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The Effect of Electronic Trading on Market Liquidity and Stock Price Behavior: An Empirical Study on Amman Stock Exchange

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ABSTRACT

This study investigates the impact of applying the Electronic Trading System (ETS) which implemented on market liquidity, and stock prices behavior in Amman Stock Exchange (ASE) before and after its implementation on 26th March, 2000. Our data consist of closing prices and trading volume for 38 companies over the period from 1st January, 1996 to 31st December, 2004. We conduct an event study for the monthly relative means of 'trading volume' as a proxy for liquidity. Additionally, stock price behavior is examined through conducting an event study for the stock return. The findings of this research can be summarized as follows. First, market liquidity is significantly influenced by the electronic trading. The trading volume which is higher on an automated trading system than on a floor trading system. Second the impact of electronic trading shows a negative abnormal return.

Keywords: Electronic Trading, Liquidity, Stock Price Behavior, Amman Stock Exchange.

INTRODUCTION

There is a growing interest of academics and market participants such as exchange management, regulators and investors on the market microstructure which stimulated the emergence of a large bulk of empirical research that mainly deals with examining the impact and the implications of specific trading mechanisms on market characteristics (such as market liquidity and price efficiency). For example, several papers have compared the trading costs of the continuous auction and dealership market see (Madhavan, 1992; Christie et al., 1994; Blennehassett and Bowman, 1998; Huang and Stoll, 1996 among others).Other studies such as Amihud and Mendelson(1987) and Amihud et al. (1997) investigate the effect of moving from call auction trading to continuous trading. Additionally, some studies compare call auction and continuous auction with a special focus on the issue of informational efficiency, such as Amihud et al. (1990) and Amihud and Mendelson (1991), among others. Many stock exchanges around the world have abandoned floor trading systems and have fully automated their trading systems, including the Swiss Stock Exchange, the London Stock Exchange, the Vienna Stock Exchange and the Amsterdam Stock Exchange.

Emerging market improve their microstructure by adopting electronic trading in order to take advantages of existing technology, for example, (Israel in 1987 Amihud et al (1997), Singapore in 1989 Naidu and Rozeff (1994),Tunisia in 1996 Sioud and Hamied (2000) and Jordan in (2000)). Although there is already a large number of empirical studies that examine how the transfer from floor trading to electronic trading has an impact on market characteristic in developed markets see (Shyy and Lee, 1995; Pirrong, 1996; Lee and Chung 1998; Freund and Pagano, 2000; Venkataraman, 2001;Ciner,2002; Bayar and Onder,2005; Maghyereh, 2005), at which these studies investigated whether floor trading systems or electronic trading systems lead to higher liquidity, volatility and informational efficiency and stock price behavior. In other words, these studies enclosed themselves within the typical perspective of comparison between different trading systems in relation to market quality. They compare the level of market

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characteristics such as liquidity, price efficiency and volatility before and after automation. However, there were few similar studies about the effects of electronic trading on liquidity, and stock price behavior that been conducted on emerging markets especially Amman Stock Exchange. The aim of this study was to show how the introduction of electronic trading has an impact on Amman stock exchange microstructure (i.e. liquidity, and stock price behavior).

Problem Statement

Since March, 2000, when Amman Stock Exchange computerized its trading system and eliminated the traditional trading floor in order to improve its micro structure, and there were limited number of empirical studies that have been done in order to show the effect of electronic trading on market liquidity, and stock's price behavior in emerging stock market especially on Amman Stock Exchange. This research empirically examines whether electronic trading has improved market's liquidity, and achieved a greater efficiency in ASE by trying to find how the behavior of stock prices had changed following the transfer.

Significance of the Study

In fact this research builds on previous researches concerning the factors that may affect the trading mechanisms on market stock exchanges especially on emerging markets. The results may used to improve the quality of trading system in Amman Stock Exchange, by providing liquidity, enhancing efficiency and improving transparency. The current study contributes to the international efforts made to improve trading mechanism in Amman Stock Exchange. Also, stock price behavior is rarely studied in this context.

Study Objectives

In fact, several emerging stock exchanges have automated their trading system in order to take advantage of automation to improve its microstructure, and to show how the introduction of electronic trading has the potential to change the way stock market function, especially in emerging stock market which suffers from low liquidity, high volatility, and low market transparency.

Our objectives here are to show empirically the following relationship:

1. The effect of electronic trading system on market's liquidity in Amman stock exchange.

2 .The effect of electronic trading system on stock price behavior in Amman stock exchange.

Theoretical Concepts

Electronic Market

Electronic markets provide an electronic, or online, method to facilitate transactions between buyers and sellers that potentially provide support for all of the steps in the entire order fulfillment process (Bakos, 1991). Malone et al. (1987) stated that electronic coordination can be used to take advantage of two effects, the first is the brokerage effect while the second the integration effect which been discussed in details see Table (1) below. Black (1971) defined it “At which market participants could communicate with one another by way of terminals tied in with the network of computers. So that, the specialist would handle discretionary orders for institutions, individuals, and other brokers”.

Market Liquidity

Liquidity has long been an important issue for securities traded in financial markets. Even though, liquidity is easy to define in theoretical terms, but its empirical measurement in an accurate and reliable manner is difficult, except for markets that are relatively very liquid. For example, Kyle (1985, p.1316) points out that “market liquidity is a slippery and elusive concept, in part because it encompasses a number of transactional properties of markets”. These include tightness, depth, and resiliency.” Tightness refers to the cost of transactions, such as the bid–ask spread. Depth represents the ability of the market to absorb a large quantity of trade without having to large impact on price. Resiliency is defined as the speed with which the prices bounce back to equilibrium following a large trade.

Table (1): the two effects of the electronic trading: electronic brokerage effect and electronic integration effect.

Effect of Electronic trading	Author, Year Explanation	Explanation
Electronic Brokerage Effect	Malone et al. (1987)	Describes how electronic markets, connected many buyers and suppliers through a central database, so that it act like a traditional broker in matching buyers and suppliers. And by making use of the electronic market, a buyer can compare the offerings of many suppliers and screen out those that are inappropriate quickly, conveniently and inexpensively.
Electronic Integration Effect	Malone et al. (1987)	The integration effect happened when the information technology was used to more tightly couple the buyer and supplier through faster communication between the two, but a change in the relationship between them.

Source: (Malone et al. 1987, p. 21).

A market is considered to be liquid when it accommodates the ability to trade a large size quickly, at low cost, when you wish to trade. This definition shows that market liquidity has several dimensions, which are: Immediacy, how quickly a trade of a given size can be arranged at a specific cost; Width, the cost of a trade that can be arranged at a given size; Depth, the size of a trade that can be executed at a specific cost; and Resiliency, the speed with which prices revert to previous levels following the trading of an uninformed trader (see Harris, 2003). In fact liquidity and marketability are considered one of the most important characteristics of financial markets, to the extent that liquid markets play an important role in reallocating investors' assets holdings by allowing investors to trade and implement their trading strategies at low cost. Moreover, liquidity represent an important attribute of assets which influence investor's portfolio decisions. Thus, investors care about expected holding period returns net of trading costs, less liquid (and more costly to trade) assets need to provide higher gross returns compared to more liquid assets.

Stock Price Behavior

The analysis of the relation between stock prices and trading volume has been an important topic in the financial literature, both empirically and theoretically. For example Chen, Firth, and Rui (2001) examined the casual relation between returns, volume, and volatility of stocks indexes, by using a data consisted of nine national markets from 1973 to 2000. They found that there was a positive correlation between trading volume and the absolute value of the stock price changes. In fact there results indicated that the trading volume contributed some information to the return process. In addition the results showed that there was persistence in volatility after the incorporate of trading volume effect. Gold (2004) tried to examine and test the validity of using trading volume in order to forecast stock return behavior. The researcher used a sample that contained some listed stocks on the NYSE, AMEX, and NASDAQ exchanges from the period 1989 and 1995. He found that there were no significant differences in the frequency of reversals, and the variances in stock returns with high trading volume were significantly greater than the normal volume.

Review of Related Literature

In line with Amihud and Mendelson (1987*)* who examined the effect of the transfer from call to continuous trading on market liquidity, efficiency, and stock prices at New York stock exchange. They found that transferring to the continuous trading increase liquidity, so that the ratio of daily trading volume to the daily absolute stock return fell significant after the transfer. In addition, they found that market improved after the transfer, and improved liquidity leaded to significant increase in stock prices.

Additionally, Amihud,et al. (1990*)* who studied the impact of the transfer from call to continuous market on return volatility and the value discovery process at Milan stock exchange, using market stock return and trading volume of 12 stock during the period from January 2, 1984 to April 30, 1987, they found that the opening transaction in the continuous market had the highest volatility in comparison with the call transaction which seemed to produce relatively lower volatility. Moreover, they concluded that in closing transaction investor's correct perceived error or noise in the price at the call (price discovery). Muscarella and Piwowar (2001) studied the effect of transferring the Paris bourse stocks from call trading to continuous trading on market liquidity and stock prices. They used a sample consisting of 134 companies listed in Paris bourse, The researcher conducted an event study and measured the relative trading volume in order to test stock price behavior and market liquidity, respectively. They found that the transfer to continuous trading enhanced the market liquidity; also they noticed that the stock price increased as a result of market quality improvement following the transfer.

Amihud, et.al (1997) examined the effects of the transfer from call auction to continuous trading session on Tel Aviv Stock Exchange (TASE) using a sample of 120 stocks that did the transfer continuous trading. The results showed that stocks that were transferred to a more efficient trading method in the TASE enjoyed significant and permanent price increase. Stock liquidity improved following the transfer to the new trading method. Specifically, the results showed that there was a large and significant increase in both the market-adjusted trading volume and the liquidity ratio.

Also, efficiency of the value-discovery process - that stock prices adjusted faster to market information improved, and the noise in stock prices declined, in contrast Chang, Hsu, Haung and Rhee (1999) tested the effect of a switching from call to continuous market on market liquidity and volatility at Taiwan stock exchange during the period from January 5, 1994 to April 30, 1994.

The sample contained 67 trading days during which the researcher used two set of data, the first set contained the price and volume based on call market method and the second set based on continuous method. The researcher found that there was a significant difference in volatility between the two trading methods. Additionally, they noticed that the price volatility under call market method was on average, one half of that under the continuous auction method. They argued that the call market method worked more effectively in reducing price volatility of high volume stocks than low volume stocks. Beside that, they concluded that the price discovery is more efficient in the call market than in continuous auction market – at which the continuous trading didn’t necessarily minimize pricing error.

In contrast, Ciner (2002) who tried to investigate the information content of trading volume before and after the move towards electronic trading by using the daily closing and trading volume of 300 stocks indexes listed on Toronto Stock Exchange during the period from January 2, 1990 until May 5, 2002. He found that there was more accurate informational efficiency under electronic trading and that the predictive power of volume for price variability disappears after full automation.

Sioud and Hmaied (2003) examined the effect of the automation on the market characteristic on Tunisian Stock Market during the period from January 2, 1995 until December 31, 1998. They found a partial support of the result of Naidu and Rozeff (1994) in which the transfer to electronic trading showed an improvement in liquidity, decreasing in return, and no significant effect on volatility and efficiency.

Maghyereh (2005) examines the effect of the automation of ASE on the market efficiency using the daily closing price index for the period from January 1, 1991, to August 30, 2002. The sample included those stocks of the largest and most liquid. The researcher found that the move to electronic trading system increased volatility, and had no significant effect on market's efficiency.

Methodology

Study Population

The data used in this study are drawn from Amman Stock Exchange's database, constructed by the research department of ASE for the period January 1, 1996 - December 31, 2004. We divided the sample period into two sub-periods: The floor trading period, from 1st January, 1996 to 25th March, 2000 and the screen trading the study period, from 26th March, 2000 to 31st Dec, 2004. Then we selected individual stocks that related to the service and industry sectors that were continuously traded under both periods, so that we excluded the banking and insurance sector for their special treatment for measurement of variables.

Study Sample:

The company that met the following conditions was included in the study sample:

1. All companies must be listed on the Amman Stock Exchange during the period of study and had available data, such as monthly trading volume, and closing prices to be able to calculate the variables of the study.

2. All companies share the same fiscal year, ending on 31^{st} December of each year.

3. The companies must not belong to banking and insurance sector for their restriction on measurement of variable and because of the stock's splits that are usually happened to stocks that belong to the financial institution. So a total number of 38 companies have met the previous conditions and have been included in the sample.

Empirical Methods and Operational Definition of Variables

Electronic trading:

Massimb and Phelps (1994) defined the electronic trading as a "Set of computer terminals connected via high speed communication lines to central host computer, Bids, offers and trade requests are entered into the remote terminal and sent to the central host." However, Al-Khouri and Al-Ghazawi (2008) stated that electronic trading is an "Automated trading system, in which all transaction takes place through using screen for each stock broker, so that each stock broker place buy and sell orders into the trading system, which in turn match those orders to generate a trade".

Market Liquidity

The estimation and use of specific liquidity proxies is unusually varied. Bailey and Jagtiani (1994) use raw trading volume, while Amihud et al. (1997) and Berkman and Eleswarapu (1998) use trading volume scaled by the security return as a liquidity proxy for market depth to explain return differentials in studies on the Thai, Israeli, and Indian stock exchanges, respectively.

In fact liquidity in Amman Stock Exchange cannot be measured by bid-ask spread. There is no designated market maker who post bid and ask quotes, so therefore we will use the stock's trading volume as a proxy of liquidity (Mendelson, 1985, Amihud and Mendelson, 1986). We conduct this event study for the relative trading volume before and after thre transfer to electronic trading. Specifically, we calculate the relative volume of each stock (VR_{it}), by summing the monthly stock's volume (V_{it}) as a percent of the sum of monthly market volume (V_{Mt}) for each event month t, where t {-51, +56}

$$VR_{it} = \text{Log}\,(V_{it})/\text{Log}\,(V_{Mt}) \qquad \text{... (1)}$$

The relative volume is averaged across the 38 stocks of the sample, for every month t

$VR_{Mt} = 1/38 * \Sigma VR_i$ ... (2)

Stock's Price Behavior:

We will conduct an event study of the transferred stocks (Brown and Warner, 1980).

In fact monthly returns are calculated as follows:

$R_{it}=(P_{it}-P_{it-1}+D_{it})/P_{it-1}$ ... (3)

Where:

R_{it}: The return on stock i on month t

P_{it}: The monthly closing price of stock i on month t.

$P_{it-1:}$ The monthly closing prices of stock i on month t_{-1}

$D_{it:}$ The dividend paid on stock i on month t.

Given the less availability of dividend in Amman Stock Exchange the monthly rates of return are calculated according to the following equation:

$R_t = (P_t-P_{t-1})/ P_{t-1}$ … (4)

Where:

R_t= The return in month t;

P_t and P_{t-1} are the closing prices in month's $_t$ and $_{t-1}$, respectively.

Based on the calculated returns, the beta coefficient for each company is estimated using the Following market model:

$R_{it}=\alpha_j+ \beta_i RM_t +e_i$ … (5)

Where:

R_{jt}= the periodic return for security i in month t;

α_i= the constant term as estimated by the market model..

β_i= the beta (systematic risk) as estimated by the market model.

Rm_t= the periodic return for the market index;

e_i = the random error term whose expected value equal to zero;

And, abnormal return (AR_{it}):

$AR_{it}=(R_{it}- \alpha- \beta_i Rm_t)$ ... (6)

Then, abnormal returns are averaged across all stocks (N=38) for each event month according to the following equation:

$CAR =1/N * \Sigma AR_{it}$ ...(7)

Empirical Results

Descriptive Statistics

We report on Tables (2 and 3) the two main variables in our study; stock return, and the relative trading volume. In Table (2), we introduce the descriptive statistics that are related to the service companies, however in Table (3) we introduce the descriptive statistics that are related to the industrial companies. Based on the reported values, the following observations can be made. Tables (2 and 3) show an increase in the mean and median values across stocks that belong to the service and industrial sectors after the switching from floor trading to electronic trading. This conclusion is due to the fact that stock prices during the electronic trading were much higher than in floor trading (Muscarella and Piwowar, 2001). Moreover, with a minimum tick, any increase in the price of a stock is likely to be met with a corresponding increase in its liquidity measured by the trading volume, (Jain, 2005). In addition, we notice from Tables (2 and 3) that there is an increase in the mean relative trading volume from 1.266 to 4.273 for service companies and a jump from 4.100 to 4.233 for industry companies. We conclude that there is improvement in liquidity following the transfer to electronic trading. Our results are similar to the finding of (Naidu and Rozeff, 1994).

Liquidity

Theoretically, the trading volume of a given security is an increasing function of its liquidity, other things being equal. Thus, an increase in the trading volume of a stock after its transfer to the new trading system reflects an increase in its liquidity. Liquidity in the Amman Stock Exchange cannot be measured by bid-ask spreads. While it is possible to impute a bid-ask spread from the best limit prices of the buy-and-sell orders, data are unavailable on a monthly basis. Therefore, we use the same measure of Amihud et al. (1997) who measured trading activity as volume in monetary units relative to the market volume. In fact, we conduct two empirical tests examine the liquidity of the market after the transfer to electronic trading system. First, we calculate the sum of relative volume of each stock in the sample (RV it) on a monthly basis as it appears in Table (4).

Secondly we conduct an event study for the monthly relative trading volume, so that the resulting time series are presented in figure 1 and 2, which shows that the transfer of stocks to the automated system is associated with a dramatic increase in the relative trading volumes so that the mean relative volume is 99.33 JD in the pre-event period and 149.00 JD in the post-event period. As the graphical representation indicates that the trading volume increase continued until the eighth month after the transfer without decline, suggesting that the increase was not temporary. In addition, the upward trend in the relative trading volume of the transferred stocks prior to the announcement is noteworthy. Therefore, the results for overall volume show that transferred shares experience, on average, significant increases in trading activity after the transfer. This result confirms that temporal consolidation of orders and enhanced market transparency increase liquidity (Schwartz, 1991) and is supported in various empirical studies (Naidu and Rozeff, 1994; Amihud et al., 1997).

Table (2): Descriptive statistics of the variables: return on stock, and the relative trading volume, the sample includes observation that consisted of 11 Service Company during the period from 1996 to 2004.

	Stock Return		Relative Trading Volume	
	Floor Trading	**Electronic Trading**	**Floor Trading**	**Electronic Trading**
Mean	0.0787	0.0802	1.266	4.273
Median	0.0263	0.0364	0.0808	0.0987
Std.Dev	0.3239	0.3050	0.543	0.277
Minimum	0.000	0.000	0.000	0.000
Maximum	6.02	6.02	4.93	6.31

Table (3): Descriptive statistics of the variables: return on stock, and the relative trading volume, the sample includes observation that consisted of 27 Industry Company during the period from 1996 to 2004.

	Stock Return		Relative Trading Volume	
	Floor Trading	**Electronic Trading**	**Floor Trading**	**Electronic Trading**
Mean	0.0561	0.0902	4.100	4.233
Median	0.0200	0.0438	0.0275	0.0847
Std.Dev	0.1226	0.2249	0.849	0.248
Minimum	0.000	0.000	0.000	0.000
Maximum	2.420	6.02	3.04	5.06

Table (4): The sum of monthly relative volume of each sample stock before and after the automation of the trading system

Number	Stock	After Automation $\Sigma\ RV_{it}$	Before Automation $\Sigma\ RV_{it}$
1	Jordan International Trading Center	128.4066	45.8353
2	Jordan Trade Facilities	44.8017	16.0002
3	Union Investment Corporation	258.5242	21.5925
4	Arab Financial Investment	52.8593	29.3725
5	United Arab Investors	710.2687	402.4082
6	Specialized Jordanian Investment	60.9321	45.8380
7	Jordanian Duty Free Shops	160.1841	71.4492
8	The Arab International For Education and Investment	39.3718	35.6208
9	United Financial Investment	26.0106	20.2656
10	Specialized Investment Compounds	1.7626	0.0931
11	Jordan Central	11.6117	17.9025
12	Public Mining	28.0787	16.5919
13	Arab Aluminum Industry/ARAL	52.0921	43.9908
14	Arab Chemical Detergents Industries	34.1674	23.2226
15	National Steel Industry	74.8257	57.0122
16	Jordan Worsted Mills	835.4000	764.7699
17	Jordan Ceramic Industries	542.8900	356.2000
18	Jordan Pipes Manufacturing	598.7700	400.7700
19	Arab Center for Pharm. And Chemicals	46.5227	33.9791
20	Universal Chemical Industries	23.70242	17.6794
21	Jordan Wood Industries	7.5841	2.7041
22	Jordan Cement Factories	433.0798	286.8271
23	Universal Modern Industries	106.0172	116.9083
24	Jordan New Cable	132.1041	101.3660
25	Ready Mix Concrete and Construction	60.1456	42.3151
26	Jordan Steel	81.9500	65.1417
27	Pearl-Sanitary Paper Converting	101.6250	97.0767
28	National Aluminum Industrial	12.2004	16.0938
29	The Arab International Food Factory	3.8085	3.4861
30	Arabian Steel Pipes Manufacturing	4.5283	0.2965
31	Al- Ekbal Printing and Packaging	283.1436	172.8975
32	Jordan Tanning	2.1565	0.8259
33	National Cable and Wire Manufacturing	269.6933	163.9673
34	Jordan Sulpho Chemicals	37.7669	17.0218
35	Woolen Industries	53.5083	48.7135
36	Jordan Industrial Resources	190.1019	104.8156
37	Arab Electrical Industries	94.7807	46.6232
38	Jordan Rockwool	56.9688	67.1089
	Mean	149.0091	99.33643
	Standard Deviation	207.1337	154.1096

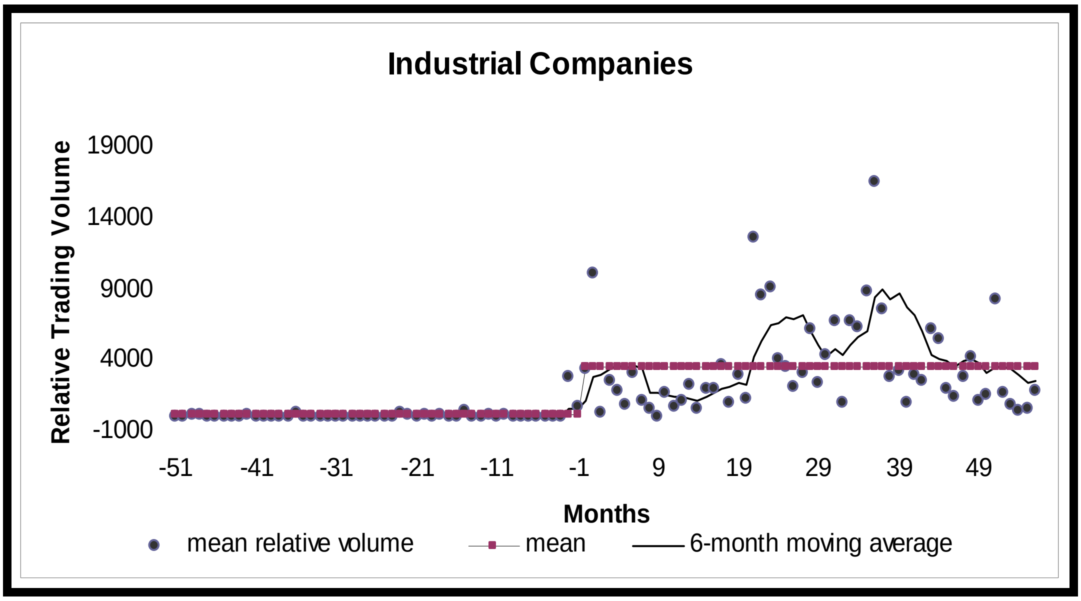

Figure 1 Monthly relative volumes, calculated over event months [-51,-1] and [0, 54].The curved line shows the 6-month moving average for the relative volume time series. The two steady lines represent the mean relative volume before and after the transfer for the industry companies.

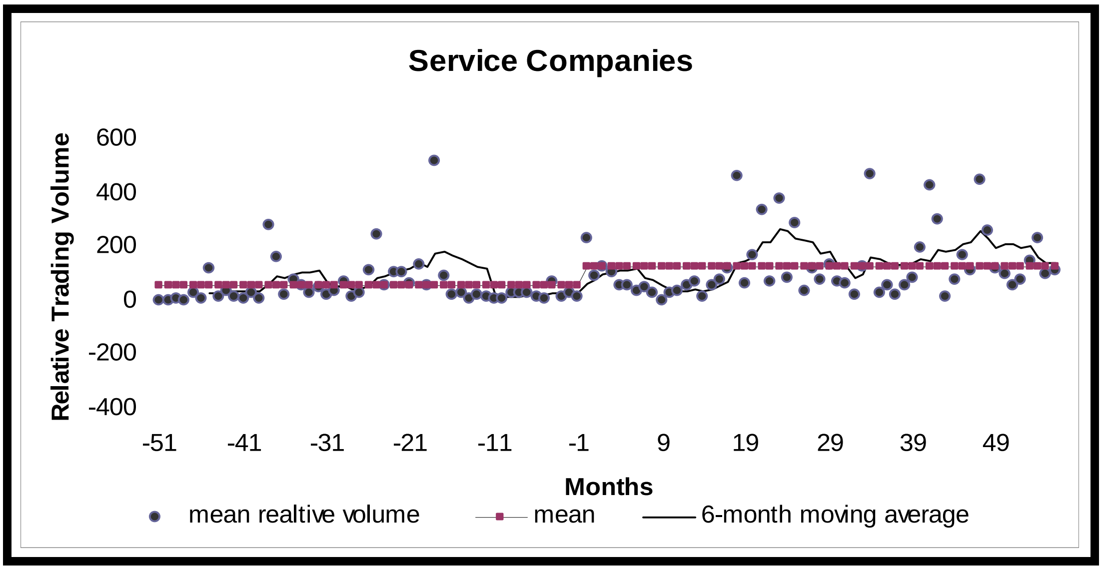

Figure 2 Monthly relative volumes, calculated over event months [-51,-1] and [0, 54].The curved line shows the 6-month moving average for the relative volume time series. The two steady lines represent the mean relative volume before and after the transfer the service companies.

Testing the behavior of stock prices

Improved liquidity and increased market transparency are expected to increase securities values because rational investors will require lower returns. Hence, improving market microstructure under the electronic trading would have a positive effect on the prices of the transferred stocks, provided the shares are priced fairly. We test this hypothesis by conducting an event study of the transferred stocks (Brown and Warner, 1980).

Figure 3 illustrates the evolution of abnormal returns and cumulative abnormal returns (CAR) on the monthly event window for service companies. We find that the average abnormal return after the transfer to electronic trading is -40.7% on (t-statistic1.65, sign test 4.47) look table (5), pointing out a significant fall in prices following the transfer to the electronic trading system which reflected by the negative abnormal return.Also, figures 4 shows that the effects of the transfer on stock prices are not temporary so that stock prices have not recovered their initial levels in spite of a slight increase in the 4th and 6th months. But, taking into account the automation circumstances we must qualify the interpretation of these results. In fact, the fall in prices cannot be considered as a negative reaction of the market to the automated trading system adopted by Amman stock exchange as the transfer coincided with the deflation of the speculative bubble. Our results are similar to the findings of (Sioud and Hamied, 2003). This decrease in value reflects a stock-price correction with the reversing tendency of the stock market rather than a negative reaction to the improvement of the trading system. In fact, the transfer to the electronic trading system permitted an adjustment of inflated price.

Table (5): Impact of the transfer to the electronic trading system on stock prices (months-51, 54) for industry companies.

Event Month	AR_t	CAR	T	Event Month	AR_t	CAR	t
-20	0.000	0.001	0.0001	0	-0.407	-0.807	-1.6535
-19	0.001	0.002	0.0019	1	-0.864	-1.608	*-1.3874
-18	0.001	0.001	0.0022	2	-0.420	-1.595	-0.6743
-17	-0.001	-0.001	-0.0009	3	-0.369	-1.226	-0.5922
-16	-0.001	-0.003	-0.0017	4	-0.500	-1.200	*-1.8022
-15	-0.004	-0.003	-0.0062	5	-0.188	-1.093	-0.3019
-14	-0.001	-0.002	-0.0011	6	-0.596	-0.644	-0.9571
-13	-0.001	-0.001	*-1.1680	7	-0.100	-0.592	-0.1602
-12	0.000	0.001	0.0002	8	-0.031	-1.059	-0.0504
-11	0.001	0.001	0.0012	9	-0.991	-1.364	*-1.5914
-10	0.001	0.000	0.0009	10	-0.015	-0.574	-0.0240
-9	0.000	0.000	0.0002	11	-0.349	0.003	-0.5604
-8	0.000	0.000	0.0002	12	-0.715	-0.079	*-1.1478
-7	0.000	0.001	0.0004	13	-0.415	-1.044	-0.6669
-6	0.001	0.001	0.0009	14	-0.018	-1.813	-0.0292
-5	0.000	0.000	0.0000	15	-0.820	-1.324	*-1.3173
-4	-0.001	0.000	-0.0011	16	-0.775	-1.182	*-1.2451
-3	-0.182	0.000	-0.2927	17	-0.830	-0.702	*-1.3334
-2	-0.037	0.000	-0.0592	18	-0.690	-0.007	*-1.1081
-1	-0.230	0.000	-0.3693	19	-0.296	-0.993	-0.4753
				20	-0.377	-1.835	*-1.6061

Significant at 10% level.

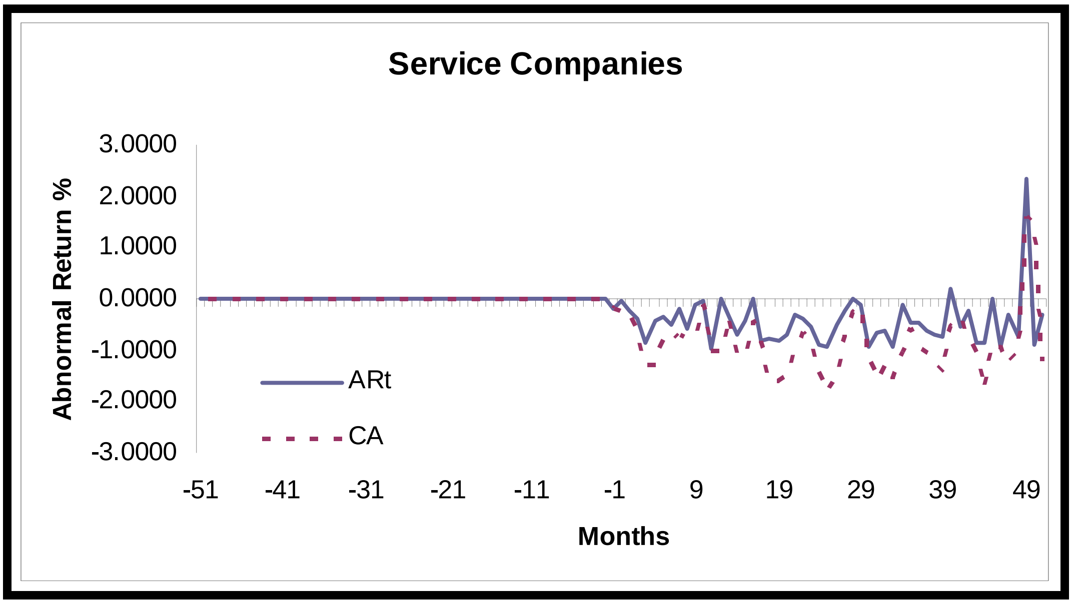

Figure 3 Monthly abnormal return and cumulative abnormal return, calculated over event month [-51 to 54].The curved line shows the monthly the abnormal return time series. The scatter lines represent the cumulative abnormal return after the transfer for the service company.

If we look at figure 4 we will notice that there is negative abnormal return produced after the transfer to electronic trading compare with zeros abnormal return before the transfer which may give a signal that there is market efficiency before the transfer and we find that the average abnormal return after the transfer to electronic trading is -79.4% (t-statistic1.15, sign test 3.35) look table (6), pointing out a significant fall in returns following the transfer. We must link the abnormal phenomena with the level of informational efficiency “market ability to determine the true fair value of security” (Fama, 1970) in a financial market to give more explanation. The observed abnormal return do not reflect any move toward zero after the effective automation date if we compare it with the amount of abnormal return before the transfer to electronic trading which is close to zero. In other words, the results indicate that the transfer have not to automation reduces the efficiency. We reject the null hypothesis that there is no change in the stock price behavior after the transfer to electronic trading. Our empirical finding does not support the argument that automation improves the price discovery process. In fact our findings are similar to (Sioud and Hmaied, 2003) on that that all stocks that transferred to the electronic trading aren't a clear effect on pricing error-residual in the Capital Asset Pricing Market (CAPM) model. They noticed that the abnormal return resulted in an increase of the residual variance after the transfer is associated with an increase in the amount of pricing errors and, therefore, no market efficiency. Contrasting the finding of Maghyereh (2005) on that there is no significant effect of the shift to electronic trading on market efficiency at Amman Stock Exchange.

Conclusion

This study investigated the impact of the Electronic Trading System (ETS) on Amman Stock Exchange (ASE) with respect to liquidity, volatility, and stock price behavior before and after the implementation of the ETS, over the period from 1st January, 1996 to 31st Dec, 2004. It extends previous research on changing trading mechanisms by focusing on the automation of an emerging market. The study examined the liquidity of the ASE by testing the behavior of ‘trading volume' using Mendelson, (1985) and Amihud and Mendelson, (1986) methodologies. The ETS showed a positive effect on market liquidity, based on monthly volume of trade, as the major determinant of market liquidity.

The study found an increase in the relative volume of stocks after the adoption of the ETS. The automated trading reflects an enhanced liquidity of stocks. This higher trading volume provides support for electronic trading because the fixed cost of the system can be spread over a larger volume; thereby achieving economies of scale. Empirical results were similar to what most of the researchers have found on other exchanges, (Sioud and Hamied, 2003). Moerover, a significant abnormal return of about 60% was observed for the securities in our sample.

This decrease in value reflects a stock-price correction with the reversing tendency of the stock market rather than a negative reaction to the improvement of the trading system. In fact, the transfer to the electronic trading system permitted an adjustment of inflated prices. (Since the new trading mechanism did not reduce volatility or pricing error, it did not improve market efficiency). The common finding pointed out in all empirical studies on automation is the improvement of liquidity, which is often sought by emerging markets but no unanimous conclusion is noted on other developed markets.

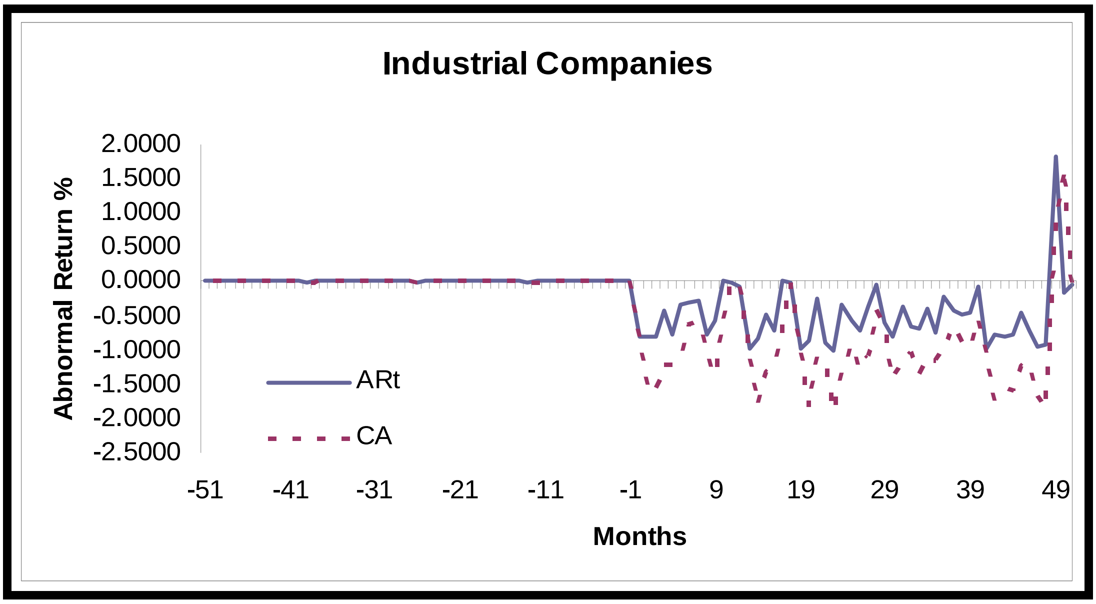

Figure 4 Monthly abnormal return and cumulative abnormal return, calculated over event month [-51 to 54].The curved line shows the monthly the abnormal return time series. The scatter lines represent the cumulative abnormal return after the transfer for the industry companies.

Table (6): Impact of the transfer to the electronic trading system on stock prices (months-51, 54) for industry companies

Event Month	AR_t	CAR	T	Event Month	AR_t	CAR	t
-20	0.000	0.001	0.0001	0	-0.794	-0.219	*-1.1586
-19	0.001	0.003	0.0014	1	-0.431	-0.267	-0.6294
-18	0.002	0.001	0.0023	2	-0.769	-0.637	*-1.1213
-17	0.000	-0.002	-0.0004	3	-0.325	-1.271	-0.4735
-16	0.000	-0.005	-0.0006	4	-0.319	-1.284	-0.4654
-15	-0.003	-0.005	-0.0037	5	-0.273	-0.789	-0.3988
-14	-0.001	-0.002	-0.0012	6	-0.786	-0.868	*-1.1459
-13	-0.001	-0.001	-0.0013	7	-0.579	-0.688	-0.8441
-12	0.000	0.001	0.0002	8	0.005	-0.784	0.0071
-11	0.000	0.001	0.0007	9	-0.002	-0.696	-0.0034
-10	0.000	0.001	0.0003	10	-0.077	-0.131	-0.1120
-9	0.000	0.000	0.0003	11	-0.968	-1.022	*-1.4117
-8	0.000	0.000	0.0002	12	-0.845	-1.006	*-1.2330
-7	0.000	0.001	0.0005	13	-0.478	-0.364	*-1.6979
-6	0.001	0.001	0.0009	14	-0.704	-1.064	*-1.0270
-5	0.000	-0.001	0.0000	15	0.002	-1.130	0.0032
-4	0.000	-0.183	-0.0005	16	-0.009	-0.434	-0.0131
-3	0.000	0.000	0.0000	17	-0.984	-0.839	*-1.4362
-2	-0.807	0.000	*-1.1779	18	-0.851	-1.596	*-1.2410
-1	-0.801	0.000	*-1.1679	19	-0.248	-1.606	-0.3619
				20	-0.895	-1.520	*-1.3059

* Significant at 10% level.

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أثر التداول الإلكتروني في سيولة السوق، وسلوك سعر السهم: دراسة تجريبية على سوق عمان المالي

مجد منير اسكندراني* وفايز حداد**

ملخـص

تتناول هذه الدراسة أثر نظام التداول الإلكتروني في سيولة السوق، وطبيعة سلوك سعر السهم في سوق عمان المالي قبل وبعد تطبيق النظام في 26 آذار 2000. تكونت عينة الدراسة من 38 شركة موزعة على قطاعي الصناعة والخدمات؛ حيث تم جمع بيانات عن أسعار الإغلاق، وحجم التداول، خلال الفترة من 1 كانون الثاني 1996 إلى 31 كانون الأول 2004. تم فحص سيولة السوق عن طريق إجراء دراسة الحدث لحجم التداول النسبي لكلا الفترتين. من جهة أخرى، تم فحص طبيعة سلوك السعر من خلال إجراء دراسة الحدث. وقد توصلت الدراسة إلى أن هنالك تأثيراً ذا دلالة إحصائية في سيولة السوق؛ حيث إن حجم التداول أظهر ارتفاعاً في ظل نظام التداول الآلي عنه في ظل نظام التداول الأرضي، وفي المقابل بينت النتائج أن التحول إلى نظام تداول الكرتوني أدى إلى إظهار عوائد غير طبيعية، مما أدى إلى التقليل من فعالية السوق.

الكلمات الدالة: نظام التداول الإلكتروني، سيولة السوق، سلوك سعر السهم، سوق عمان المالي.

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