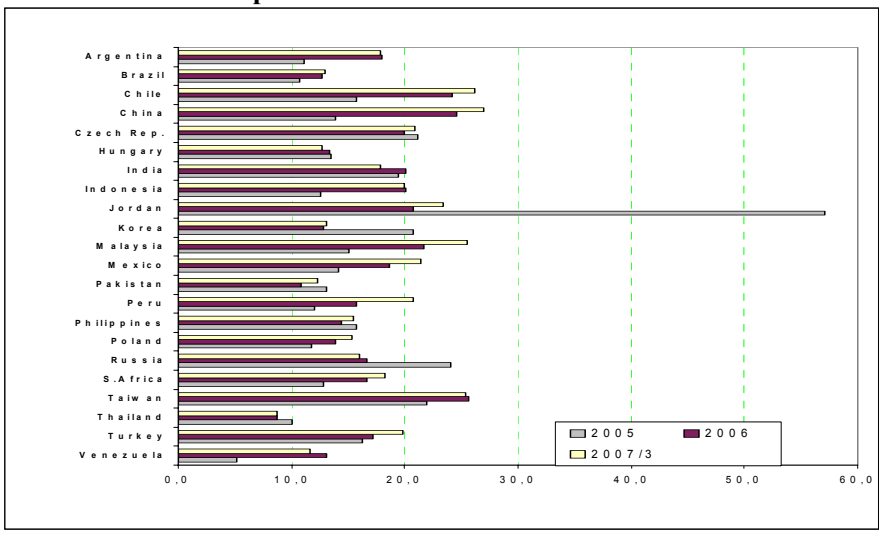
Source: Standard & Poor's Global Stock Markets Factbook, 2007.

Number of Trading Companies (1986-2006)

	Global	Developed Markets	Emerging Markets	ISE	Emerging / Global (%)	ISE/Emerging (%)
1986	28,173	18,555	9,618	80	34.14	0.83
1987	29,278	18,265	11,013	82	37.62	0.74
1988	29,270	17,805	11,465	79	39.17	0.69
1989	25,925	17,216	8,709	76	33.59	0.87
1990	25,424	16,323	9,101	110	35.80	1.21
1991	26,093	16,239	9,854	134	37.76	1.36
1992	27,706	16,976	10,730	145	38.73	1.35
1993	28,895	17,012	11,883	160	41.12	1.35
1994	33,473	18,505	14,968	176	44.72	1.18
1995	36,602	18,648	17,954	205	49.05	1.14
1996	40,191	20,242	19,949	228	49.64	1.14
1997	40,880	20,805	20,075	258	49.11	1.29
1998	47,465	21,111	26,354	277	55.52	1.05
1999	48,557	22,277	26,280	285	54.12	1.08
2000	49,933	23,996	25,937	315	51.94	1.21
2001	48,220	23,340	24,880	310	51.60	1.25
2002	48,375	24,099	24,276	288	50.18	1.19
2003	49,855	24,414	25,441	284	51.03	1.12
2004	48,806	24,824	23,982	296	49.14	1.23
2005	49,946	25,337	24,609	302	49.27	1.23
2006	50,212	25,954	24,258	314	48.31	1.29

Source: Standard & Poor's Global Stock Markets Factbook, 2007.

Comparison of P/E Ratios Performances



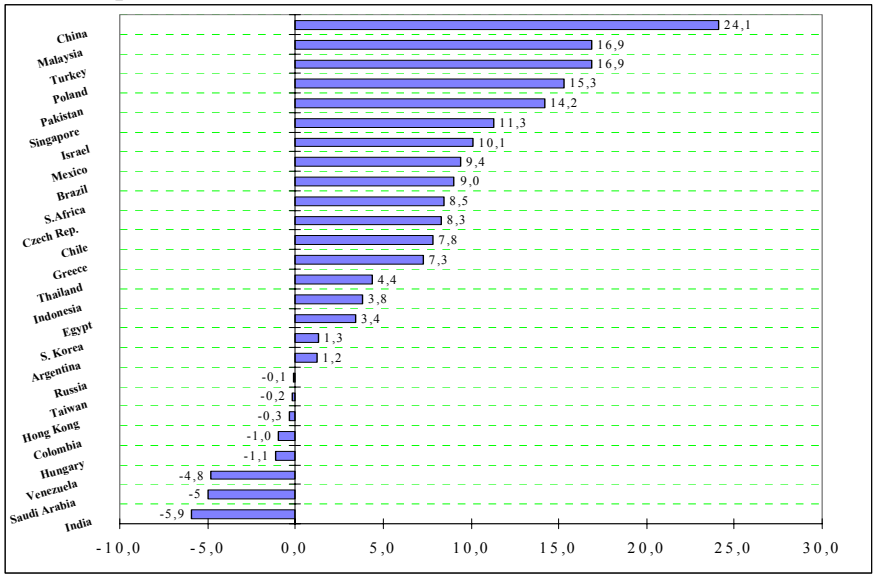
Source: IFC Factbook 2001. Standard & Poor's, Emerging Stock Markets Review, March 2007.

Price-Earnings Ratios in Emerging Markets

	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007/3
Argentina	13.4	39.4	-889.9	32.6	-1.4	21.1	27.7	11.1	18.0	17,8
Brazil	7.0	23.5	11.5	8.8	13.5	10.0	10.6	10.7	12.7	13,0
Chile	15.1	35.0	24.9	16.2	16.3	24.8	17.2	15.7	24.2	26,2
China	23.8	47.8	50.0	22.2	21.6	28.6	19.1	13.9	24.6	26,9
Czech Rep.	-11.3	-14.9	-16.4	5.8	11.2	10.8	25.0	21.1	20.0	20,9
Hungary	17.0	18.1	14.3	13.4	14.6	12.3	16.6	13.5	13.4	12,7
India	13.5	25.5	16.8	12.8	15.0	20.9	18.1	19.4	20.1	17,8
Indonesia	-106.2	-7.4	-5.4	-7.7	22.0	39.5	13.3	12.6	20.1	19,9
Jordan	15.9	14.1	13.9	18.8	11.4	20.7	30.4	6.2	20.8	23,4
Korea	-47.1	-33.5	17.7	28.7	21.6	30.2	13.5	20.8	12.8	13,1
Malaysia	21.1	-18.0	91.5	50.6	21.3	30.1	22.4	15	21.7	25,5
Mexico	23.9	14.1	13.0	13.7	15.4	17.6	15.9	14.2	18.6	21,4
Pakistan	7.6	13.2	-117.4	7.5	10.0	9.5	9.9	13.1	10.8	12,3
Peru	21.1	25.7	11.6	21.3	12.8	13.7	10.7	12.0	15.7	20,7
Philippines	15.0	22.2	26.2	45.9	21.8	21.1	14.6	15.7	14.4	15,5
Poland	10.7	22.0	19.4	6.1	88.6	-353.0	39.9	11.7	13.9	15,3
Russia	3.7	-71.2	3.8	5.6	12.4	19.9	10.8	24.1	16.6	16,0
S.Africa	10.1	17.4	10.7	11.7	10.1	11.5	16.2	12.8	16.6	18,2
Taiwan	21.7	52.5	13.9	29.4	20.0	55.7	21.2	21.9	25.6	25,4
Thailand	-3.6	-12.2	-6.9	163.8	16.4	16.6	12.8	10.0	8.7	8,7
Turkey	7.8	34.6	15.4	72.5	37.9	14.9	12.5	16.2	17.2	19,8
Venezuela	5.6	10.8	30.5	-347.6	-11.9	14.4	6.0	5.1	13.1	11,6

Source: IFC Factbook, 2004; Standard&Poor's, Emerging Stock Markets Review, March 2007
Note: Figures are taken from S&P/IFCG Index Profile.

Comparison of Market Returns in USD (29/12/2006-03/04/2007)



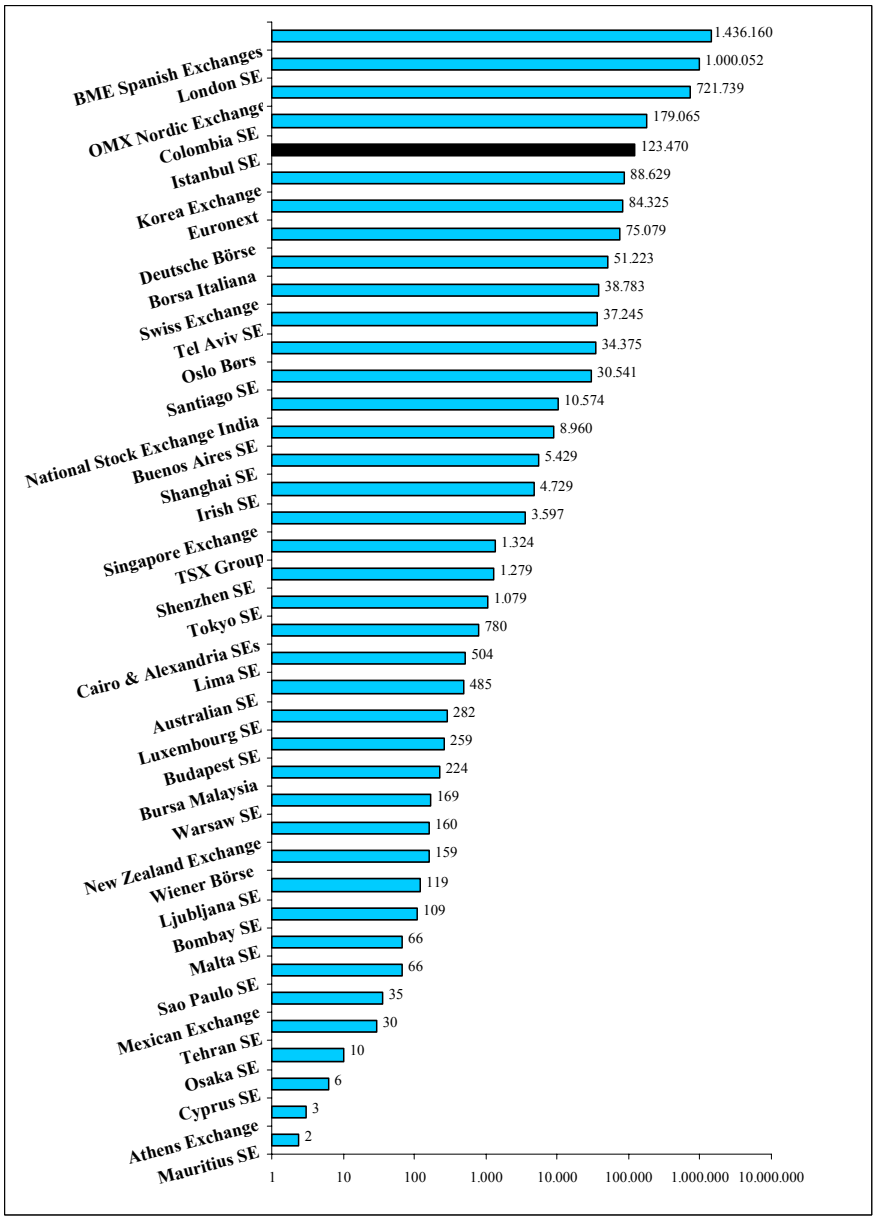
Source: The Economist, Apr 7th 2007.

Market Value/Book Value Ratios

	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007/3
Argentina	1.3	1.5	0.9	0.6	0.8	2.0	2.2	2.5	4.1	4,0
Brazil	0.6	1.6	1.4	1.2	1.3	1.8	1.9	2.2	2.7	2,7
Chile	1.1	1.7	1.4	1.4	1.3	1.9	0.6	1.9	2.4	2,6
China	2.1	3.0	3.6	2.3	1.9	2.6	2.0	1.8	3.1	3,4
Czech Rep.	0.7	0.9	1.0	0.8	0.8	1.0	1.6	2.4	2.4	2,5
Hungary	3.2	3.6	2.4	1.8	1.8	2.0	2.8	3.1	3.1	2,9
India	1.8	3.3	2.6	1.9	2.0	3.5	3.3	5.2	4.9	4,5
Indonesia	1.5	3.0	1.7	1.7	1.0	1.6	2.8	2.5	3.4	3,3
Jordan	1.8	1.5	1.2	1.5	1.3	2.1	3.0	2.2	3.3	3,7
Korea	0.9	2.0	0.8	1.2	1.1	1.6	1.3	2.0	1.7	1,8
Malaysia	1.3	1.9	1.5	1.2	1.3	1.7	1.9	1.7	2.1	2,5
Mexico	1.4	2.2	1.7	1.7	1.5	2.0	2.5	2.9	3.8	4,3
Pakistan	0.9	1.4	1.4	0.9	1.9	2.3	2.6	3.5	3.2	3,6
Peru	1.6	1.5	1.1	1.4	1.2	1.8	1.6	2.2	3.5	4,6
Philippines	1.3	1.4	1.0	0.9	0.8	1.1	1.4	1.7	1.9	2,1
Poland	1.5	2.0	2.2	1.4	1.3	1.8	2.0	2.5	2.5	2,8
Russia	0.3	1.2	0.6	1.1	0.9	1.2	1.2	2.2	2.5	2,4
S.Africa	1.5	2.7	2.1	2.1	1.9	2.1	2.5	3.0	3.8	4,2
Taiwan	2.6	3.4	1.7	2.1	1.6	2.2	1.9	1.9	2.4	2,4
Thailand	1.2	2.1	1.3	1.3	1.5	2.8	2.0	2.1	1.9	1,9
Turkey	2.7	8.9	3.1	3.8	2.8	2.6	1.7	2.1	2.0	2,1
Venezuela	0.5	0.4	0.6	0.5	0.5	1.1	1.2	0.7	2.6	2,3

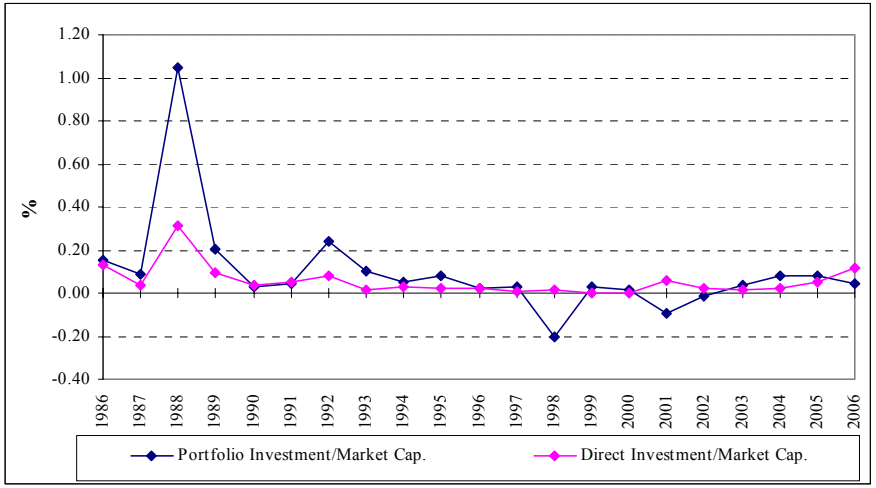
Source: IFC Factbook, 2004; Standard & Poor's, Emerging Stock Markets Review, March 2007.
Note: Figures are taken from S&P/IFCG Index Profile.

Value of Bond Trading (Million USD Jan. 2007-March 2007)



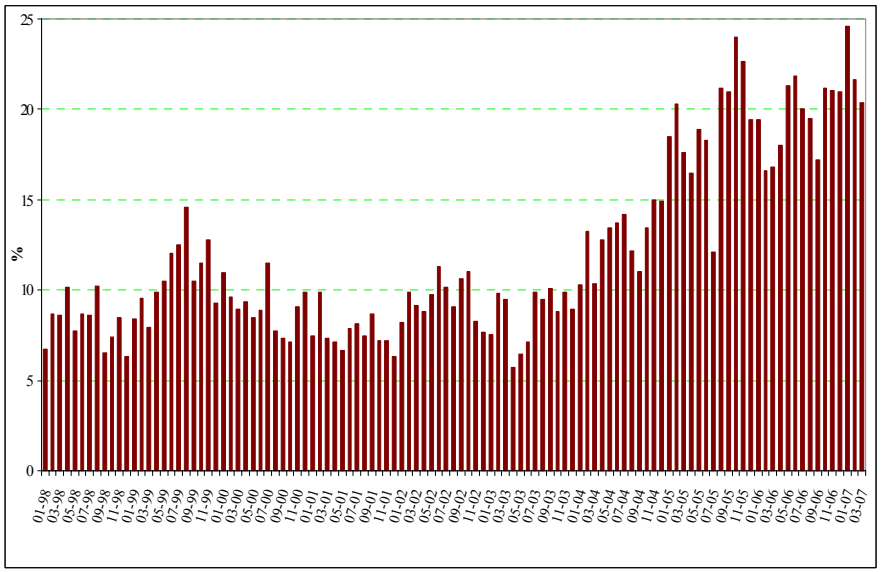
Source: FIBV, Monthly Statistics, March 2007.

Foreign Investments as a Percentage of Market Capitalization in Turkey (1986-2006)



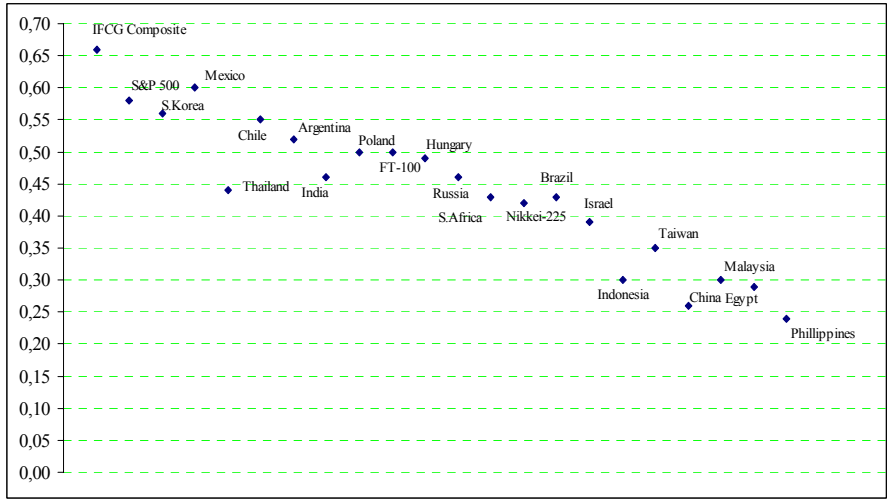
Source: ISE Data. CBTR Databank.

Foreigners' Share in the Trading Volume of the ISE (Jan. 1998-March 2007)



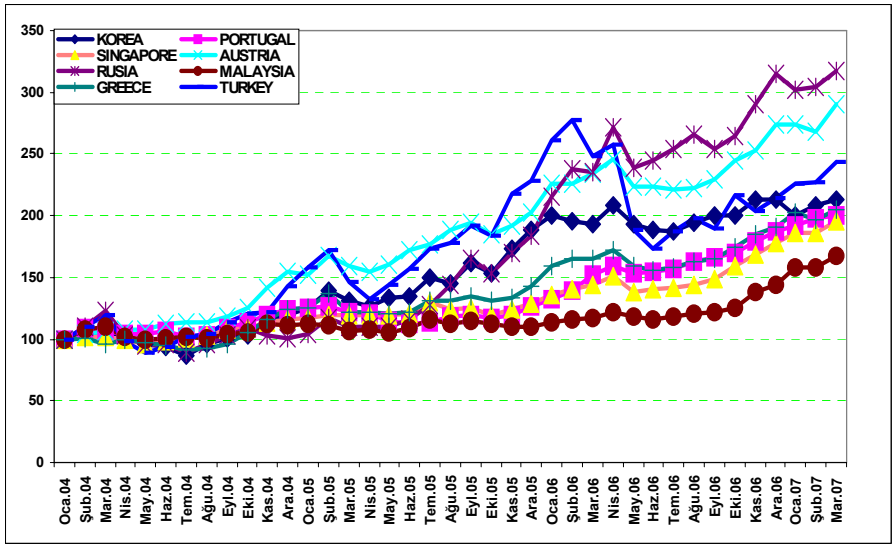
Source: ISE Data.

Price Correlations of the ISE (March 2002- March 2007)



Source: Standard & Poor's, Emerging Stock Markets Review, March 2007.
Notes: The correlation coefficient is between -1 and +1. If it is zero. for the given period. it is implied that there is no relation between two serious of returns.

Comparison of Market Indices (31 Jan. 2004=100)



Source: Bloomberg
Note: Comparisons are in US$.

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ISE
Market Indicators

STOCK MARKET

	Number of Companies	Traded Value				Market Value		Dividend Yield	P/E Ratios		
		Total		Daily Average							
		(YTL Million)	(US$ Million)	(YTL Million)	(US$ Million)	(YTL Million)	(US$ Million)	(%)	YTL (1)	YTL (2)	US$
1986	80	0,01	13	---	---	0,71	938	9,15	5,07	---	---
1987	82	0,10	118	---	---	3	3.125	2,82	15,86	---	---
1988	79	0,15	115	---	---	2	1.128	10,48	4,97	---	---
1989	76	2	773	0,01	3	16	6.756	3,44	15,74	---	---
1990	110	15	5.854	0,06	24	55	18.737	2,62	23,97	---	---
1991	134	35	8.502	0,14	34	79	15.564	3,95	15,88	---	---
1992	145	56	8.567	0,22	34	85	9.922	6,43	11,39	---	---
1993	160	255	21.770	1	88	546	37.824	1,65	25,75	20,72	14,86
1994	176	651	23.203	3	92	836	21.785	2,78	24,83	16,70	10,97
1995	205	2.374	52.357	9	209	1.265	20.782	3,56	9,23	7,67	5,48
1996	228	3.031	37.737	12	153	3.275	30.797	2,87	12,15	10,86	7,72
1997	258	9.049	58.104	36	231	12.654	61.879	1,56	24,39	19,45	13,28
1998	277	18.030	70.396	73	284	10.612	33.975	3,37	8,84	8,11	6,36
1999	285	36.877	84.034	156	356	61.137	114.271	0,72	37,52	34,08	24,95
2000	315	111.165	181.934	452	740	46.692	69.507	1,29	16,82	16,11	14,05
2001	310	93.119	80.400	375	324	68.603	47.689	0,95	108,33	824,42	411,64
2002	288	106.302	70.756	422	281	56.370	34.402	1,20	195,92	26,98	23,78
2003	285	146.645	100.165	596	407	96.073	69.003	0,94	14,54	12,29	13,19
2004	297	208.423	147.755	837	593	132.556	98.073	1,37	14,18	13,27	13,96
2005	304	269.931	201.763	1.063	794	218.318	162.814	1,71	17,19	19,38	19,33
2006	316	325.131	229.642	1.301	919	230.038	163.775	2,10	22,02	14,86	15,32
2007	306	87.531	62.427	1.412	1.007	257.193	186.493	1,98	15,44	14,60	15,35
2007/Q1	306	87.531	62.427	1.412	1.007	257.193	186.493	1,98	15,44	14,60	15,35

Q: Quarter

Note:

* Between 1986-1992, the price earnings ratios were calculated on the basis of the companies' previous year-end net profits. As from 1993,
  TL(1) = Total Market Capitalization / Sum of Last two six-month profits
  T(2) = Total Market Capitalization / Sum of Last four three-month profits.
  US$ = US$ based Total Market Capitilization / Sum of Last four US$ based three-month profits.
* Companies which are temporarily de-listed and will be traded off the Exchange under the decison of ISE's Executive Council are not included in the calculations.
* ETF's data are taken into account only in the calculation of Traded Value.

Closing Values of the ISE Price Indices

YTL Based

	NATIONAL -100 (Jan. 1986=1)	NATIONAL - INDUSTRIALS (Dec. 31.90=33)	NATIONAL - SERVICES (Dec. 27,96=1046)	NATIONAL - FINANCIALS (Dec.31.90=33)	NATIONAL - TECHNOLOGY (Jun.30.2000=14.466,12)	'INVESTMENT TRUSTS (Dec 27,1996=976)	'SECOND NATIONAL (Dec.27,1996=976)	'NEW ECONOMY (Sept. 02, 2004 =20525,92)
1986	1,71	---	---	---	---	---	---	---
1987	6,73	---	---	---	---	---	---	---
1988	3,74	---	---	---	---	---	---	---
1989	22,18	---	---	---	---	---	---	---
1990	32,56	---	---	---	---	---	---	---
1991	43,69	49,63	---	33,55	---	---	---	---
1992	40,04	49,15	---	24,34	---	---	---	---
1993	206,83	222,88	---	191,90	---	---	---	---
1994	272,57	304,74	---	229,64	---	---	---	---
1995	400,25	462,47	---	300,04	---	---	---	---
1996	975,89	1.045,91	---	914,47	---	---	---	---
1997	3.451,--	2.660,--	3.593,--	4.522,--	---	2.934,--	2.761,--	---
1998	2.597,91	1.943,67	3.697,10	3.269,58	---	1.579,24	5.390,43	---
1999	15.208,78	9.945,75	13.194,40	21.180,77	---	6.812,65	13.450,36	---
2000	9.437,21	6.954,99	7.224,01	12.837,92	10.586,58	6.219,00	15.718,65	---
2001	13.782,76	11.413,44	9.261,82	18.234,65	9.236,16	7.943,60	20.664,11	---
2002	10.369,92	9.888,71	6.897,30	12.902,34	7.260,84	5.452,10	28.305,78	---
2003	18.625,02	16.299,23	9.923,02	25.594,77	8.368,72	10.897,76	32.521,26	---
2004	24.971,68	20.885,47	13.914,12	35.487,77	7.539,16	17.114,91	23.415,86	39.240,73
2005	39.777,70	31.140,59	18.085,71	62.800,64	13.669,97	23.037,86	28.474,96	29.820,90
2006	39.117,46	30.896,67	22.211,77	60.168,41	10.341,85	16.910,76	23.969,99	20.395,84
2007	43.661,12	35.689,19	23.243,99	66.140,71	10.561,42	16.767,50	24.957,08	20.383,97
2007/Q1	43.661,12	35.689,19	23.243,99	66.140,71	10.561,42	16.767,50	24.957,08	20.383,97

US $ Based

	NATIONAL - 100 (Jan. 1986=100)	NATIONAL - INDUSTRIALS (Dec. 31, 90=643)	NATIONAL - SERVICES (Dec. 27, 96=572)	NATIONAL - FINANCIALS (Dec.31, 90=643)	NATIONAL - TECHNOLOGY (Jun. 30,2000=1.360.92)	'INVESTMENT TRUSTS (Dec. 27, 96=534)	'SECOND NATIONAL (Dec. 27, 96=534)	'NEW ECONOMY (Sept. 02, 2004 =796,46)	EURO Based NATIONAL - 100 (Dec. 31, 98=484)
1986	131,53	---	---	---	---	---	---	---	---
1987	384,57	---	---	---	---	---	---	---	---
1988	119,82	---	---	---	---	---	---	---	---
1989	560,57	---	---	---	---	---	---	---	---
1990	642,63	---	---	---	---	---	---	---	---
1991	501,50	569,63	---	385,14	---	---	---	---	---
1992	272,61	334,59	---	165,68	---	---	---	---	---
1993	833,28	897,96	---	773,13	---	---	---	---	---
1994	413,27	462,03	---	348,18	---	---	---	---	---
1995	382,62	442,11	---	286,83	---	---	---	---	---
1996	534,01	572,33	---	500,40	---	---	---	---	---
1997	981,99	756,91	1.022,40	1.286,75	---	834,88	785,65	---	---
1998	484,01	362,12	688,79	609,14	---	294,22	1.004,27	---	---
1999	1.654,17	1.081,74	1.435,08	2.303,71	---	740,97	1.462,92	---	1.912,46
2000	817,49	602,47	625,78	1.112,08	917,06	538,72	1.361,62	---	1.045,57
2001	557,52	461,68	374,65	737,61	373,61	321,33	835,88	---	741,24
2002	368,26	351,17	244,94	458,20	257,85	193,62	1.005,21	---	411,72
2003	778,43	681,22	414,73	1.069,73	349,77	455,47	1.359,22	---	723,25
2004	1.075,12	899,19	599,05	1.527,87	324,59	736,86	1.008,13	1.689,45	924,87
2005	1.726,23	1.351,41	784,87	2.725,36	593,24	999,77	1.235,73	1.294,14	1.710,04
2006	1.620,59	1.280,01	920,21	2.492,71	428,45	700,59	993,05	844,98	1.441,89
2007	1.842,28	1.505,90	980,78	2.790,80	445,64	707,50	1.053,06	860,10	1.620,94
2007/Q1	1.842,28	1.505,90	980,78	2.790,80	445,64	707,50	1.053,06	860,10	1.620,94

Q: Quarter

BONDS AND BILLS MARKET

Traded Value

Outright Purchases and Sales Market

	Total		Daily Average	
	(YTL Million)	(US$ Million)	(YTL Million)	(US$ Million)
1991	1	312	0,01	2
1992	18	2.406	0,07	10
1993	123	10.728	0,50	44
1994	270	8.832	1	35
1995	740	16.509	3	66
1996	2.711	32.737	11	130
1997	5.504	35.472	22	141
1998	17.996	68.399	72	274
1999	35.430	83.842	143	338
2000	166.336	262.941	663	1.048
2001	39.777	37.297	158	149
2002	102.095	67.256	404	266
2003	213.098	144.422	852	578
2004	372.670	262.596	1.479	1.042
2005	480.723	359.371	1.893	1.415
2006	381.772	270.183	1.521	1.076
2007	108.250	77.054	1.746	1.243
2007/Q1	108.250	77.054	1.746	1.243

Repo-Reverse Repo Market

Repo-Reverse Repo Market

	Total		Daily Average	
	(Y TL Million)	(US$ Million)	(Y TL Million)	(US$ Million)
1993	59	4.794	0	22
1994	757	23.704	3	94
1995	5.782	123.254	23	489
1996	18.340	221.405	73	879
1997	58.192	374.384	231	1.486
1998	97.278	372.201	389	1.489
1999	250.724	589.267	1.011	2.376
2000	554.121	886.732	2.208	3.533
2001	696.339	627.244	2.774	2.499
2002	736.426	480.725	2.911	1.900
2003	1.040.533	701.545	4.162	2.806
2004	1.551.410	1.090.477	6.156	4.327
2005	1.859.714	1.387.221	7.322	5.461
2006	2.538.802	1.770.337	10.115	7.053
2007	592.940	422.711	9.564	6.818
2007/Q1	592.940	422.711	9.564	6.818

Q: Quarter

ISE GDS Price Indices (January 02, 2001 = 100)

YTL Based

	3 Months (91 Days)	6 Months (182 Days)	9 Months (273 Days)	12 Months (365 Days)	15 Months (456 Days)	General
2001	102,87	101,49	97,37	91,61	85,16	101,49
2002	105,69	106,91	104,87	100,57	95,00	104,62
2003	110,42	118,04	123,22	126,33	127,63	121,77
2004	112,03	121,24	127,86	132,22	134,48	122,70
2005	113,14	123,96	132,67	139,50	144,47	129,14
2006	111,97	121,14	127,77	132,16	134,48	121,17
2007	112,12	121,52	128,44	133,19	135,91	121,25
2007/Q1	112,12	121,52	128,44	133,19	135,91	121,25

ISE GDS Performance Indices (January 02, 2001 = 100)

YTL Based

	3 Months (91 Days)	6 Months (182 Days)	9 Months (273 Days)	12 Months (365 Days)	15 Months (456 Days)
2001	195,18	179,24	190,48	159,05	150,00
2002	314,24	305,57	347,66	276,59	255,90
2003	450,50	457,60	558,19	438,13	464,98
2004	555,45	574,60	712,26	552,85	610,42
2005	644,37	670,54	839,82	665,76	735,10
2006	751,03	771,08	956,21	760,07	829,61
2007	784,73	808,35	1.005,88	802,47	866,84
2007/Q1	784,73	808,35	1.005,88	802,47	866,84

ISE GDS Portfolio Performance Indices (December 31, 2003 = 100)

YTL Based

	Equal Weighted Indices (YTL Based)			Market Value Weighted Indices			
	EQ180-	EQ180-	EQ COMPOSITE	MV 180-	MV 180+	MV COMPOSITE	REPO
2004	125,81	130,40	128,11	125,91	130,25	128,09	118,86
2005	147,29	160,29	153,55	147,51	160,36	154,25	133,63
2006	171,02	180,05	175,39	170,84	179,00	174,82	152,90
2007	178,94	190,53	184,34	178,46	189,77	183,92	158,52
2007/Q1	178,94	190,53	184,34	178,46	189,77	183,92	158,52

Q: Quarter