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Lagged Effect of Macroeconomic Variables on Stock Returns: A Case of Firm Size

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ABSTRACT
The evidence of lagged effect regarding firm size between macroeconomic factors and stock returns is found with GARCH model for the UAE firms. More precisely, the exchange rate significantly affected stock returns irrespective of size group and lag level. However, a positive effect is observed at lag four and a negative impact on lag five and two for small and large firms. For the majority of the firms in small size, the risk-free rate showed a negative lagged effect on stock returns; however, for the majority of the firms in large size, it showed a positive lagged effect on stock returns. Inflation also showed a significant effect on stock returns on each lag level except for large firms where at lag five it is insignificant. Moreover, as the lags increase from 1- 4 and size from small to large, the negative effect of inflation converts to a positive effect on stock returns. The lag effect of real activity showed both positive and negative impacts on small firms' relatively larger stock returns than big firms. Money supply showed a significant positive impact on stock returns of all firms irrespective of the size group; however, this relationship is even more prominent at lag five. Finally, the oil prices showed a positive effect on stock returns (large size) which further maximizes at lag two; whereas, a negative maximization takes place at lag three. Hence, investors can make informed and effective decisions, and UAE policymakers developed effective measures to control and promote macroeconomic growth and stability.

JEL Classification: *E00, E44, L11*

Keywords: *Lagged Effect, Macroeconomic Variables, Firm Size, UAE Markets*

INTRODUCTION

The relationship between macroeconomic factors and stock returns has dominated the financial literature over the past decades. Theoretically, Capital Asset Pricing Model (CAPM), Arbitrage Pricing Theory (APT), and Dividend Discount Model (DDM) admit the role of macroeconomic variables in determining the stock returns in a market (Arnold & Vrugt, 2006; Chinzara, 2011; Lin & Su, 2020). After the initial work by Fama (1981) and Chen, Rol and Ross (1986) in the context of NYSE started examining the role of economic forces in determining stock prices. For instance, an earlier study by Bennett and Kelleher (1988) investigated the role of interest rate, inflation, unemployment and industrial production in determining the developed markets firms' returns. They reported significant effect of industrial production in US, Germany and UK markets and interest rate in all four countries. Afterwards, Mukherjee and Naka (1995)

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investigated Tokyo market for the relationship between stock returns and economic factors. Later some researchers also focused on emerging markets such as Hong Kong, Taiwan, Thailand, Singapore, and South Korea (During the financial crisis). Applying the GARCH-M model they reported the negative effect of exchange rate on stock returns for all these countries. Indian market was examined by Agrawal, Srivastav and Srivastava (2010) and Singh (2010) for the possible relationship between macroeconomic variables and stock returns. More precisely, Agrawal *et al.* (2010) found a unidirectional effect of stock returns on exchange rate using Granger causality test. However, Singh (2010) observed a bilateral relationship of industrial production and stock prices in the same market. The majority of the existing studies (Hoque & Low, 2020; Jan, Khan & Khan, 2018; Khan & Jan, 2020; Khan, Muneer & Anuar, 2013; Narayan & Sharma, 2011; Tuna & Almahadin, 2020) have reported a significant relationship between the two factors. A sectoral level effect in Australian markets was observed by McSweeney and Worthington (2008), who concluded that the impact of oil prices will be different for different sectors.

The UAE markets are not been extensively studied by researchers so far for the determinants of stock returns. Moreover, the limited literature in this context only investigates the firm-specific factors of stock returns. For instance, Obeidat (2009) conducted his study to determine firms' stock prices listed at Abu Dhabi Securities Exchange. He considered the data from 2002 to 2006 for earning per share (EPS), dividend per share (DPS), and book value per share (BVPS). Further, he concluded a significant effect of EPS and BVPS on the firms' stock returns of Abu Dhabi Securities Exchange. Moreover, he also argued that stocks with strong fundamental values will only survive in the long run and stocks having drift on the random walk will face downward trend. Similarly, the UAE markets were also investigated by Al-Tamimi, Alwan and Rahman (2011) using data for the period from 1995-2005 for the determinants of stock prices. They applied ordinary least squares regression (OLS) and concluded that earning per share is the most significant determinant of stock prices followed by money supply and GDP. They further suggested that as the investors mainly rely on the earning per share; therefore, the firms and managers should improve this performance indicator.

The South African market was examined for the possible relationship between macroeconomic factors and stock return volatility by Chinzara (2011). He concluded a significant effect of exchange rate and the interest rate on the stock return volatility at a sectoral level using GARCH and VAR models on monthly data. Similarly, Narayan and Sharma (2011) also conducted a sectoral level study for the effect of oil prices on stock returns of NYSE firms. Applying GARCH (1, 1) on the data set for the period 2000-2008 at the sectoral level, they found the following results. First, they concluded that oil prices affect the stock returns differently with respect to the sectoral nature of the firm. Second, they also found the significant lag effect of oil prices on stock returns. Finally, they also suggested future studies to incorporate the size effect of the firm. Several other researchers also highlighted the role of oil prices in determining the stock prices (Filis, Degiannakis & Floros, 2011; Le & Youngho, 2011; Akinlaso, Hamid & Ali, 2020; Aziz & Hussain, 2021) however, they focused on aggregate market level analysis in developed context.

Based on the identified literature gaps and needs, the current study examines two important issues regarding the effects of macroeconomic variables on stock returns in the context of UAE i.e., the lag effect of economic variables and the size effects. In the following paragraphs, a detailed justification is provided for both.

The Lagged Effect of Economic Factors

For instance, as argued by Jones and Kual (1996) and more recently by Ma et al. (2019) the significant lag effect of oil prices on the stock returns indicates either the market is inefficient or this economic factor (oil price) brings variations in expected stock returns. Similarly, the hypothesis of under-reaction suggests that investors in short horizon the investors under react to new information; however, over the long horizon they over react to the same information (Fullwood, James & Marsh 2021; Poteshman, 2001; See-To & Yang, 2017; Zhao et al., 2020). So, in light of this hypothesis, investors do not react strongly to new information and their strong reaction delays for some time, leading to the lag effect of it on stock returns. Yet another hypothesis justifies the lag effect of economic variables is the "information quantity hypothesis". According to Barberis et al. (1998), when a piece of information is preceded by small or insignificant information, investors under-react to it; however, when this information is preceded by large or significant information, investors over-react to it. In this connection, Hong, Torous and Valkanov, (2007) also presented a "limited information processing capacity hypothesis". According to this hypothesis, all the investors in stock markets cannot perceive and understand the information equally. Therefore, their response cannot arrive at an equal time and is delayed. Finally, as indicated by Balvers, Cosimano and McDonald (1990), Breen, Glosten and Jagannathan (1990), Fama and French (1989), the expectable component of stock returns is linked to the business cycle and referred it as "mean reversion hypothesis". In addition to this, Pesaran and Timmermann (1995) also indicated that the business cycle plays its role rather than stock returns are the result of economic shocks.

The Size Effect

The role of size effect is recognized by a strong stream of research studies. (Ahinful, Boakye & Bempah, 2021; Loderer & Waelchli, 2010; Rahman & Yilun, 2020). Further, these studies make a distinction for the size effect in two groups. In the first group, the researchers are of the view that small size firms have inexperienced managers, lack financial and R&D resources as compared to large firms (e.g., Khan & Jan, 2020; Salman & Yazdanfar, 2012; Westhead, 1995; Winter, 1994). Hence, these experienced and competent managers, with the support of large financial resources, bring the large firms in a better position to diversify their capital and utilize economies of scale (e.g., see Chang, McAlee & Tansuchat, 2021; Elyasiani et al., 2007; Park & Luo, 2001). Similarly, according to Glancy (2007), James and Wier (1990) and Vilkov (2007), large firms are considered as safer, liquid, and credible. On the other hand, small firms are considered riskier and face higher borrowing costs and tough conditions (Coad, 2018; Cooley & Quadrini, 2001; Huynh & Petrunia, 2010; Mazhar, 2020; Vickery, 2008). Further, small-size firms also face a high level of interest rate as these firms cannot dispose-off as many assets as large firms can (Ehrmann, 2000). Small firms are also incapable of being flexible to the market dynamics (Elyasiani et al., 2007; Jan et al., 2018; Salman & Yazdanfar, 2012). Abdullah, Shah and Khan (2001) also indicated that small firms lack financial and R&D resources and cannot provide quality training to their employees. In a related vein, Chang et al. (2021), Jan et al. (2018), Khan et al. (2016), Khan and Jan (2020), Sharma et al. (2014) and Miroshnychenko (2021), articulated that since small firms have limited marketing strategies, thus they might be more exposed to the shocks than the large ones.

The second and opposite group of studies regarding firm size publishes the downside of large firms. Prior researchers state that (Jan et al., 2018; Jiang, Chua, Kotabe & Murray, 2011; Khan & Jan, 2020; Loderer et al., 2013; Loderer & Waelchli, 2010; Tripsas & Gavetti, 2000;

UhlanerStel, Duplat & Zhou, 2013) large firms have organizational rigidity and inertia that negatively affect the performance, efficiency, higher cost, and reduction in R&D costs of these firms. Due to inherent rigidity and moral hazards, these firms are also relatively slower in adjusting and learning new technology and innovation (e.g., see Barringer & Jones, 2004; Jan et al., 2018; Jiang et al., 2011; Khan & Jan, 2020; Sorensen & Stuart, 2000). In a similar vein, Moeller, Schlingemann and Stulz (2004), argued that small-size firms have better incentive mechanisms and comparatively more flexible with respect to management as compared to large firms. They also furnished two concluding remarks with regard to firm's gains from acquisitions. First, they reported that the acquisition ratio is about two percent higher than that of the large firms. Second, small firms generally make payments for acquisitions in cash, which becomes the reason for the declaration of lower profits on their stocks (Travlos, 1987). A large stream of literature documented a negative relationship between the firm's profitability and its age (such as Loderer et al., 2010; Park & Lu, 2001; Salman & Yazdanfar, 2012; Wang & Zhao, 2020). Moreover, resting on the negligence of existing scholars, Khan et al. (2016) and Mandimika and Chinzara (2012) suggested that future studies must articulate the worth of size effect from the point of view of economic exposure since it can be worthy for the investors for effective decisions.

The above-mentioned discussion established the theoretical and empirical significance of the lag and size effects of macroeconomic factors on stock returns for both developed and emerging markets. It is clearly evident that the macroeconomic factors affect the stock returns based on their lag values and the small firms behave quite differently from large firms. In addition, to the best of authors' knowledge, there is no study conducted in the context of UAE which had explored the relationship between the lag effects of macroeconomic factors on the stock returns particularly with respect to the size effect. Therefore, it is the matter of empirical investigation to determine precisely the differences they have. Thus, it is praiseworthy to get the empirical tangible sense of the intrinsically elusive idea of lag and size effects of macroeconomic factors and firms, respectively (Jan et al., 2018; Khan & Jan 2020), specifically in an emerging market of UAE.

METHODOLOGY

The analytical procedure of the current study includes two step-analyses. In the first step, the firms' stock returns of both the markets i.e. Abu Dhabi Securities Exchange and Dubai Financial Market along with the macroeconomic variables are examined with respect to temporal characteristics. For example, as this study uses time series data, the descriptive statistics consisted of Augmented Dickey-Fuller (ADF) and Philips and Parrens (PP) tests testing of stationarity. Jarque-Berra test for normality and Q-statistic for screening the serial correlation of time series. Further, mean and standard deviation along with skewness and kurtosis are also examined for the stock returns. All these statistics are duly calculated; however, results are not reported in this study due to the space limitations. From these statistics it has been concluded that the data is stationary at level; however, exhibited volatility clustering. This clearly indicates the use of ARCH and GARCH models. As a second step, the current study applied the following GARCH (1, 1) model on the data to investigate the lag effect of macroeconomic factors on the firm's stock returns:

$$R_{it} = \beta_0 + \beta_1 EV_t + \beta_2 EV_{t-1} + \beta_3 EV_{t-2} + \beta_4 EV_{t-3} + \beta_5 EV_{t-4} + \beta_6 EV_{t-5} + e_{it} \text{--- (1)}$$

Where R_{it} indicates the stock return of firm i at month t. Further, EV displays the respective economic factor whose lagged effect is to be tested on stock returns. However, t-1 to t-5 represents the lag one to lag five for the respective economic factor *. The same equation is repeatedly used for each economic variable separately in order to determine its lagged effect on stock returns of each firm. Those economic factors include Exchange Rate (EXR), Risk-Free Rate (RFR), Consumer Price Index (CPI), Industrial Production Index (IPI), Money Supply (M2) and Oil Prices (OIL).

The two important financial markets of UAE are Abu Dhabi Securities Exchange (ADX) and Dubai Financial Market (DFM) established in November and March 2000, respectively. Currently, ADX includes four sectors; whereas, nine sectors are included in DFM. For the empirical investigation, the current study utilizes the monthly stock returns from both Abu Dhabi Securities Exchange (ADX) and Dubai Financial Markets (DFM). There are more than 120 firms listed on both markets; however, the balanced data for the purpose of the current study was found for only 68 firms from January 2010 to December 2017. Moreover, for firm size, the existing financial literature (e.g., Chun et al., 2008; Fama & French, 2004; Jan et al., 2018; Khan et al., 2016; Khan & Jan, 2020; Narayan & Sharma, 2011; Pastor & Veronesi, 2001 and Sharma et al., 2014) states that firms are categorized into four groups based on the market capitalization on the starting day of data period. More precisely, size group 1 represents the smallest while size group 4 represents the largest firms.

GARCH (1, 1) Model

Following the important stream of financial literature (e.g., Jan et al., 2018; Khan & Jan, 2020; Narayan & Sharma, 2011; Nguyen & Sy, 2017; Sharma et al., 2014; Tetteh, Adenutsi & Amoah, 2019); the current study also applies GARCH (1, 1) model to investigate the lagged effect of economic factors on the stock returns of UAE firms. Similarly, Fah, Nassir and Chowdhury (2011) and Nguyen et al. (2017) stated that (1, 1) is the most acceptable, agreed and suitable order for applying GARCH model.

The GARCH model in equation form is as follows (Chinzara, 2011):

$$r_t = u_i + \sum_{i=1}^{k} \alpha_i r_{t-i} + \varepsilon_t, \frac{\varepsilon_t}{I_{t-1}} \sim N(0, h_t) \text{ ---------- (2)}$$

$$h_t = \omega + \sum_{i=1}^{p} \alpha_i \varepsilon_{t-i}^2 + \sum_{j-1}^{q} \beta_j h_{t-j}, \omega > 0, |\alpha_i + \beta_j| < 1 \text{ ---------- (3)}$$

RESULTS AND DISCUSSION

In table 1, all the results from GARCH (1, 1) are presented, which explain the lag effect of macroeconomic factors on stock returns with respect to firm size groups. The first part of the table describes the lag effect of exchange rate on a firm's stock returns at different size groups. For the lag effect of the exchange rate, the results are fivefold as follows. First, for the stock returns, the significant positive lag effect of the exchange rate is maximized at lag four i.e.,17.65% to 23.53% of small size firms (size 1 and size 2) against 29.41% to 35.29% of large firms (size 3 and size 4). On the other hand, for the same variable, the significant negative

* *It is found that lag five is the maximum lag at which economic factors affected the stock returns. For inspection purpose, when higher lags are tested, it is determined that either the lagged effect disappeared or diminished considerably. Thus, finally results are reported up to five lags.*

effect of the exchange rate is maximized at lag 5 i.e., 17.65% to 47.05% of small size firms and 11.76% to 23.53% of large size firms. Second, it is observed that large firms dominate in terms of significant positive (35.29% of firms) while small firms dominate in terms of the significant negative lag effect of the exchange rate (47.05% of firms) i.e., at lag 4 and lag 5, respectively. In other words, for the significant positive lag effect, the most common lag is 4 and for the significant negative lag effect, it is lag 5. Thirdly, irrespective of the size effect, the largest significant positive effect of exchange rate takes place at lag four (i.e., 17.65% to 23.53% for size 1 and 2; 29.41% to 35.29% for size 3 and 4). The fourth dimension of result suggests that for all the groups even at lag 5, both the significant positive and negative effect of exchange rate persist. Therefore, this suggests that exchange rate influences the firm's returns across all the lags, irrespective their size group. Finally, the results also reveal that for the significant negative lag effect of the exchange rate, the percentage of firms gradually increases with the increase of lag level for small size (size 1 and 2) firms. However, the opposite is observed for the positive lag effect of the exchange rate, i.e., the percentage of firms increase as the lag level increases for large size firms (size 3 and 4).

For the risk-free rate, again the results are observed from four dimensions. The first observation in this regard is that at lag 1 and lag 4 in small size firms no firm is identified with the significant positive lag effect of the risk-free rate. The second observation suggests that regardless of the size of the firms, the significant negative effect of risk-free rate is observed on the stock returns of largest firms at lag level 1. More precisely, the percentage of firms at lag 1 showing a negative effect for the risk-free rate is 47.05% for size1, 29.41% for size 2, 29.41% for size 3, and 23.53% for size 4. Thirdly, the significant positive lag effect of risk-free rate gradually increases with the increase in size from 1 to 4 at lag level 2 (i.e., from 11.76% to 29.41%). Lastly, the small firms dominate in terms of the significant negative lag effect of risk-free rate i.e., 47.07% of small size firms. However, the large size firms dominate in terms of the significant positive effect of risk-free rate i.e., 29.41% of large size firms.

For inflation (consumer price index), four interesting findings are reported. First of all, at lag 5 and for large size, no firm is found having the positive significant lag effect of inflation. Secondly, on lag level 1, the lag effect of inflation is maximized irrespective of the firm's size. More precisely, for small firms the percentages of firms with this effect 35.29 and 23.53 for size 1 and 2 respectively and 29.41and 23.53 for size group 3 and 4 respectively. The third aspect of the results is related to the positive significant effect of inflation on stock returns which is maximized at lag four irrespective of firm size. More precisely, for size 1, 23.53% of the firms, for size 2, 35.29% of the firms, for size 3, 29.41% of the firms and for size 4, 58.82% of the firms have shown positive lag effect of inflation on their stock returns. Finally, as the levels of lag increase from one till four, the percentage of firms with the negative significant effect of inflation on stock returns gradually decreases and converts into significant positive effect irrespective of the size group. For instance, the inflation's lag significant negative effect which is as high as 35.29% of the firms on lag one and size one decreases to as low as 5.88% of the firms on lag four and size three. On the other side, the positive significant lag effect of inflation for as low as 5.88% of firms at lag one and size two increases to 58.82% of firms at lag four and size four. For the industrial production index (IPI), the results indicate that the small firms dominate in terms of both significant positive and significant negative effect. More precisely, for size group one, the coefficient of IPI is significantly positive and negative on lag two and five of about 29.41 % of the firms each, respectively. In other words, for the

significant positive effect of industrial production lag 2 and for the significant negative effect lag 5 are most important. Further, irrespective of the size effect, the largest percentage of firms associated with positive significant lag effect of IPI on stock returns on lag two belong to size 1 (with 29.41% of firms), followed by size two, size three and size four. On the other hand, irrespective of the size of firms, the largest significant negative effect of IPI on stock returns identified as the percentages of firms is 29.41%, 29.41%, 17%, and 23.53% on lag five for size group 1, 2, 3, and 4 respectively. Finally, the final characteristic from the results discloses that even at lag 5, both the significant negative and positive effect of real output doesn't decay. Therefore, irrespective of the size effect this indicates the significant effect of real output on the stock returns exists across all the lags. Next, the effect of the money supply is observed from the table indicating four different findings. First, money supply doesn't hold any significant negative lag effect on stock returns of size 4 at lag 1 and on size 2 and 4 at lag 5. Second, overall the lag effect of money supply on stock returns is positive, which further maximizes at 5th lag with respect to firm size. More precisely, 52.41% of the firms in size 1, 41.17% of the firms in size 2, 52.41% of firms in size 3, and 82.35% of the firms in size 4 for lag 5 are positively and significantly affected by money supply. After lag 5, lag 2 is the next most common lag where the percentage of firms irrespective of the size effect is the highest for significant positive effect. Further, the large size firms dominate the small firms in terms of the significant positive effect of money supply on the stock returns of the firms. Specifically, large size, 29.41% to 82.35% at different lags are associated with positive significant effect; whereas, for small firms, 17.65% to 52.41% of firms show the same results. Similarly, the percentage of firms with positive significant of money supply also increases with the increase in the size of the firms. For instance, at lag one, it increases from 17.65% to 29.41% as the size increases from size 1 to size 4 and same is the case for the rest of the lags. Finally, four different features are observed for the lag effect of oil prices. First, the significant positive lag effect of oil price is maximized at lag two; whereas, the significant negative effect is maximized at lag three. For example, the significant positive impact ranges from 5.88% to 35.29% of firms for small size and 11.76% to 76.47% of the firms for large size. However, the significant negative impact ranges 5.88% to 23.53% of firms for small size as well as for large size. This concludes that the large firms dominate in terms of the significantly positive lag effect of oil prices. Thirdly, irrespective of firm size, the largest percentage of firms with significant positive effect exists at lag 2; whereas, the largest percentage of firms with significant negative effect exists at lag 3. Finally, regardless of firm size groups, the significantly positive and negative effect persists even at lag five of oil prices on stock returns. Hence, this proves that the oil prices affect the firm's stock returns across entire lags disregard of the size variations.

Table 1:
Results from GARCH (1, 1) Model –Size Effect

Lags		***Firm Size***			
		Lagged Effect of Exchange Rate			
		Small Size (1)	*Size (2)*	*Size (3)*	*Large Size (4)*
Lag 1	Sig(+)	1(5.88)	1(5.88)	2(11.76)	2(11.76)
	Sig(-)	3(17.65)	2(11.76)	2(11.76)	2(11.76)
Lag 2	Sig(+)	2(11.76)	3(17.65)	2(11.76)	1(5.88)
	Sig(-)	3(17.65)	3(17.65)	4(23.53)	5(29.41)

Lag 3	Sig(+)	3(17.65)	3(17.65)	4(23.53)	5(29.41)
	Sig(-)	4(23.53)	3(17.65)	2(11.76)	5(29.41)
Lag 4	Sig(+)	3(17.65)	4(23.53)	5(29.41)	6(35.29)
	Sig(-)	2(11.76)	2(11.76)	1(5.88)	3(17.65)
Lag 5	Sig(+)	2(11.76)	3(17.65)	2(11.76)	2(11.76)
	Sig(-)	8(47.05)	2(11.76)	2(11.76)	4(23.53)
		Lagged Effect of Risk-Free Rate			
		Small Size (1)	*Size (2)*	*Size (3)*	*Large Size (4)*
Lag 1	Sig(+)	0(0.0)	0(0.0)	1(5.88)	1(5.88)
	Sig(-)	8(47.05)	5(29.41)	5(29.41)	4(23.53)
Lag 2	Sig(+)	2(11.76)	2(11.76)	4(23.53)	5(29.41)
	Sig(-)	4(23.53)	2(11.76)	1(5.88)	2(11.76)
Lag 3	Sig(+)	2(11.76)	2(11.76)	2(11.76)	2(11.76)
	Sig(-)	4(23.53)	2(11.76)	2(11.76)	4(23.53)
Lag 4	Sig(+)	2(11.76)	0(0.0)	3(17.65)	3(17.65)
	Sig(-)	2(11.76)	2(11.76)	2(11.76)	3(17.65)
Lag 5	Sig(+)	2(11.76)	2(11.76)	2(11.76)	2(11.76)
	Sig(-)	2(11.76)	1(5.88)	2(11.76)	3(17.65)
		Lagged Effect of Consumer Price Index			
		Small Size (1)	*Size (2)*	*Size (3)*	*Large Size (4)*
Lag 1	Sig(+)	2(11.76)	1(5.88)	2(11.76)	1(5.88)
	Sig(-)	6(35.29)	4(23.53)	5(29.41)	4(23.53)
Lag 2	Sig(+)	4(23.53)	5(29.41)	4(23.53)	5(29.41)
	Sig(-)	1(5.88)	5(29.41)	6(35.29)	3(17.65)
Lag 3	Sig(+)	2(11.76)	4(23.53)	1(5.88)	3(17.65)
	Sig(-)	2(11.76)	3(17.65)	3(17.65)	3(17.65)
Lag 4	Sig(+)	4(23.53)	6(35.29)	5(29.41)	10(58.82)
	Sig(-)	2(11.76)	2(11.76)	1(5.88)	3(17.65)
Lag 5	Sig(+)	2(11.76)	3(17.65)	1(5.88)	0(0.0)
	Sig(-)	2(11.76)	2(11.76)	3(17.65)	4(23.53)
		Lagged Effect of Industrial Production Index			
		Small Size (1)	*Size (2)*	*Size (3)*	*Large Size (4)*
Lag 1	Sig(+)	4(23.53)	4(23.53)	4(23.53)	4(23.53)
	Sig(-)	2(11.76)	3(17.65)	1(5.88)	1(5.88)
Lag 2	Sig(+)	5(29.41)	3(17.65)	4(23.53)	4(23.53)
	Sig(-)	1(5.88)	2(11.76)	2(11.76)	1(5.88)
Lag 3	Sig(+)	3(17.65)	2(11.76)	2(11.76)	1(5.88)

	Sig(-)	2(11.76)	1(5.88)	2(11.76)	1(5.88)
Lag 4	Sig(+)	3(17.65)	3(17.65)	2(11.76)	1(5.88)
	Sig(-)	4(23.53)	3(17.65)	2(11.76)	2(11.76)
Lag 5	Sig(+)	3(17.65)	1(5.88)	1(5.88)	2(11.76)
	Sig(-)	5(29.41)	5(29.41)	3(17.65)	4(23.53)
		Lagged Effect of Money Supply			
		Small Size (1)	*Size (2)*	*Size (3)*	*Large Size (4)*
Lag 1	Sig(+)	3(17.65)	3(17.65)	5(29.41)	5(29.41)
	Sig(-)	2(11.76)	1(5.88)	1(5.88)	0(0.00)
Lag 2	Sig(+)	8(47.05)	7(41.17)	8(47.05)	11(64.70)
	Sig(-)	2(11.76)	2(11.76)	1(5.88)	1(5.88)
Lag 3	Sig(+)	5(29.41)	7(41.17)	5(29.41)	8(47.05)
	Sig(-)	2(11.76)	1(5.88)	1(5.88)	1(5.88)
Lag 4	Sig(+)	6(35.29)	5(29.41)	4(23.53)	9(52.41)
	Sig(-)	1(5.88)	1(5.88)	1(5.88)	1(5.88)
Lag 5	Sig(+)	9(52.41)	7(41.17)	9(52.41)	14(82.35)
	Sig(-)	1(5.88)	0(0.00)	1(5.88)	0(0.00)
		Lagged Effect of Oil Prices			
		Small Size (1)	*Size (2)*	*Size (3)*	*Large Size (4)*
Lag 1	Sig(+)	4(23.53)	3(17.65)	4(23.53)	5(29.41)
	Sig(-)	2(11.76)	3(17.65)	1(5.88)	1(5.88)
Lag 2	Sig(+)	6(35.29)	5(29.41)	5(29.41)	13(76.47)
	Sig(-)	1(5.88)	2(11.76)	2(11.76)	2(11.76)
Lag 3	Sig(+)	1(5.88)	1(5.88)	2(11.76)	3(17.65)
	Sig(-)	4(23.53)	4(23.53)	4(23.53)	4(23.53)
Lag 4	Sig(+)	4(23.53)	4(23.53)	4(23.53)	6(35.29)
	Sig(-)	3(17.65)	2(11.76)	2(11.76)	4(23.53)
Lag 5	Sig(+)	4(23.53)	1(5.88)	3(17.65)	2(11.76)
	Sig(-)	3(17.65)	3(17.65)	2(11.76)	3(17.65)

By way of applying GARCH (1, 1) model, it shows lagged effect of each of the macroeconomic variable on firm stock returns w.r.t firm size up to five lags by displaying a number of firms in each size and their level of statistically significant positive and negative trends at each lag. Further, results are also converted into a percentage for each size at each lag and reported in parenthesis.

Explanation

At first glance, the above mentioned empirical results regarding the lag effect of macroeconomic variables on stock returns observe that the UAE markets (both Abu Dhabi Securities Exchange and Dubai Financial Market) are inefficient. Secondly, these empirical results also validate

the theoretical foundations set by the "under-reaction hypothesis", "information quantity hypothesis", "information diffusion hypothesis", "limited capacity hypothesis", "conservatism hypothesis" and the "mean reversion hypothesis", insisting that there may be lagged effect of macroeconomic factors on the stock returns.

In light of the above discussion, it is evident that the lag effect of macroeconomic variables on the stock returns significantly varies with respect to the size to which the firm belongs. For instance, it is observed that the significant negative lag effect on the stock returns of small firms is prominent for most macroeconomic factors. On the other hand, the significant positive lag effect is mostly observed in large firms. More precisely, as the level of lag increases from one to five, the significant effect of exchange rate on stock returns becomes negative for small size firms. However, this significant effect becomes positive as the lag progress from one to four for large size firms. Similarly, the significant negative effect for inflation gradually converts to significant positive as the lag progresses from one to four and size of the firm from small to large. However, for the interest rate, the bulk of the small firms showed the significant negative lag effect at lag level one; whereas, for the majority of large firms, this exhibited significant positive lag effect at lag two. Moreover, the large firms dominate the small firms in terms of significant positive lag effect for both money supply and oil prices (from lag one to lag five, this significant effect of money supply becomes more positive with the conversion of firm size from small to large). Particularly, the maximization occurs at lag two in case of oil prices and at lag five in case of the money supply.

The results present regarding lag effects of macroeconomic factors with respect to the size of the firms are not surprising due to the following reasons. Large firms (in contrast to small firms) are more resourceful, have experience management, having diversified product range, have a large customer base, apply powerful marketing strategies, get benefits from economies of scale, have the flexibility to market dynamics. All these features bring the large size firm in a position, where they are considered less risky, more liquid, and powerful and ultimately investors trust that it will survive in the long run. In light of these arguments, it is expected that although these firms get affected inversely by the macroeconomic factors in the short run; however, in the long run, they can stabilize their position in the markets. This is how the results are justified and empirically it is evident that the lag effect of macroeconomic variables has a positive effect on the stock returns of large size firms. On the other hand, small firms are logically more vulnerable to the adverse effects of macro events and hence they have a negative impact on the stock returns of small size firms.

CONCLUSION

The current study investigated the lag effect of macroeconomic factors on the stock returns of UAE markets. According to the best of authors' knowledge, no previous study was conducted in the context of UAE for the lag effect of macroeconomic factors on the stock returns. Further, this study used GARCH (1, 1) model on the monthly stock returns of Abu Dhabi Securities Exchange and Dubai Financial Market for the period of January 2009 to December 2017. The total firms from these stock markets for which the balanced data was available were ninety-two. Yet another hallmark of the current study was the use of firm-level data and considering the firm size while empirically investigating the possible relationship. The results clearly indicated the lag effect of all macroeconomic variables on the stock returns of the firms with respect to different size groups. For instance, it is observed that for most of the macroeconomic factors

the significant negative lag effect on the stock returns of small firms is prominent. On the other hand, the significant positive lag effect is mostly observed in large firms.

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