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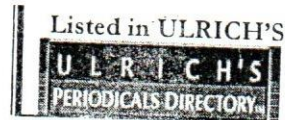
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Testing the Relationship between Risk and Return in the Palestine Securities Exchange



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Abstract

This paper examines the relationship between risk and return in the Palestine Securities Exchange (PSE) with the objective of determining the ability of the market risk premium to compensate investors. Using daily returns over the period 17 Oct 2000 to 16 Aug 2009 for Al-Quds Index and applying a Generalized Autoregressive Conditional Heteroskedasticity model (GARCH) the results show that there is no significant positive relationship exists between risk and return in the Palestine Securities Exchange (PSE).

Keywords: Palestine Securities Exchange, Risk, Return, GARCH, Global Financial Crisis

1. Introduction

The financial crisis which hit the United States of America late 2007 has rapidly developed and spread into a global economic shock. The results were devastating and varied from one country to another around the world. However, of most affected by the financial crisis were the stock markets. Bank failures, declining stock market indices, and the large reductions in the market value of equities and commodities in the US has led to a type of instability and fluctuation in stock markets around the globe and created fears among investors. Consequently, most investors become more risk-averse and started to search for safer investments and other investment vehicles away from stock markets. Others however, claimed higher returns for risky assets than what these assets used to pay before the crisis.

As for the effect of the financial crisis on the Arab World's economies, the effect varied for each country depending on the ties with the US economy. Nevertheless, fluctuations and doubts in the Arab stock markets have increased sharply specially for markets which originally characterized

by a high degree of volatility. This was a direct effect of the crisis on investors' trust and the change in risk-return relationship observed globally.

Previous empirical research provides mixed results to the risk-return relationship. While some empirical studies found a positive relationship between risk and return (Ghysels et al 2005, Bollerslev et al 1992), other studies found that the relationship is negative and hence higher risk is compensated with lower return (Brandt and Kang, 2004). Moreover, some studies did not find any relationship (Battilossi and Houpt 2006). This conflict in result ultimately produced an intellectual dilemma and more empirical research is needed to clarify the nature of the relationship between risk and return; if any.

Although there has been extensive empirical research testing the relationship between risk and return in advanced stock market, little has been done in emerging markets specially small markets such as PSE. Therefore, this paper attempts to test the relationship between risk and return under the current financial crisis for the Palestine Securities Exchange (hereafter PSE). The results of the study then can be used by policy makers, investors and portfolio managers in pricing financial assets in an emerging market such as PSE.

This research will add to the existing body of knowledge of emerging markets by examining the existence of a positive relationship between risk and return in PSE. In addition, what distinguishes this research study is that it uses a Generalized Autoregressive Conditional Heteroskedasticity model (hereafter GARCH) to test the non-linear relationship that might exist between risk and return. The results will be of much concern for policy makers when placing general policies to supervise the market's performance; as well as for investors and portfolio managers when planning their investment strategies.

The rest of this paper is organized as follows. Section 2 provides a brief Description of the Palestine Securities Exchange. Section 3 provides a review of literature. Section 4 discusses the data and methodology. Section 5 analyzes the empirical findings. And section 6 summarizes, and recommends the paper

2. Palestine Securities Exchange: A Brief Description

At the beginning of 1995, a number of pioneers from the Palestinian private sector realized the importance of establishing a modern sophisticated and well organized market to facilitate dealing with securities in Palestine. The aim at that time was to attract and retain local and foreign capital

for the purpose of funding long-term infrastructure and productive projects. With the signature of the agreement with the Palestinian National Authority at the end of 1996, the PSE was materialized and the actual trading started on 18/2/1997.

At the beginning few companies traded in the market. However, by mid 2009 the number of trading companies rose to 38. It is expected that the number of trading securities will rise further when the Capital Market Authority is established in order to supervise non-banking institutes including PSE. As for the exchange currency, most companies are trading in Jordan Dinar. However there are few companies that are trading in US dollar.

On 7 July 1997 the benchmark index (Al-Quds Index) was constructed from 10 of the most active shares in the market. Al-Quds Index is value weighted where each company's weight in the index is determined by its relative percentage of the aggregate market capitalization of the 10 companies that constitute the index.

During the previous period, PSE demonstrated flexibility and capability of overcoming political, social and economical obstacles. The market also managed to be ahead of many of international stock exchanges in terms of performance. This is evident by the increase of Al-Quds Index by around 306% at the end 2005. The amount of circulation also rose to 2.096 billion dollars in 2005 and market value reached around 4.5 billion dollars (this value is almost equal to the value of securities of seven European States newly joined the European Union). However, the index decreased in the following years by around 46% in 2006, 13% in 2007 and 16% in 2008. During the year 2009 Al-Quds Index started to witness a modest improvement but unfortunately was not able to reach the levels of 2005 (for more information on PSE please refer to the website: www.p-m-s.org.ps).

3. Relevant Literature

The Global Financial Crisis which exploded in the year 2007 grew uncontrollably until it became the largest financial shock since the great depression of 1929 and caused severe damages to capital markets and financial institutions that constitute and control the financial system (Zarraq, 2009). One aspect of the current crisis is the occurrence of unprecedented loss of liquidity. Banks' liquidity kept low due to the continuous increase in uncertainty resulted from losses related to mortgage-backed securities (Hashad, 2009).

For equity markets the state of fear and horror struck investors in the whole world and. The crash spread throughout most stock markets starting from the stock exchange in Wall Street and ending by Indonesian Stock Exchange which stopped trading at one instant. The decline has also struck most of Arabian stock markets. The Decline was severe and liquidity dried out quickly as a result of the global financial crisis (Onoor, 2009).

As for PSE, although the global financial crisis had its effect on it but the effect was minimal. According to financial economists the impact of the crisis was limited or indirect because of the weak linkage between PSE and the world's capital markets. However, the sharp decline observed in PSE at the beginning of the crisis was due to a psychological reaction rather than weak fundamentals.

On the other side modern Portfolio Theory (PT) defines risk as the volatility or variance of stock returns. Returns represent the benefits of which investors seek against investing their funds in risky investments. During high volatility periods investors demand higher returns and search for investments that give the highest rewards (returns) for the accepted level of risk (Khraiwish et al, 1996, pp. 40-41). The increase in the accepted level of risk on the other hand makes investors reject the investment unless there is a proper increase in the expected rate of return (al-Hindi, 2002, p. 398).

As an extension of PT, the Capital Assets Pricing Model (CAPM) breaks down risk into diversifiable and non-diversifiable and that non-diversifiable risk is regarded to be the most important factor when making the investment decision (al-Hindi, 2002, p. 399).

Consequently the basic principle of which investment decisions are based on is that there is a positive relationship between risk and return (tradeoff); when risk increases required return increases (Khraiwish et al, 1996, p. 42).

As for the empirical research testing the tradeoff between risk and return results are mixed and inconclusive. Many studies have shown empirically the existence of a positive relationship between risk and return, other found a negative relationship and the rest found no significant relationship.

Choudary (1996) studied volatility and risk premiums in six emerging markets before and after the US stock market crash in 1987. The research used a GARCH-M model of the monthly returns of Argentina, Greece, Mexico, Thailand and Zimbabwe stock markets during the period 1976-

1994. The findings showed a change the ARCH indicators and fluctuation in the stock markets before and after the crash. Also the results showed less risk premium during such period but the volatility and premium depended on each market separately and their cause was not merely restricted to the market crash of 1987.

Salman (2002) study aimed at providing an imperial investigation to risk-return relationship in Istanbul Stock Exchange during the period 2/1/1992 - 29/5/1998, using a GARCH model. The study reported a positive relationship between risk and return and changes in trading volume and return during the period of study.

Al-Fayyumi's (2003) investigated the relation between the trading volume and volatility of stock prices of PSE. The study used weekly data and GARCH methodology of Al-Quds Index during the period 7/8/1997 - 28/9/2000. The research reported that it is statistically difficult to explain prices volatility by trading volume.

Ghysels et al. (2005) tested the relationship between risk and return in US using daily and monthly prices during the period 1928-2000. The research employed different methodologies such as ICAPM and GARCH to reveal a positive relationship between risk and return. The research also reported new results regarding the asymmetric reaction of volatility to positive and negative return shocks. Compared with negative shocks, positive shocks have a bigger impact on mean returns; slower to be incorporated into the conditional variance, and are much more persistent and account for the persistent nature of the conditional variance process.

Shin (2005) examined the relationship between risk and return in fourteen international emerging markets during the period 1989-2003. Using weekly data and applying a GARCH model, the study found that there is a positive relationship between risk and return in 10 markets but this relationship was statistically significant only for 3 markets.

Battilossi and Houpt (2006) used weekly data for investigating the relationship between risk and return and trading volume in Bilbao Stock Exchange during the period 1916- 1926. Using a GARCH model the study reported strong evidence in favor of autocorrelation and GARCH effects, no evidence of risk-return relationship, and weak evidence of a contemporaneous impact of trading volumes on returns.

Khediri and Muhammad (2008) studied the volatility of the UAE stock market using GARCH and ARCH models for the period 2001-2005. The results showed that the model used is able to

forecast market volatility described by means of low, medium and high volatility episodes. Furthermore, based on the non linear threshold autoregressive methodology, the study identified a significant leverage effect such that a stock price decrease would have a greater impact on subsequent volatility than a stock price increase with the same magnitude.

4. Research Data and Methodology

The data for this research is daily closing prices for Al-Quds Index from 17/10/2000 to 16/8/2009. The period after September 2000 was chosen because of the political and economic instability in the Palestinian territory before that date. The study period was also divided into two sub periods: the first period extends from 17/10/2000 to 15/8/2007 (Pre Global Financial Crisis Period) and the second spans over the period 16/8/2007 to 16/8/2009 (Global Financial Crisis Period). Daily returns R_t were computed as the natural logarithm of daily prices according to the following formula:

$$R_t = \ln(P_t - P_{t-1})$$

Where P_t , P_{t-1} are the closing prices of Al-Quds Index on day t and $t-1$, respectively.

The total number of observations was 1,858 for the full period, divided to 1,368

observations for the Pre Global Financial Crisis Period and 490 observations for the Global Financial Crisis Period.

In order to study the relationship between risk and return in PSE, this study assumes that a positive relationship exists between risk and return under the presence of the global financial crisis. The relationship will be investigated using GARCH model instead of using traditional models such as CAPM. The reason for this is that previous studies have shown that returns are not normally distributed for PSE market index and because of the presence of heteroskedasticity (see for example Alfayyumi (2003) and Darwish (2009)). However, this study will use Jarque-Bera (JB), Ljung-Box, Dickey-Fuller (ADF) and ARCH-LM tests to investigate normality, heteroskedasticity and stationary of the series.

Table 1 shows some descriptive statistics of the daily returns of the Al-Quds Index in addition to the basic tests of the whole period of study and the two sub periods. The mean return of the market index and standard deviation for the whole period are 0.0004 and 0.019,

respectively, with the mean and standard deviation or the pre global financial crisis period greater than that of the period of global financial crisis.

Table 1: Descriptive Statistics and Results of Basic Statistical Tests

	Mean Return	Standard Deviation of Daily Returns	Skewness	Kurtosis	Jarque- Bera (JB)	Ljung- Box test LB(1Lag) (Q)	Unit Root Test (ADF)	ARCH- LM (6 Lags)
Full Period 17/10/2000 – 16/8/2009	0.0004	0.019	0.462	9.014	2865.99*	0.257* (123.35)	-33.06*	37.79*
Pre Global Financial Crisis Period 17/10/2000 – 15/8/2007	0.0004	0.019	0.568	9.757	2675.72*	0.227* (96.54)	-28.11*	41.46*
Global Financial Crisis Period 16/8/2007 – 16/8/2009	0.0003	0.016	-0.043	4.1	24.86*	0.265* (25.35)	-17.52*	18.57*

* Significant at the 1% level

Examining the results in Table 1 shows that returns of the full and sub periods are not normally distributed (this is evident from measures of skewness and kurtosis) and the hypothesis of normality can be rejected at the 1% level using Jarque-Bera (JB) test. However, the distribution of return approximates normality during the period of the global financial crisis when the JB coefficient considerably drops in value.

The Ljung-Box test is used to test the time-series autocorrelations in returns for 1 lag. The results clearly show a rejection at the 1% level of the hypothesis that the time-series of returns. It is noticed, however, that the value of the coefficient is higher during the period of the global financial crisis than that of the period preceded it.

The Augmented Dickey-Fuller (ADF) is used to test if the series of returns is stationary or not. The results of the test reject the hypothesis that the series has a unit root at the 1% level of significance. Therefore, it can be concluded that the series of returns are stationary. This result is necessary to avoid obtaining spurious results when using non-stationary variables.

Finally, it can be noticed from Table 1 that there is a high degree of volatility in the index's returns and consequently non-stationary covariances (Heteroscedasticity). This last result is evident from the ARCH-LM (6 lags) and the Lagrange Multiplier (LM) tests.

To summarize, descriptive statistics show that the series of returns of Al-Quds Index has skewness and kurtosis and hence not normally distributed. This result is in line with the results

obtained by previous studies for PSE (Al-Fayyumi 2003, Darwish 2009) and other emerging markets (Bekaert et al. (1998). The results also show a high degree of volatility and non-linearity in returns which is according to Diebold (1986) more appropriate to use GARCH models when the time-series variable has such characteristics.

Because the research will use a GARCH-M model it is important to decide the lag length for p and q . For this purpose, the Bayesian information criterion (BIC) or Schwarz Criterion, Akaike's information criterion (AIC), and the log-likelihood are used to decide the optimal model and test the goodness of fit of the model according to the procedures described in Bollerslev and Wooldrige (1992). The GARCH-M (1,1) model takes the form

$$R_t = \mu + b R_{t-1} + \delta \sigma_t^2 + \varepsilon_t, \quad (1)$$

$$\varepsilon_t / \Omega_{t-1} \sim N(0, \sigma_t^2) \quad (2)$$

$$\sigma_t^2 = \omega + \alpha_1 \varepsilon_{t-1}^2 + \beta_1 \sigma_{t-1}^2 \quad (3)$$

Where R^t represents the stock market return, μ is the constant or the conditional mean, and ε_t is the residual term, limited to Ω_{t-1} is being normally distributed. The conditional variance, σ_t^2 is a function not only of last period's error but also of the last period's conditional variance with the parameters α_1 and β_1 , indicating the propensity of volatility shocks to persist over time. The sum of these two coefficients denotes the degree of persistence in the conditional variance given a shock to the system. In particular, the above sum should be less than 1 in order to have a stationary variance. Table 2 gives the results of the model using different lags. The results in Table 2 show that a GARCH-M model with lags of (1,1) is the most appropriate for PSE.

Table 2: Model selection of GARCH-M (p,q)

	GARCH-M(1,1)	GARCH-M(1,2)	GARCH-M(2,1)	GARCH-M(2,2)
BIC	-5.8161	-5.8083	-5.8106	-5.8044
AIC	-5.8236	-5.8218	-5.8218	-5.8205
Log Likelihood	5708.9438	5707.1868	5706.4276	5706.339

Among the parameters to be estimated by the GARCH and the most relevant to this study is the parameter δ . The sign and significance of the parameter determine the relationship between volatility and stock market return. Whereas the significant positive estimate implies that investors

are compensated with higher returns for the higher risk, the significant negative estimate model indicates that investors are penalized for bearing higher risk.

5. Empirical Results

Table 3 presents the coefficients of GARCH-M (1,1) model for the full period and the two sub periods. The results show the appearance of the effect of GARCH in all periods. This represents an evidence of high volatility in the return series significant at the 1% level.

Total GARCH coefficients' value ($\alpha + \beta$) are almost one integer in all periods. This includes the continuity of volatility shocks in this market. In general, the continuity of volatility supports the results of the unit root (ADF) shown in Table 1 and as a result volatility responds to the short term (daily) shocks. By comparing α and β values, it is clear from Table 2 that the value of α is less than β for all periods. This result means that the effect of historical news and information is less than that of the current information and hence investors and brokers value more new information than historical information.

Table 3: Coefficients of GARCH-M (1,1)

	α	β	$\beta + \alpha$	δ
Full Period 2009/8/16 -2000/10/17	0.296* (11.061)	0.702* (30.531)	0.998	0.819 (0.733)
Pre Global Financial Crisis Period 200/8/15 – 2009/10/177	0.32* (9.589)	0.70* (26.788)	1.02	10122 (0.902)
Global Financial Crisis Period 2009/8/16– 2007/8/16	0.233* (4.64)	0.704* (14.292)	0.937	-0.133 (-0.051)

* Significant at the 1% level
Z score value is in the parentheses

Results in Table 3 show that the volatility effect on returns of the indicator (α) was positive for the whole period including the Pre Global Financial Crisis but it was not statistically significant at the 1% level. This means that the relation between risk and return, and consequently risk premiums is positive but not statistically significant.

On the other hand, during the period of the global financial crisis, the relation between risk and return in PSE was negative but not significant at the 1% level. In other words in PSE there was no increase in the risk premium and that market investors were not concerned about the global financial crisis. These results show that there is no effect for the global financial crisis on the volatility of PSE and that there are other factors that are responsible for price behavior in PSE.

This result is expected to be observed in PSE as the market is inefficient due to many factors (see Darwish 2009).

By comparing the results of the GARCH model for the two sub periods, there was no statistically significant difference observed. However, the stability of volatility in the market, which was measured by $\alpha + \beta$, dropped during the period of the global financial crisis as compared to the period before.

6. Summary and Recommendations

This research investigated the relationship between risk and return in the Palestine Securities Exchange (PSE); the effect of the global financial crisis on the market and how far the market was able to compensate investors for the additional risk in terms of return.

This study used daily returns for Al-Quds Index during the period 17/10/2000 until 16/8/2009. The full period is also divided into two sub periods; Pre Global Financial Crisis Period and the Global Financial Crisis Period. For the full period GARCH-M (1,1) model's results showed a positive relationship between risk and return in PSE though this relationship was statistically insignificant. Nevertheless, the results of the sub period "Global Financial Crisis Period" showed a negative statistically insignificant relationship. Therefore, the results indicate that the relationship between risk and return is weak in PSE and that the market was not directly affected the global financial crisis. This is logical given that PSE is a newly established small market.

Based on the pervious results the research gives the following recommendations:

- i. Current and potential investors should be fully aware of the risks that they are willing to take when investing in PSE and manage these risks in a proper manner using precautionary measures and actions.
- ii. It is required that policy makers in PSE make the market more transparent by introducing laws requiring more financial information and disclosures by quoted companies to allow investors assess risks properly.
- iii. It is necessary that PSE and other Arab and emerging markets to coordinate, exchange experience and information, and discuss financial and economic analysis for the purpose of promoting stability specially when facing some economic problems.

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