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THE SPEED OF STOCK MARKET PRICE REACTIONS TO FISCAL BUDGET AND ELECTION ANNOUNCEMENTS IN FIVE MIDDLE-EASTERN AND AFRICAN COUNTRIES

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Abstract

This paper provides evidence on how stock market index reacts to releases of market-relevant information by five Middle-eastern and North African country budget and general election results. After estimating the ARMA (*1, 2*) estimator using daily stock returns over a recent five-year period, it was found that the market price effect over is a 20-day test window. The stock price adjustment to national annual budget announcement is significant, and the speed of adjustment is around two days to announcement. The national general election news attracts a faster adjustment time in all five countries tested. These findings of macro level market price effects from two key events are new to the literature.

Keywords: Market-wide news; Price Adjustment; Market Efficiency; Information Flow, ARMA
JEL Classification:

1. Market-Relevant News and Stock Market Reaction

This paper is different from several others[1] on market efficiency studies of emerging markets in that the paper focuses on (i) whether stock markets in five newer economies react to market-relevant information at all, and (ii) if they do, how quickly or speedily the market reacts to unexpected market-wide information releases. Middle-eastern stock markets have been transformed on

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[1] Most event studies tended to measure political news effect on firms owned by related parties to the government in power, Chen, Ariff, Hassan, & Mohamad (2014). This paper measured macro level effects of election results and government budget news by measuring the impact of these macro events on the total market, as represented by market index value changes.

the back of huge cash gathered during the energy boom years from 1972 and 2012, and the consequent surge of, first, the economic activities during that period, and then the reform-cum-market development, as would follow under the Demand Leading hypothesis by Schumpeter (1912). There is none, as yet, a study of stock market reaction at the macro index level to unexpected news although there are published studies about how firm-specific information release leads to price change in Middle-eastern markets (as well as other markets).

Various factors contribute to changes in the stock exchange return, for example, the country's unexpected political changes, outstanding industry performance, and economic data releases, and so on. In some studies, mostly how individual firms use micro variables such as the size of company, book value per share, earning per share, and dividend per share, and etc., would have importance to stock market liquidity (Hashemijoo, Ardekani & Younesi, 2012) by examining the dividend policy effect on the share price volatility in *Bursa* Malaysia. Docking and Koch (2005) provided empirical evidence on the sensitivity of investor reaction and the resulting volatility due to dividend change announcements. Park and Rathi, (2000), and Wang (2010) explored macroeconomic variable impact on stock market return. Therefore, stock market return has become one of this researcher's interest to further explore the behaviour of the market. Hence, this paper aims to shed some light if macro level news do does indeed have impact on the macro market measure of stock indices from five emerging markets.

Announcement of annual budget ought to have some important effect on stock market returns, though there could be other concurrent news which may cloud the impact, either by reducing or augmenting the price effects. Macro level phenomenon deserves to be studied, especially in the region famous for mega budgets in the heady days of high oil prices leading to important budget plans by rich governments. The government budget is a formal announcement of the vision of government, whether newly elected or otherwise. The annual national budget is a confidence-building measure where a concrete road map is laid to put into shape the policies pursued for the growth of the economy. This mere confidence in such news proving future expectations about governments brings in several positive changes in the productivity of the economy under an expansionary budget plan. Does the stock market tend to be greatly influenced by the budget announcement?

Many researchers reported the effect of the national annual budget announcement on the stock market, but none exists for the Middle-eastern region. Wilayat, Sabeah, Fahad, Fayyaz and Ilyas (2012) explored the volatility of Karachi stock exchange using the Pakistani Government budget news. Thomas and Shah (2001), and Singh and Kansal (2010) examined the Indian stock market response to the Indian Union budget. However, there are no studies of MENA countries on this key research issue about how their local stock markets react to budget news.

Political risk is another factor influencing the operation of a country's financial market. Risk can come in many forms such as a new legislation, a coup,

an election, or a change in the country's ruling regime. Lin and Wang (2007) stated that politics significantly influence financial markets. This is because new information regarding political decision requires the stock market to absorb them into their stock prices. Therefore, as political uncertainty recedes, positive stock returns are expected, as would such a risk increase (example when a Socialist government wins elections) leading to stock price decline. While political uncertainty takes on different shapes, this paper focuses only on the political uncertainty associated with national elections. The relationship between political elections and stock market performance can be dated to a study by Niederohofer, Gibbs, and Bullock (1970) about the behaviour of US elections. The general election is often a variable that researchers use best to figure out its impact on financial markets.

The rest of the paper is organised as follows. The next section provides a review of literature on price effect, annual budget, and general elections. Section 3 provides a brief background about MENA countries to suggest that these two events would have a significant effect. This is followed in section 4 ontheprice adjustment coefficient test hypothesis. Section 5 is about data and methodology, while Section 6 summarises the main findings with section 7 concluding the paper.

2. Macro News Research Literature

Despite the vast body of literature on stock market efficiency including studies on emerging economies, few studies had been done on the MENA stock markets. Furthermore, no study has documented the MENA stock markets on the speed of price adjustment to macro news. Additionally, the legislative environment and the structure of markets under analysis indicate these markets are still in the development stage (Al-Zaubia & Al-Nahlehb, 2010). MENA countries face two problems in financial asset pricing. On the one hand, they have executed different reform programmes to liberalise their stock markets in the past two decades. They have also instituted different programmes to create a centre of attention to the flow of foreign direct investment (FDI). On the other hand, MENA countries lack democracy and meaningful progress attributable to the paralysing mixture of high-level political disagreement and the strict traditional roots of the culture of most of the region's regimes (Garber, 2007).

2.1   *Annual Budget and Stock Market*

Thomas and Shah (2002) investigated the stock market's reaction to union budget announcements by estimating the impact of the news. They traced the impact over 45 days around the budget date using the event study method. The study also investigated possible trading and hedging strategies around the budget date. BSE Sensex index data from 1979 to 2001 and NSE Nifty index data from 1994 to 2001 were used in their study. Around 26 annual budgets were considered

for the study, comprising both interim and final budget news, respectively. The study reported that the Indian stock market is efficient at information processing around the union budget announcement dates, although no significant difference in returns was observed before and after the event date. The study also found that the Union budget added around 10% to the stock index, on average, and that volatility was elevated in the ensuing short periods.

Ranjani, Sujeewa, and Rathnasiri (2009) examined the impact of Sri Lankan government budget announcements on the Colombo stock exchange indices (All Share Price Index (ASPI) and Milanka Price Index (MPI)) by also using the event study methodology with data over 15 days before and after the event date during the period 2005-2009. They found a significant negative effect on index returns during the event window period across all years except 2007.

Singh and Kansal (2010) examined the impact of 17 Union budget news including three interim budgets, and announcements on the NSE Nifty index for the period 1996-2009. The event window period was grouped into short-term (three days), medium-term (15 days), and long-term (30 days). By conducting student t-test and Z-test, they estimated the statistically significant changes in returns and also the volatility of the indices. They found statistically significant changes in returns as well as volatility for short-term and also in long-term periods.

2.2 *General Election and Stock Market*

Fama (1965) confirmed that stock prices are correlated with news of future or expected economic activity. Confidence in the country's President may implicitly reflect the underlying economic conditions, which are important in determining stock prices. Kim and Mei (2001) discovered that changes in government administration affect stock markets. This will happen because new governments would often implement new fiscal and monetary policies, leading to increase in uncertainties. The uncertainty discourages investors from taking risk, which causes negative stock returns.

Bialkowski, et al. (2008) discovered that in 27 Organisations for Economic Co-Operation and Development (OECD) countries, unexpected election results such as narrow margin of victory, lack of compulsory voting laws, change in political orientation, and failure to form a government with parliamentary majority after an election, result in negative effects on the stock market.

Chuang and Wang (2009) found that political change in America, Japan, Britain, and France has a negative impact on stock market returns. This means, when there is a change in government, stock returns would drop. They also explained that different political parties have different economic agendas, leading to frequent economic policy modification. Investors view this as a serious uncertainty. To protect their positions, they will take up conservative stock positions.

Irungu (2012) observed that the information release of general election announcements is useful for valuing securities, though the market did not value

the information contained in a professional election such as the one in 2002. The average cumulative abnormal returns is measured from a reducing stock return trend in the periods preceding announcement and a slower increase after announcement. These point to market absorption of the information in the long-run period after the announcement.

In another study, Ro (2012) stated that the election would cause three events: firstly, the stake of changing the government that may result in changes in policies that will affect the economic environment; secondly, the time pattern relating to elections taking place gives an impact on government spending and investing behaviour. Lastly, the increase of political and social uncertainties are factors to be evaluated. These three consequences relating to a given event will certainly affect all classes of assets, in particular the equities, as these are very sensitive to changes in the country's future economic outlook, which is what the election news is all about.

What do we know about MENA countries? MENA countries extends from Morocco in northwest, through North Africa to Iran in southwest Asia. The population of MENA countries constitutes about 6% of the total world population, and is about one-third of the population of the largest population country (China). The total population is about equal to the population of European Union countries (World Bank; 2011). During the 1990s, most MENA countries undertook a number of economic policy reforms to promote the revival and efficacy of stock markets. Saudi Arabia, Kuwait, and Jordan created the new financial markets, as did also Dubai and Abu Dhabi. The objective was to sustain economic growth and to satisfy the increasing mobility of funds involving international trade and financial transactions.

Massive privatisation programmes are at the heart of the various institutional and structural reforms. The aim is to create favourable conditions to further develop the financial system. Additionally, with an electronic trading system, investor's protection laws and stock holding tax reduction are implemented in order to enhance market liquidity and transparency. Financial liberalisation has also been undertaken in order to ease the mobility of cross-border capital flows as well as the participation of foreign investors. However, the development of these markets still remain slow for almost all countries. They are further characterised by heterogeneous levels of market development. While some markets such as the ones in Jordan and Egypt are moving faster to the standards of developed countries, the others, including, for example, Lebanon, Tunisia, and Morocco are viewed as frontier emerging markets (Lagoarde-Segot & Lucey 2008). Table 1 is a summary of financial indicators of selected MENA stock markets. Saudi Arabia outperformed other countries as it achieved very strong progress from 1999 to 2012. On the other hand, Egypt came at the end of the list. On average, all MENA countries achieved high levels of performance from 1999 to 2012.

MENA stock markets differ in terms of size and dynamics. Based on Table 1, Saudi Arabia had the largest total market capitalisation valued at (US$373.38 billion) in 2012. Oman, with total market capitalisation value of US$820.11 billion, had the smallest equity markets.

Table 1: Indicators of Selected MENA Stock Market Development, 2012

Country	Stock market capitalisation (billions of US$)			Market liquidity Value of shares traded % of GDP			Turnover ratio			Listed domestic companies number		
	1999	2012	% change	1999	2012	% change	1999	2012	% change	1999	2012	% change
Egypt	32.84	58.01	76.64	9.73	7.7	-20.9	29.44	37.8	28.4	1033	234	-77.34
Jordan	5.83	27	363.12	0.55	9	1536.4	9.41	10.3	9.5	152	243	59.87
Kuwait	18.81	97.09	416.16	6	13.3	121.7	30.62	23.2	-24.2	76	189	148.68
Oman	4.30	20.11	367.67	0.71	3.7	421.1	16.6	13.3	-19.9	140	124	-11.43
Saudi Arabia	60.44	373.38	517.77	15.09	72.3	379.1	24.75	144.4	483.4	73	158	116.44

Source: World Development Indicators (World Bank, 2013)

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Another indicator of market dynamics is the value of share trading (promoting liquidity), which is equivalent to turnover by value. Unsurprisingly, Saudi Arabia's stock market has the highest share trading volume in the MENA with almost US$72.3 billion trade in the year 2012. The statistics in Table 1 indicate that the Saudi Arabian stock market, with a trade turnover ratio of 144.4 in 2012, out performed MENA stock markets considerably.

3. Data, Hypotheses, and Methodology

What is the speed of price adjustment coefficient?

The speed of adjustment reflects the investor's reaction to new information during trading, and measures the required time for stock prices to react and achieve a new level of equilibrium, which incorporates all information into the stock price. To test the speed of price adjustment with respect to public announcements of national general election and national annual budget, this study proposed the following hypotheses:

H_1:   Each MENA country reacts efficiently to national general election announcements in terms of price adjustments in less than 20 days.

H_2:   Each MENA country reacts efficiently to national general budget announcements in terms of price adjustments in less than 20 days.

This study was based on the pioneering work of Theobald and Yallup (2004) in terms of the use of speed of price adjustment as the investigative tool to determine the dynamics of the market over a period.

3.1   The Auto-covariance Ratio estimator

The stochastic processes for intrinsic value and observed price series are specified by partial adjustment with noise model, as described by Theobald and Yallup (2004). Observed prices are supposed to be partially adjusted toward their fundamental values or to be intrinsic toward the dimension of adjustment being displayed in the speed of the price adjustment coefficients. They assumed that the fundamental value follows a random walk procedure. The fundamental value and observed price series are identified as follows:

$$\Delta p_t = g\{(V_{(t)} - p_{(t-1)}\} + u_{(t)} \tag{1}$$

$$\Delta V_{(t)} = \mu + e_{(t)} \tag{2}$$

where g and $\Delta p_{(t)}$ are the speed of adjustment coefficient and change in logarithm observed price, respectively. The adjustment coefficient will be

between [0, 2] and may be assumed to be stationary with μ_t as a white noise sequence, ΔV_t is the change of intrinsic values in logarithm, μ the mean of the fundamental value random walk procedure, and is e_t the innovation in logarithmic fundamental values (if market is efficient, e_t must be serially uncorrelated). If prices fully adjust, the speed of adjustment coefficient should equal one. When over (under) reactions occurs, g is greater (less) than one.

The autocorrelations in the return series can be reduced by under or overreaction. The positive autocorrelations would take place when prices under react. The auto-covariance for lags one and two can be derived as:

$$Log\ one = Cov\ [R_t, R_{t-1}] = \frac{g}{2-g}\ [(1\text{-}g)\ var\ \{e_t\}\text{-}var\ \{u_t\}] \qquad (3a)$$

$$Log\ two = Cov\ [R_t, R_{t-2}] = (\frac{g(1-g)}{2-g})\ [(1\text{-}g)\ var\ \{e_t\}\text{-}var\ \{u_t\}] \qquad (3b)$$

If noise and innovation processes are stochastic and the cross-covariances between them are zero, then the speed of adjustment coefficient can be written as follows:

$$1 - \pi = \frac{Cov\{R(t), R(1-2)\}}{Cov\{R(t), R(-1)\}} \qquad (4)$$

As predicted instinctively, based on this estimator, the speed of price adjustment coefficient is a function of the auto-covariance structure. The sample moments in Equation 4 because of its identity with an instrumental variable assessor, provide asymptotic variance of the estimator that can be defined as follows:

$$Asy.var\ (1\text{-}g) = n^{-1}\sigma^2 var\ \{R_t[> cov\{R_t, R_{t-1}\}]^{-2} \qquad (5)$$

where, n and σ^2 represent the number of observations and the variance estimation of the disturbance term, ε_t; for the procedure $R_{t-2} = \alpha + \beta R_{t-1} + \varepsilon_t$, respectively.

Thin trading impacts may increase price adjustment delays in spite of the slow adjustment toward fundamental values. Both of them are clear phenomena. For instance, traders may not adjust their mid-market quotes fully toward intrinsic values when a trade indicator is in a bid–ask, as in a spread model. Thus, delays caused by late reported trades lead to an additional non-synchronous trading that impacts transaction price series. Theobald and Yallup (2004) also showed various effects within a stochastic procedure description. Although, non-trading can induce autocorrelations; however, using trade to trade prices in any efficient market can lead to the autocorrelations disappearance as a result of complete adjustment of these prices. The estimator presented in Equation 4 will

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be inconsistent during thin trading; however, a consistent estimator of 1-g will be calculated by

$$1 - g = \frac{Cov\{R(m,t), R(m,t-2-q)\}}{Cov\{R(m,t), R(m,t-1-q)\}}$$

(6)

where q represents the impact upon observed return variable, or $R_{(m,t)}$, as the longest lag in true return subject to thin trading. For instance, the lag three sample auto-covariance to the lag two sample auto-covariance ratio with the consecutive trades' assumption can provide a consistent estimator of 1-g.

3.2 The ARMA estimator

According to Theobald and Yallup (2004), there is another assessor that can be derived from Equation 1 after differencing:

$$R_t = (1\text{-}g)\ R_{t-1} + g\Delta V_t + \Delta u_t$$

(7)

By substituting for $g\Delta V_t$ terms from Equation 2, and Equation 7 becomes

$$R_t = g\mu + (1\text{-}g)\ R_{t-1} + ge_t + u_t - u_{t-1}$$

(8)

The autocorrelations induced by over/under-reactions in the present modelling structure are displayed as in an ARMA (1, 1) model where price adjustment impacts take place within the AR (1) coefficient. When the adjustment is complete, the procedure will be an MA (1) model; in this condition innovations are a function of noise. When $|1\text{-}g|<1$, the AR component will be stationary. This corresponds to the conditions applied by Amihud and Mendelson (1987) in their model to check that prices were finite. When non-synchronicities are available, Equation 8 is:

$$= g\mu + (1-g)R_{m,1-1} + \sum_{i=0}^{q} w_i L^i \{ge_{t-i} - u_{t-i} - u_{t-1-i}\} + (1-(1-g)L)r_t$$

(9)

where L^i represents the lag operator for i steps back. This is an ARMA (1, q+1) procedure. The assessor for (1-g), is the moving mean component, which captures the thin trading impacts; this is provided by the autoregressive coefficient and now is a higher order. ARMA (1, 2) is suitable for the case of continuous trades considered before.

Using the daily differencing interval, the speeds of adjustment, which were significantly less than one at the 5% level, were categorised as under-reaction. The degrees of under-reaction denote the lack of confidence in market participants in reacting to the given information being publicly available. When the information announcement is judged to be ambiguous or insignificant to increase future cash inflow of the announcing firm, the buyers do not push the price reaction. Similarly, at the daily differencing interval, the speeds of

adjustment, which were significantly more than one the 5% level are categorised as over-reaction. The degrees of over-reaction denoting the overconfidence of the market participants are mainly due to the buyers.

When information announcement is judged to be accurate and definite in order to increase future cash inflow of the announcing firm, the buyers rush into making buy orders that push the price reactions to above its intrinsic value. This study used ARMA (1, 2). There is no standard rule to differentiate the robustness of different levels of ARMA measurements, except by noting the suitable trends of coefficients measuring a particular pattern of returns. Based on previous studies, the ARMA (1, 2) estimator is considered to be the appropriate estimator for the settings of MENA stock markets.

3.3 Data Sources

The data sets used in this study were the daily closing prices of stocks from the DataStream database. The sample comprised all companies that were continuously listed in the stock exchanges of selected countries for a period of four years from 2005 to 2008. Daily closing prices of five MENA stock markets (Egypt, Jordan, Kuwait, Oman, and Saudi Arabia) were also collected from the same source. The sample selection procedure was to investigate the component companies of each country included in this study; namely Oman, Saudi Arabia, Kuwait, Jordan, and Egypt. The selected market capitalisation should represent at least 95% of the total market capitalisation. The sample size distribution and the market capitalisation of sample companies are listed in Table 2. The test window measuring for information effect was set at one day (meaning on the day of announcement), then 2 days right up to 20 days around the announcement day. This is the standard methodology in the literature, and this study followed the same procedure. If the speed of adjustment falls within the very short test window, it shows that the information used has very high speed of price adjustment in the market concerned. Announcement dates of announcements of news were obtained from the web sites of the Ministry of Finance and the Prime Minister's Department.

Table 2: Sample Size Distribution and its Market Capitalization Representation

Country	Number of companies in the sample	Number of companies in the country	Total M cap. of the sample US$ mil	Total M Cap. of the country US$ mil	Sample rep. by number of companies %	Sample rep. by M cap. %
Oman	75	114	21,645	21,943	65.8	98.6
Saudi Arabia	76	154	347891	369730	49.3	95.5
Kuwait	55	198	328,604	341264	53.5	96.3

(continued)

Country	Number of companies in the sample	Number of companies in the country	Total M cap. of the sample US$ mil	Total M Cap. of the country US$ mil	Sample rep. by number of companies %	Sample rep. by M cap. %
Jordan	96	220	15,767,131,600	16,165,096,642	43.6	97.5
Egypt	129	212	390,661,042,482	399,417,094,976	61	98.7

Source: the data collected from daily report of each country stock exchange except the data for Saudi Arabia, Kuwait, and Oman, which were collected from the Gulf base on 24/09/2012

4. Findings on Macro Event Effects on Stock Prices

The study proceeded to investigate the way in which the estimated speed of adjustment coefficients changed with the differencing interval over which returns were defined. From an efficient markets perspective, an important question is whether the adjustment of observed market prices to full information prices is complete (when the adjustment speed must equal g=1); if not, how rapidly the adjustment process completely dissipates, with an increasing differencing interval set from 1 day to 20 days interval of time.

Speeds of price adjustment were determined in selected sample stocks of MENA countries based on market wide announcements. These included the study of the speed of price adjustment to two different market-wide announcements, which were based on the macro factors of political announcements. These factors influence market makers' decisions in buying and selling of shares and other capital market securities. Two macroeconomic announcements were used: the National Annual Budget Announcement and the National General Elections Announcement.

To assess the speed of adjustment coefficient, mean g was estimated and summarised in the tables. As Tables 3 and 5 show, the speed of price adjustment values of the coefficients were less than one for most of the time in all selected countries. This implies under-reactions in the market due to thin trading. Based on the auto-covariance ratio estimator, for the first-day return difference interval, mean g was less than one for all selected countries. This indicated under-reaction in the market. Just for Oman on the third day, mean g was about 1.085, showing over-reaction in prices. The mean g of Saudi Arabia was more than one on the fifth day.

Based on the ARMA (1, 2) estimator, speed of adjustment coefficient was less than one for most of the time, and continuous during the period for all selected countries. For the first-day return difference interval, mean g of Kuwait and Saudi Arabia was 1.190 and 1.172, respectively. These indicated over-reaction in these markets. On the second day, the mean of Egypt, Kuwait, and Oman were about 1.263, 1.011, and 1.088, respectively, which were different from one, showing over-reaction in prices. According to the summary statistics

in Table 3, the mean of g was statistically significantly lower than one at 0.05 in the days up to 2 days for Egypt, Jordan, and Saudi Arabia. This indicated that the stock prices of companies listed on the Egypt and markets Jordan under-react and for Saudi Arabia over-reacts to the information arrival for one day before fully adjusting to its new level of equilibrium on the second day. Other countries adjusted to new information on the first day.

　　　　Results reported in Table 7 suggested that under-reactions were observed in most of the selected countries, whereas in Saudi Arabia, there were over-reactions as well. According to the Auto-covariance Ratio estimator, the mean g values showed under-reaction on the first and the second day for all selected countries. Based on the ARMA (1, 2), the values of g indicated overreactions during quite a few intervals in the first period in Oman and Saudi Arabia, whereas for other countries, there were under-reactions. There were overreactions in return differencing intervals at 2-, 3- days for Kuwait stock market, and under-reactions were recorded at other intervals. The speed of adjustment coefficients for Egypt were less than one for most of the time, and continuous during the period. Base on Table 9, the mean of g was statistically significantly lower than one at 0.05 up to 2 days for Saudi Arabia. This indicated that for the stock prices of the companies listed in Saudi Arabia,it takes two days to adjust stock returns to the information arrival time, while other countries adjust to new information on the first day.

Table 3: Speed of Price Adjustment to National Annual Budget Announcements for Each Selected Countries base on *Auto-covariance Ratio estimator*

Differencing Interval in days	Mean g *By Auto-covariance Ratio*				
	Egypt	Jordan	Kuwait	Oman	Saudi Arabia
1	0.901	0.880	0.884	0.718	0.872
2	0.912	0.866	0.892	0.736	0.850
3	0.943	0.878	0.892	1.085	0.913
4	0.977	0.910	0.926	0.928	0.932
5	0.915	0.934	0.882	0.882	1.036
6	0.922	0.948	0.910	0.867	0.897
7	0.949	1.134	1.070	0.865	0.905
8	0.861	0.954	0.955	0.882	0.757
9	0.827	0.892	0.906	0.874	0.840
10	0.855	0.870	0.934	0.860	0.827
11	0.861	0.810	0.892	0.851	0.830
12	0.832	0.787	0.894	0.826	0.810
13	0.880	0.769	0.862	0.790	0.838

(continued)

Differencing Interval in days	Mean g *By Auto-covariance Ratio*				
	Egypt	Jordan	Kuwait	Oman	Saudi Arabia
14	0.874	0.805	0.937	0.810	0.781
15	0.864	0.771	0.881	0.800	0.839
16	0.836	0.782	0.889	0.826	0.814
17	0.870	0.802	0.901	0.827	0.850
18	0.771	0.792	0.848	0.843	0.851
19	0.771	0.792	0.848	0.843	0.851
20	0.784	0.702	0.837	0.795	0.812

Table 4: National Annual Budget Announcements T- Test for Each Selected Countries base on *Auto-covariance Ratio estimator*

Differencing Interval in days	Mean g *By Auto-covariance Ratio*				
	Egypt	Jordan	Kuwait	Oman	Saudi Arabia
1	-2.124	-1.992	-2.028	-5.197	-2.107
2	-1.989	-1.913	-1.474	-4.520	-2.217
3	-1.166*	-1.470	-1.533	1.355	-1.335
4	-0.489	-1.727	-1.067	-1.062	-1.080
5	-1.854	-1.072	-1.764	-1.862	0.532
6	-1.709	-0755	-1.346	-2.433	-1.625
7	-1.288	2.066	0.952	-2.170	-1.534
8	-3.182	-0.710	-0.600	-2.543	-4.002
9	-3.464	-1.446	-1.422	-1.783	-2.693
10	-3.838	-2.107	-0.860	-2.652	-2.371
11	-4.131	-3.026	-1.596	-2.375	-2.715
12	-3.504	-3.235	-1.582	-3.078	-3.689
13	-2.669	-4.170	-1.919	-3.373	-3.108
14	-2.674	-3.032	-0.919	-3.307	-3.744
15	-2.824	-4.042	-1.593	-3.373	-2.336
16	-3.224	-3.670	-1.867	-2.769	-2.749
17	-2.927	-3.587	-1.290	-3.030	-2.561
18	-6.306	-3.029	-2.560	-2.541	-2.415
19	-6.469	-4.847	-2.245	-3.538	-2.990
20	-11.480	-4.815	-2.029	-3.517	-5.631

Critical t-value = ± 1.96 at 0.05

Table 5: Speed of Price Adjustment to National Annual Budget Announcements for Each Selected Countries base on *ARMA (1, 2)*

Differencing Interval in days	Mean g *By ARMA (1, 2)*				
	Egypt	Jordan	Kuwait	Oman	Saudi Arabia
1	0.837	0.943	1.190	0.939	1.172
2	1.263	0.882	1.011	1.088	0.993
3	0.892	0.940	1.005	0.913	1.000
4	1.008	0.976	0.994	0.955	1.076
5	0.946	0.994	0.985	1.012	1.025
6	0.917	1.028	0.969	0.945	1.012
7	0.963	0.995	1.008	0.918	1.039
8	0.786	1.004	0.961	0.793	1.017
9	0.847	0.972	0.949	0.891	0.917
10	0.834	1.000	0.979	0.795	0.985
11	0.821	0.929	1.051	0.799	1.007
12	0.902	0.933	0.918	0.823	1.020
13	0.923	0.877	1.035	1.000	0.991
14	0.937	0.945	1.049	0.853	0.849
15	0.930	0.802	0.924	0.762	0.972
16	0.942	0.802	0.893	0.871	0.886
17	0.914	0.812	1.026	0.700	0.903
18	0.854	0.821	0.973	0.893	0.945
19	0.846	0.913	0.992	0.761	0.884
20	0.886	0.965	1.066	0.849	0.887

Table 6: National Annual Budget Announcements T-test for Each Selected Countries base on ARMA (1, 2)

Differencing Interval in days	Mean g *By ARMA (1, 2)*				
	Egypt	Jordan	Kuwait	Oman	Saudi Arabia
1	-3.643	-0.822	2.753	-0.974	2.535
2	5.966	-1.757	0.148	1.320	-0.101
3	-2.461	-0.904	0.066	-1.495	0.002
4	0.175	-0.378	-0.091	-0.666	1.137
5	-1.157	-0.092	-0.218	0.189	0.374
6	-1.794	0.416	-0.433	-0.907	0.177

(continued)

Differencing Interval in days	Mean g *By ARMA (1, 2)*				
	Egypt	Jordan	Kuwait	Oman	Saudi Arabia
7	-0.766	-0.069	0.109	-1.357	0.566
8	-5.008	0.061	-0.532	-3.166	0.250
9	-3.474	-0.398	-0.699	-1.702	-1.167
10	-3.738	0.005	-0.281	-3.263	-0.213
11	-4.115	-1.061	0.702	-3.156	0.109
12	-2.190	-1.023	-1.119	-2.883	0.296
13	-1.693	-1.808	0.468	0.004	-0.131
14	-1.371	-0.810	0.663	-2.224	-2.352
15	-1.531	-3.043	-1.049	-3.989	
					-0.435
16	-1.298	-3.139	-1.490	-2.175	-1.678
17	-1.975	-2.754	0.369	-5.179	-1.445
18	-3.304	-2.652	-0.374	-1.704	-0.814
19	-3.384	-1.280	-0.107	-3.540	-1.742
20	-2.507	-0.530	0.904	-2.311	-1.747

Critical t-value = ± 1.96 at 0.05

Table 7: Speed of Price Adjustment to National General Election Announcements for Each Selected Countries based on Auto-covariance Ratio estimator

Differencing Interval in days	Mean g *By Auto-covariance Ratio*				
	Egypt	Jordan	Kuwait	Oman	Saudi Arabia
1	0.984	0.775	0.835	0.840	0.822
2	0.955	0.903	0.871	0.853	0.777
3	1.022	1.154	0.951	1.150	0.667
4	0.983	0.914	0.941	0.912	1.149
5	1.024	0.859	1.122	0.884	1.093
6	1.048	0.836	0.967	0.830	0.886
7	0.992	0.880	0.930	0.856	1.031
8	0.977	0.791	0.908	0.788	1.052
9	0.807	0.764	0.897	0.815	1.044
10	0.743	0.866	0.844	0.778	1.097
11	0.730	0.856	0.855	0.738	1.090
12	0.833	0.830	0.826	0.743	1.160

(continued)

Differencing Interval in days	Mean g *By Auto-covariance Ratio*				
	Egypt	Jordan	Kuwait	Oman	Saudi Arabia
13	0.747	0.848	0.811	0.718	1.082
14	0.763	0.750	0.791	0.719	1.113
15	0.753	0.764	0.798	0.749	1.147
16	0.712	0.792	0.759	0.698	1.094
17	0.738	0.748	0.784	0.702	1.089
18	0.623	0.823	0.810	0.668	1.118
19	0.635	0.651	0.743	0.606	1.052
20	0.549	0.680	0.757	0.521	1.067

Table 8: National General Election Announcements T-test for Each Selected Countries based on Auto-covariance Ratio estimator

Differencing Interval in days	Mean g *By Auto-covariance Ratio*				
	Egypt	Jordan	Kuwait	Oman	Saudi Arabia
1	-0.184*	-2.094	-1.135	-1.613	-2.040
2	-0.476	-1.678	-0.850	-1.415	-2.959
3	0.224	1.081	-0.391	1.464	-4.877
4	-0.177	-0.786	-0.422	-0.714	1.104
5	0.353	-1.611	1.029	-1.022	0.984
6	0.543	-1.258	-0.291	-1.816	-1.123
7	-0.089	-1.915	-0.490	-1.856	0.228
8	-0.234	-2.326	-0.734	-1.830	0.373
9	-2.310	-2.788	-1.018	-1.331	0.283
10	-2.786	-1.376	-1.265	-2.747	1.048
11	-3.521	-1.261	-1.214	-3.299	0.581
12	-2.791	-1.102	-1.223	-2.005	1.524
13	-4.129	-1.466	-1.258	-2.832	0.649
14	-2.704	-1.617	-2.387	-2.330	0.886
15	-3.548	-2.552	-1.625	-2.686	1.193
16	-3.464	-2.335	-1.806	-3.939	0.690
17	-2.795	-1.771	-1.713	-3.099	0.934
18	-5.755	-1.581	-1.564	-3.469	0.826
19	-3.823	-3.470	-2.360	-4.371	0.423
20	-6.498	-3.264	-2.224	-5.315	0.586

Critical t-value = ± 1.96 at 0.05

Table 9: Speed of Price Adjustment to National General Election Announcements for Each Selected Countries based on ARMA (1, 2)

Differencing Interval in days	Mean g *By ARMA (1, 2)*				
	Egypt	Jordan	Kuwait	Oman	Saudi Arabia
1	0. 997	0.966	0.748	1.051	1.308
2	0.834	0.741	1.010	1.194	1.276
3	0.881	0.931	1.156	0.983	0.897
4	0.856	0.985	0.859	0.966	0.905
5	0.936	0.945	0.834	0.924	0.844
6	0.950	0.881	0.930	1.024	1.163
7	0.952	0.995	0.735	1.126	0.884
8	0.997	0.994	1.012	1.056	0.898
9	0.904	0.953	0.806	0.814	1.081
10	0.953	0.976	1.062	0.740	1.193
11	1.011	0.906	0.829	0.792	1.167
12	0.863	0.873	1.309	0.762	0.896
13	0.870	0.922	0.997	0.680	0.894
14	0.720	0.990	1.130	0.736	0.913
15	0.833	1.003	0.610	0.721	1.024
16	0.846	1.058	0.654	0.706	1.115
17	0.848	1.000	0.684	0.916	0.915
18	0.848	1.124	0.839	0.896	0.896
19	0.728	0.968	0.590	0.851	1.130
20	0.757	1.092	0.780	1.002	0.908

Table 10: National General Election Announcements T-test for Each Selected Countries based on ARMA (1, 2)

Differencing Interval in days	Mean g *By ARMA (1, 2)*				
	Egypt	Jordan	Kuwait	Oman	Saudi Arabia
1	-0.040	-0.291	-1.956	0.394	2.403
2	-2.071	-1.831	0.070	1.553	2.181
3	-1.273	-0.559	1.362	-0.141	-0.774
4	-1.607	-0.116	-0.957	-0.259	-0.649
5	-0.698	-0.503	-1.529	-0.619	-1.135
6	-0.553	-0.985	-0.554	0.189	1.149

Differencing Interval in days	Mean g *By ARMA (1, 2)*				
	Egypt	Jordan	Kuwait	Oman	Saudi Arabia
7	-0.544	-0.041	-1.983	0.956	-0.892
8	-0.040	-0.049	0.086	0.483	-0.769
9	-1.564	-0.373	-1.664	-3.256	0.580
10	-0.695	-0.205	0.460	-2.070	1.438
11	0.148	-0.754	-1.214	-1.667	1.492
12	-1.559	-0.963	2.411	-1.989	-0.843
13	-1.439	-0.628	-0.025	-2.795	-0.790
14	-3.363	-0.073	0.913	-2.655	-0.630
15	-1.945	0.023	-3.054	-2.618	0.166
16	-1.810	0.468	-2.840	-2.996	0.876
17	-1.724	-0.002	-2.438	-0.768	-0.603
18	-1.684	1.100	-1.151	-0.787	-0.854
19	-3.075	-0.266	-3.230	-1.328	1.017
20	-2.814	0.807	-1.716	0.017	-0.703

Critical t-value = ± 1.96 at 0.05

Speed of price adjustment to each type of announcement tested led to the rejection of the null hypotheses. That means, the speed of adjustment coefficient $g \neq 1$ is in less than 20 days, for any of the announcements tested here. That shows that there is slight under-reaction.

5. Conclusion

Efficient market theory predicts that prices should adjust rapidly (quickly)to the arrival of information. The main objective of this study was to analyse the speed of stock price adjustment coefficients using daily data of five selected MENA stock markets. This was done by using Theobald-Yalup's methodology, using data for the period 2005-2008. Two estimators were used, one in terms of auto-covariance ratios and the second variable is in terms of an ARMA specifications. These estimators had advantages over other estimators in that, for example, they could be adjusted for thin trading and are associated with sampling distributions, thereby affording accurate hypothesis testing. The National Annual Budget announcement is a market-wide announcement, which is widely broadcasted in all countries.

For the purpose of this study, the first announcement selected was the National Annual Budget announcement broadcasted live in local radio and television channels. The other is the announcement of the General Elections Results, which was of greater interest to every citizen in the country.

The annually reoccurring National Annual Budget announcement would take two days for price reactions to complete in Egypt, Kuwait, and Saudi Arabia, while for Jordan and Oman, it took just one day. However, the national general election attracted faster adjustment time "one-day under-reaction for three countries and one-day over-reaction for other three countries." This study showed that the speed of price adjustment for each type of announcements is less than 20 days.

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