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COMOVEMENTS OF STOCK MARKETS AMONG SELECTED OIC COUNTRIES

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This paper examines the stock market linkages among a set of stock market indices of selected OIC countries, namely Egypt, Jordan, Kuwait, Lebanon, Morocco, Oman, Pakistan and Turkey. The set of relationships between each pair of stock exchanges is analysed by using Engle-Granger (1987) and Dynamic OLS models. The analysis is made both for the whole period 31.12.1999-24.02.2004 and for the sub-periods 31.12.1999-10.08.2001 and 01.11.2001-24.02.2004. This is performed to see the effect of the September 11, 2001 incident on the relationship among the said stock exchanges. Among the 28 pair-wise relations of the selected stock market indices, only two country pairs, namely Turkey-Egypt and Lebanon-Kuwait are found to be cointegrated for the whole period. For the sub-period 31.12.1999-10.08.2001 two, for the other sub-period 01.11.2001-24.02.2004 eight cointegration relations are observed. The results of the cointegration tests show that the cointegration relations among the selected countries have become stronger after September 11, 2001 incident.

1. INTRODUCTION

Capital movements among various stock exchanges have rapidly increased during the last decade. This has occurred as a result of the advances in the information technology as well as the increased openness of financial markets throughout this period. Not only the 1990s crises, but also the subsequent financial distresses that occurred at the end of this decade contributed to the pattern of risk perceptions of the international investors as well as their efforts of seeking profit in different capital markets. For instance, Dembinski (2003) states that global stock market capitalisation has increased five times faster than global production over the last two decades. Moreover, the number of

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stock markets increased from 47 in 1981 to 109 in 2000. Likewise, the number of business firms quoted in stock markets increased more than 100 percent during the period 1981-2000.

In such an environment where development and cross-interrelation between stock exchanges are under way, information and price movements in one market are rapidly transmitted to the others (Eun and Shim 1989). This condition raises the question of whether "international portfolio diversification is profitable". Indeed, this question became the subject of many empirical studies far before the last two decade's globalisation movements. Starting with Grubel (1968), the relationship between stock market indices of different countries has been the concern of increasing number of studies in the literature.

At the earlier stages of the related literature, empirical studies focused on the short-run relationship of stock markets by comparing equity returns rather than equity prices. Granger and Morgenstern (1970), Ripley (1973), Lessard (1974 and 1976), Panton et al. (1976) are among the leading works of the literature and study the market interdependence by estimating the cross correlation coefficients of the stock market return series. The general conclusions of these studies state that the national economic factors are dominant over the stock market returns and that the stock markets are weakly correlated. Such a conclusion, in fact, implies that international portfolio diversification is possible. Neal (1985) and Machlup (1977) tested the capital market integration by using autoregressive moving averages process to compare the prices rather than the returns of identical assets from London, Amsterdam, Paris, and New York stock exchanges in the period 1745-1907. Berument, Kılınç and Yücel (2004) investigated in their study the possibility of the economic integration of Turkey to EU in the short term. Neal (1985) concluded that the European capital markets were integrated during the eighteenth century. On the other hand, the above mentioned developments in the global financial markets guided many researchers to investigate the long-run relationship between the international stock markets by applying the unit root and cointegration techniques. Taylor and Tonks (1989), Eun and Shim (1989), Yang et al. (2003), Huang et al. (2000), Harris et al. (1995), and Malatyalı (1998) have found cointegration and long-run relationships among non-stationary international stock market prices.

Though there are many studies searching for the relations among various stock exchanges, those analysing the interrelations between the stock exchanges of the Islamic countries are very few. However, such studies are important since some of those countries have stock markets that are prone to development. For the real sector firms of those countries, not only leveraging but also equity financing is a means to be resorted. On the other hand, following September 11, 2001 incident along with the historically low levels of risk free rates, international liquidity has become watchful for higher yields in developing country financial instruments. Thus, in such a context, the way stock exchanges of the OIC countries could attract more international investors and funds, the private sector firms could benefit from international capital flows and the OIC equity markets could cooperate under such conditions and which steps could be taken in developing regional schemes between those exchanges are worth being studied.

Despite their interesting nature, research topics related with the OIC equity markets are vast and require a great deal of attention. Due to the complex and diverse character of the issue, this article limits itself to searching for the long-run cointegration relation between selected OIC stock exchanges. Within this framework, the paper is organised as follows: Data and method used are presented in Section II, while in Section III a brief overview on the basic magnitudes for the selected OIC stock exchanges is presented. Section IV conveys the econometric results. Finally, Section V contains concluding remarks and further topics of research.

2. DATA AND METHODOLOGY

As the basic aim of this paper is to search for the long-run relations between the stock exchanges of the OIC countries, techniques of cointegration and dynamic ordinary least squares (DOLS) are applied on pairs of stock markets. Eight OIC stock markets are considered in the study. Of the twenty-one OIC stock exchanges those eight markets are selected in function of the availability of continuous daily index values in US dollar terms in the database used. The data is obtained from the Datastream and covers the daily observations between 31 December 1999 and 24 February 2004. Though the study is performed over the whole range of the data set, in order to observe the post-September 11 period, the methodology is also applied over two sub-periods; 31

December 1999-10 August 2001 and 01 November 2001-24 February 2004.

Given the stated conditions, the elaborated stock markets are those of Egypt, Jordan, Kuwait, Lebanon, Morocco, Oman, Pakistan and Turkey. The study aims to detect the long-run comovements of those equity markets. As greater degrees of long-run comovements generally reflect greater stock market integration, the results of the study would also give a picture of which pairs of the markets are financially integrated to each other.

In order to estimate the cointegrating vectors, Engle-Granger single equation method is used. For the DOLS analysis, the methodology introduced by Stock and Watson is utilised. This methodology is preferred since it gives way for a DOLS with a number of leads and lags of the explanatory variables. Also, the method releases Johansen-equivalent type of estimators distributed with χ^2 using the series integrated with the order of one i.e. I(1). Hence in this methodology the pair of series, which are individually I(1) and which own a single cointegrating vector, is analysed through regressing one on the other's contemporaneous observation as well as the leads and lags of the first differences and on a constant term. The application of the methodology and the results are given in Section IV. However, before proceeding onto the econometric results it would be better to briefly glance at the basic conditions of the selected OIC stock markets in the following section.

3. AN OVERVIEW OF THE SELECTED STOCK EXCHANGES

The selected stock exchanges are mainly situated in the Middle East-North Africa (MENA) and the Mediterranean regions. One additional equity market in this regard is Pakistan. Hence, the analysed markets give the relations of equity traded in a certain time horizon of the day, except Pakistan where trading starts far before the others in the day. In this section, those selected markets are analysed, with the help of Table 1, as to their market capitalisation, market liquidity, turnover ratio and number of listed domestic companies in trade.

During the period 1990-2003, market capitalisation figures, which define the market value of outstanding shares (i.e. share prices

multiplied by the number of shares outstanding[1]), show high rates of increases in respect to both the markets' own capitalisation and in comparison with the totals of the World, Middle Income Countries (MICs) and European Monetary Union Area (EMU). These rapid increase are also detected looking at the percentage shares of market capitalisation within GDP. For instance, of the selected 8 OIC stock exchanges Egypt, Jordan and Morocco recorded jumps in this regard while the increases in Turkey, Oman and Pakistan remained relatively moderate, though their achievements were also satisfactory. However, observing high percentage increases in the same parameter regarding the World, MICs and EMU leads us to think that during the period between 1990 and 2003, the stock exchange capitalisation all over the world has recorded remarkable increase and the OIC equity markets could benefit further from this trend.

Table 1: Market Features of the Selected Stock Exchanges

	Market Capitalisation				**Market Liquidity**		**Turnover Ratio**		**Listed Domestic Companies**	
	Million USD		% of GDP		Value Traded as % of GDP		Value of Shares Traded as % of market Capitalisation		Number	
	1990	2003	1990	2003	1990	2002	1990	2003	1990	2003
Egypt	1,760	27,073	4.1	29.0	0.3	2.8	---	1.6	573	967
Jordan	2,000	10,963	49.7	76.2	10.1	14.4	20.0	3.6	105	161
Kuwait	---	---	---	56.1	---	11.4	---	---	---	---
Lebanon	---	1,497	---	8.1	---	0.7	---	0.6	---	13
Morocco	966	13,152	3.7	23.8	0.2	1.6	---	0.9	71	53
Oman	1,060	5,014	9.4	19.7	0.9	2.6	12.3	2.1	55	96
Pakistan	2,850	16,579	7.1	17.3	0.6	44.1	8.7	40.1	487	701
Turkey	19,100	68,379	12.7	18.5	3.9	38.5	42.5	28.5	110	284
World	*9,403,525*	*23,359,484*	*48.0*	*74.6*	*28.5*	*122.8*	*57.1*	*123.0*	*25,424*	*47,576*
*MIC**	*320,160*	*1,639,528*	*20.0*	*35.3*	*5.2*	*16.0*	---	*44.1*	*4,231*	*13,307*
*EMU**	*1,183,500*	*3,485,194*	*21.7*	*52.4*	*14.2*	*67.4*	---	*106.1*	*2,630*	*5,843*

Source : World Development Indicators, p.266-268.
*"MICs" stands for Middle Income Countries, "EMU" stands for European Monetary Union Area.

In addition, the market liquidity measure (i.e. the total value traded divided by GDP[2]) which defines the level of average trading in the

[1] WDI, p.269.
[2] ibid.

market also shows that, during the period between 1990 and 2002, trading recorded jumps both on the World scale and in the MICs and EMU. With respect to that parameter, of the selected OIC stock exchanges Turkey and Pakistan showed remarkable jumps in the average trading volumes while the remaining selected equity markets showed relatively moderate increases.

Turnover ratio (i.e. total value of shares traded during the period divided by the average market capitalisation for the period[3]) shows the traded portion of the whole asset magnitude the stock exchange represents. When the figures of the World, MICs and EMU are referred to, we see that the parameter is comparatively low in the selected OIC equity markets by the end of 2003. Also, for the exchanges where data is available, it is evident that this parameter decreased when the two observations of 1990 and 2003 are considered. An exception to this is Pakistani equity markets.

When the domestically incorporated companies which are listed on the stock exchange are observed between 1990 and 2003, we see that the number of companies in the World has increased by 87 percent while it has more than doubled in EMU and more than tripled in MICs. However, this number shows a reduction in the Moroccan stock exchange, while Jordan's increase remained limited. On the other hand, the number of the Lebanese quoted firms is very small. It is the highest in Egypt and Pakistan, respectively, while the highest rate of increase among those 8 markets is recorded in Turkey.

4. APPLICATION OF THE METHODOLOGY AND RESULTS

This section elaborates on the application of the econometric methodology and its results. However, the series are tested regarding the unit roots before exploring the relationships among the stock markets. At this stage, the methods suggested by Dickey-Fuller and Phillips-Perron to test for the unit roots are adopted, in order to test the stationarity of the individual series. Along those guidelines, the results of the two tests, Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) for the eight stock market indices in US dollar terms are reported in Table 2.

[3] ibid.

When both ADF and PP test-results are considered, it is observed that the test statistics are greater than the critical values. So we see that the null hypothesis of the "existence of a unit root in the stock market index series" cannot be rejected at 1 percent significance level. In other words, the series individually have unit roots.

Table 2: Unit Root Test

	TEST STATISTICS		CRITICAL VALUES		
	ADF	PP	1%	5%	10%
EGYPT	-2,67**	-2,30	-3.43	-2.86	-2.57
JORDAN	1,08	1,75	-3.43	-2.86	-2.57
KUWAIT	1,57	2,80	-3.43	-2.86	-2.57
LEBANON	-2,48	-2,72**	-3.43	-2.86	-2.57
MOROCCO	-1,50	-7,33*	-3.43	-2.86	-2.57
OMAN	-0,16	0,06	-3.43	-2.86	-2.57
PAKISTAN	0,49	0,94	-3.43	-2.86	-2.57
TURKEY	-2,27	-1,91	-3.43	-2.86	-2.57

Note: * and ** indicate the level of significance at 1% and 10%, respectively.

A method for making the series stationary is to take the differences of two consecutive observations. For this, in our study the logarithmic first differences of the series are taken. As it is observed from Table 3, the log-first differences of all eight series reject the null hypothesis at 1 percent significance level, indicating that after the application of the method they become stationary, or in other words, the derived series are integrated of order one I(1).

Table 3: Unit Root Test for the First Differences

	TEST STATISTICS		CRITICAL VALUES		
	ADF	PP	1%	5%	10%
EGYPT	-7,08*	-29,29*	-3.43	-2.86	-2.57
JORDAN	-5,95*	-34,24*	-3.43	-2.86	-2.57
KUWAIT	-5,79*	-29,85*	-3.43	-2.86	-2.57
LEBANON	-7,34*	-34,85*	-3.43	-2.86	-2.57
MOROCCO	-10,50*	-36,39*	-3.43	-2.86	-2.57
OMAN	-6,85*	-29,41*	-3.43	-2.86	-2.57
PAKISTAN	-6,50*	-32,78*	-3.43	-2.86	-2.57
TURKEY	-6,42*	-33,42*	-3.43	-2.86	-2.57

Note: * indicates the level of significance at 1%.

After making the series I(1), Engle-Granger single equation methodology is used as in Akdi, Atakan and Berument (2004) and Berument, Malatyalı and Neyaptı (2001) to test for cointegration using a pair-wise analysis of the eight countries' stock market indices.

Engle-Granger cointegration test results to detect the pair-wise relationships among the eight stock market indices are reported in Table 4. Referring to the test results, we see that cointegrating relations can be observed among the Turkish and Egyptian stock markets at 5 percent significance level, while a similar relationship is observed among Lebanese and Kuwaiti equity markets at 10 percent significance level. However, a similar cointegration relation can not be spotted among the remaining 26 pairs of indices.

Table 4: Engle-Granger Cointegration Test Results for the Period 31.12.1999-24.02.2004

	EGYPT	JORDAN	KUWAIT	LEBANON	MOROCCO	OMAN	PAKISTAN	TURKEY
EGYPT								
JORDAN	0,86							
KUWAIT	1,49	-2,54						
LEBANON	-2,03	-3,00	-3,17***					
MOROCCO	-2,83	-1,60	-1,57	-1,45				
OMAN	0,22	-1,53	-1,90	-2,12	-1,44			
PAKISTAN	0,40	-1,75	-2,43	-2,05	-0,25	-1,96		
TURKEY	-3,71**	-2,10	-1,80	-1,61	-2,61	-2,15	-2,25	

Note: *, ** and *** indicate the level of significance at 1%, 5% and 10% level, respectively.

Aside from the cointegration relations, in order to assess the magnitude of the interaction, we use Dynamic OLS (DOLS). In order to do that, the general regression equation used in the paper can be expressed as follows:

$$Y_t = \alpha + \beta_0 X_t + \sum_{i=1}^{21} \beta_i \Delta X_{t-i} + \sum_{k=-21}^{-1} \beta_k \Delta X_{t-k} + u_t$$

where Y_t and X_t are the logarithms of the stock market indices and u_t is the error term at time t.

The lag interval in the model is taken to be 1-21 since this interval is supposed to be long enough to cover all the transmission effects among the stock markets due to the dynamic nature of the relations.

The findings of the estimation of the above-mentioned model, when Lebanon stock market index is regressed on Kuwait stock market index, show that a 1 unit change in the value of Kuwait stock market index causes a 0.08 unit increase in the value of Lebanon stock market index. The test results also support the findings of the Engle-Granger test findings for Turkey and Egypt, as a 1 unit change in the value of Egypt stock market index causes a 1.32 unit increase in the value of Turkish stock market index.

Table 5: Dynamic OLS Cointegration Tests for the Period 31.12.1999-24.02.2004

	EGYPT	JORDAN	KUWAIT	LEBANON	MOROCCO	OMAN	PAKISTAN	TURKEY
EGYPT								
JORDAN	-0,04**							
KUWAIT	-0,12*	1,92*						
LEBANON	0,11*	0,25*	0,08*					
MOROCCO	0,42*	-0,03	0,03***	1,07*				
OMAN	0,37*	0,50*	0,27*	1,79*	0,81*			
PAKISTAN	0,31*	1,93*	0,86*	4,63*	0,83*	1,85*		
TURKEY	1,32*	-0,54*	-0,44*	2,95*	2,55*	1,47*	0,12*	

Note: *, ** and *** denote significance levels at 1%, 5% and 10%, respectively.

Evidence from the Sub-samples

In our work, we also examine the integration among the countries by dividing our sample into two sub-samples. In doing so, the aim is to search for the post-September 11, 2001 effect where capital flows are claimed to be re-distributed toward emerging markets. Thus, in order to eliminate the statistical anomalies of the incident over the sample, the separation is performed as 31 December 1999-10 August 2001 and 01 November 2001-24 February 2004.

Table 6: Engle-Granger Cointegration Test Results for the Period 31.12.1999-10.08.2001

	EGYPT	JORDAN	KUWAIT	LEBANON	MOROCCO	OMAN	PAKISTAN	TURKEY
EGYPT								
JORDAN	-0,97							
KUWAIT	-0,84	-0,26						
LEBANON	-2,07	0,70	-2,62					
MOROCCO	-3,14***	0,08	-2,23	-2,69				
OMAN	-2,53	-0,53	-1,73	-2,44	-2,24			
PAKISTAN	-3,46**	-0,73	-1,37	-2,67	-2,90	-2,64		
TURKEY	-2,13	0,38	-1,63	-2,07	-2,88	-2,048	-2,91	

Note: *, ** and *** indicate the level of significance at 1%, 5% and 10% level, respectively.

Table 6 reports the Engle-Granger cointegration results for the first sub-period. As it can be seen from the table, cointegration exists among Pakistan-Egypt and Morocco-Egypt with a significance level of 5 percent and 10 percent, respectively.

The findings of Engle-Granger test results regarding the first sub-period are also confirmed by DOLS results in Table 7. Those results suggest that a 1 unit change in the index of Egyptian stock market causes the stock market index of Morocco and Pakistan to increase by 0.28 and 0.6 unit, respectively.

Table 7: Dynamic OLS Estimates for the Period 31.12.1999-10.08.2001

	EGYPT	JORDAN	KUWAIT	LEBANON	MOROCCO	OMAN	PAKISTAN	TURKEY
EGYPT								
JORDAN	0,13*							
KUWAIT	-0,10*	0,45*						
LEBANON	0,21*	0,59*	-0,34*					
MOROCCO	0,28*	0,22*	-0,91*	1,35*				
OMAN	0,41*	1,16*	-1,18*	1,72*	1,21*			
PAKISTAN	0,60*	1,38*	-1,06*	2,60*	1,78*	1,44*		
TURKEY	1,41*	1,63*	-1,81*	6,33*	4,02*	3,29*	2,32*	

Note: *, ** and *** indicate the level of significance at 1%, 5% and 10%, level respectively.

The Engle-Granger cointegration results for the second sub-sample are reported in Table 8. The results show that there exists a comovement among the stock market indices of Jordan-Egypt, Morocco-Egypt, Turkey-Egypt, Morocco-Jordan, Turkey-Jordan, Morocco-Kuwait, Pakistan-Kuwait and Pakistan-Lebanon. Of those cointegrating relations Jordan-Egypt and Morocco-Egypt are significant at a level of 5 percent while the others are significant at 10 percent level.

Table 8: Engle-Granger Cointegration Test Results for the Period 01.11.2001-24.02.2004

	EGYPT	JORDAN	KUWAIT	LEBANON	MOROCCO	OMAN	PAKISTAN	TURKEY
EGYPT								
JORDAN	-3,70**							
KUWAIT	-2,16	-1,75						
LEBANON	-2,12	-1,50	-2,72					
MOROCCO	-3,52**	-3,23***	-3,34***	-1,69				
OMAN	-1,89	-1,67	-3,01	-2,24	-1,83			
PAKISTAN	-2,32	-1,95	-3,17***	-3,04***	-2,24	-2,68		
TURKEY	-3,25***	-3,10***	-2,09	-2,31	-1,97	-2,17	-1,98	

Note: *, ** and *** indicate the level of significance at 1%, 5% and 10% level, respectively.

DOLS results reported in Table 9 for the sub-period between 01.11.2001 and 24.02.2004 suggest that a 1 unit change in the index of Egyptian stock market causes the stock market index of Jordan, Morocco and Turkey to increase by 0.78, 0.66 and 1.05 unit, respectively. The same effect is observed for the stock market of Jordan; a 1 unit change in the index of Jordan stock market causes the stock market indices of Morocco and Turkey to increase by 0.73 and 1.18 unit, respectively. On the other hand, when we consider the market pairs of Morocco-Kuwait and Pakistan-Kuwait, we can see that a 1 unit change in the index of Kuwait stock market causes the stock market index of Morocco and Pakistan to increase by 0.37 and 1.04, unit respectively. In addition, DOLS estimates of Lebanon-Pakistan states that a 1 unit change in the stock index of Lebanon causes the stock index of Pakistan to increase by 8.44 units.

Table 9: Dynamic OLS Estimates for the Period 01.11.2001-24.02.2004

	EGYPT	JORDAN	KUWAIT	LEBANON	MOROCCO	OMAN	PAKISTAN	TURKEY
EGYPT								
JORDAN	0,78*							
KUWAIT	1,42*	1,83*						
LEBANON	0,20*	0,25*	0,12*					
MOROCCO	0,66*	0,73*	0,37*	3,31*				
OMAN	0,78*	1,03*	0,54*	3,92*	1,12*			
PAKISTAN	1,36*	1,93*	1,04*	8,44*	2,22*	1,94*		
TURKEY	1,05*	1,18*	0,29*	2,44*	1,00*	0,50*	0,27*	

Note: *, ** and *** indicate the level of significance at 1%, 5% and 10% level, respectively.

When the results of Engle-Granger is considered both for the whole period and for the sub-periods, some similarities and differences among the country pairs are observed. The stock market indices of Turkey and Egypt are found to have cointegration both for the whole period and for the second sub-period. Cointegration is also observed among Morocco and Egypt for the first and the second sub-periods, but there is none when the whole period is considered. When the other market pairs are found cointegrated for the whole period or in one of the sub-periods, we can say that some relations have a tendency to fade while some others suggest a possibility in this regard. Especially, the results of the second sub-sample beginning on 11 September 2001 show us that the comovements among the selected equity markets have started

increasing, as in this sub-period eight comovements among the countries' stock indices are observed.

5. CONCLUSION

In a global setting where financial capital circulates around the world so rapidly and massively, capital markets of the emerging economies work as an area of target for such type of capital. Attracting such capital, on the other hand, is important on the part of those emerging market economies to create additional means of financing for their real sector firms. However, in addition to the institutional and legal aspects, international investors need to know the information set regarding the portfolio diversification opportunities in order to invest in such markets.

As markets which are yet to develop further, the OIC stock markets deserve a special attention to be analysed deeply. This is important both on the international investors' part who need to increase their portfolio returns and on the part of authorities of those countries who might be interested in developing coordinated policies with their counterparts in the other markets, in their efforts to give a momentum to the equity financing in the OIC domain. Therefore, this study aims to elaborate on this topic, i.e. to study whether there exist any relations among the stock exchanges of the selected OIC countries regarding the returns they provide, and whether they offer an opportunity of portfolio diversification or whether there exist comovements between those equity markets allowing the authorities to pursue a policy of specialisation in capital market instruments.

In such a perspective, this paper investigates the existence of cointegrating relationships among the stock exchange pairs and applies the method of Dynamic Ordinary Least Squares (DOLS) to see the strength of the long-run relations whenever it is detected. For this, of the 21 OIC stock exchanges 8 OIC stock exchanges, whose daily index values in US dollar terms are found on DataStream, are used. Those are the exchanges of Egypt, Jordan, Kuwait, Lebanon, Morocco, Oman, Pakistan and Turkey. Hence, the study comprises the markets in the MENA and the Mediterranean Regions, which operate in a similar time frame, as well as Pakistan which is located in a much earlier starting trading zone, compared to the other selected markets.

The econometric analyses rest upon daily index values of the selected countries over the period 31 December 1999-24 February 2004. However, in order to detect the behaviour of those markets in the period following the 11 September 2001 incident, the analyses are also performed over the sub-samples of 31 December 1999-10 August 2001 and 01 November 2001-24 February 2004. As a result of the econometric analyses of the 28 pair-wise relations among the selected OIC countries' stock market indices, only two country pairs, namely Turkey-Egypt and Lebanon-Kuwait, are found to be co-integrated over the whole period. On the other hand, for the sub-period 31 December 1999-10 August 2001 two pairs of markets, for the other sub period 01 November 2001-24 February 2004 eight pairs of markets are observed to have cointegration relations.

Although the second sub-sample results show eight cointegrating relations of those, especially the linkages among Egypt-Turkey, Jordan-Turkey and Lebanon-Pakistan are strong. Although, the cointegration relations in the remaining 5 pairs of the selected markets are statistically significant, the DOLS results indicate that this relation could be developed further. However, in any case we can easily conclude that, in the period following 11 September 2001, the linkages among the stock markets of the selected countries have increased.

Taking these findings into consideration, we can say that since DOLS results indicate an approximately unit relationship in three cases, there still exists an opportunity of portfolio diversification among the selected equity markets. However, the results also mean that, in the post-11 September 2001 period, yields in the 8 pairs of selected OIC stock exchanges have started to move together, which might be interpreted as if among those markets the authorities might develop some common policies of which one might be named as asset specialisation. Although this study attempts to give a hint of financial linkage among the selected OIC stock exchanges, studies might be furthered in analysing the behaviour of the remaining OIC equity markets, upon the condition of data availability. Also, aside from the financial linkage studies, new studies pertaining to asset quality standardisation problems, surveillance matters or other institutional problems as well as impediments on fund transfers or settlement of traded instruments might be suggested.

REFERENCES

Akdı, Y., C. Atakan, H. Berument, *An Empirical Analysis of Istanbul Stock Exchange Sub-indexes*, mimeo, 2004.

Berument, H., Z. Kılınç, E. Yücel, *Business Cycles in Turkey and European Union Countries: A Perspective to Membership*, mimeo, 2004.

Berument, H., K. Malatyalı, B. Neyaptı (2001), "Turkey's Full Membership to the European Union", *Russian and East European Finance and Trade*, 37(4), 2001, pp. 50-60.

Dembinski, P., *Economic and Financial Globalization: What the numbers say*, New York, United Nations, July 2003.

Eun, C.S., S. Shim, "International Transmission of Stock Market Movements", *Journal of Financial Quantitative Analysis*, 24, 1989, pp. 241-256.

Grubel, H.G., "Internationally Diversified Portfolios", *American Economic Review*, 58, 1968, pp. 1299-1314.

Granger, C.W., O. Morgenstern, *Predictability of Stock Market Prices*, Lexington, MA: Heath Lexington Books, 1970.

Harris, F. H.B., T.H. Mclnish, G. Shoesmith, R.A. Wood, "Cointegration Error Correction and Price Discovery on Informationally Linked Security Markets", *Journal of Financial and Quantitative Analysis*, 30:4, December 1995.

Huang, B.N, C.W. Yang, J.W.S. Hu, "Causality and Cointegration of Stock Markets among the United States, Japan, and the South China Growth Triangle", *International Review of Financial Analysis*, 9:3, 2000, pp. 281-297.

Lessard, D.R., "World, National and Industry Factors in Equity Returns", *The Journal of Finance*, 29, 1974, pp. 379-391.

Lessard, D.R., "World, Country, and Industry Relationships in Equity Returns: Implications for Risk Reduction through International Diversification", *Financial Analysts Journal*, 32, 1976, pp. 2-8.

Machlup, F., *A History of Thought on Economic Integration*, NewYork, 1977.

Malatyalı, K., "An Inquiry on the Evidence of Comovements among Various Stock Market Returns, *ISE Review*, 2:7-8, 1998, pp. 21-32.

Muradoğlu G., H. Berument, K. Metin, "Financial Crises and Changes in Determinants of Risk and Return: An empirical Investigation of Emerging Markets", *Multinational Finance Journal*, 3(4), 1999, pp. 223-252.

Neal, L., "Integration of International Capital Markets: Quantitative Evidence from the Eighteenth to Twentieth Centuries", *Journal of Economic History*, 45, June 1985, pp. 219-226.

Panto, D.B., V.P. Lessing, M. Joy, "Comovement of International Equity Markets: A Taxonomic Approach", *Journal of Financial and Quantitative Analysis*, 11(3), September 1976, pp. 415-432.

Ripley, D.M., "Systematic Elements in the Linkage of National Stock Market Indices". *The Review of Economics and Statistics*, Aug, 55, 1973, pp. 356-361.

Taylor, M.P., I. Tonks, "The Internationalisation of Stock Markets and the Abolition of U.K. Exchange Control", *The Review of Economics and Statistics*, 71, May 1989, pp. 332-336.

Yang, J., M.M. Khan, L. Pointer, "Increasing Integration between the United States and Other International Stock Markets", *Emerging Markets Finance and Trade*, 39, 2003, pp. 39-53.

World Bank (2004), World Development Indicators (WDI 2004), Washington D.C., U.S.A.