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DIVERSIFICATION BY INVESTING IN THE TURKISH STOCK MARKET
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Özet

Uluslararası hisse senedi piyasalarında yatırım yapmak, riskin çeşitlendirilmesi açısından önemli bir kavramdır. Bu çalışmada Amerikan ve Türk hisse senedi piyasaları arasındaki ilişki kointegrasyon yöntemiyle araştırılarak, İMKBnin Amerikan piyasasının yanında risk çeşitlendirilmesi için kullanılabilirliği sınanmaktadır. Sonuçlar iki piyasa arasında kointegrasyon bulunamamasına bağlı olarak İMKBnin portföy riskini azaltmakta kullanılacak bir borsa olduğunu göstermektedir. Buna karşın, Amerikan piyasasının Türk piyasasına uzun dönemde yaptığı etki, portföy çeşitlendirilmesinden ortaya çıkan yararı kısıtlamaktadır.

Abstract

Portfolio diversification is an important issue in the investment process. Country diversification is a way to achieve higher returns with lower risk for international portfolio investment. In this study, I examine the long term relationship between the US and the Turkish equity markets by employing cointegration methodology and Granger causality. Results indicate that the two markets do not have a cointegrating relationship, so the Turkish market can provide diversification benefits. However, long term Granger causality results that show influence of the US market on the Turkish market limits the benefits that can be derived from diversification.

Introduction

In the context of “globalization”, world economies are becoming more interconnected and integrated. Increasing volume of international trading, and even faster increase of the international capital flows are the two main drivers of globalization. Trade liberalization and increasing number of memberships with the WTO can be listed as the reasons for larger international trade volume, where the liberalization and deregulation in the capital markets, elimination of foreign exchange controls, and search for higher returns of capital exporting economies can be listed as the reasons for larger international capital flows.

The issue about the higher level of integration and interrelation among world capital markets, especially world stock markets, has received a great level of attention by the financial media, as well as the research community. Lately, when we read financial news, we can see that the movements and expectations in the stock markets are usually interpreted by including the effects of the foreign markets as well as the currency markets. This is especially true for the relatively smaller markets, where the movements in the larger markets are described as the major source of influence. Turkish stock market is one of these smaller markets, and its movements are generally described in the financial media as the results of what happens in the global stock and currency markets. It is also reported that a large part (around 70%) of the Turkish stock market is controlled by foreign investors and a large part of the trading volume (e.g. 45% in the first 6 months of 2007) is realized by those. In light of these facts, it is not unexpected that the foreign investors providing a link between the world markets and the Turkish stock market. From the financial point of view, one can explain the large capital flows and ownership of foreign investors in especially developing markets like Turkey with two motivational factors: higher returns and lower overall portfolio risk. It is an empirical issue, which is not examined in this study, to determine if the developing markets provide higher returns than the developed markets. In some sample periods this can be true, but in the long run, because of the higher volatility, it may not be the case, especially when considered in a common currency. On the other hand, although those developing market returns seem to have higher volatility, if their returns are not correlated with those of the developed markets, they can provide significant portfolio diversification benefits. In the past, these benefits were tied to factors such as barriers to international capital flows, exchange controls, lack of free trade, inadequate information on foreign securities and investor bias against foreign securities. However, in later years, significant increase in correlations and volatility transmission between equity markets during, and after, the 1987 equity market crash are considered as the reason for lower available benefits by international diversification.

In this study, I examine the long and short run dynamics between the world’s largest stock market, the US market and the Turkish stock market in order to determine if investing in the Turkish market provides diversification benefits relative to the US market. Results indicate that the Turkish stock market is not strongly integrated to the US market in the long run, and is a good choice to provide diversification. However, a long run influence of the US market is also discovered, and should be considered as a limiting influence on the benefits expected.

The rest of the paper proceeds as follows: next section provides a brief review of the related literature, followed by the data and methodology employed. Results of the empirical tests are presented in the fourth section, and the last section summarizes results and concludes.

Literature review of the interdependencies among financial markets

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There are a large number of studies that investigate the dynamic linkages among world equity markets. Some of them provide evidence for integration, and some of them, against. Those studies that examine multiple countries may even provide evidence for some countries and against some others.

Hamao and Masulis (1990), Kasa (1992), and Arshanapalli and Doukas (1993) present evidence for the equity markets of the developed countries being integrated. Chen et al., (2002) for emerging markets, Gilmore and McMannus (2002) between the US and three developing Central European Markets and Manning (2002) for South East Asia, all find cointegrating relationships among equity markets. In addition to those, Tokic (2003) supports the integration results for the USA and five markets; Australia, Japan, Hong Kong, New Zealand and Singapore; Cha and Oh (2000) for the Japanese, the US, Hong Kong, Korea, Singapore and Taiwan; and Ghosh et al. (1999) for the US, Hong Kong, India, Korea and Malaysia. Eun and Shim (1989) finds effects of the US equity markets on world markets, and also argue that the US is the most dominant market in the world, an argument usually supported in other studies that include the US in their sample.

Some of the studies that do not support the integrating relationship are as follows: Yang, Khan and Pointer (2003) for developed markets, DeFusco et al. 1996 for the US market and thirteen emerging capital markets, Pan et al. (1999) for six country's equity indices. No long-term linkages between the US and European equity markets were found by Byers and Peel (1993) and Kanas (1998). Ghosh et al. (1999) does not find any effect of the USA and Japan on the stock markets of Taiwan and Thailand.

A very recent study by Ozdemir et al. (2008) find long term relationship (cointegration) for 8 of the 15 emerging markets they examine. For the remaining 7, including Turkey, they do not find evidence of cointegration, but they document granger causality from the US, but not vice versa. Another study on Turkey was conducted by Berument and Ince 2005, who assess the effect of S&P500 return on the Istanbul Stock Exchange by using daily data. Their estimates suggest that returns on S&P500 affect ISE return positively up to four days.

Data and methodology

Data used in this study is the MSCI Indices for the US and for Turkey, both denominated in US Dollars. By using indices with a common denominator, and that are constructed with same methodology, I make sure that these indices are comparable, and lead to meaningful results. As the indices represent the level of the equity markets for each country, I take the natural logarithm of both.

The method first employed in this study is cointegration analysis. Cointegration is based on the idea that if two or more non-stationary economic variables are in an equilibrium relationship, then their stochastic trends must be linked. In other words, cointegration represents a stationary linear combination of variables that are non-stationary. That linear combination is generally considered as representing an equilibrium relationship among the factors.

When two or more series are cointegrated, error correction models (ECMs) can be used to examine the short-term relationships, as stated by Johansen [1988]. Error correction models are based on the idea that cointegrated series can only have short-term deviations from equilibrium, and these deviations will be corrected in the long-run, thus the series will drift together. In ECMs, there is an error correction term for each cointegrating vector included in each equation in addition to the lagged values of variables.

The first step in cointegration analysis is to test for the presence of a unit root in each series in the system. The Augmented Dickey and Fuller [1979] (ADF) methodology is generally used for unit root tests.

However, when a series is shown to have a unit root, another round of unit root tests have to be applied to the first differences of the series in order to conclude that the series is not integrated with an order higher than one. Series with higher levels of integration should not be included in the cointegration analysis when the other series are $I(1)$.

After showing the existence of unit roots in the data, the next step is testing for the presence of cointegration among the series. Johansen's [1988] maximum likelihood method is an advanced method used in estimating the systems. Johansen develops a method that corrects for the shortcoming of Engle and Granger's [1987] original methodology. His method can test for multiple cointegrating relationships among the series. This is an important advantage when there are more than two series employed in the study because the number of cointegrating relationships can theoretically be up to one less than the number of series employed. Engle and Granger methodology, which is a single equation linear regression that tests for the stationarity of the error term, is more intuitive than Johansen's methodology, but it can not identify more than one cointegrating relationship even when there are multiple cointegrating relations. Furthermore, Johansen's method employs maximum likelihood estimation method that is more robust to non-normality in the distributions in the series, compared to the two-step process employed by Engle-Granger method.

When using Johansen's method, the system is represented by the following equation:

$$\Delta X_t = \Pi X_{t-p} + \sum_{i=1}^{p-1} \Gamma_i \Delta X_{t-i} + \mu + \varepsilon_t \quad (1)$$

where $\Gamma_i = -(I - A_1 - \dots - A_i)$ and $\Pi = -(I - A_1 - \dots - A_p)$.

X_t is the vector of the variables, and Δ is the first difference operator. p is the maximum number of lags, and ε_t is a four dimensional identically independently distributed vector with zero mean and variance matrix Ω_ε . The $n \times n$ Π matrix, the long run impact matrix, can be represented as the multiplication of two $n \times r$ matrices α and β as in $\Pi = \alpha\beta'$. r represents the rank of Π matrix, and it is less than or equal to n .

The test for cointegration is a rank test for Π matrix. Reduced rank of Π implies that *under certain conditions the process ΔX_t is stationary, X_t is nonstationary, but also that $\beta'X_t$ is stationary.*

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Thus we can interpret the relations βX_t as the stationary relations among nonstationary variables, i.e. as cointegrating relations.

The rank test for Π is the test for the number of characteristic roots of the Π matrix that are significantly different from zero, and it is conducted using the following log-likelihood ratio test statistics.

The first test statistic, λ_{max} , tests the null that the number of cointegrating vectors is r against the alternative of $r+1$ cointegrating vectors. The second statistic, λ_{trace} , tests the null hypothesis that the number of cointegrating vectors is less than or equal to r against a general alternative. λ_{max} is preferred as the primary selection criteria to pin down the number of cointegrating vectors, as it provides a sharp alternative hypothesis. However, λ_{trace} statistic is conventionally reported and used as a supporting test for choosing the number of cointegrating vector, as it may provides a more robust test statistic in some cases. The critical values for the two tests are provided in Johansen and Juselius [1990].

After determining the rank of Π matrix as the number of cointegrating vectors, coefficients of α and β matrices can be examined. Significant coefficients of the α matrix are interpreted as an indicator of adjustment of a series towards the equilibrium state represented by the cointegrating relationship(s). Another such indicator is the coefficients of the error correction term(s) in the error correction models, and these two indicators can be examined together.

As part of the information set provided by the Π matrix, coefficients of the β matrix identify the linear combinations of the variables that result in a stationary (cointegrated) system.

When the cointegration tests result show no cointegrating among variables, we can use the VAR system to examine short-term influences. Instead, in this study, I employ the Toda-Yamamoto (1995) procedure to test for long run Granger causality. The procedure only requires a VAR in level, which does not lead to a loss of information due to differencing. However, the procedure allows for long run Granger causality tests only.

Empirical Results

The first step is testing for unit roots in the two series, LTR and LUS by using two unit root tests: augmented Dickey and Fuller (1979) (ADF), Phillips and Perron (1988) (PP). The unit root test results are shown in Table 1.

Table 1 Unit root test results

		LEVELS	
		ADF	PP
Intercept	LTU	-2022814(0)	-2.189575
	LUS	-1.716258(0)	-1.716258
Intercept and Trend	LTU	-2.746078(0)	-3.037539
	LUS	-1.247228(0)	-1.238562
		FIRST DIFFERENCES	
		ADF	PP
Intercept	LTU	-14.71834 ^a (0)	-14.71655 ^a
	LUS	-15.60480 ^a (0)	-15.60467 ^a
Intercept and	LTU	-14.68701 ^a (0)	-14.68510 ^a
	LUS	-15.66517 ^a (0)	-15.66517 ^a

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Trend

^a denotes significance at 1% level

LTR is the log of MSCI Turkey series (in US\$)

LUS is the log of MSCI US series (in US\$)

Both unit root tests yield similar results, that shows that LTR and LUS are both I(1). Hence, the maximum order of integration (d) is determined to be 1.

As both variables are integrated of the same order, 1, next Johansen cointegration tests are run by employing the two series.

Table 2 Cointegration test results

		Number of cointegrating vectors	
		0	<= 1
intercept and no deterministic trend	λ_{max}	7.474093	2.624913
	λ_{trace}	10.09901	2.624913
intercept and trend in CE no trend in VAR	λ_{max}	8.880922	2.676565
	λ_{trace}	11.55749	2.676565
intercept and trend in both	λ_{max}	8.863518	0.880856
	λ_{trace}	9.744374	0.880856

Based on the results presented in Table, there is no cointegration between the Turkish and US stock market series for the period under examination. These results lead to the conclusion that the Turkish market, namely IMKB is a good candidate for portfolio diversification for the long term investors that holds portfolios from the US market.

As there was no evidence of cointegration, I couldn't run the VEC Models to examine the Granger causality. Instead, we employ the Toda-Yamamoto procedure, where the Granger causality test results are shown in Table 3.

Table 3 Granger non-causality test results

Hypothesis	Wald statistic
LUS does not Granger cause LTU	4.806736 ^b (0.0293)
LTU does not Granger cause LUS	0.908042 (0.3416)

The p-values are in parentheses. Superscript b stands for significance at 5%

These results indicate that the US stock market Granger causes Turkish stock market in the long run, limiting the benefits that can be derived from having both markets in an investment portfolio.

Conclusion

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In this study I examine the long run relationship between the American and Turkish equity markets using cointegration and long run Granger-causality. The results show that the two markets are not in a long term equilibrium relationship, indicated by the lack of cointegration. This indicates that the Turkish market can be used to achieve diversification benefits when used with a portfolio of investment that includes the US market. However, as indicated by the long run Granger causality results, the US market has an influence on the Turkish market, limiting the benefits that can be achieved in terms of diversification.

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