SLOW DIFFUSION OF INFORMATION HYPOTHESIS AND STOCK MARKET PREDICTION: A CASE OF PAKISTAN STOCK EXCHANGE

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ABSTRACT

Study aims to investigate whether large industries predict stock market return. Four industries including fuel, cement, chemical and textile have been selected on the basis of relative size. Daily Data for 70 firms from these industries have been collected over the period 2001 to 2011. Separate regression for each industry and combined regression for equally weighted portfolio of industries return have been used for analysis. The results indicate that only Fuel sector has some predictive power. On the other hand, chemical, cement and textile sectors have no predictive power. Therefore, our findings support slow diffusion of information hypothesis for the chemical, cement and textile sectors. Moreover a set of control variables is also significantly related.

Keywords: *Stock Return, Industries, Diffusion of Information Hypothesis, Market Prediction*

INTRODUCTION

Future is always uncertain and investors prefer to invest in stocks that are relatively less risky. Financial managers spend most of their time in investment decisions and trying to estimate return. Therefore predicting the stock prices has remained an area of interest for investors and academia. Association among stock market return and industry return was identified initially by Lo and Machinaly (1990). They present evidence against overreaction and explain that return on small stocks can be determined on the basis of return of large stocks. Previously, working on experimental psychology show that some investors in the market over react to dramatic and unexpected news, and supported over reaction hypothesis. Similarly, return predictability is due to thin trading. They explained that in the United States significant number of industry like retail, service, commercial real estate, etc can lead the market by up to two months but it is correlated to indicators of economic activity. Contrary to Hong, Torous & Valkanov (2007) and Shah, Munir, Khan & Abbas (2011) explained that there exist no evidences that industry return can lead market return but some control variables can predict stock market return by up to two months. They tested slow diffusion of information hypothesis but the results reject this hypothesis, their results supports efficient market hypothesis of Malkiel (1992).

Our study is motivated by the fact that traditional asset pricing model like Capital Asset Pricing Model (CAPM) presented by Sharp (1964) and lintner (1965) and Arbitrage Pricing Theory (APT) of Merton (1973) could not explain stock market completely. In this paper we tested the hypothesis

of Hong et al. (2007) and Shah et al. (2011) that large industries may lead stock market. Large industries were selected because they can be the perfect representative of the market due to the fact that major economic activities take place in large companies. Like previous studies diffusion of information hypothesis is also tested which suggests that large number of investors trade those stocks about which they have information as a result unknown stocks are traded at discount. Shah et al. (2011) studied same relationship using monthly and weekly data. For monthly data the results did not approve the slow diffusion of information hypothesis, but for weekly data the results support the Slow Diffusion of Information Hypothesis. The contradiction in results clearly indicates that for testing hypothesis (Slow Diffusion of Information Hypothesis) data frequency matters. So the present study contributes to the literature as it is the first study that has analyzed daily data (data of very low frequency). Moreover we have also included a textile industry in our analysis which is the fourth largest industry in Pakistan listed at PSX.

LITERATURE REVIEW

Predicting stock return has always remained the area of interest for both individual and institutional investors due to future uncertainty, as every investor wants a smooth cash flow from investment. So every individual will try to invest in securities that are predictable and relatively stable. The phenomena of predicting stock return was initially identified by Lo and Machinaly (1990). They argued that return on small stock can be determined on the basis of return on large stocks. In contrast to the argument of Lo and Machnilay (1990) some researchers added the idea that such association did not exist. The return is auto correlated to its past values. Merton (1987) developed a model in which he explained that investors have information only about limited shares and they invest in those shares. As a result the shares which are less informed are traded at discount. Dealing with experimental psychology which showed that in response to dramatic news and events investors overreact. They investigated whether such reaction influence the future price. The results were consistent to the overreaction hypothesis (investors overreact to both good and bad news in the market). They found that due to overreaction the loser stocks have earned 25% which is more than the Winner stocks.

In the same line Hong and Stein (1999) conducted a study in which the population of the company was divided into two group; news watchers and momentum traders. Every news watcher was able to excess new information but could not extract other news watcher information from prices. In such situation if information diffuse quickly price in short run under react. Based upon the gradual diffusion of information Hong, et al. (2000) incorporated that moving to past even in the smallest stock the fluctuation strategies of profitability decrease sharply with respect to the size of the firm. Final conclusion was that the impact of analyst coverage was highest for such stocks that are past loser as compare to past winners. In developed market increase in dividend and bonus issuance have significant impact on share price. Consistent to this idea that increase in cash dividend and bonus issuance in emerging markets generated positive abnormal return. So the trend of increasing

in cash dividend and bonus issuance in emerging markets and developed market is same, both have significant positive effect. Hong, et al. (2007) examined that whether the return of large industry portfolio predict fluctuation in stock market return.

The results gave support to the argument of Lo and Machinaly (1990) which suggested that return of large industries can predict the return of small industries. They found that a number of large industries (USA including retail, services, commercial real estate etc) predict the stock market return by up to two months. They also added that market reacts slowly to the information in the industry and the information across market diffused gradually. Similarly Shiu (2009) conducted a study considering impact of macroeconomic variable on stock market movements. The results show that macroeconomic variables have significant impact on stock return. Inflation rates were most significantly related to market return. Sample for the study was S&P 500 and similarly bear stock can also be quite easily forecasted following the same methodology. In the same line to the previous research Shah *et al.* (2011) investigated association among stock return and industry return taking evidence from Pakistan stock exchange. Adopting methodology of Hong *et al*. (2007) they came to the conclusion that there are no such evidences that large industries can predict stock return. But among control variables some variables have some predictive power which can predict market return by up to two months.

Working in the same area Zhao, Yang, Zhao & Li (2011) incorporated that role of information cannot be ignored while explaining stock return. He documented internet based news play big role and firms listed at Shenzhen stock exchange are more affected than firms listed at Shanghai stock exchange. Unlike previous research which has concentrated on unidirectional relationship lee *et al*. (2013) studied bidirectional relationship among market return and industry return. They come up with the conclusion that finance and consumer service industry have significantly predictive power while explaining fluctuation in stock market return. Moreover to check leading hypothesis exchange rate and interest rate are important tool for explaining market and industry connection. These results are consistent to Shiu (2008) and Hong (2007). Dhaoui and Kharief (2014) argued that stock market did not react to the change in oil price even oil industry is a large industry but could not predict market return. These results are consistent to previous research of Shah *et al*. (2011). Chen and Lu (2015) test the gradual diffusion information of Hong and stein (1999) for option market and found that profit momentum for stock are larger whose information across market diffuse slowly.

RESEARCH METHODOLOGY

Sample and Data Collection

Population of the study comprises of all non-financial companies listed at Pakistan Stock Exchange (PSX). Daily Data for textile, cement, fuel and chemical industries have been collected from 2001

to 2011. For industry and market return we collect data of share prices and index points respectively from Business recorder web site. Inflation data (Consumer Price Index CPI) have been collected from monthly review of Federal Statistical Bureau of Pakistan. Dividend yield data is collected from Balance Sheet Analysis (BSA). Industries have been selected using relative size approach and for size of industry we use market capitalization as proxy.

Variables of Study

Dependent Variable

Stock market return is explained variable of the study. The proxy of stock index is used for stock market return. Market Return (RM) is calculated as below.

$$\boldsymbol{Rm} = \frac{Indexpoint_t - Indexpoint_{t-1}}{Indexpoint_{t-1}}$$

Explanatory Variables

Industry Return

Industry Return is calculated in two steps, in first step stock return is calculated from percentage increase in share prices, and in the second step all the firms have been equally weighted into industry portfolio as shown below.

$$\boldsymbol{Ri} = \frac{P_t - P_{t-1}}{P_{t-1}}$$

$$\boldsymbol{Rp} = \sum_{i=1}^{n} WiRi$$

P and W respectively represent Stock Price and weight of stock in Portfolio Return.

Control Variables

Among the control variables dividend yield is used to control the effect of time varying risk factor. Consistent to Campbell and Shiller and Hong *et al*. (2007) we included dividend yield in the present study and calculate as below

$$DVD = Dividend \div price, where DVD is the dividend yield on the market index$$

Second control variable is inflation and it is a proxy of real activity in the industry. Consumer price index is measure for inflation used in the study and WPI whole sale price index can also be used. Similarly lagged market return is also a control variable which is defined as previous taken value of any variable.

Model of the Study

Following Hong *et al*. (2007) and Shah *et al*. (2011) as the baseline the said phenomenon is tested by the following model.

$$\boldsymbol{Rmt} = a_i + \lambda_i R_{p,t-i} + A_i Z_{t-i} + e_t$$

Stock Market Return is separately regressed on each industry using daily data and a combine regression is also used for the industry portfolio. Rmt is dependent variable (Market Return), $R_{p,t-I}$ are lagged industry return and Z_{t-I} are other market predictor which include inflation, dividend yield and lagged market return. λ indicates the coefficients of the given industry which explain the extent to which industry lead the market. Different lengths of lag for explanatory variables including one, two and three lags have been used.

RESULTS AND DISCUSSIONS

This section incorporates the results conclusions and recommendations in the light of hypothesis and objectives. All the statistical tools applied are shown in the following tables with justifications. As the study has been carried out using time series data so all the diagnostics tests that could be used for testing of stationarity (Unit Root), serial correlation, (LMF) and multi collinearity, VIF (Variance Inflation Factor) have been carried out.

Table: Regression Analysis with Three Lags of Independent Variables

Variables	Co-efficient	Std error	T-values	P-values		
Chemical sector						
CPI	-0.001	0.0004	-2.1902	0.0286**	R-squared	0.0093
LRM	0.0775	0.0204	3.7863	0.0001***	Adj R-squared	0.0077
DIV.Y	-0.170	0.0841	-2.0281	0.0426**	F(4, 2369)	5.6042
CHEMICAL IND	-0.042	0.0269	-1.5643	0.1178	P-value (F)	0.0001***
Const	0.0071	0.0027	2.6259	0.0087***		
Cement sector						
CPI	-0.0010	0.0005	-2.09	0.037**	R-squared	0.0091
LRM	0.0792	0.0205	3.86	0.000***	Adj R-squared	0.0074
DIV.Y	-0.1666	0.0841	-1.98	0.048**	F(4,2370)	5.4487
CEMENT IND	0.0150	0.0109	1.38	0.168	P-value (F)	0.0002***
Const	0.0068	0.0027	2.25	0.012**		
Textile sector						
CPI	-0.0010	0.0004	-2.062	0.0393**	R-squared	0.0085
LRM	0.0782	0.0204	3.819	0.0001***	Adj R-squared	0.0069
DIV.Y	-0.1644	0.0841	-1.955	0.0506*	F(4,2370)	5.1329
TEXTILE IND	0.0227	0.0282	0.803	0.4216	P-value (F)	0.0004***
Const	0.0067	0.0027	2.4943	0.0126**		
Fuel Sector						
CPI	-0.0009	0.0004	-1.935	0.0530*	R-squared	0.0111
LRM	0.0778	0.0204	3.806	0.0001***	Adj R-squared	0.0095
DIV.Y	-0.1559	0.0840	-1.855	0.0636*	F(4,2370)	6.7017
FUEl IND	0.0598	0.0224	2.620	0.0088***	P-value (F)	0.0000***
Const	0.0064	0.0027	2.365	0.0180**		
ALL Sectors						
CPI	-0.0009	0.0004	-2.017	0.0437**	R-squared	0.0094
LRM	0.0793	0.0204	3.875	0.0003***	Adj R-squared	0.0077
DIV.Y	-0.1630	0.0841	-1.938	0.0527*	F(4,2370)	5.6483
TOTAL IND	0.0494	0.0305	1.6194	0.1055	P-value (F)	0.0001***
Const	0.0066	0.0027	2.447	0.0144**		

At level some of the variables were not stationary and was a problem of unit root but after taking first difference all the variables were stationary and the problem of unite root was removed. For

serial correlation and multi-collinearity the test shows normal results. Following Shah et al. (2011) we use separate regression for all the four industries, and combined regression for equally weighted portfolio by assigning equal weight to each industry. PSX 100-index return is regressed on Industry Return and a set of control variables (inflation, lagged market return and dividend yield).One two and three lags of explanatory variables are used but the results are significant at three lags only. In table 1(chemical, cement, textile and industry portfolio respectively) results show that these industries return does not lead stock market as they are statistically insignificant. These results are consistent to Shah et al. (2011), but conflicting to the idea of financial behaviorist. For contrasting results to the idea of financial behaviorist there could be some possible explanations. First large industries did not spread any information regarding macroeconomic fundamental in the study period. Second the information diffusion process is quicker than the time lag used in the study as the market quickly adjust to new information and this view is consistent to efficient market hypothesis of Malkiel (1992).

In the table 1 results of fuel sector show significant relation with stock market return. These results are in the same line with Lo and Machinaly (1990) (pioneer for identifying the relationship) who argued that return of small stocks can be determined on the basis of return on large stocks. Similarly Gogineni (2007), argued that stock market react positively to change in oil price due shifts in aggregate demand. Possible explanation for this significance could be that fuel sector is the largest sector in the Pakistan Stock Exchange. This sector contributes almost about 45% to the total market based on market capitalization, so due to its size it can lead the market. Consistent to our results, Bheenick and Robert (2009) argued that trading volume matter in explaining stock market return in Australia as lager industries can predict stock market return. Among the control variables dividend yield and CPI (Consumer Price Index) are having predictive power which shows that an increase in dividend yield and CPI can forecast decrease in market for coming days. This argument is in favor of Compbell and Shillar (2011). Nikolaos et al. (2001) who also documented same results as they explained that in emerging market higher dividend yield results positive and abnormal return. Lagged Market Return (LRM) is also statistically significant and it implies that stock market can be predicted on the basis of its past history. More specifically if the investors invest on the basis of past history and if market had generated more return they will expect more and vice versa.

CONCLUSION

Return predictability is one among the challenges faced by CFOs. Experimental psychologist has also contributed to the literature but still there exists problems while predicting Market Return. In the present study we tested slow diffusion of information. The results do not support the slow diffusion of information for cement, chemical, and textile sectors. i.e. these industries have no predictive power. On the other hand fuel sector have predictive power. The reason for prediction can be the size as it is the largest sector on the basis of market capitalization in Pakistan stock exchange. Furthermore a set of control variables has also some predictive power. The results

partially support the slow diffusion of information hypothesis.

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