Review Article

Macroeconomic Factors and Stock Market Inefficiency: Role of Trading Effect

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Abstract - *This study examines the role of the trading effect in determining the lagged effect of economic factors on stock returns in an emerging market of Pakistan. Study applied generalized autoregressive conditional heteroskedasticity model GARCH (1, 1). The results of the study indicatethat three lags for exporting firms and four lags for the non-exporting firms are the most common lags for the significant positive impact of exchange rate on stock returns. Second, resting on the overall significant negative lagged effect of the risk-free rate, the results uncovered that it is maximized at one lag in the case of exporting firms while at three lags for non-exporting firms. More so, the results uncovered that the significant negative impact of inflation on stock returns is maximized at lag one for both exporting and non-exporting firms. Moreover, it is also deducted that with the increase in lags from lag one to lag four, for both the exporting as well as non-exporting firms, the significant impact of inflation on stock returns shifts from negative to positive. Furthermore, results depicted that the statistically significant positive impact of real activity on stock returns is maximized at two lags for both exporting and non-exporting firms. Next, with the increases in lags from lag one to lag five, the significant impact of money supply on stock returns becomes more and more positive for both the exporting as well as non-exporting firms. Furthermore, it is found that in the case of exporting firms, the statistically significant positive effect of oil prices on stock returns is maximized at two lags, while for non-exporting firms, it is maximized at lag one. However, the statistically significant but negative effect of oil prices on stock returns is maximized at lag three in the case of exporting firms, but it is maximized at four lags in the case of non-exporting firms. Finally, we uncover that economic factors have lagged effect that varies with respect to firm trading nature, signifying the role of the trading effect.*

Keywords - *Lagged effect, economic exposure, Pakistani stock market,and firm trading effect.*

I. INTRODUCTION

Fama (1970) studied the stock return movements. According to him, the market inefficiency means that the prices of securities do not properly represent all the information available in the market. Inefficient markets do not always respond to fresh and new information to determine the expected prices.

Many studies documented significant associations between economic variables, including gross national product (GNP), industrial production, money supply, and inflation, and US equity returns (Fama, 1981 and Chen *et al.* 1986). Ball and Brown (1980) examined the sensitivity of mining industry stock returns in Australia. They also found that even without reflecting any risk premium, mining corporations were riskier than industrial corporations,and it could be either due to the hedging behavior of investors in the mining industry or due to the measurement error.

II. MOTIVATIONS FOR TRADING EFFECT (EXPORTING VS. NON-EXPORTING FIRMS)

Since due to the fact that most of the countries (like Pakistan) are facing a balance of payment deficit, and therefore attempts to increase the exports (Kaynak, 1982; Joynt, 1982; O'Rourke, 1985; Miesenbock, 1988 and Aaby and Slater, 1989), the research regarding exporting and non-exporting firms are of enormous importance. Exporting firms develop specific strategies in order to meet and face the competitive environment in both the domestic and international markets (McDougall, 1989).

The financial literature concurs that the exporting firms have a better payment mechanism for workers and managers, are more R&D oriented, have more experienced management, have faster growth rates, have a larger customer base, have large and diversified suppliers, have strong financial bases, have more research resources, are more productive, more innovative and are better in developing strategies particularly regarding the services, quality, and marketing (e.g., see McDougall, 1989; Westhead, 1995; Bernard and Jensen, 1995; McDougall *et al.,* 2003[1]; Farinas and Marcos, 2006;Schank*et al.,* 2007;Schank*et al.,* 2010; Hagemejer and Kolasa, 2011); in contrast to their non-exporting counterparts. More so, Augier and Dovis (2013) determined that the exporting firms absorb

new technology and knowledge from the foreign market (foreign contacts) and thus, through large market share, exploit them to scale. Hence, in the light of the above, the exporting firms might be considered safer, credible, and liquid than the non-exporting firms. Specifically, from the context of Pakistan, inspite of several hurdles, exporting firms have performed relatively better than the non-exporting ones.

Whereas, of a counter-argument; is that the exporting firms are exposed to both the domestic as well as international macroeconomic uncertainties, unlike the non-exporting firms. Moreover, the exporting firms might be more responsive to the international event thus more volatile than the non-exporting ones. More so, exporting firms are larger in size in contrast to non-exporting firms, as documented by Yaprak (2007), Farinas and Marcos (2006), and Castellani*et al.* (2010), but this might trap them in a very famous agency problem faced by the large size firms (e.g., Pi and Timme, 1993; Elyasiani*et al.,* 2007; and Loderer and Waelchli, 2010), consequently can damage their performance in contrast to the non-exporting firms. In addition, owing to severe competition in the international market, exporting firms need more elaborative design, packaging, handling, and supervision, and hence require more educated and skilled manpower. To attract such manpower, they are forced to pay higher compensation than the non-exporting firms (Were and Mugerwa, 2009). Taken together, Khan *et al.* (2014) proposed that for the future studies, it is worth highlighting the firm trading effect while detecting the behavior of various dynamics of firm stock returns.

Therefore, emanating from above, exporting firms can behave differently than the non-exporting firms. Thus, there is every reason to infer that there is a trading effect in terms of the effect oflagged effect of economic factors on stock returns. More so, since Pakistan has not been explored in this context at all, hence it seems important for two reasons. Firstly, Pakistan is largely a developing country. Thus it is very crucial to understand its exporting firm's behavior. Secondly, Pakistan's growth in manufacturing and specifically in exporting has been largely slower than that of many other developing nations (notably, India and China) (IMF Country Report, 2012); therefore, it looks quite admirable and interesting to understand that what kind of differences the stock returns of exporting firms set in contrast to their non-exporting counterparts.

A. Motivation for Lagged Effect
There are several reasons for the lagged effect of economic factors on stock returns. At first, the studies of Jones and Kual (1996) argued that statistically significant lagged effect of oil prices on stock returns declares that either stock markets are inefficient or the shock in economic factors (e.g., oil prices) brings variations in expected stock returns.

Secondly, the proposed under-reaction hypothesis owns the lagged effect of economic factors on stock returns. In an interconnected research, one branch agrees with the fact that in short-horizon investors in the stock market underreact; whereas, over the long horizon, they overreact to the information (e.g., see the research models introduced by Barberis*et al.,* 1998; Daniel *et al.,* 1998; Hong and Stein, 1999; Poteshman, 2001). This hypothesis dictates that investors do not respond strongly enough to the new information. Therefore, since the strong reaction by the investors takes time; consequently, information displays its effect after sometime. Further, in a closely related argument, Daniel *et al.* (1998) stated that the stock prices underreact to the publically available information signals; while, they overreact to the privately held information. Therefore, the under-reaction to the news regarding macroeconomic factors is very likely to take place in the stock market.

Thus, all the afore-mentioned arguments from the financial literature dictate the significance of the lagged effect of economic factors on stock returns. Therefore, this research, for the first time, particularly in emerging markets, empirically explores the lagged effect of economic factors on stock returns at the firm level. Taken together, based upon the negligence of existing scholar and the recommendation of Khan *et al.* (2014), it can be of vital importance to further explore that how does the lagged effect of economic factors on stock returns vary with respect to firm trading nature.

III. DATA AND DESCRIPTION
Following the financial literature (e.g., see Hagemejer and Kolasa, 2011), exporting firms are identified on the grounds of their export sales. Data for the export sales are gathered from the annual reports of the firms together with the Reports (i.e., Balance Sheet Analysis) issued by the State Bank of Pakistan. The firms having export sales at least 5% of their total sales and doing it for at least two years over the sample period are termed as exporting; otherwise, they are treated as non-exporting firms (Hagemejer and Kolasa, 2011). There are 96 exporting firms against 64 non-exporting firms in the sample. Hence, monthly stock returns for 160 firms from 1998 to 2018, are obtained from the Pakistan Stock Exchange website and Business Recorder. Monthly data is applied as it enables to confine long-term movements and prevent the impact of delays in clearing and settlements, which influences stocks over the shorter interval and prevents the issue of spurious correlation (Patra&Poshekwale, 2006; Beirne*et al.,* 2009).

The fact that most of the data series reflect serial correlation together with the rejection of normality motivates and suggests that application of GARCH type models can considerably improve the explanation of the return series (Elyaisani *et al.* 2011; Mandimika & Chinzara, 2012). More so, both Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) unit root tests declare that all data series are stationary.

IV. METHODOLOGY

The measurement of lagged effect of each of the economic factors on stock returns with respect to firm trading nature is determined by applying the following GARCH (1, 1) model:

$R_{it} = \beta_0 + \beta_1 EV_t + \beta_2 EV_{t-1} + \beta_3 EV_{t-2} + \beta_4 EV_{t-3} + \beta_5 EV_{t-4} + \beta_6 EV_{t-5} + e_{it}$ --- (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. Same equation is repeatedly used for each economic variable separately in order to determine its lagged effect on the 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).

V. EMPIRICAL FINDINGS AND DISCUSSION

The below-mentioned Table 1 below presents the lagged effect of an economic variable on stock returns of exporting vs. non-exporting firms. Firstly, for exporting firms, the statistically significant and positive effect of exchange rate on stock returns is largest at third lag; while, for non-exporting firms, it is largest at four lags. For example, the stock returns of about 22 percent of the exporting firms at lag three and around 17 percent of the non-exporting firms at lag four are significantly and positively affected by the exchange rate. However, the statistically significant negative effect of the exchange rate is maximized at lag one and five each in the case of exporting firms, but it is maximized at two lags in the case of non-exporting firms. Such as, about 8 percent of the exporting firms at both lag one and five each against 30 percent of the non-exporting firms at lag two is significant and negatively responsive to the exchange rate. Both types of firms bear positive as well as a negative effects of exchange rate on their stock returns across all the lags. Irrespective of the sign, it ranges from almost 3 percent to 30 percent of the firms. Secondly, operating with the lagged effect of the risk-free rate, resting on the fact that by and large, it leaves an overall significant negative impact on stock returns of both exporting and non-exporting firms, it is tabulated that the largest effect takes place at lag one for exporting and at lag three for non-exporting firms- around 21 percent of the exporting at lag one and 25 percent of the non-exporting at lag three are significantly affected by risk-free rate with negative trend. Regardless of the sign, ranging from 1 percent to 25 percent of the significant effect on stock returns, results confirm that the short-term interest rate influences the stock returns of both types of the firm across all the lags.

Third, lagged effect of inflation on stock returns of exporting and non-exporting firms sets some interesting results. The highest percentage of exporting firms holds a significant positive effect of inflation on their stock returns at lag four (i.e., around 27 percent firms), while the highest percentage of non-exporting firms holds a significant positive effect of inflation at lag two (about 27 percent firms). While, in the case of significant negative response, it is the case at lag one for both types of firms- about 15 and 19 percent of the exporting and non-exporting firms, respectively. Table further reports that the significant positive, as well as the negative effect of inflation on stock returns of both exporting and non-exporting firms, prevails across all the lags. Neglecting the sign effect, it extends from almost 3 percent of the firms to 27 percent of the firms. Results further disclose the drifting trends insignificant effect of inflation on stock returns of both exporting and non-exporting firms from lag one to four. So much so that from lag one to four; for exporting firms, the significant negative effect of inflation decreases from about 15 percent to almost 3 percent, but significant positive effect increases from about 4 percent to almost 27 percent, however, for non-exporting firms, the significant negative effect of inflation decreases from about 19 percent to 11 percent but significant positive effect increases from 9 percent to almost 22 percent.

Fourth, in the case of both exporting and non-exporting firms, the statistically significant and positive impact of real activity on stock returns is maximized at two-period lagged. However, the statistically significant negative effect of real activity on stock returns is maximized at lag four in the case of exporting firms, but it is maximized at five lags in the case of non-exporting firms. For instance, the stock returns of about 11 percent of the exporting against around 17 percent of the non-exporting firms are significantly and positively affected by real activity at lags two, while about 14 percent of the exporting firms at lag four and 25 percent of the non-exporting firms at lag five is significant and negative responses to real activity. Similar to the other economic factors, real activity also marks both statistically significant positive and negative impacts on exporting as well as non-exporting firms across all the lags- ignoring the sign, it increases from as low as almost 3 percent firm to as high as 25 percent of the firm.

Fifth, results related to the lagged effect of money supply on firm stock returns with respect to their trading nature rest on the following findings. Primarily the money supply affects stock returns of both the exporting and non-exporting firms across all the lags. Irrespective of the sign, it ranges from about 2 percent to 26 percent for the exporting firms and from 2 percent to 47 percent for the non-exporting firms. More so, it is also evident that the largest significant positive effect of money supply on stock returns exists at both lag two and five each for the exporting firms (around 26 percent firms), while at lag five for the non-exporting firms

(about 47 percent firms). It is further demonstrated that for both the categories of firms, the significant impact of money supply on their stock returns becomes more and more positive from lag one to five. For exporting firms, it increases from about 16 percent at lag one to around 26 percent at lag five, while for non-exporting firms, it increases from about 16 percent at lag one to 34 percent at lag five.

Finally, results demonstrate interesting outcomes related to the lagged effect of oil prices. It is revealed that, for both exporting and non-exporting firms, at all the lags, oil prices embark on the significant effect in both positive and negative directions. Not considering the sign effect, it ranges from almost 5 percent to 29 percent for exporting firms and from 4 percent to 20 percent for non-exporting firms. Further, in the case of exporting firms, the statistically significant and positive effect of oil prices on stock returns is largest at two

lags (i.e., around 29 percent firms), while for non-exporting firms, it is largest at lag one (i.e., almost 23 percent firms). However, though the small but yet statistically significant negative effect of oil prices on stock returns is maximized at lag three (about 16 percent firms) in the case of exporting firms but it is maximized at four lags (about 20 percent firms) in the case of non-exporting firms.

The highlights of all the above empirical results regarding lagged effect of economic factors on stock returns witness that the Pakistani stock market is inefficient. Second, these results empirically confirm the theoretical foundations set by the under-reaction hypothesis (seeBarberis*et al.,* 1998; Daniel *et al.,* 1998; Hong and Stein, 1999; Poteshman, 2001), establishing that there could be lagged effect of economic factors on stock returns and is central in predicting the return generation process.

Table 1. Results of GARCH (1, 1) Model –Trading Effect

Lags		Firm Trading Nature	
		Lagged Effect of Exchange Rate	
		Exporting Firms	Non-Exporting Firms
Lag 1	Sig(+)	5(5.21)	2(3.12)
	Sig(-)	8(8.34)	8(12.50)
Lag 2	Sig(+)	7(7.29)	5(7.81)
	Sig(-)	6(6.25)	19(29.68)
Lag 3	Sig(+)	21(21.87)	1(1.56)
	Sig(-)	7(7.29)	8(12.50)
Lag 4	Sig(+)	18(18.75)	11(17.18)
	Sig(-)	6(6.25)	6(9.38)
Lag 5	Sig(+)	12(12.50)	5(7.81)
	Sig(-)	8(8.34)	11(17.18)
Lags		Lagged Effect of Risk Free Rate	
		Exporting Firms	Non-Exporting Firms
Lag 1	Sig(+)	1(1.04)	2(3.12)
	Sig(-)	20(20.84)	15(23.44)
Lag 2	Sig(+)	3(3.12)	9(14.06)
	Sig(-)	10(10.42)	4(6.25)
Lag 3	Sig(+)	3(3.12)	3(4.68)
	Sig(-)	6(6.25)	16(25.00)
Lag 4	Sig(+)	4(4.17)	4(6.25)
	Sig(-)	3(3.12)	9(14.06)
Lag 5	Sig(+)	7(7.29)	2(3.25)
	Sig(-)	5(5.21)	5(7.81)

Lags		Lagged Effect of Consumer Price Index	
		Exporting Firms	**Non-Exporting Firms**
Lag 1	Sig(+)	4(4.17)	6(9.38)
	Sig(-)	14(14.58)	12(18.75)
Lag 2	Sig(+)	16(16.67)	17(26.56)
	Sig(-)	10(10.42)	7(10.94)
Lag 3	Sig(+)	8(8.34)	8(12.50)
	Sig(-)	7(7.29)	4(6.25)
Lag 4	Sig(+)	26(27.08)	14(21.88)
	Sig(-)	3(3.12)	7(10.94)
Lag 5	Sig(+)	3(3.12)	6(9.38)
	Sig(-)	10(10.42)	6(9.38)
Lags		**Lagged Effect of Industrial Production Index**	
		Exporting Firms	**Non-Exporting Firms**
Lag 1	Sig(+)	10(10.42)	8(12.50)
	Sig(-)	5(5.21)	4(6.25)
Lag 2	Sig(+)	11(11.46)	11(17.18)
	Sig(-)	5(5.21)	2(3.12)
Lag 3	Sig(+)	7(7.29)	4(6.25)
	Sig(-)	3(3.12)	4(6.25)
Lag 4	Sig(+)	5(5.21)	5(7.81)
	Sig(-)	13(13.54)	5(7.81)
Lag 5	Sig(+)	7(7.29)	6(9.38)
	Sig(-)	10(10.42)	16(25.00)
Lags		**Lagged Effect of Money Supply**	
		Exporting Firms	**Non-Exporting Firms**
Lag 1	Sig(+)	15(15.63)	11(17.18)
	Sig(-)	3(3.13)	2(3.12)
Lag 2	Sig(+)	25(26.04)	23(35.94)
	Sig(-)	7(7.29)	3(4.68)
Lag 3	Sig(+)	16(16.67)	20(31.25)
	Sig(-)	4(4.17)	4(6.25)
Lag 4	Sig(+)	15(15.63)	18(28.13)
	Sig(-)	3(3.12)	3(4.68)
Lag 5	Sig(+)	25(26.04)	30(46.88)
	Sig(-)	2(2.08)	1(1.56)
Lags		**Lagged Effect of Oil Prices**	
		Exporting Firms	**Non-Exporting Firms**

Lag 1	Sig(+)	11(11.46)	15(23.44)
	Sig(-)	5(5.21)	7(10.94)
Lag 2	Sig(+)	28(29.17)	10(15.63)
	Sig(-)	7(7.29)	3(4.68)
Lag 3	Sig(+)	9(9.38)	4(6.25)
	Sig(-)	15(15.63)	8(12.50)
Lag 4	Sig(+)	21(21.88)	6(9.38)
	Sig(-)	5(5.21)	13(20.31)
Lag 5	Sig(+)	8(8.34)	6(9.38)
	Sig(-)	9(9.38)	8(12.50)

By way of applying the GARCH (1, 1) model, it shows lagged effect of each of the macroeconomic variables on stock returns of exporting vs. non-exporting firms up to five lags by displaying a number of firms in each category and their level of statistically significant positive and negative trends at each lag. Further, results are also converted into percentages for each category at each lag and reported in parenthesis.

VI. CONCLUSIONS AND RECOMMENDATIONS

Study concludes that three lags for exporting firms and four lags for the non-exporting firms are the most common lags for the significant positive impact of exchange rate on stock returns. While lag one and five each are the most common lags for exporting firms, and two lags are the most common lag for non-exporting firms reflecting significant and negative relation of an exchange rate with stock returns. Further, resting on the overall significant negative lagged effect of the risk-free rate, the results uncovered that it is maximized at one lag in the case of exporting firms while at three lags for non-exporting firms. More so, the results uncovered that the significant negative impact of inflation on stock returns is maximized at lag one for both exporting and non-exporting firms. Whereas, the significant positive relation of inflation with stock returns of exporting firms is maximized at lag four, but for the non-exporting firms, it is maximized at lag two. Moreover, it is also deducted that with the increase in lags from lag one to lag four, for both the exporting as well as non-exporting firms, the significant impact of inflation on stock returns shifts from negative to positive.

Furthermore, results depicted that in both the cases, statistically significant positive impact of real activity on stock returns is maximized at two lags. However, the statistically significant negative effect of real activity on stock returns is maximized at lag four in the case of exporting firms, but it is maximized at five lags in the case of non-exporting firms. Next, the study entailed that for exporting firms, the positive and significant impact of the money supply is maximized at both lag two and five each;

however, for non-exporting firms, it is maximized only at lag five. Therefore, with the increases in lags from lag one to lag five, the significant impact of money supply on stock returns becomes more and more positive for both the exporting as well as non-exporting firms. Furthermore, it is concluded that in the case of exporting firms, the statistically significant positive effect of oil prices on stock returns is maximized at two lags, while for non-exporting firms, it is maximized at lag one. However, the statistically significant but negative effect of oil prices on stock returns is maximized at lag three in the case of exporting firms, but it is maximized at four lags in the case of non-exporting firms.

Hence, the State Bank of Pakistan should build a very careful monitoring system with the intention of getting the maximum benefit of such a monetary instrument.

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