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Does the Egyptian Stock Exchange Still Have a Day-End Effect?

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ABSTRACT

This paper utilizes both parametric and nonparametric analysis to test whether the introduction of a volume weighted average price (VWAP) mechanism for closing a trading session on the Cairo and Alexandria Stock Exchange (CASE) has eliminated the day-end phenomenon or not. Results provide evidence that: (1) the day-end effect is still present and significant on the CASE; (2) the effect is significantly larger for stocks that are restricted by 5% price limits; and (3) counter to U.S. market data the effect is significantly higher for high-price stocks.

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I. INTRODUCTION

This article tests the presence of a day-end effect on the Cairo and Alexandria Stock Exchange (CASE). There, in an effort to mitigate such a phenomenon, a daily volume weighted average price (VWAP) mechanism was imposed in 1998 to act as the closing price of all listed securities. We compare intraday price behavior during the day with the behavior at closing. We find clear and robust evidence that the VWAP mechanism has not mitigated the day-end effect on the CASE.

The day-end effect has been documented across a number of exchanges. Harris (1986, 1989) and Wood, McInish and Ord (1985) show abnormally large returns associated with the last transaction of trading day on the New York Stock Exchange (NYSE). The pattern is also observed on the Toronto Stock Exchange (TSE) (McInish and Wood 1990), the American Stock Exchange (AMEX) (Gosnell 1995), the Hong Kong Stock Exchange (HKSE) (Cheung 1995) and the Paris Bourse (Michayluk and Sanger 2006). The NYSE, TSE and AMEX are all specialists markets while the HKSE and the Paris Bourse are essentially electronic communication networks (ECN), with multiple competing dealers and electronic display books.

Previous studies have offered several explanations for the day-end-effect. Harris (1989) and Porter (1992) attribute a portion of the effect to the tendency to move from bid to ask price at the close. Michayluk and Sanger (2006) comment on that by saying that "even if a shift from bid the ask price could explain the entire day-end anomaly, this would merely beg the question of why the shift occurs" (p. 132).

Other studies have tackled the day-end anomaly from a price manipulation angle. Cushing and Madhavan (2000) find an increase in volume and volatility for the Russell 1000 index constituent stocks toward market closure, and they attribute this effect to window dressing by institutions. Michayluk and Sanger (2006) study the day-end effect on the Paris Bourse and find that the anomaly is present and is double the magnitude found in the U.S., and attribute their findings to trading conducted by registered dealers (market makers).

The CASE invites analysis of the day-end effect because of its unique distinction from all the markets that were studied before. First, the market is an order-driven market that does not utilize designated market makers, registered dealers or specialists. Investors issue orders that are posted on large screens and during regular trading orders are matched approximately every five minutes to determine the equilibrium prices.

Second, on the CASE more liquid stocks trade freely with no daily price limit imposition. Less liquid stocks are subject to trading halts if their prices move by a $\pm$ 5% from the previous days' closing price. By comparing day-end returns for stocks trading under both regimes, we examine whether the presence of price limits would further enhance the day-end effect. Such a comparison is indeed essential, since microstructure literature provides evidence that price limits exert a magnet effect on prices (See Tooma, 2006; Cho et al, 2003; and Berkman and Steenbeek, 1998).

Finally, the CASE has a very tight fixed tick size of (one piaster). Previous studies have found that fixed tick sizes pronounce the day-end anomaly in low-price stocks. The CASE data further investigates this finding.

The results of this paper indicate that: (1) the day-end effect is present and significant on the CASE; (2) the effect is significantly larger for stocks that are

restricted by 5% price limits; and (3) counter to U.S. market data the effect is significantly higher for high-price stocks.

The rest of this paper is organized as follows. Section II provides an overview of the Cairo and Alexandria Stock Exchange. The data employed is described in Section III. Section IV presents our empirical results and Section V concludes.

II. AN OVERVIEW OF THE CAIRO AND ALEXANDRIA STOCK EXCHANGE

The CASE is one of the oldest exchanges in the world and it dates as far back as the era of British colonial rule. As a matter of fact, during the early twentieth century the CASE was one of the world's largest and most active stock exchanges. However, the market was marginalized by Nasser's government and kept in an inoperable status till its revival in 1992.

Alongside the revival of the CASE, major regulatory changes have been put in place to complete the organizational framework of the Egyptian Capital Market. The CASE is regulated by the Capital Market Authority (CMA) established under Law 95 for the year 1992. The CMA is responsible for the issuance of licenses to all financial intermediaries including the Misr Settlement and Clearing Depository Registry (MSCDR) the clearing house. The CMA is also responsible for the revision of Law 95 and its executive regulation in a way that achieves its statutory objectives of promoting efficiency and transparency in the market. Aly et al (2004) and MohieEldin and Sourial (2000) provide a comprehensive coverage on the Egyptian Capital Market structure and organization.

The CASE is an order-driven market that does not utilize designated market makers. Investors issue orders that are posted on a large screen. During regular trading hours, from 11:30 a.m. to 3:30 p.m., Sunday through Thursday, orders are matched approximately every five minutes to determine equilibrium prices. The closing price for the session is the VWAP of all matched transaction for the day.

Total market capitalization on the CASE was approximately L.E. 456 billion (or roughly $79.3 billion[1]) in December 2005. Table 1 provides summary statistics of the market and its evolution from 2000-2005. Like many other emerging markets, CASE has a relatively small set of companies dominating. The 100 most actively traded companies, out of 650 listed, account for 83% of total market capitalization, 85% of trading by volume, and 92% of trading by value.

III. DATA AND METHODOLOGY

Inline with other microstructure papers, namely, Michayluk and Sanger (2006), we examine intraday transactions and quotes for firms continuously listed from January 2005 through December 2005. There are 1,227,967 quotes and 823,000 trades for 100 firms over a 247-trading-day sample period. For each reported trade our database includes the transaction price, number of shares traded and time of the trade.

Table 2 shows descriptive statistics for the total sample and for the two subsamples based on whether the firm is under the price limit rule or not. Share prices and firm size are determined at the beginning of the sample period and are averaged across firms. All trading related activity variables are first averaged across 247 days for each firm and then across firms.

Table 1
Main market indicators for the period 2000-2005

Indicators	2002	2003	2004	2005
Total Volume (m)	904	1,422	2,435	5,310
Volume of Listed Securities	707	1,202	1,786	4,199
Volume of Unlisted Securities	197	221	648	1,112
Total Value Traded (LE m)	34,176	27,764	42,764	160,635
Value Traded (Listed Securities)	25,799	23,000	36,142	150,924
Value Traded (Unlisted Securities)	8,377	4,764	6,233	9,711
Total Number of Transactions (Thousand)	834	1,229	1,744	4,210
Number of Transactions (Listed Securities)	740	1,206	1,675	3,992
Number of Transactions (Unlisted Securities)	94	24	68	218
Average Daily Value Traded (LE m)	137	114	170	645
Average Daily Value Traded (Listed Securities)	104	94	145	606
Average Daily Value Traded (Unlisted Securities)	34	20	25	39
Number of Trading Days	249	244	249	249
Number of Listed Companies	1,151	978	795	744
Number of Traded Companies	671	540	503	441
Market Capitalization End of Year (LE b)	122	172	234	456
Market Capitalization as % of GDP	32	41	53	87
Turnover Ratio (%)	10	12	14	31
Foreign Participation as % of Total Value Traded	19	20	27	30
% Change in S&P/IFCI Price Index	(6)	79	126	159
% Change in S&P/IFCG Price Index	(2)	48	106	156
% Change in MSCI Price Index	(5)	81	118	155

Source; Cairo & Alex Stock Exchange, CMA, and published in http://www.egyptse.com/index.asp?CurPage=main_market_indicators.asp, http://www.cma.gov.eg/cma/jtags/english/default_en.jsp

Table 2
Summary statistics over the week

	Mean	Standard Deviation	Minimum	Maximum
All Firms (N = 100)				
Number of Firms Trading Per Day	75	2.20	72	77
Opening Share Price (L.E.)	72.65	157.84	1.89	1,001.65
Market Capitalization (L.E. m)	4,769	10,129	23	68,636
Daily Volume (Shares)	469,176	1,366,990	39	13,106,827
Number of Trades Per Day	377	852	1	9,655
Transaction Size (Shares)	1,243	6,125	1	2,131,229
No Price Limits Firms (N = 42)				
Number of Firms Trading Per Day	43	0.55	42	43
Opening Share Price (L.E.)	76.03	159.06	5.59	1,001.07
Market Capitalization (L.E. m)	6,415	12,711	179	68,636
Daily Volume (Shares)	588,817	1,359,365	1,631	9,857,908
Number of Trades Per Day	568	1,073	8	9,655
Transaction Size (Shares)	1,033	2,281	1	199,061

Table 2 (continued)

	Mean	Standard Deviation	Minimum	Maximum
Price Limits Firms (N = 58)				
Number of Firms Trading Per Day	32	1.64	30	34
Opening Share Price (L.E.)	68.24	158.46	1.89	1,001.65
Market Capitalization (L.E. m)	2,591	4,310	23	20,513
Daily Volume (Shares)	310,209	1,286,352	39	13,106,827
Number of Trades Per Day	125	238	1	2,105
Transaction Size (Shares)	2,423	14,080	1	2,131,229

Out of the 100-firm sample, 44 companies do not have price limits. These firms are on average, larger, more active, and more liquid than those that have price limits imposed on them. Following Michayluk and Sanger (2006), we calculate day-end returns, using the last two transactions of the day, for every security and each trading day that are then averaged over the 247 trading days. This averaged time-series is compared to the averaged intra-day return of all securities on each trading day. We calculate an intra-day return using transacted prices of two consecutive transactions, ignoring the first and last transaction of a trading day, which is then averaged per security for the day. Then statistical tests are performed using the 247 day averaged time-series for both the day-end and Intra-day returns. Comparisons are conducted for the full sample as well as the two subsamples of firms using both parametric (analysis of variance [ANOVA]) and nonparametric (Wilcoxon rank) tests.

VI. RESULTS

The results of our tests indicate that there exists a very significant and large[2] day-end effect on the CASE. Table 3 presents an analysis of day-end and intra-day returns for the full sample and the subsamples: (1) firms that trade freely with no price limits, and (2) firms that trade with 5% symmetric price limits.

There is a total of 18,625 final transaction returns in the sample; 10,621 for firms without price limits and 8,004 for firms with price limits. The average final transaction return for the entire sample is 0.1234%, which is significantly different from zero at the 1% level with a t-statistic of 31.32. When compared to the average intra-day returns for the period, we find that day-end returns are significantly larger at the 1%. This is consistent with other empirical work; for example, Harris (1989) reports a mean final transaction return of 0.05% for the NYSE stocks from December 1981 to January 1985. Furthermore, Gosnell (1995) reports a mean closing return of 0.054% on the NYSE and AMEX from 1985 to 1991 and finally, Michayluk and Sanger (2006) reports an average closing return of 0.0957%.

Next, we test the effect of price limits on final returns. Both parametric and nonparametric tests for equality of means provide evidence that the day-end effect is also present and significant at the 1% level in both sub-samples. The average day-end return for stocks with price limits is nearly 2.4 times greater than stocks without price limits (0.2261% vs. 0.0972%). These results could be explained by two reasons. First,

related to price limit literature[3], Tooma (2006) shows that circuit breaker mechanisms like price limits attract[4] stock prices toward the bounded limits because traders advance their trades in anticipation of failing to execute when limits are hit. Second, on the CASE, stocks trading with price limits are usually traded less frequently than stocks without price limits, it is possible that the difference in day-end returns is due to the higher spreads associated with the illiquidity of the price limited stocks.

Table 3
Average day-end returns

	Final Average Returns	Intraday Average Returns	ANOVA (Wilcoxon)
All Firms (N = 100)			
Mean (%)	0.1234	0.023	
t-statistic	31.32***	14.02**	
N (Days)	247	247	574.66***
% Positive	89.3	61.3	(241.11)***
% Negative	10.7	38.7	
No Price Limits Firms (N = 44)			
Mean (%)	0.0972	0.0442	
t-statistic	24.98***	18.61**	382.79**
N (Days)	247	247	(212.08)**
% Positive	83.4	47.1	
% Negative	16.6	52.9	
Price Limits Firms (N = 56)			
Mean (%)	0.2261	0.0961	216.36***
t-statistic	32.68***	17.22***	(118.12)***
N (Days)	247	247	
% Positive	92.2	80.1	
% Negative	7.8	19.9	

*** Significant at 1% level. ** Significant at 5% level.

In essence, it is hard to know whether the higher average day-end return observed for stocks with price limits is due to the presence of price limits, or to firms' characteristics. As was mentioned earlier, firms trading with price limits are on average smaller and less liquid than firms without price limits. In order to distinguish between effects we conduct two more tests. First, we follow Harris (1989) and Michayluk and Sanger (2006) in dividing stocks into price-level groups to investigate whether low-price securities lead to higher day-end returns. Table 4 divides firms into five price groups with each stock assigned to a group based on its price at the beginning of the sample period. As can be seen firms are concentrated around the less than L.E. 50 group with only 1 out of 100 sample firms having prices above L.E. 500. Both parametric and nonparametric tests still show that firms trading with price limits have significantly higher day-end returns than those without price limits. Furthermore, there is a clear positive relation between the price-level and the magnitude of the day-end average return. These results contradict those of Harris (1989).

Table 4

Average day-end returns classified by price level

	< L.E. 50		50-100		100-200		200-500		>500	
	FAR	IAR	FAR	IAR	FAR	IAR	FAR	IAR	FAR	IAR
All Firms										
N (Firms)	59		24		11		5		1	
Mean (%)	0.0672	0.0134	0.0861	0.0116	0.0881	0.0124	0.0992	0.0014	0.0792	0.0013
t-statistic	7.41***	4.95***	6.92***	3.95***	4.33***	3.82***	5.57***	4.71***	4.07***	3.64***
N (Days)	247		247		247		247		247	
% Positive	68.5	72.1	70.8	82.1	67.9	70.4	81.3	80.7	66.7	39.4
% Negative	31.5	27.9	29.2	17.9	32.1	29.6	18.7	19.3	33.3	60.6
ANOVA	5.28***		11.39***		9.28***		8.07***		10.22***	
Wilcoxon	22.31***		19.82***		31.72***		21.47***		20.32***	
No Price Limits Firms										
N (Firms)	29		9		2		3		1	
Mean (%)	0.0212	0.0019	0.0444	0.01	0.0341	0.0098	0.0412	0.0214	0.0792	0.0013
t-statistic	3.45***	4.01***	4.98***	3.22***	3.67***	3.93***	7.61***	6.92***	4.07***	3.64***
N (Days)	247		247		247		247		247	
% Positive	55.5	61.6	66.6	75.8	70.2	75.6	76.4	75.5	66.7	39.4
% Negative	44.5	38.4	33.4	24.2	29.8	24.4	23.6	24.5	33.3	60.6
ANOVA	7.21***		6.99***		8.29***		7.78***		10.22***	
Wilcoxon	18.61***		21.21***		22.46***		29.74***		20.32***	
Price Limits Firms										
N (Firms)	30		15		9		2		0	
Mean (%)	0.1164	0.0141	0.1321	0.0152	0.1274	0.0296	0.1427	0.0011	N/A	N/A
t-statistic	3.62***	4.15***	3.84***	4.02***	6.66***	5.09***	7.92***	4.21***	N/A	N/A
N (Days)	247		247		247		247		N/A	
% Positive	70.1	62.4	74.3	80.1	61.9	67.3	79.2	78.4	N/A	N/A
% Negative	29.9	37.6	25.7	19.9	38.1	32.7	20.8	21.6	N/A	N/A
ANOVA	10.28***		9.92***		21.42***		11.47***		N/A	
Wilcoxon	27.79***		31.36***		19.92***		36.72***		N/A	

(FAR = Final Average Return, IAR = Intra-day Average Return)

Second, in order to strengthen our results, we follow Michayluk and Sanger (2006) in running cross-sectional OLS regressions where the dependent and the independent variables are the time-series averages of each firm. The dependent variable is the average day-end effect of each firm and the independent variables include average values of trade size, daily share volume, number of trades per day, stock price, firm capitalization and a dummy variable to indicate if the firm trades with a price limit or not. Michayluk and Sanger (2006) note that "trade size and number of trades are highly correlated with share volume and stock price is highly correlated with firm capitalization" (p.141). Therefore, we estimate two regressions with alternate sets of independent variable specifications. Table 5 reports the results. For both specifications, there are only two significant variables at the 1% level. Day-end returns are negatively related to firm capitalization and are positively related to the price limit dummy. Given the limitations if the data it is still uncertain if the imposition of price limits or other microstructure issues are the cause of higher day-end returns.

Table 5
Regression of day-end return on firm trading characteristics

	Regression 1		Regression 2	
Independent Variables	Coefficient	t-statistic	Coefficient	t-statistic
Intercept	0.0002	1.22	0.0011	1.41
Price Limit Dummy	1.2342	4.21***	1.1461	3.98***
Trade Size	-0.4256	-1.21	N/A	N/A
Number of Trades	-0.3162	-1.09	N/A	N/A
Share Volume	N/A	N/A	-0.2964	0.49
Stock Price	0.0022	0.92	N/A	N/A
Firm Capitalization	N/A	N/A	-0.0621	-3.94***
RSQUARED (%)	11.2		9.6	
F-Value	10.4***		11.6***	

IV. CONCLUSION

This paper investigates whether the introduction of a volume weighted average price (VWAP) to act as the closing price has eliminated the day-end phenomenon on the Cairo and Alexandria Stock Exchange (CASE) as it was intended to do or not. Using both parametric and nonparametric tests, we compare between day-end returns and intraday returns for the full sample, as well as, two sub-samples divided depending on whether the firm is traded under the 5% price limit rule or not. Results show that: (1) the day-end effect is present and significant on the CASE; (2) the effect is significantly larger for stocks that are restricted by 5% price limits; and (3) inline with U.S. market data the effect is significantly higher for low-price stocks.

These results suggest that the VWAP mechanism that was introduced has not accomplished what it was intended for: the elimination of the day-end effect. The results also suggest that the imposed price limit rule might has played a role in magnifying the day-end effect. Given the data limitations, this final result should be

interpreted very cautiously as it is not clear whether it is the price limit rule or other microstructure fundamentals that are the cause of the higher day-end returns. To fully evaluate the causal effect between price and day-end effects, it would be essential to examine a larger sample and include more markets.

ENDNOTES

1. Exchanges rate is: $1 = L.E. 5.75
2. Compared to day-end effects referenced in other studies surveying western emerged markets.
3. For an extensive literature review of price limits see Harris (1988) and Tooma (2005).
4. Defined in the literature as the "Magnet Effect".

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