THE EFFECTS OF US STOCK MARKETS ON THE ISTANBUL STOCK EXCHANGE AND ITS COMPONENTS

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ABSTRACT

With increasing financial integration (globalization), the performance of the emerging financial market has been substantially affected by the performances of major developed financial markets. This study explores how one of the leading Emerging Markets (the Istanbul Stock Exchange; ISE hereafter) and various components of the ISE index are affected by various indices from the US stock markets. The empirical evidence reveals that unexpected shocks in the US stock markets have both contemporaneous and first period effects on the Turkish stock market. The co-movements among the markets are positive and significant. Moreover, importantly, the Turkish stock market closely follows the movements of the US stock exchange which has small-cap companies rather than of the stock exchanges which have similar sectoral weights as in the Istanbul Stock Exchange.

1. INTRODUCTION

Globalization today has come to signify the interconnection between the world economies and the financial markets. The significant increase in international capital flow and cross listing of companies as well as the improvements in telecommunications and computer technology make international financial markets more integrated where a lead-lag relationship is often observed (Gan *et al.* 2005). Hence, the majority of developed financial markets have substantial influence on performances of emerging financial markets. The information on market integration and financial co-movements among stock markets is very important for investors to diversify their portfolio and the financial stability of a country. Although a number of studies have investigated financial market integration, the existing literature has been limited in two important ways. First, attention has been restricted to financial market integration among the developed countries such as between the European equity markets and the American stock markets (Fratzscher, 2001; Flood and Rose, 2005), or among the emerging countries such as in the ASEAN equity markets, MENA, GCC countries(Cowen *et al.*, 2006; Maghyereh, 2006; Marashdeh and Shrestha, 2010). Second, several studies (Berument and Ince, 2005; Dogan and Yalcin, 2008) have examined the interdependency of emerging financial markets (e.g., Turkey) from the developed financial markets (e.g., the US and Japan) by typically focusing on the effect of one major index of a developed market (such as Standard and Poors 500, hereafter S&P500) on another major index of an emerging market (such as Istanbul Stock Exchange 100). This study contributes to the existing literature by examining the effects of US stock exchanges on the Istanbul Stock Exchange (ISE) and its components. The latter is important because if all ISE components are affected by all US stock market performances in a similar fashion, then it may suggest that the ISE is affected by a common factor stemming from the U.S. markets. However, if the components of ISE are affected by each type of U.S. market differently, then this would suggest that there is a link among the type of firms that have similar characteristics both in the US markets and the ISE; any shock that affects U.S. firms also affects Turkish firms similarly.

The ISE, the only security exchange corporation in Turkey, has become one of the best performing stock markets in an emerging economy. The ISE provides 3 stock indices namely, the ISE National 100 Index (ISE100), ISE National 50 Index (ISE50) and ISE National 30 Index (ISE30). The share of foreign investors at the ISE was above 66% by April 2010. In March 2010, there were 344 firms trading on the ISE and 333 of them had market capitalization less than 2 billion USD. They may be considered small-cap companies. The ISE100, used as a main indicator of the National Market, covers the top 100 largest and most traded stocks listed on the ISE. Moreover, 52% of the benchmark ISE100 valuation is in the banking sector assets. Similarly, most of these firms in the ISE100 are small sized companies. The ISE100 automatically covers both ISE30 and ISE50 stocks.

Most studies on Turkish stock market integration with US stock market, European equity markets or Asian markets showed a considerable degree of interdependency among markets. For example, the study by Berument and Ince (2005) empirically finds that S&P500's return has a positive effect on the ISE. Kasman *et al.* (2009) examined the existence of integration between the Turkish stock market

and markets in some developed and emerging countries by taking structural breaks into account. Their results show that the speed of adjustment is especially higher in the case of the major trading partners of Turkey (i.e., France, Germany, and the UK). However, the components of these countries' stock market indices are very different so that any movement is expected to affect them in a different ways. For example, the Dow Jones Industrial Average (DJIA) consists of mostly industrial firms and may not move together with the ISE100 since over 50% of this index is composed of banking sector assets. Therefore, the ISE100 is more likely to move with an US market index which includes financial sector such as the S&P500. Similarly, the ISE Technology, one of the components of ISE, may move with the NASDAQ that consists mostly of large technology companies. Previous studies on the Turkish stock market integration, except the study by Dogan and Yalcin (2008), did not explore effects of foreign countries' stock markets on various components of the ISE. Dogan and Yalcin (2008) looked at the asymmetric effects of the major indices of US, European and Asian stock markets on the components of the ISE by using asymmetric cointegration. However, the Turkish stock market is likely to be quite sensitive to a variety of developed markets and also by its own lags but not vice-versa. Neither Dogan and Yalcin (2008) nor other studies took into account this possibility. Our study will also contribute to the existing literature by incorporating the effect of several of the US stock market indices, namely Down Jones Industrial Average (DJIA), New York Stock Exchange (NYSE), Standard and Poors 500 (S&P500), American Stock Exchange (AMEX), National Association of Securities Dealers Automated Quotations (NASDAQ) and Russell 2000 on each component of the ISE, as well as, on both the ISE100 and ISE30. In order to capture the dynamic co-movements and interaction among each market, this study employs a block recursive VAR model which assumes that each foreign stock exchange (DJIA, NYSE, S&P500, AMEX, NASDAQ and Russell 2000) has both contemporaneous and lagged effects on the Turkish stock exchange returns but not vice-versa.

The outline of this paper is as follows. Section II elaborates on the methodology. The data and empirical analysis are discussed in section 3 and 4, respectively. Finally, the paper is concluded in the last section.

2. METHODOLOGY

Istanbul Stock Exchange is an emerging market compared to the US stock market. Since an emerging financial market is likely to be quite sensitive to a variety of developed markets, it is expected that the US stock market has a strong influence on the Turkish stock market. The model incorporates the assumption that returns on the US stock market affect returns on the Turkish stock market, but not vice versa. So, the Turkish stock exchange movements are affected by the movements of the US stock market as well as by its historical values. However, the US stock market is only affected by its own movements. Therefore, it can be thought that the US stock market has an exogenous effect on Turkish stock market.

In order to examine what extent the US stock markets influence the variations in the Turkish stock market, the structural vector autoregressive (SVAR) methodology with block exogeneity proposed by Cushman and Zha (1997) is used. There are several advantages in relying on the structural VAR approach for the analysis of the effects of external shocks on domestic country. In particularly, it allows modeling dynamic interactions among variables and it facilitates the interpretation of the contemporaneous correlations among disturbance terms. On the contrary to the Choleski decomposition approach, the structural VAR allows us to impose a block exogeneity restriction which indicates that a shock originating from a domestic market (i.e., Turkish stock exchange) has neither contemporaneous nor lagged effects on the external variables (i.e., returns on the US stock market indices). The following is general specification of VAR model with block exogeneity of Cushman and Zha (1997):

$$\sum_{k=0}^{p} \begin{bmatrix} A_{11}(k) & 0 \\ A_{21}(k) & A_{22}(k) \end{bmatrix} \begin{bmatrix} y_{1,t-k} \\ y_{2,t-k} \end{bmatrix} = \begin{bmatrix} \varepsilon_{1,t} \\ \varepsilon_{2,t} \end{bmatrix} \qquad (1)$$

where $A_{ij}(k)$, $i, j = 1, 2$ is coefficient matrix, $y_t = \begin{bmatrix} y_{1,t} & y_{2,t} \end{bmatrix}'$ is observation vector and $\varepsilon_t = \begin{bmatrix} \varepsilon_{1,t} & \varepsilon_{2,t} \end{bmatrix}'$ is structural disturbances vector. It assumed that the coefficient matrix for k=0 is nonsingular and ε_t is uncorrelated with past y_{t-k} for k>0, and satisfies

$$E\begin{bmatrix} \varepsilon_t \varepsilon_t' | y_{t-k}, k > 0 \end{bmatrix} = I \quad \text{and} \quad E\begin{bmatrix} \varepsilon_t | y_{t-k}, k > 0 \end{bmatrix} = 0.$$

In Equation 1, the block exogeneity is imposed by the restriction, $A_{12}(k) = 0$ for $k = 1, 2, ..., p$, which

indicates that $y_{1,t}$ is exogenous to $y_{2,t}$ both simultaneously and also for lagged values. The standard errors of the impulse response functions are obtained by using the modified error bands of Bernanke et al.(1996) (see Sims, 1986; Gordon and Leeper, 1994).

In the observation vector, foreign block, $y_{1,t}$=[developed stock exchange] is a vector of external variable to the domestic country and the domestic block, $y_{2,t}$=[Turkish stock exchange] is a vector of domestic variable. Therefore, it is assumed that both lag and contemporaneous values of the developed stock exchange affect the Turkish stock exchange but not vice-versa. For the SVAR model, the optimal lag length, based on the Bayesian information criteria, is determined to be 5 time periods for both domestic and external variables.

3. DATA

In order to investigate the possible relationship between the US stock market and the Turkish stock market and its components, daily data of stock returns for the period from 31 July 2000 to 31 March 2010 are employed. Excluding holidays in these markets, there are a total of 2542 observations. The US stock exchange indices, namely the DJIA stock exchange index, NYSE Composite, S&P500 Composite, AMEX Composite, NASDAQ Composite, and Russell 2000 index are used as a measure of US stock market performance. Moreover, the ISE100, ISE30 and the components of ISE are used for the Turkish stock exchange indices. The ISE Basic Material, ISE Defense, ISE Food & Beverage, ISE Holding & Investment, ISE Information & Technology, ISE Insurance, ISE National Financial, ISE National Industrial, ISE National Services, ISE Textile & Leather, ISE Tourism, ISE Transportation, ISE Wholesale & Retail Trade, ISE Wood, Paper & Printing are used as the components of the ISE. All these indices are denominated in the local currency units. The time series of daily closing stock market price indexes are obtained from DataStream. Defining stock market returns as $r_t=(\log P_t - \log P_{t-1})*100$, the summary statistics of daily stock returns are reported in Table 1.

TABLE1 : SUMMARY STATISTICS ON THE STOCK RETURN SERIES

	Average	Max	Min	Std. Dev.	Skewness	Kurtosis	Jarque-Bera +
DJIA	0.001	10.51	-8.20	1.272	0.035	11.54	7726.62
NYSE Composite	0.003	11.53	-10.23	1.345	-0.294	13.39	11462.03
SP500 Composite	-0.009	10.98	-9.47	1.357	-0.108	11.61	7853.10
AMEX Composite	0.028	12.49	-10.46	1.170	-0.400	19.84	30104.08
NASDAQ Composite	-0.020	13.25	-9.59	1.788	0.208	7.94	2599.24
Russell 2000	0.010	8.860	-12.61	1.624	-0.283	8.00	2879.25
ISE Basic Material	0.033	20.26	-29.79	3.472	-0.290	9.44	4427.19
ISE Defense	0.025	22.86	-39.82	4.094	-0.328	11.12	7029.92
ISE Food Beverage	0.037	23.16	-19.13	2.972	-0.305	10.67	6287.71
ISE Holing Investment	-0.001	23.65	-26.66	3.386	-0.208	9.58	4599.04
ISE Information Technology	-0.054	21.73	-30.90	3.314	-0.398	11.08	6951.89
ISE Insurance	0.032	23.54	-32.23	3.475	-0.579	10.28	5755.45
ISE National Financial	0.024	23.94	-30.75	3.468	-0.253	10.47	5937.89
ISE National Industrial	0.019	18.51	-25.05	2.837	-0.450	11.77	8231.17
ISE National Services	0.006	27.76	-27.13	2.948	-0.157	13.72	12190.88
ISE Textile Leather	-0.006	27.64	-31.13	2.982	-0.920	16.78	20470.06
ISE Tourism	-0.016	35.89	-21.25	3.879	0.107	10.48	5930.30
ISE Transportation	0.034	24.09	-25.10	3.328	-0.214	9.22	4122.14
ISE Wood Paper Printing	0.011	25.12	-35.87	3.190	-0.705	14.34	13832.75
ISE Wholesale Retail Trade	0.026	27.80	-26.58	2.961	-0.094	14.27	13457.25
ISE National100	0.019	22.47	-28.04	3.179	-0.272	11.01	6827.81
ISE National30	0.019	22.64	-23.29	3.181	-0.081	9.66	4694.88

+Jarque-Bera test is performed to check the normality of each series. Jarque Bera statistics lead to the rejection of null hypothesis of a normal distribution. Therefore, distributions of stock returns are not normal.

Table 1 reports the descriptive statistics of the daily stock index returns. It is observed that overall Turkish stock market shows higher average returns with higher levels of variability than the US market. Table 1 also shows that all daily market returns have a kurtosis value which is greater than 3 (kurtosis for normally distributed series is 3). So, clear rejection of null hypothesis of normal distributions of returns with the Jarque-Bera test is observed for all indices in the study.

In order to highlight the co-movements among the stock markets, the correlation coefficients of daily stock returns among the US and Turkish markets are reported in Table 2. The results show that correlations of coefficient between the US and ISE stock market returns are all positive ranging from 0.159 to 0.280. The interactions among the US stock exchange indices are considerably higher than

the interaction between the US and Turkish stock markets suggesting gains from portfolio diversification among these markets. Among four US indices used in this study, the AMEX composite shows the highest correlations with the Turkish stock indices and the NASDAQ has the lowest correlation with the Turkish market with the exceptions of the ISE Information & Technology and ISE Textile & Leather.

TABLE 2: CORRELATION OF STOCK RETURNS

	DJIA	NYSE Composite	SP500 Composite	AMEX Composite	NASDAQ Composite	Russell 2000
DJIA	1.000					
NYSE Composite	0.956	1.000				
SP500 Composite	0.971	0.978	1.000			
AMEX Composite	0.705	0.801	0.737	1.000		
NASDAQ Composite	0.821	0.817	0.890	0.601	1.000	
Russell 2000	0.857	0.897	0.904	0.708	0.871	1.000
ISE Basic Material	0.219	0.269	0.232	0.276	0.213	0.233
ISE Defense	0.161	0.196	0.169	0.217	0.159	0.164
ISE Food &Beverage	0.181	0.219	0.190	0.242	0.178	0.185
ISE Holing &Investment	0.214	0.258	0.223	0.288	0.210	0.217
ISE Information &Technology	0.183	0.219	0.189	0.235	0.189	0.184
ISE Insurance	0.216	0.263	0.225	0.278	0.205	0.218
ISE National Financial	0.231	0.274	0.237	0.276	0.214	0.229
ISE National Industrial	0.216	0.262	0.226	0.280	0.213	0.222
ISE National Services	0.200	0.243	0.208	0.254	0.195	0.203
ISE Textile &Leather	0.185	0.219	0.191	0.247	0.194	0.185
ISE Tourism	0.193	0.221	0.196	0.233	0.191	0.189
ISE Transportation	0.203	0.232	0.200	0.240	0.186	0.192
ISE Wholesale &Retail Trade	0.178	0.218	0.183	0.234	0.161	0.166
ISE Wood, Paper& Printing	0.186	0.229	0.196	0.256	0.186	0.191
ISE National100	0.227	0.273	0.235	0.279	0.216	0.229
ISE National30	0.203	0.244	0.210	0.244	0.196	0.210

The US market seems to be most correlated with the ISE100 and least related with the ISE Defense. It is interesting to point out that the ISE National Financial is the second most related with the US market. Since more than 50% of the ISE consists of banking sectors, their dominant share may explain these orders. However, the correlation between the DJIA and the ISE National Industrial is among the lowest. Surprisingly, the NASDAQ seems to move with the ISE Basic Material and the ISE100 stronger than the ISE Defense and the ISE Information & Technology even though the NASDAQ mostly consists of technological firms. These facts support the proposition that the compositions of stock market indices are not the main factors but movements in markets /or liquidity composition are the main factors explaining the co-movements among the stock markets.

It is also interesting that the Russell 2000 moves mostly with the ISE100, ISE National Financial and ISE Basic Material. Note that the Russell 2000 mostly consists of small companies. One plausible argument for explaining the co-movement among the ISE100 and the Russell 2000 is the perception of the foreign investors regarding the stock markets. In other words, foreign investors may regard small US firms listed in the Russell 2000 the same as companies listed in the ISE100. So, foreign investors may diversify their risks by investing in small firms in the US and Turkish markets through the Russell 2000 and the ISE100, respectively.

Another striking observation is that the pair-wise correlation among the AMEX and NYSE with the ISE is higher than the one with the S&P500 and the ISE. The S&P500 includes large cap stocks. The AMEX includes all the stocks, ADR, closed and investment vehicles, REITS and limited partnership. The NYSE composite includes all the common stock in NYSE. Thus, their coverage is wider than the S&P500. It seems that foreign investors may consider the ISE as an alternative to non-large cop investment vehicle due to scope and size of the ISE which it is sensible. Although the correlation analysis gives some sensible results, it has a limitation of not accounting for the past periods' performance of the stock market. Therefore, any model that intends to capture the dynamic effects of US market on the ISE must take into consideration of the historical performances of the US and Turkish stock markets. In order to incorporate these effects, a VAR methodology is employed.

4. EMPIRICAL ESTIMATION RESULTS

In order to capture the dynamic effect of the US market over the Turkish market, we employ a VAR methodology. VAR system includes daily stock index returns from 31 July 2000 to 31 March 2010 with five lags and five daily dummy variables to capture the day-of-the-week-effect. Table 3 reports the corresponding impulse response function for 10 days regarding how ISE100, ISE30 stock indices and each component of the ISE responded to a one-unit shock to the DJIA, NYSE Composite, S&P500 Composite, AMEX Composite, NASDAQ Composite and Russell 2000 returns, respectively.

Therefore, the dynamic VAR allows us to capture unexpected shocks in the US market return and their effects on the Turkish stock market returns.

In order to calculate the significance levels, we use the Bayesian inference method of Zha (1999) with 2500 iterations at 95% level. When the coefficient is not statistically significant, then the null hypothesis that there is no effect of the US stock movements on the Turkish stock return cannot be rejected. Several interesting patterns emerge from analysis. The impulse responses tabulated in Table 3 shows the following.

1. For almost all impulse responses, there is a positive and statistically significant effect contemporaneously and in the first period. However, the effects of all US stock market indices on the Turkish stock market become negative and are still statistically significant at the fifth and sixth periods. After the 7th business day, these impacts virtually disappear.
2. The biggest impulse responses in magnitudes across time periods are observed contemporaneously. These effects are smaller but positive at the first period compared to previous period. On the contrary, effects of the NASDAQ on the Turkish indices considered in this study are bigger in magnitude at the first period than the contemporaneous time.
3. The AMEX has the highest contemporaneous effect across all indices that we consider. The NYSE and DJIA have the second and third highest contemporaneous effect across all Turkish indices except for the ISE Wholesale & Retail Trade index, respectively. The effect of the NASDAQ on the ISE indices are the smallest in size compared to other US indices.
4. The effect of the DJIA on the ISE indices last the longest and the effects of the NYSE and the S&P500.
5. The effect of US markets on ISE30 is most persistent.

Generally, the Turkish stock exchange is expected to co-move with a foreign stock exchange which is dominated by financial stocks. However, the empirical result points out that the Turkish stock exchange is heavily affected by the AMEX. The reason is that both the AMEX and ISE are made of small companies. The AMEX trades mostly small and medium sized stocks. Almost all trading on the AMEX is in small-cap stocks, exchange-traded funds and derivatives (www.investopedia.com, 2010). So, the Turkish stock market closely follows the movements of the stock exchange which has small-cap companies rather than of the stock exchange which has similar weight components as the ISE. In addition, the effect of AMEX is persistent on the Turkish stock market indices, especially on the ISE National Industrial, ISE Textile & Leather, ISE Basic Material, ISE Food & Beverage, ISE Holding & Investment, ISE Insurance, ISE100 and ISE30. Similarly, although the NASDAQ has the largest ratio in technological stock, its effect on the ISE Technology is very negligible. The reason is that the NASDAQ stock exchange consists of big-cap technology companies. Moreover, the US stock market has the largest effect on the ISE100, ISE Financial, ISE Basic Material but the smallest effect on the ISE Defense (consisted of sole company, Aselsan), ISE Food & Beverage and ISE Wholesale & Retail Trade indices.

TABLE 3. RESPONSE OF COMPONENTS OF ISE TO THE DEVELOPED STOCK MARKET

ISE Basic Material

	0	1	2	3	4	5	6	7	8	9
DJIA	0.6616*	0.5131*	-0.0900*	-0.0280	0.0859	0.1350*	-0.0415*	0.0072	0.0141*	-0.0067
NYSE	0.7386*	0.4791*	-0.0716	-0.0190	0.0757	0.1409*	-0.0423*	0.0038	0.0101*	-0.0075
SP500	0.6578*	0.5035*	-0.0806	-0.0129	0.0653	0.1311*	-0.0377*	0.0024	0.0087	-0.0071
AMEX	0.8159*	0.5042*	-0.0415	-0.0515	0.1254*	0.1950*	-0.0300*	-0.0061	0.0095	-0.0068
NASDAQ	0.4265*	0.4044*	-0.0693*	0.0214	0.0228	0.0631*	-0.0124	-0.0018	0.0013	-0.0010
Russell2000	0.5407*	0.4510*	-0.0499	-0.0136	0.0391	0.1111*	-0.0289*	0.0040	0.0033	-0.0039

ISE Defense

	0	1	2	3	4	5	6	7	8	9
DJIA	0.5776*	0.4552*	-0.0313	-0.0111	0.0166	0.1646	-0.0373	-0.0055	0.0149*	-0.0002
NYSE	0.6379*	0.4282*	-0.0326	0.0199	0.0278	0.1484*	-0.0359*	-0.0039	0.0086	-0.0017
SP500	0.5704*	0.4706*	-0.0475	0.0214	0.0207	0.1562*	-0.0358*	-0.0054	0.0093	-0.0024
AMEX	0.7543*	0.4722*	0.0159	0.0033	0.0788	0.1513*	-0.0198	-0.0088	0.0060	-0.0010
NASDAQ	0.3901*	0.4176*	-0.0576	0.0540	0.0267	0.0880*	-0.0159	-0.0036	0.0010	0.0000
Russell2000	0.4534*	0.4316*	-0.0272	0.0016	0.0109	0.1182*	-0.0317*	0.0009	0.0040	-0.0007

ISE Food &Beverage

	0	1	2	3	4	5	6	7	8	9
DJIA	0.4752*	0.4370*	-0.0248	-0.0344	0.0793*	0.0497	-0.0373*	0.0006	0.0030	-0.0065
NYSE	0.5228*	0.4095*	-0.0291	-0.0178	0.0635	0.0499	-0.0362*	-0.0016	0.0005	-0.0059
SP500	0.4700*	0.4322*	-0.0211	-0.0194	0.0555	0.0357	-0.0330*	-0.0015	0.0003	-0.0045
AMEX	0.6127*	0.4169*	0.0012	-0.0286	0.0730	0.0911*	-0.0273*	-0.0114*	-0.0011	-0.0048
NASDAQ	0.3199*	0.3398*	-0.0113	0.0067	0.0273	-0.0025	-0.0168*	-0.0014	-0.0001	-0.0001
Russell2000	0.3722*	0.3625*	0.0021	-0.0142	0.0494	0.0365*	-0.0270	-0.0025	-0.0016	-0.0037

ISE Holding &Investment

	0	1	2	3	4	5	6	7	8	9
DJIA	0.6327*	0.5327*	-0.0586	-0.0642	0.0878	0.1250*	-0.0503*	0.0070	0.0147*	-0.0061
NYSE	0.6948*	0.4993*	-0.0501	-0.0563	0.0773	0.1289*	-0.0486*	0.0050	0.0111*	-0.0064
SP500	0.6177*	0.5296*	-0.0638	-0.0443	0.0675	0.1189*	-0.0446*	0.0043	0.0085	-0.0059
AMEX	0.7565*	0.4977*	-0.0109	-0.0777	0.1505*	0.1977*	-0.0312*	-0.0063	0.0093	-0.0071
NASDAQ	0.4168*	0.4275*	-0.0610	0.0106	0.0253	0.0591	-0.0182	-0.0003	0.0005	-0.0001
Russell2000	0.4898*	0.4688*	-0.0361	-0.0400	0.0386	0.1052*	-0.0356*	0.0048	0.0039	-0.0023

ISE Information &Technology

	0	1	2	3	4	5	6	7	8	9
DJIA	0.5369*	0.4776*	-0.0778	0.0149	0.1064*	0.1217	-0.0301*	0.0081	0.0064	-0.0078
NYSE	0.5794*	0.4329*	-0.0631	0.0294	0.1058*	0.1263*	-0.0302*	0.0049	0.0020	-0.0093*
SP500	0.5212*	0.4780*	-0.0632	0.0407	0.0975*	0.1147*	-0.0284*	0.0022	0.0007	-0.0082
AMEX	0.6610*	0.4020*	-0.0213	-0.0073	0.1521*	0.1459*	-0.0134	-0.0021	0.0025	-0.0065
NASDAQ	0.3762*	0.4111*	-0.0392	0.0645*	0.0512	0.0576	-0.0122	-0.0034	-0.0019	-0.0020
Russell2000	0.4135*	0.4175*	-0.0396	0.0198	0.0650	0.1071*	-0.0231*	0.0042	-0.0013	-0.0056

ISE Insurance

	0	1	2	3	4	5	6	7	8	9
DJIA	0.6550*	0.5626*	-0.0888	-0.0668	0.0645	0.1278	-0.0544*	0.0056	0.0142*	-0.0074
NYSE	0.7258*	0.5274*	-0.0763	-0.0385	0.0672	0.1350*	-0.0532*	0.0037	0.0090	-0.0092
SP500	0.6407*	0.5614*	-0.0845	-0.0470	0.0603	0.1175*	-0.0492*	0.0035	0.0078	-0.0085
AMEX	0.8175*	0.5672*	-0.0368	-0.0448	0.1053*	0.1951*	-0.0366*	-0.0094	0.0057	-0.0081
NASDAQ	0.4218*	0.4626*	-0.0589	-0.0124	0.0336	0.0568*	-0.0223	-0.0011	0.0008	-0.0019
Russell2000	0.5090*	0.5020*	-0.0321	-0.0443	0.0356	0.1117	-0.0414*	0.0034	0.0034	-0.0052

ISE National Financial

	0	1	2	3	4	5	6	7	8	9
DJIA	0.7020*	0.5678*	-0.0711	-0.0719	0.0570	0.1441*	-0.0606*	0.0059	0.0158*	-0.0074
NYSE	0.7591*	0.5240*	-0.0686	-0.0686	0.0435	0.1468*	-0.0576*	0.0052	0.0125*	-0.0072
SP500	0.6774*	0.5647*	-0.0742	-0.0538	0.0345	0.1384*	-0.0549*	0.0036	0.0099*	-0.0074
AMEX	0.8139*	0.5243*	-0.0377	-0.1027*	0.1000*	0.2317*	-0.0359*	-0.0071	0.0103	-0.0080
NASDAQ	0.4423*	0.4660*	-0.0572	0.0117	0.0013	0.0728*	-0.0242*	-0.0019	-0.0003	-0.0004
Russell2000	0.5369*	0.5023*	-0.0440	-0.0480	0.0149	0.1152*	-0.0434*	0.0055	0.0039	-0.0031

ISE National Industrial

	0	1	2	3	4	5	6	7	8	9
DJIA	0.5384*	0.4647*	-0.0634	-0.0423	0.0641	0.0938*	-0.0369*	0.0041	0.0085*	-0.0052
NYSE	0.5980*	0.4331*	-0.0548	-0.0283	0.0567	0.0983*	-0.0370*	0.0021	0.0051	-0.0057
SP500	0.5288*	0.4596*	-0.0608	-0.0219	0.0485	0.0881*	-0.0328*	0.0013	0.0039	-0.0051
AMEX	0.6750*	0.4437*	-0.0191	-0.0451	0.1011*	0.1478*	-0.0256*	-0.0088	0.0028	-0.0053
NASDAQ	0.3622*	0.3717*	-0.0492	0.0194	0.0206	0.0378	-0.0131	-0.0017	-0.0007	-0.0006
Russell2000	0.4257*	0.4041*	-0.0326	-0.0178	0.0296	0.0791*	-0.0256*	0.0018	0.0002	-0.0028

ISE National Services

	0	1	2	3	4	5	6	7	8	9
DJIA	0.5175*	0.4736*	-0.1209*	-0.0654	0.0607	0.1317*	-0.0545*	0.0044	0.0136*	-0.0051
NYSE	0.5705*	0.4364*	-0.1058*	-0.0560	0.0521	0.1340*	-0.0515*	0.0029	0.0100*	-0.0049
SP500	0.5047*	0.4765*	-0.1063*	-0.0543	0.0407	0.1204*	-0.0482*	0.0014	0.0082	-0.0045
AMEX	0.6271*	0.4380*	-0.0711	-0.0760	0.0783	0.1809*	-0.0330*	-0.0102	0.0078	-0.0021
NASDAQ	0.3455*	0.4041*	-0.0666*	-0.0061	0.0057	0.0577*	-0.0225*	-0.0019	0.0002	0.0007
Russell2000	0.4050*	0.4224*	-0.0550	-0.0398	0.0175	0.0943*	-0.0369*	0.0017	0.0025	-0.0006

ISE Textile &Leather

	0	1	2	3	4	5	6	7	8	9
DJIA	0.4855*	0.4314*	-0.0558	-0.0406	0.0324	0.1091*	-0.0435*	-0.0010	0.0120*	-0.0032
NYSE	0.5190*	0.3887*	-0.0481	-0.0210	0.0374	0.1189*	-0.0404*	-0.0017	0.0083	-0.0043
SP500	0.4664*	0.4164*	-0.0514	-0.0144	0.0313	0.1064*	-0.0391*	-0.0027	0.0066	-0.0045
AMEX	0.6178*	0.3957*	-0.0166	-0.0636	0.0964*	0.1682*	-0.0253*	-0.0099	0.0091	-0.0059
NASDAQ	0.3392*	0.3348*	-0.0383	0.0227	0.0305	0.0534*	-0.0213*	-0.0033	-0.0008	-0.0015
Russell2000	0.3679*	0.3661*	-0.0229	-0.0184	0.0273	0.0942*	-0.0329*	0.0000	0.0030	-0.0028

ISE Tourism

	0	1	2	3	4	5	6	7	8	9
DJIA	0.6388*	0.4498*	-0.0197	-0.0068	0.1388*	0.1733*	-0.0234	0.0027	0.0103	-0.0030
NYSE	0.6717*	0.4093*	-0.0245	0.0010	0.1377*	0.1610*	-0.0201	0.0010	0.0052	-0.0043
SP500	0.6109*	0.4370*	-0.0252	0.0091	0.1255*	0.1661*	-0.0215	-0.0014	0.0037	-0.0039
AMEX	0.7602*	0.4037*	0.0063	-0.0342	0.1548*	0.1543*	-0.0027	-0.0053	0.0053	-0.0003
NASDAQ	0.4328*	0.3585*	-0.0297	0.0188	0.0585*	0.1258	-0.0056	-0.0043	-0.0008	0.0007
Russell2000	0.4869*	0.4056*	-0.0078	-0.0171	0.0673	0.1488*	-0.0147	0.0021	0.0008	-0.0008

ISE Transportation

	0	1	2	3	4	5	6	7	8	9
DJIA	0.5885*	0.4464*	-0.0188	0.0069	0.1342*	0.1402*	-0.0339*	0.0057	0.0064	-0.0091
NYSE	0.6147*	0.4093*	-0.0069	-0.0013	0.0968*	0.1373*	-0.0324*	0.0014	0.0044	-0.0080
SP500	0.5469*	0.4358*	-0.0206	0.0157	0.0969*	0.1303*	-0.0314*	0.0000	0.0019	-0.0082
AMEX	0.6788*	0.3989*	0.0243	-0.0515	0.1103*	0.1942*	-0.0127	-0.0050	0.0066	-0.0043
NASDAQ	0.3688*	0.3458*	-0.0313	0.0517	0.0522	0.0676*	-0.0120	-0.0034	-0.0019	-0.0020
Russell2000	0.4260*	0.3756*	-0.0025	0.0124	0.0654*	0.1090*	-0.0234*	0.0016	-0.0014	-0.0048

ISE Wholesale &Retail Trade

	0	1	2	3	4	5	6	7	8	9
DJIA	0.5185*	0.4861*	-0.0440*	0.0727	0.0734	0.0951	-0.0168*	-0.0048	-0.0027	-0.0028
NYSE	0.5107*	0.3716*	-0.1138*	-0.0170	0.0231	0.0754*	-0.0269*	0.0040	0.0033	-0.0017
SP500	0.4457*	0.4074*	-0.1076*	-0.0123	0.0157	0.0642	-0.0233*	0.0021	0.0024	-0.0017
AMEX	0.5791*	0.3975*	-0.1018*	-0.0690	0.0200	0.1285	-0.0150*	-0.0041	0.0041	0.0012
NASDAQ	0.2862*	0.3508*	-0.0571*	0.0356	0.0074	0.0313	-0.0123	-0.0010	-0.0010	0.0002
Russell2000	0.3338*	0.3568*	-0.0635*	-0.0037	0.0038	0.0477	-0.0192*	0.0025	-0.0001	-0.0001

ISE Wood, Paper & Printing

	0	1	2	3	4	5	6	7	8	9
DJIA	0.5217*	0.4525*	-0.0564	-0.0623	0.0107	0.0864*	-0.0444*	-0.0017	0.0142*	-0.0022
NYSE	0.5827*	0.4138*	-0.0501	-0.0425	0.0154	0.0867*	-0.0410*	-0.0010	0.0109*	-0.0029
SP500	0.5122*	0.4495*	-0.0515	-0.0388	0.0067	0.0807*	-0.0387*	-0.0018	0.0095*	-0.0029
AMEX	0.6943*	0.4358*	-0.0246	-0.0799	0.0814	0.1351*	-0.0303*	-0.0079	0.0119*	-0.0041
NASDAQ	0.3535*	0.3682*	-0.0341	0.0002	0.0125	0.0331	-0.0186*	-0.0016	0.0011	-0.0005
Russell2000	0.4106*	0.3955*	-0.0261	-0.0400	0.0058	0.0694*	-0.0319*	0.0007	0.0056	-0.0013

ISE National100	0	1	2	3	4	5	6	7	8	9
DJIA	0.6349*	0.5282*	-0.0769	-0.0633	0.0617	0.1268*	-0.0557*	0.0059	0.0139*	-0.0075
NYSE	0.6920*	0.4893*	-0.0706	-0.0558	0.0504	0.1300	-0.0537*	0.0046	0.0105	-0.0077
SP500	0.6157*	0.5260*	-0.0760*	-0.0458	0.0411	0.1200*	-0.0505*	0.0032	0.0082	-0.0073
AMEX	0.7509*	0.4958*	-0.0411	-0.0804	0.0985*	0.1972*	-0.0355*	-0.0078	0.0081	-0.0077
NASDAQ	0.4092*	0.4346*	-0.0576*	0.0103	0.0085	0.0589	-0.0223*	-0.0017	-0.0001	-0.0007
Russell 2000	0.4889*	0.4677*	-0.0439	-0.0376	0.0221	0.0995*	-0.0393*	0.0042	0.0027	-0.0034

ISE National30	0	1	2	3	4	5	6	7	8	9
DJIA	0.5808*	0.6045*	-0.0388	-0.0965*	0.0736	0.1324*	-0.0523*	-0.0009	0.0166*	-0.0070
NYSE	0.6346*	0.5900*	-0.0390	-0.0965*	0.0620	0.1376*	-0.0526*	-0.0015	0.0137*	-0.0078
SP500	0.5644*	0.6059*	-0.0439	-0.0858*	0.0539	0.1200*	-0.0473*	-0.0016	0.0110*	-0.0072
AMEX	0.6541*	0.5949*	-0.0017	-0.1171*	0.1131*	0.2176*	-0.0349*	-0.0172*	0.0100	-0.0071
NASDAQ	0.3748*	0.4889*	-0.0428	-0.0153	0.0122	0.0453	-0.0180	-0.0030	0.0015	-0.0005
Russell 2000	0.4595*	0.5421*	-0.0270	-0.0623	0.0202	0.0890*	-0.0341*	0.0001	0.0048	-0.0027

0 Confidence band for impulse response does not contain zero
* Indicates the level of significance at the 5% level

Finally, since the non-overlapping trading hours between the US and Turkish stock markets, it is important to examine the first day effect among the markets. There is a seven hours difference between markets (the Turkish stock market is closed at 10am EST). So, the Turkish stock market will not respond to the US shock within the same time, instead the Turkish stock indices will respond to the developments of the US stock with a one-day lag. The result shows that both the DJIA and S&P 500 indices have the largest first-day effect on the Turkish stock market.

5. CONCLUSION:

The objective of this study to empirically examine whether the US stock indices (DJIA, NYSE, S&P500, AMEX, NASDAQ and Russell 2000) have any influence on the performance of the Turkish stock indices (components of the ISE, ISE100 and ISE30). It is assumed that the performance of the US stock market is independent of the Turkish stock market performance; however the Turkish stock exchange is influenced by both its own dynamics and the performance of US stock exchange. The structural vector autoregressive (SVAR) model with block exogeneity is utilized to capture this assumption over the period from July 2000 to March 2010. This study finds that that a shock originating from the US stock market has both a contemporaneous and a first period effect on the Turkish stock market. These co-movements among the markets are positive and significant. Another important finding is that the Turkish stock market closely follows the movements of stock exchanges consisting of small-cap companies (e.g. AMEX) rather than a stock exchange which has components similarly weighted as the Istanbul Stock Exchange.

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Σ, APPENDIX

Figure1
Part I :Response of components of ISE100 to the developed stock markets

Figure 1 (Continued)
Part II :Response of components of ISE100 to the developed stock markets

Figure 1 (Continued)
Part III :Response of components of ISE100 to the developed stock markets