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The Behavior of the Major and Sub-sector Indices in Amman Stock Exchange during the Global Financial Crisis

سلوك مؤشرات الأسهم الرئيسة والقطاعية في بورصة عمان خلال الأزمة المالية العالمية

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Abstract

This study aims to empirically examine the effect of global financial crisis (2008) on the behavior of Amman Stock Exchange (ASE) represented by the three general main indices viz., Free Float (FF), General Unweighted (UW), and Price Weighted (PW), and on the four sectoral indices, namely banking, insurance, services and industrial. The hypotheses were tested by investigating the differences in the three general market indices and the sectoral indices before and after the global financial crisis by applying the parametric paired sample t-test and the non-parametric Wilcoxon Matched-Paired Signed Ranks test. The time span was 116 trading days before June 19, 2008 (which was chosen as a trading peak day) and 116 trading days after June 22, 2008. The study found that there were statistically significant differences between stock prices before and after the global financial crisis for most indices in (ASE). This result indicates that these indices succeeded in capturing the negative signals of the financial crisis, except for the banking's sub-index. On the other hand, the incompatibility of the (PW) index's result with the other indices may suggest the need to review the index sample or the weighting scheme. The results also indicate that parametric or nonparametric tests can be used interchangeably in (ASE).

Keywords: Global financial crisis, Amman Stock Exchange (ASE), General indices, Sectoral indices, Parametric and non-parametric tests.

الملخص

هدفت الدراسة الى التحقق من أثر الأزمة المالية العالمية عام (2008) على أداء بورصة عمان للأسهم من خلال تحليل المؤشرات الرئيسة الثلاث (المؤشر العام بالأسهم الحرة FF، والمؤشر العام غير الموزون UW، والمؤشر العام الموزون بالسعر PW)، فضلا عن اختبار أثر الأزمة على المؤشرات القطاعية (الفرعية) التي يشتمل عليها كل مؤشر عام، وهي (مؤشر البنوك، مؤشر التأمين، مؤشر الخدمات والمؤشر الصناعي). اختبرت الدراسة الفرضيات من خلال التحقق من وجود فروقات معنوية بمستويات المؤشرات (العامة والقطاعية) قبل وبعد الأزمة المالية العالمية، من خلال تطبيق اختبارين مختلفين، الأول: اختبار(t) للعينات المزدوجة، كاختبار معلمي، والاختبار الآخر: هو اختبار ويلكوكسون لإشارة العينات المزدوجة، كاختبار لا معلمي، من أجل مقارنة النتائج. اشتملت مدة الدراسة على فترتين: الأولى قبلية، تكونت من 116 مشاهدة لأسعار الإغلاق ليوم التداول 2008-6-19 رجوعاً، حيث تبين أن هذا التاريخ يؤشر بداية هبوط شديد لجميع المؤشرات، أما الفترة الثانية فتبدأ من يوم 2008-6-22 وتشمل 116 مشاهدة. تشير النتائج إلى وجود فروقات ذات دلالة معنوية بمعظم المؤشرات سواء أمر المؤشرات العامة أم القطاعية قبل وبعد الأزمة المالية العالمية، وهذا يشير إلى نجاح هذه المؤشرات على التقاط الإشارات السلبية التي أثرت على مستويات الأسعار ما عدا مؤشر قطاع البنوك. وبينت نتائج المؤشر الموزون بالسعر PW عدم تماثلها مع نتائج المؤشرين الآخرين، وربما يحتاج ذلك إلى إعادة نظر بالعينة أو طريقة وزن الأسهم بالمؤشر. وفي الختام أوضحت النتائج أن اختبار الفروقات باستخدام الاختبار المعلمي أو اللامعلمي، يعطيان نفس النتائج، وبالتالي يمكن أن يشكل أحدهما بديلاً عن الآخر في بورصة عمان للأسهم.

الكلمات المفتاحية: الأزمة المالية العالمية، بورصة عمان للأسهم، مؤشرات السوق العامة، مؤشرات السوق القطاعية، اختبارات معلمية ولا معلمية.

1. Literature Review

1.1 Introduction

Financial crises in stock exchanges have become so common that it was perceived as a phenomenon in the past three decades. However, a number of factors have made the recent global financial crisis (2008) different from others in terms of intensity and wide scope of influence globally. One study revealed that the global stock market lost $29 trillion; a 56% decline (Bartram, et al. 2009).

Financial crisis has influenced almost all countries and it has been estimated that ASE has been also affected in one way or another by the global financial crisis. Nine years after the financial crisis, and due to the shortage of similar studies, it is necessary to analyze the impact of this crisis on the price behavior of the ASE represented by the three main indices: (FF), (PW), and (UW), each with four sectoral indices: banking, insurance, service, and industrial. When the level of these indices were tracked, some differences of the effect of the financial crisis on these indices were noticed. Therefore, the study attempts to detect these differences, using two different statistical tests: Paired Sample t-test and the Non-parametric Wilcox-

on Matched-Paired Signed Ranks test. Hopefully, this study will be comprehensive for all sectors in ASE and serve a wide range of researchers and investors. The remaining sections of this part are organized as follow: problem of the study, research objectives of the study, significance of the study, hypotheses, theoretical framework and previous studies.

1.2 Problem of the Study

The response of any stock indices to the important events, especially the financial crises, may be different depending on the number and type of shares in these indices and the mechanism of calculating each index. However, following the various stock indices in ASE, a great variation in the response of these indices to the global financial crisis was noticed, and some of them move contrary to expectations. Therefore, this study tried to detect the impact of the financial crisis on the three main indices: (FF), (PW), and (UW). Each general index has sectoral indices, namely banking, insurance, service and industrial. Moreover, the current study is an attempt to detect if there are differences in the results when using two different types of tests, an issue that may

lead researchers to different results and conclusions in ASE. The two different tests are: paired sample t-test; which requires the data to be distributed normally, something proved difficult to achieve in most of the financial markets, compared with the other test, Wilcoxon matched-paired sign ranks test; which does not assume the normal distribution of data, so the current study seeks to answer the following questions:

Is there an impact of the global financial crisis on the stock indices of ASE, whether the indices are general or sub-sectoral? From the main question, the following sub questions are derived:

A. Are there statistically significant differences in the three main indices, namely the (FF), (UW), and (PW) before and after the global financial crisis?

B. Are there statistically significant differences for the sectoral indices, namely the banking, insurance, service and industrial before and after the global financial crisis?

C. Will the results of the previous tests differ when two different tests are used: The parametric paired sample t-test and the non-parametric Wilcoxon matched- paired signed ranks test?

1.3 Objectives of the Study

The main goal is to ascertain how the main and sub-sectoral indices of the ASE responded to the global financial crisis through achieving a number of the following sub-objectives:

A. To clarify the impact of the global financial crisis on each of the three main indices in ASE, as well as to clarify its impact on the sectoral indices.

B. To examine the existence of differences between the level of different indices, whether main or sectoral indices, before and after the global crisis.

C. To test the hypotheses according to two different statistical methods: a parametric test (paired samples t-test) and a non-parametric test (Wilcoxon matched- paired signed ranks).

D. To investigate if there is a need to review the performance of equity indices, whether ma-

jor or sectoral, by judging the nature of their response to the global financial crisis in 2008.

1.4 Significance of the Study

The study importance of this study stems from the role played by equity indices and examines the behavior of these indices in response to the global financial crisis. It also reveals whether there are differences in the level of the three main indices before and after the crisis, if these differences are proved, this indicates that investors have a quick response to the global events in ASE. The study also contributes to the scientific debate in determining the appropriate testing of hypotheses by determining the differences in the results after using two types of statistical tests. Therefore, the researcher hopes that results may serve both the academics and investors in ASE.

1.5 Hypotheses of the Study

The first main hypothesis (H0) 1: There are no statistically significant differences ($\alpha \leq 0.05$) before and after the global crisis for each of the following four sectoral indices: banking, insurance, service and industrial in the ASE according to (paired sample t-test). The following sub-hypotheses stem from the first hypothesis:

(H0) 1-1: There are no significant differences in the four sectoral indices included in the first main index: the (FF) before and after the global crisis according to (paired sample t-test).

(H0) 1-2: There are no significant differences in the four sectoral indices included in the second main index: the (UW) before and after the global crisis according to (paired sample t-test).

(H0) 1-3: There are no significant differences in the four sectoral indices included in the third main index: the (PW) before and after the global crisis according to (paired sample t-test).

The second main hypothesis (H0) 2: There are no statistically significant differences ($\alpha \leq 0.05$) before and after the global crisis for each of the following sectoral indices: banking, insurance, service and industrial in the ASE according to Wilcoxon matched-paired sign ranks test. The following sub-hypotheses stem from the second hypothesis:

(H0) 2-1: There are no significant differences in the

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four sectoral indices included in the first main indicator: the (FF) before and after the global crisis according to the Wilcoxon test.

(H0) 2-2: There are no significant differences in the four sectoral indices in the second main index: the (UW) before and after the global crisis according to the Wilcoxon test.

(H0) 2-3: There are no significant differences in the four sectoral indices included in the third main index: the (PW) before and after the global crisis according to the Wilcoxon test.

1.6 Theoretical Framework
1.6.1 The timing of the crisis globally and locally

Although there is a consensus on the impact of the global financial crisis on most financial markets around the world, there is no agreement on the history of the start of the crisis or its peak. For example, on September 14, 2008, Merrill Lynch announced that it had been acquired by Bank of America and the following day Lehman Brothers Bank announced its bankruptcy. In Europe, on October 5, 2008, the Icelandic government declared bankruptcy after a series of bank crises, which led to a 20% devaluation of the local currency against the Euro. In this regard, the study of Onour (2010) reported that the date of August 15, 2008 is the dividing line between the period before and after the global crisis based on the bankruptcy of Lehman Investment Bank. Ivashina and Scharfstein (2013) confirmed that in the United States new loans to large borrowers fell by 47% during the peak period of the financial crisis (fourth quarter of 2008) relative to the prior quarter and by 79% relative to the peak of the credit boom (second quarter of 2007) as an indicator to the financial crisis.

In order to determine the history of the crisis, Manda (2010) tracked stock prices from January 2005 to November 2009. Then, March 17, 2008 was chosen as the pre-crisis period when JP Morgan acquired Bear Stearns investment bank. Alnajjar et al. (2010) reported that the global financial crisis began in July 2007, according to a report in the Wall Street Journal that year where there were signs of a very hard decline in stock indices started in August, the sharpest decline was in October and November of the same year.

The impact of the global financial crisis and its spread to various economies and markets around the world are well established. However, what needs to be further examined is how this impact has reached its peak in various financial markets. The difference in the timing of the arrival of the impact of the global financial crisis to the world markets and exchanges depend in part on the extent to which these local markets are linked to the global markets in general and to the United States markets in particular and their openness to foreign capital. Therefore, determining the date of arrival of the impact of the crisis on each financial market is a challenge, also it is the basis for the success of any study.

In order to determine the peak of the impact of the global financial crisis, a cut-off date for the pre-post crisis in ASE should be chosen, so the prices of all three major stock indices as well as the sectoral indices within each index have been tracked. The largest decline in the ASE during that period was between the close of trading on Thursday June 19, 2008 and the close of trading on Sunday June 21, 2008 which is the first trading day after the weekend. Nevertheless, the study of Nour and Sharabati (2014) asserted that the impact of the global financial crisis reached late to the stock market and caused the decline of the ASE but in 2009.

Since the Jordanian economy is part of the global economy and is linked to it through trade transactions (exports and imports) with capital and investment transactions and transfers (Awad, 2010), it is natural that the Jordanian economy is influenced by what is happening in the global economy. Nevertheless, the former Minister of Finance in Jordan explained that the true impact of the global financial crisis was psychological rather than real factors, and the stock market plunged 30% in the six months following the crisis.

1.6.2 Stock Indices

The main objective of the financial indices is to monitor, evaluate and compare the performance of the various markets and companies that are invested in, to make the right decisions in a timely manner. It is also used to compare the performance of the main indices within the same financial market.

Although the stock indices perform the same purposes by measuring the general levels of stock prices, they differ in terms of the type and number of companies included in the index sample, as reflected in the difference in the calculation of the index. Some of them include dozens of shares, others include hundreds; some are price weighted the other weighted by the market value of shares and some of them are equally weighted.

1.6.3 The function of stock index

In addition to the above functions of traditional stock indices, new indices have emerged with different nature called reputable (reputational indices). Where some companies join this indicator considering several factors, the most important are the financial performance factors, as well as social and environmental indices. Therefore, the companies that are nominated for these indices must fulfill several requirements related to social responsibility as well as to distinguish them in terms of financial performance, so price increase is expected for those companies because of the community's recognition socially and environmentally. Examples of these indices are: the (Dow Jones Sustainability index), which was established in 1999 in the United States and (Financial Times FTSE 4 Good index) which was established in Britain on 2001 (Blajer, 2014).

1.6.4 Most prominent types of indices

The success of any financial index depends on its ability to reflect the current economic situation and the general trend in prices, as well as the activity of companies whose shares are traded on the stock exchange, also to predict in advance some future economic conditions. The most prominent types of indices include (ASE, 2015):

1. Simple arithmetical index: it is the index that adopts a simple mathematical method in calculating the index. This is done by dividing the total share price of companies in the index sample by the number of these companies to reach the average price of the index for a given day. It is compared to the average price on any other day without being linked to a base day price.

2. Simple index: This index calculation scheme is somewhat similar to the previous simple arithmetic index, but the comparison is based on the market value of the base year, by calculating the index market value and attributing it to the nominal value of the base year.

3. Weighted market value index: The index determines specific weight for each share in the sample depends on its market value. Each company is given weight in the index to the extent that its market value represents the market value of the sample as a whole.

4. Free weighted equity index: Free stocks are the stocks that are actually available for trading, considering that government institutions and large companies sometimes hold large amounts of shares without trading them for sale or purchase transactions. Therefore, it can be said that this indicator provides a better representation of the movements of stock prices in the market.

1.7 Previous studies
1.7.1 (Alnajjar et al., 2010).

This descriptive study was aimed to determine the impact of the global financial crisis on the financial services sector in ASE. The study emphasized the influential role of the financial sector on ASE, thereby; pointing out that the effect of the crisis on the Jordanian capital market is not a credit crisis, but a liquidity crisis. Therefore, the claim of some companies to deal with the global financial markets affected by the financial crisis has made many investors seeking to withdraw their investments from the Jordanian market and was estimated to be between one billion to one and half billion Jordanian dinars.

1.7.2 (Septiany and Nugioho, 2011).

This study aimed to practically analyze the impact of the Greek financial crisis in 2009 on two main financial indices in Indonesia by applying two periods before and after the crisis between 2007 and 2011. The study used paired sample t-test in the hypotheses testing. The results also showed that the financial market in Indonesia is almost inefficient. It was considered that the insignificant differences in

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the financial indices for the period before and after the financial crisis are pieces of evidence that investors in that market did not have a quick and direct response to the crisis and this contradicts with the efficient market hypotheses when new news arrives.

1.7.3 (Bush 2012).

One of the most important objectives of this doctoral dissertation was to test the relationships and behavior of a number of well-known stock market indices in 23 countries, the most important of which are the DJIA and the NASDAQ indices, and how they differ from sectoral indices. The researcher asserts that if there are significant differences between the sectoral and the main indices, then this will be a challenge to the Efficient Market Hypotheses (EMH) by checking the Monday effect, and the first trading day after the weekend in western countries. The results supported the existence of a difference in the impact of some events such as the impact of Monday on the main indices compared to the impact on the sectoral indices and their component stocks, but these differences dimensioned when the duration of the study extended to cover the global financial crisis.

1.7.4 (Kharka , 2012).

This study aimed to verify the need to conduct two types of tests in the financial markets: the parametric tests which assume that the share prices are distributed normally, the other is the non-parametric test which does not assume data normality. The study analyzed the stock prices and returns for the period before and after the crisis, from January 2006 to December 2011.The sample included the South Asian Association for Regional Cooperation (SARRC) countries: Bangladesh, Bhutan, Nepal, Pakistan, Sri Lanka and India. The study also used t-test to detect the differences between the financial markets in the sample countries. The results pointed that the distribution of stock prices of these countries is not normal because of the high values of skewness and flattening, but the use of non-parametric tests showed that there were significant differences in returns. During the global financial crisis, these differences were found to be significantly high on the weekly time periods as well as in the annual periods.

1.7.5 (MdKamrul, 2012).

This study used the Paired Sample t-test to determine whether there were differences in yield and risk before and after the important events that may occur in the financial markets such as starting a new stock index, taking into account the volume of stock trading and liquidity. Data was collected to cover two periods before and after launching new stock indices in a number of Southeast Asian countries. The results showed that there was a significant effect of the important events on the quantity of trading and liquidity of most financial markets in the research sample, also the results were almost identical in both types of parametric and nonparametric tests.

1.7.6 (Gul et al., 2013).

This study examined the financial sector of Pakistan to determine the impact of economic and climatic events and crises on share prices. The study randomly selected shares of 14 listed companies over a period of four years. It tested the hypotheses using Paired Sample T-test comparing the averages before and after the events affecting the various stock indices. The results indicate that the events, both local and global had a negative impact on the stock indices on the financial sector of Pakistan.

1.7.7 (Ikram and Nugraoho, 2014).

The goal of this study was to test the efficiency of the Indonesian stock market in a semi-strong form by studying 19 cases of merger declaration since 2000. It followed the event study methodology by tracking the abnormal returns of each stock in the sample by choosing 30 days ahead and 30 days after the announcement. The argument is as follow, if the market is efficient, equity indices will respond quickly to the merger announcement or any other significant events. The study concluded that Indonesia stock market was efficient in the semi strong form.

1.7.8 (Nour and Sharabati, 2014).

This study aimed to verify the impact of the global financial crisis on the Jordanian economy by studying the performance of the ASE, assuming that the occurrence of the global financial crisis was

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in 2009. The results of the study surprisingly showed that there was no significant correlation between the general index and the sectoral indices in the ASE compared to the New York Stock Exchange as well as other world markets. The study found that there was a similarity between the performance of the ASE and the Gulf Cooperation Council (GCC) member countries stock exchanges.

1.7.9 (Kasilingam et al., 2015).

This study was a comparative analysis of the performance of the Indian stock market in respect to some of Asian financial markets (Japan, Hong Kong, Taiwan, China, and Singapore). The study covered the period from July 1, 2000 until June 30, 2012. The researchers divided the whole period into partial periods, most notably the second period ending in the midst of the global financial crisis on June 30, 2008. The study found out that during the three periods of study, correlations were only 16% of the total number of links. The researchers recommended investors to diversify into different markets to achieve appropriate returns.

2. Study Design and Analysis

2.1 Data sources

The study was based on ASE published data available on the exchange web site. These data represent the closing prices of the three main indices: the (FF), (UW) and (PW). The four sectoral indices that were used during the period of the financial crisis and the stock exchange continued publishing them are: banking, insurance, services, and industrial indices. The statistical program (SPSS) version 21was used to test the hypotheses.

2.2 Determination of analysis intervals

For the practical purposes, it is necessary to determine the time when the negative impact of the financial crisis on the ASE began. The importance of determining this date is to find the pre-test and the post-test periods, which are necessary to calculate the significance of the differences. This requires a comprehensive track of all major and sectoral stock indices levels during the global financial crisis.The researcher found that the biggest daily decline in these indices was in the period from the trading closure day on Thursday June 19, 2008 and the closure of the first trading day after the end of the week holiday on Sunday June 21, 2008. For example, the general index of Free Floats closed on Thursday June 19, 2008 at (5043.7), while the index closed on Sunday the next trading day at (4871.8) with a daily decline of 3.4% as shown in Figure (1), see also Figures (2) and (3) in the Appendix. In order to confirm these periods, the researcher calculated the rate of change in the level of various indices after six months and found the following: The rate of decline in the level of the (PW) was (46%). For the (UW) the decline was (39%). The same applies to the general index of (FF), where the decline was (45%). These findings confirmed the peak period of the global financial crisis in (ASE). Based on the previous premises, the pre-period is chosen; ending with the closure of all indices on Thursday June 19, 2008, back to the beginning of the year 2008 which included 116 daily observations. In the same context, the post-period was chosen from Sunday June 22, 2008 and ended after 116 daily observations on March 12, 2008.
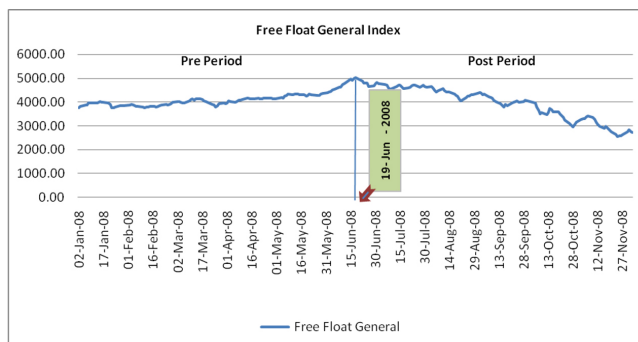

Figure (1) The highest level of the (FF) and the Pre-Post Periods during the global crisis.

2.3 Statistical tests

T-Test: Paired sample t-test which is considered to be the most appropriate test to this kind of research. It is used to detect the significance of the differences for the same variables but for the two periods of pre and post crisis. It is assumed that to apply this test, the distribution of variables is normal. There are many studies which proved that stock prices are often not normally distributed because the prices cannot fall below zero, while the stock prices can go up a lot and therefore, the upper tail of the distribution can be extended theoretically for infinity. The Wilcoxon matched-paired signaled ranks test performs the same purposes as paired sample t-test to detect positive or negative differences, however, observations are not necessarily normally distributed

(Black, 2008: 508).

2.4 Results

Table (1), shows the results of the paired sample t-test of the differences between the (FF) and the sectoral indices before and after the global financial crisis.

The results show that the level of significance is less than 5%. This leads to reject the first sub-null hypothesis in the first main hypothesis ((H0) 1-1) and to accept the alternative hypothesis that there are significant differences between these indices before and after the global crisis, except for the banking sectoral index, where the level of significance is higher than 5%. This confirms that the general index and other sectoral indices have responded to market

Table (1) Results of the Paired sample t-test of the (FF) and sectoral indices before and after the global crisis

		Paired Differences					T	df	Sig. (2-tailed)
					95% Confidence Interval of the Difference				
		Mean	Std. Deviation	Std. Error Mean	Lower	Upper			
Pair 1	General index Pre-Pro	160.14	504.99	46.88	67.53	253.28	3.421	115	.001
Pair 2	Bank index Pre-Post	68.29	612.15	56.83	-44.28	180.88	1.202	115	.232
Pair 3	Insurance index Pre-Post	-149.59	266.74	24.76	-198.64	-100.53	-6.040	115	.000
Pair 4	Service index Pre-Post	252.56	252.94	23.48	206.04	299.08	10.754	115	.000
Pair 5	Industrial index Pre-Post	-190.35	514.98	47.81	**-285.06**	**-95.63**	**-3.981**	**115**	**.000**

Table (2) Results of Wilcoxon test of the (FF) and sectoral indices before and after the global crisis

	General index Pre-Post	Bank index Pre-Post	Insurance index Pre-Post	Service index Pre-Post	Industrial index Pre-Post
Z	-2.152	-.616	-5.306	-8.273	-3.780
Asymp. Sig. (2-tailed)	.031	.538	.000	.000	.000

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volatility due to the global financial crisis except for the bank sectoral index.

The previous result of the differences between the various indices before and after the global financial crisis are confirmed in Table (2), which uses the Wilcoxon test for differences between the averages of the samples, where the distribution of observations is not required to be normal. The results also show that all the differences are significant except for the banking sectoral index. This leads to reject the first null hypothesis in the second main hypothesis ((H0) 2-1) and accept the alternative hypothesis that there are significant differences between these indices before and after the global crisis except for the banking sectoral index.

Table (3), shows the results of the paired sample t-test of the pre- post differences for both the (UW) and the sectoral indices. The results show that there are significant differences for all indices before and after the global crisis, as long as the significance level is less than 5%. This result leads to reject the second null hypothesis in the first main hypothesis ((H0)1-2) and accept the alternative hypothesis. This indicates that ASE has responded to the financial crisis according to the (GU) Index and the sectoral indices.

The results of the differences between various indices before and after the global financial crisis for the (UW) is shown in Table (4). The Wilcoxon test for the differences between the averages of the as-

Table (3) Results of the Paired sample t-test of the (UW) and sectoral indices before and after the global crisis

		Paired Differences					T	df	Sig. (2-tailed)
					95% Confidence Interval of the Difference				
		Mean	Std. Deviation	Std. Error Mean	Lower	Upper			
Pair 1	General index Pre-Pro	116.48	229.68	21.32	74.24	158.72	5.462	115	.000
Pair 2	Bank index Pre-Post	121.32	545.79	50.67	20.94	221.70	2.394	115	.018
Pair 3	Insurance index Pre-Post	185.94	499.11	46.34	94.14	277.73	4.012	115	.000
Pair 4	Service index Pre-Post	282.01	457.41	42.46	197.97	366.22	6.642	115	.000
Pair 5	Industrial index Pre-Post	35.83	89.94	8.35	19.29	52.37	4.291	115	.000

Table (4) Results of the Wilcoxon test of the (UW) and sectoral indices before and after the global crisis

	General index Pre-Post	Bank index Pre-Post	Insurance index Per-Post	Service index Per-Post	Industrial index Pre-Post
Z	-3.646	-1.364	-2.047	-4.807	-3.030
Asymp. Sig. (2-tailed)	.000	.173	.041	.000	.002

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sociated samples was used. Further, these results confirm that there is a similarity with the results of the paired sample t-test differences at 5%, except for the banking sectoral index. This leads to reject the second null hypothesis in the second main hypothesis ((H0)2-2). This result is also identical to the previous test of the (FF) using the Wilcoxon test in Table (2).

Table (5), shows the results of the paired sample t-test of the differences between the general and sectoral Price Weighted (PW) indices before and after the global financial crisis. The results show that most of the differences are not significant at 5% level, but only in the service and industrial indices.

This leads to accept the null hypothesis in the third sub-hypothesis of the first main hypothesis ((H0) 1-3). These results are not expected and are in contradictory with the previous results related to the indices of (FF) and (UW).

The results of the differences of the paired samples using the Wilcoxon test for the differences between the averages of the associated samples shown in Table (6), were similar to the results of the previous table (5). The results also show that most of the differences are not significant at α less than 5% except for the service and industrial indices. This leads to accept the third null hypothesis of the second main

Table (5) Results of the Paired sample t-test of the (PW) and sectoral indices before and after the global crisis

		Paired Differences					T	Df	Sig. (2-tailed)
					95% Confidence Interval of the Difference				
		Mean	Std. Deviation	Std. Error Mean	Lower	Upper			
Pair 1	General index Pre-Pro	-14.65	1070.71	99.41	-211.57	182.26	-.147	115	.883
Pair 2	Bank index Pre-Post	-92.52	2019.12	187.47	-463.86	278.81	-.494	115	.623
Pair 3	Insurance index Pre-Post	18.62	515.15	47.83	-76.11	113.37	.389	115	.698
Pair 4	Service index Pre-Post	296.96	354.35	32.90	231.79	362.13	9.026	115	.000
Pair 5	Industrial index Pre-Post	-424.05	937.17	87.01	-596.41	-251.69	-4.873	115	.000

Table (6) Results of the Wilcoxon test of the (PW) and sectoral indices before and after the global crisis

	General index Pre-Pro	Bank index Pre-Post	Insurance index Per-Post	Service index Per-Post	Industrial index Pre-Post
Z	-.847[a]	-.989[a]	-.050[a]	-7.697[b]	-4.234[a]
Asymp. Sig. (2-tailed)	.397	.323	.960	.000	.000

Table (7) Summary of the study hypotheses testing results

	General Index		Sectoral Indices								
			Bank Index		Insurance Index		Service Index		Industrial Index	
	T test	Wilcoxon test	T test	Wilcoxon test	T test	Wilcoxon test	T test	Wilcoxon test	T test	Wilcoxon test
Free Float Index (FF). Tables 1 and 2	Reject Null	Reject Null	Accept Null	Accept Null	Reject Null	Reject Null	Reject Null	Reject Null	Reject Null	Reject Null
Unweighted Index (UW). Tables 3 and 4	Reject Null	Reject Null	Reject Null	Accept Null	Reject Null	Reject Null	Reject Null	Reject Null	Reject Null	Reject Null
Price Weighted Index (PW). Tables 5 and 6	Accept Null	Accept Null	Accept Null	Accept Null	Accept Null	Accept Null	Reject Null	Reject Null	Reject Null	Reject Null

hypothesis ((H0) 2-3). This confirms that the results in the previous two tables are identical and not coincidental. Table (7) summarizes all the previous tests of the study hypotheses.

3. Conclusion and Recommendations

1. The last closing trading day, Thursday June 19, 2008 is considered the beginning of the decline in all stock indices in (ASE) because of the global financial crisis, whether general or sub-sectoral indices.

2. Most of the results showed that there were significant differences (α less than 0.05) for the financial indices before and after the crisis, both on the general or sectoral indices, confirming the ability of these indices in capturing the negative signals that affect the price levels and the volume of trading, except in the banking sector.

3. The results of the differences of the banking sector were unexpected, five of the six tests were to accept the null hypothesis that there was no significant differences before and after the crisis, taking into consideration that the global financial crisis started from the banking sector. This result is inconsistent with the logical foundations of the financial markets. This might be due to the precautionary procedures implemented by the Central Bank of Jordan. Such procedures have the impact of reducing the negative effects of the crisis locally. Also, it might be attributed to the precautionary policies announced by the commercial banks which could have an impact in mitigating the negative effects of the crisis. However, much research is needed in this area.

4. The results of the (PW) were mixed and not consistent with the other two indices, whether general or sectoral indices specifically banking and insurance. This may be a sign to review the sample included in the index or the weighting mechanism.

5. There is a similarity in using the parametric (paired sample t-test), which requires the normal distribution of observations and the non-parametric (Wilcoxon matched- paired signed ranks test), which does not require the normal distribution of the observations. The results were identical 29 out of 30 tests (see Table 7). Therefore, the researcher recommends using either test interchangeably.

6. Investors in ASE are recommended to use scientific diversification to mitigate some types of risks by allocating capital in different stocks and investment classes.

7. For future study, it is preferable to use the expected rate of return and examine the effect

of the global financial crisis on the basic two types of risk; unsystematic and systematic for the different types of stock indices in (ASE).
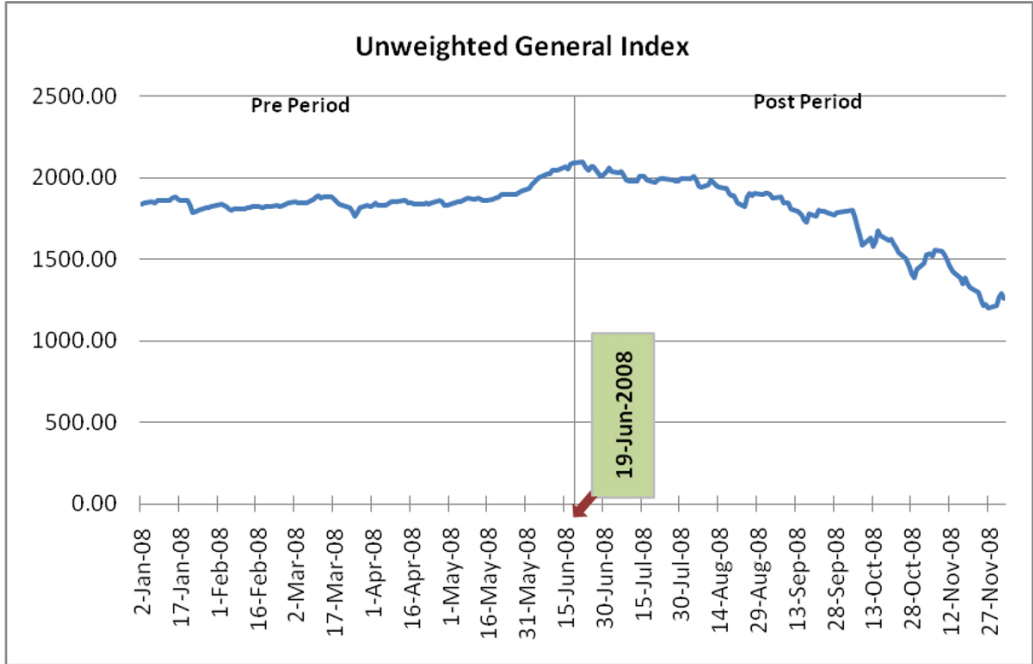
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Appendices

Appendix(1):

Appendix(2)