Impact of Inflation on Dividend Policy: Synchronization of Capital Gain and Interest Rate

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Impact of Inflation on Dividend Policy: Synchronization of Capital Gain and Interest Rate

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Abstract

The study evaluates the impact of consumer's buying power regarded as overall CPI on the dividend policy of firms. Dividend yield is used as a proxy of dividend policy. There are two separate equations to explain the phenomenon. The predicted values of capital gain yield against inflation and other supporting variables were first estimated and these predicted values along with interest rate were then put to check the dependency of dividend policy. Its theoretical background is related to classical discussion among financial researchers about the inflation-hedging capabilities of stock investment in short to medium-run. Study is carried out on stocks listed at Karachi Stock Exchange to see the overall behavior of Pakistani Stock Market. Sample of KSE-30 index for six financial years from 2007 to 2011 for the study is used. Following the 2-stage least square regression, the empirical results of the study illustrate that capital gain is affected by inflation levels prevailing for the year and its relationship is of inverse in nature. The market is following the global trend in this perspective. On the other hand, dividend yield is also not independent with inflationary effect. Interest rate is found to be positively related with dividend yield. This behavior of interest rate in the market is astonishing. It may be deduced that in the context of Pakistan, monetary policy and business activities improve simultaneously.

Keywords: Stock Return, Inflation, Dividend Yield, Monetary Policy, Debt to Equity Ratio, 2-Stage Least Square Regression

1. Introduction

The influence of macroeconomic variables on dividend policy has been an interesting subject among academics, investment professionals and monitory policymakers. Historically, the effects of the rate of inflation on dividend policy have now been proved. The present study is based on the classical discussion among financial researchers about the characteristics of investment in stocks as inflation-hedge. The discussion is a continual of differing arguments depicted in Irving Fisher's one-to-one or parity hypothesis and Eugene Fama's (1990) proxy hypothesis which addresses the same question with different observations. The particular study is focused to relate the stock's dividend and capital gain yields fluctuations, investors attained on stocks in KSE, in relation to inflation movements during financial years of 2007 to 2011. Figure 1 shows the past trends of inflation from 2001 to 2010 in Pakistan which proved the hike. It has been increased from 4.4% in 2001 to 11.7% in 2010. The big jump was in the year 2009 when it reached to 20.8%. The pressure from the domestic demand, as evidenced by rising private sector credit and growing volume of imports, led to mounting inflation in the year 2009.
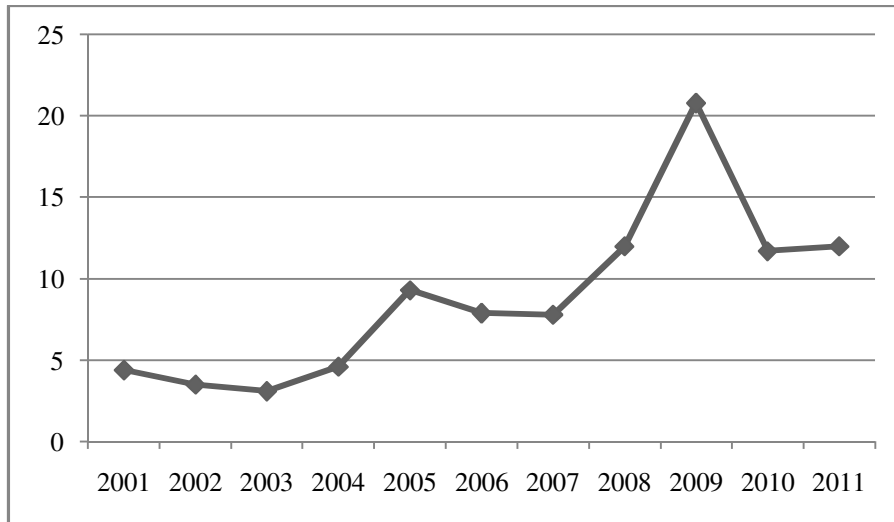
Figure 1: Past Trend of Inflation in Pakistan

The study takes its routes from different studies carried out by renowned researchers trying to find out the answer to the classical question of whether stock investments save capital from inflationary erosion. These studies have evaluated ex-ante and ex-post stock yields in relation to real and expected inflation levels prevailing in the U.S, Canada and other developed economies. These studies generally found a negative correlation between inflation and stock yields but also concluded the cross-sectional impact of industry segments as well. Eugene A. Pillote (2003) particularly built the model for evaluating the component wise study of stock returns with inflation movements for the big industrialized nations. Thus his study can be considered very relative to the current examination of these micro and macro-economic factors. In recent past, multiple studies were carried out to relate assets return with macro-economic indicators especially inflation. Its impact on these assets in short and long term horizons was evaluated by different researchers. They have used different hypotheses in subsequent studies to find a relationship between expected stock yields with real and anticipated inflation. Figure 2 shows the overall stock returns of KSE-30 index from 2009 to 2011. It is empirically evidenced that stock returns decreased in the year in which inflation increased.
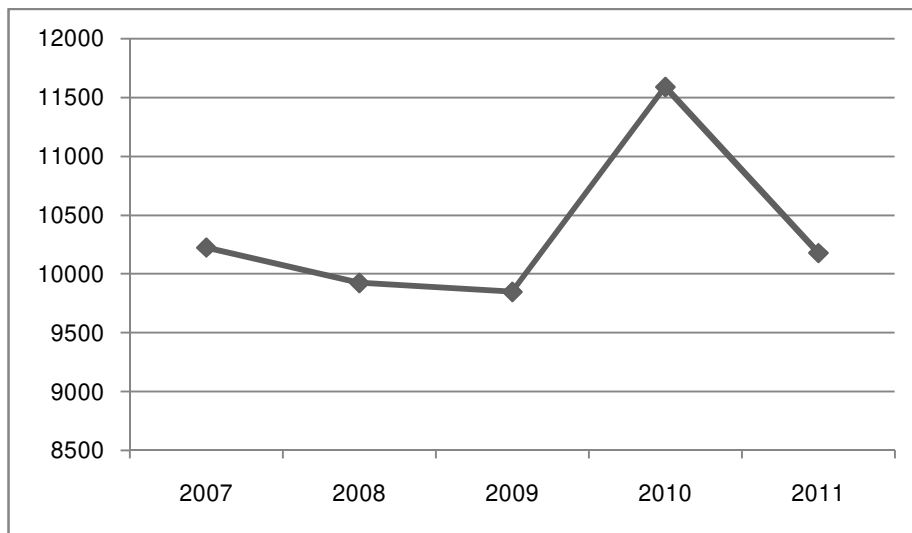
Figure 2: Stock Return on KSE-30 Index from 2009-2011

2. Prior Studies

Archer (1960) has explored the idea by stating that stocks or near-liquid assets are logically considered as a hedge against inflation. Inflation drives up the prices of company products and its physical assets and thus investors save their money from erosion by investing in these assets. He showed that in large scale industrial sector, where inflationary price differential is left to open market operations, earnings per share and dividend growths are outplayed the increase of CPI in all time periods of 1935-1950, 1935-1955 & 1945-1955 in the US economy.

In the contrary, Gultekin (1983) examined that stocks are poor hedges against expected and un-expected inflation. To test the soundness of this hypothesis, he used post-world war data (1947-1979) of twenty six big industrialized nations. His study proved that other than four countries (Japan, Israel, Spain and Peru) results from remaining twenty two economies followed the pattern observed in US and UK and earlier scholars' findings. The result was though in violation of Fisher's hypothesis, but it was also observed that relationship was not consistent over time and regression coefficients were sizably different in different economies.

Cozier and Rehman (1988) have also investigated the relationship between inflation and real stock returns on the data collected between first quarter of 1958 to fourth quarter of 1983 on Toronto Stock Exchange Yields. They built their model considering the derivations from Fisher one-to-one and Fama's proxy-effect hypothesis. Their results were closer to these same hypotheses and it was seen that real stock returns were exogenous with respect to inflation rates. They could not find a causality relationship between inflation and stock returns. However it was observed that anticipated real production activity had an inverse relationship with inflation and thus an increase in real activity produce opposite co-movement between inflation and real stock returns.

Fama (1990) has studied further the variability in stock's returns because of combined explanatory power of shocks to expected cash flows of companies; time-varying expected returns (real activity) and shocks to discount rate. The study used 1953 (Post-Korean War data) to 1987 New York Stock Exchange data for the study. He argued in the paper that out of these factors, large stock's variability can be explained majorly by time-varying expected returns and forecasts of real activity. But he had also cautioned that the relationship should be further studied as fresh data is available to know its robustness.

Boudoukh and Richardson (1993) have added another angle to this debate in their study. They noticed a limitation in contemporary literature of that time in which all studies on the topic were carried out in short investment horizon. That was against the normal investment outlook in stocks and thus they tried to see this relationship over a long-horizon. They took 1802-1990 data for US and UK economies for their study to make the study as robust as it could. Their empirical results proved that in both markets, positive correlation is found between nominal stock returns and inflation at long horizons. They found consistent results in favor of their hypothesis in both economies by dividing investment horizon in different sub-periods, selecting different instrument sets and ex-ante and ex-post inflation.

Boudoukh, Richardson and Whitelaw (1994) have conducted the study to test the robustness of Fisher's model which advocates for one-to-one movement of nominal stock returns with expected inflation because real and monetary sectors of the economy are causally independent. They have used industry data from 1953 to 1993 of New York Stock exchange firms trading for full calendar year in this time zone. They further organized data in twenty two portfolios to smooth out observations and found that though there was a negative correlation between stock returns and inflation but there was cross-sectional variation in this relationship among industry portfolios. Moreover there was a positive correlation between these two factors for long time horizon. These results supported the Fisher's model.

Adrangi, Chatrath and Shank (1999) conducted their study on Chile and Peru industries data to find their relationship with expected inflation and see whether these emerging economies are behaving differently from big industrialized markets or not. The selection of these two economies was because of their difference in economic formation and closeness to free economy model in the region. Data used for the study is from January1985 to December 1995 for Chile and January 1990 through March 1996 for Peru. The difference in duration was because Peru had lagged Chile in following free economy policy. Their results again confirmed the inverse relationship between inflation and real stock's returns but proxy-effect was only found in Chilean Market in short-run. Interestingly they found a long-run equilibrium correlation between price levels (inflation), real activity and stock's return thus proxy-effect was noticeable in long-run in both economies.

Henry (2002) has studied this relationship from another angle. He has seen the impact of Government's effort of curbing inflation (disinflation) on stock market returns. He studied eighty one different disinflation programs in different countries and related its impacts with performance of their stock exchanges. For removing the doubt between variations of disinflation policies adopted in different countries, he focused for such efforts where disinflation is carried out by an IMF plan which usually follow a universal monetary disciplinary program in such cases. His results reaffirmed the previous findings that disinflation impacts are not similar for stock markets operating under different inflationary pressures. He observed that in real dollar terms, markets operating in high inflationary pressures (above 40%) gained about 24% by the disinflation program but there are no apparent net benefits for markets operating at low to moderate inflationary levels.

Goyal and Welch (2003) have slightly changed the debate by investigating the forecasting power of aggregate dividend ratios (dividend to price ratio and dividend yield) to predict equity premium or stock's return. They used post world war-II data from late 1940s to 2000 to test their model. Their results showed that dividend ratios followed almost a random walk but equity premiums were followed an independently and identically distributed (i.i.d.) behavior. They also observed by their simple graphical diagnostic technique that both dividend ratios being examined had no predictive ability of equity premiums for the complete range of data. They also found that in earlier study of French and Fama (1988) the results were different even with similar tests because of restricted sample time period.

Adams, McQueen and Wood (2004) studied the impact of macroeconomic fundamentals on large movements in stock prices resulting in sudden increase or decrease in wealth. They have included both PPI and CPI inflation levels in their study. They also included speed, path and state of unexpected inflation news on large and small stocks. They tested their model on NYSE data from 1983 to 2000. Their results proved again the negative relationship between stock returns and inflation news and it was also noticeable that this impact was significantly faster on larger stocks than their smaller counterpart. They also observed that stock price response to PPI level was more significant but impact of CPI level was more severe. There was a noticeable difference in the speed of response to both announcements as well. They found that PPI level reaction time was about twenty minutes while it was ten minutes for CPI case. Regarding the state of inflation news, their finding was that investors were more sensitive to react to bad news than to good news.

Padhan (2007) had investigated the relationship of real economic activity with Bombay Stock exchange performance for the monthly data from April-1993 to March-2004 in Indian economy. He used TYDL model to check the Granger's bi-directional causality relationship between economic activity and real stock returns in post liberalization period. Granger's bi-directional causality relationship was a unique development over classical studies in which it was seen that monetary policies drive development or performance of stock markets, not the vice versa. Padhan's (2007) results were aligned to Granger's bi-directional causality relationship between stock market and economic activity. Thus it was a unique finding from previously known cause and effect relationship between the two factors.

Pilotte (2003) had contributed his research work to address the puzzling negative relationship between inflation and stock's returns. He targeted to check how inflation is impacting on both parts (dividend yield and capital gain) of the stock's yield. He based his work to interpret the findings presented in Fama's proxy-effect hypothesis. He collected quarterly data from 1953 to 1997, because in the same sample, negative inflation Beta coefficients for common stock returns were found. For making his study robust, he collected data from eight big industrialized nations including US, Belgium, France, Germany, Japan, Sweden, Switzerland and UK. His major finding was that dividend and capital gains were related differently to inflation and this pattern was common in all eight markets under study. He also observed that cause of this difference was a negative correlation between real price/dividend ratios and expected inflation. He also concluded that countercyclical monetary policy and positive economic shocks produce a negative relationship between total stock returns and inflation, a negative relationship between capital gain yield and inflation but a positive relation between dividend yield and inflation. Thus his initial hypothesis that inflation affects both components of stock yield differently is proven, by the collected data, in developed economies.

A summary is given in table 1 below for some important findings of some researchers on the related topic. The table is established in chronological order so that development on the same topic can be depicted. The current study is an extension of the study done by Pillote (2003) in which the relationship between two components of stock return i.e. capital gain and dividend yield were separately checked.

Table 1: Summary of some prior study on the same topic

Name	Year	Study	Data/Time Span	Results
Archer	1960	Stocks or near liquid assets are logically considered as a hedge against inflation	Industrial sector data of the US economy 1935-1950 1935-1955 1945-1955	Accepted
Gultekin	1983	Stock are poor hedge against expected and unexpected inflation	Post world war data of 26 industrial nations 1947-1979	Accepted in Japan, Israel, Spain and Peru but not consistent over time Rejected in the US and the UK
Cozier and Rehman	1988	Relationship between inflation and real stock returns	Data of Toronto Stock Exchange 1958- 1983	No cause and effect relationship
Boudoukh and Richardson	1993	Relationship between nominal stock return and inflation on a long time horizon	Data of the US and the UK 1802- 1990	Positive correlation on a long time horizon
Boudoukh, Richardson and Whitelaw	1994	Correlation between stock return and inflation	data of NYSE 1953-1993	negative correlation but cross-sectional variation
Adrangi, Chetrath and Shank	1999	Relationship between expected inflation and stock return	Data of Chile 1985-1995 data of Peru 1990-1996	Negative correlation

Pillote	2003	Component wise relationship of stock return with inflation movement	Data of the US, Belgium, France, Germany, Japan, Sweden, Switzerland, and the UK 1953-1997	Negative relation between Capital Gain and Inflation Positive relation between Dividend Yield and Inflation

3. Methodology

3.1 Research Hypothesis

Considering the international trend and logically relating the buying power of money with dividend policy, it is hypothesized that capital gain yield is negatively related with inflation levels while the dividend yield is positively related with predicted values of capital gain yield along with interest rate. Besides, some supporting variables are also used to explain the phenomenon. The same hypotheses in different variants have also been tested in other economies and proven the relationship to a greater extent. Since the study uses 2-stage least square regression in two steps, inflation is only used in model 1 to see the shock on capital gain yield. The predicted values of capital gain yield then are used to see the impact on dividend yield which includes inflationary effect as well.

3.2 Data Treatment

The selection of specific time sample was important for the study since it included single-digit inflation year with sizeable GDP growth of 2007, soaring inflation years of 2008 & 2009 with diminishing GDP growth and then a stabilizing period of 2010 & 2011 of controlled inflation and somewhat improving GDP growth rates.

Sample is based on companies listed in KSE-30 index which is the only index in KSE based on free-float market capitalization principle, covering all economic sectors. Interest rates are taken from the State Bank of Pakistan. Data of financial sector is separated by a dummy variable (FINDUMMY) because of their unique financial structure. Banks and insurance companies are given the value of 1 otherwise 0. KSE data portal is the main data source for statistical results while data collection is made from individual companies as well to complete the time frame of the study.

This selection omitted closely held companies from the study. Similarly individuals and influential groups' moves for stocks purchase and subsequent gains, targeted for certain strategic aims, could not bias the analysis. Stocks comprising KSE-30 index as per 31st December, 2011 notification of stock exchange are given in table2.

Capital gain was calculated while considering bonus and right shares issue. Their volume gain is also taken into account in the eventual price gain of the investor. This can be depicted by the equation 1.

$$\textbf{Capital Gain (\%age)} = [(Q_t \times P_t - Q_{t-1} \times P_{t-1}) / (Q_{t-1} \times P_{t-1})] * 100 \dots\dots\dots\dots (1)$$

Where,

$Q_t = (Q_{t-1} + \text{Bonus Shares (\%age)} + \text{Rights Shares (\%age)})$

Q_{t-1} = Unit Share in the listed company in previous year

P_t = Unit Price of Share at Time t

P_{t-1} = Unit Price of Shares in the previous year

Given dividend yield which is announced as percentage to book price of share was rationalized with the previous year's market price of the share to calculate dividend yield of stock and can be explained by the equation 2.

$$\textbf{Dividend Yield (\%age)} = [Div_t / P_{t-1}] * 100 \dots\dots\dots\dots\dots\dots\dots\dots (2)$$

Where,

Div$_t$ = Div (%age) * Book Value of Share (Rs)

P$_{t-1}$ = Unit Price of Shares in the previous year

Table 2: Companies Included in KSE-30 Index as on 31st December, 2011 Notification

S-NO.	SYMBOL	NAME OF COMPANY	CLOSING PRICE (31-12-2011)	FREE-FLOAT SHARES	FREE-FLOAT MARKET CAP	MARKET WEIGHT (%)
1	OGDC	Oil & Gas Development Co. Ltd	151.62	631,348,555	95,725,067,909	17.80%
2	FFC	Fauji Fertilizer Company Limited	149.54	466,487,357	69,758,519,366	12.97%
3	PPL	Pakistan Petroleum Limited	168.32	272,699,603	45,900,797,177	8.53%
4	MCB	MCB Bank Limited	134.60	334,494,590	45,022,971,814	8.37%
5	POL	Pakistan Oilfields Limited	346.45	108,004,731	37,418,239,055	6.96%
6	HUBC	The Hub Power Company Limited	34.20	925,723,510	31,659,744,042	5.89%
7	PSO	Pakistan State Oil Company Limited	227.21	78,089,304	17,742,670,762	3.30%
8	ENGRO	Engro Corporation Limited	92.70	176,977,882	16,405,849,661	3.05%
9	NBP	National Bank of Pakistan	41.05	398,378,103	16,353,421,128	3.04%
10	UBL	United Bank Limited	52.39	306,044,922	16,033,693,464	2.98%
11	ULEVER	Unilever Pakistan Limited	5,565.80	2,803,878	15,605,824,172	2.90%
12	FFBL	Fauji Fertilizer Bin Qasim Limited	42.43	326,938,500	13,872,000,555	2.58%
13	BAHL	Bank AL Habib Limited	28.53	483,228,442	13,786,507,450	2.56%
14	HBL	Habib Bank Limited	106.08	110,206,800	11,690,737,344	2.17%
15	LUCK	Lucky Cement Limited	75.04	129,350,000	9,706,424,000	1.80%
16	NESTLE	Nestle Pakistan Limited	3,597.11	2,267,500	8,156,446,925	1.52%
17	BAFL	Bank Alfalah Limited	11.25	674,578,125	7,589,003,906	1.41%
18	KAPCO	Kot Addu Power Company Limited	41.32	176,050,646	7,274,412,693	1.35%
19	NML	Nishat Mills Limited	40.45	175,799,924	7,111,106,926	1.32%
20	NRL	National Refinery Limited	242.69	25,376,019	6,158,506,051	1.14%
21	DAWH	Dawood Hercules Corporation Ltd	42.39	144,386,135	6,120,528,263	1.14%
22	PTC	Pakistan Telecommunication Co. Ltd.	10.39	585,350,594	6,081,792,672	1.13%
23	APL	Attock Petroleum Limited	412.50	13,824,000	5,702,400,000	1.06%
24	MTL	Millat Tractors Limited	365.21	14,642,163	5,347,464,349	0.99%
25	DGKC	D.G. Khan Cement Company Limited	19.03	240,965,515	4,585,573,750	0.85%
26	ICI	I. C. I. Pakistan Limited	120.27	30,968,833	3,724,621,545	0.69%
27	LOTPTA	Lotte Pakistan PTA Limited	9.27	378,551,802	3,509,175,205	0.65%
28	AICL	Adamjee Insurance Company Limited	46.51	74,222,726	3,452,098,986	0.64%
29	ATRL	Attock Refinery Limited	107.65	29,852,550	3,213,627,008	0.60%
30	AHCL	Arif Habib Corporation Limited	25.91	123,750,000	3,206,362,500	0.60%
		TOTAL		**7,441,362,709**	**537,915,588,678**	**100.00%**

Prices of shares for both years (t & t-1) used in the model is the average price of shares during the year. There were companies for which neither the actual price levels nor is a direct average pricing of stocks was not available at the consulted sources. In such a case, following formula is used to have their yearly prices. The two inputs in the formula are taken either from annual books or projected numbers estimated by analysts:

Price of Stock (Rs) = EPS × P/E Ratio

Overall CPI numbers were taken from Economic Surveys of 2010 & 2011 issued by Ministry of Finance, Pakistan. Individual stock's yields were taken from different analysis report available at KSE's data portal especially for last three years.

There are two regression models. In the model 1, CGY is assumed to be dependent on inflation, change in debt to equity ratio and a dummy variable. Model 2 assumes that DY is dependent on interest rate and CGY predicted in the model 1.

3.3 Statistical Models

Following the 2-stage least square regression, two models are now built to test the hypotheses of the relationship of inflation with individual components of stock return. Model 1 is run first to check the dependency of CGY of the set of predictors. Then the predicted values of model 1 is used as independent variable in the model 2

$$\text{Model 1 CGY} = \alpha + \beta_1 CPI + \beta_2 \Delta D/E + \beta_3 FINDUMMY + \varepsilon \ldots\ldots.. (4)$$

$$\text{Model 2 DY} = \alpha + \beta_1 INTRATE + \beta 2 CGYPREDICTED + \varepsilon.\ldots\ldots.. (3)$$

4 Stylized Facts of Dividend Policy

Since we have selected thirty companies as evaluation sample and their five years performance was considered for the individual stock gains in cash and capital terms, therefore we combined data set of one hundred and fifty observations for both the regression equations. Individual descriptive data for both equations is depicted in table 3 and table 4.

Table 3:*Descriptive Statistics – Model 1*

Variables	Mean	Std. Deviation	Observations
Capital Gain Yield (%age)	5.4157	51.59765	150
Consumer Price Index (%age)	13.2740	4.29728	150
Δ in D/E Ratio	-2.8267	31.10207	150
FINDUMMY	0.2333	0.42437	150

Table 4:*Descriptive Statistics- Model 2*

Variables	Mean	Std. Deviation	Observations
Dividend Yield (%age)	6.0816	5.96118	150
Interest Rate	12.7060	1.56548	150
CGYPREDICTED	5.41573	18.17897	150

Clearly, the mean and standard deviation terms are not close to uniformly distributed data characteristics because of obvious nature of the factors. Being inflation an always positive integer during the years of observation and as of usual trend of Pakistani economy, there is no negative data to normalize it except change in D/E ratio. Similarly the two yields were majorly in positive zone for most of the stocks thus they both are positively skewed as well.

The results of 2-stage regression are given in table 5. It can be observed that model has proven the hypothesis of capital gain dependency with inflation. Model shows that about 10.6% change in capital gain is driven by the set of predictors. Change in debt to equity ratio also suggests that any change in financial decision of firms brings negative change in stock prices. It may be concluded that financing decisions of firms leads to lower down the stock price. Furthermore, financial sector dummy also suggests a negative reliance of capital gain yields. However for dividend yield part, model depicts that dividend policy is dependent not only on the set of predictors of model 1 but also on interest rate (INTRATE). The model explains only 11.6% variation. The second model which also includes the predicted values of model 1 is significant at 5% level. It reveals that 2-stage regression is evident to prove that dividend yield depends on capital gain yield which is a function of inflation (CPI), change in debt to equity ratio (Δ D/E) and cross-section industry effects. Ultimately, it can be suggested that dividend yields rely on the factors used to measure the capital gain yield. It has already been proved by different researchers that there is negative relationship between interest rate and stock market performance. The results of present study illustrate the positive relations which is a surprising outcome. Based on these results, it can be argued that corporations have to pay higher dividend to attract the capital as and when interest rates go up.

Table 5: Predicting the Yields

Variables	Model 1 Capital Gain Yield		Model 2 Dividend Yield	
	Coefficient	Std. Error	Coefficient	Std. Error
Intercept	56.728 (4.310)	13.161	-16.900 (-3.400)	4.971
CPI	-3.628* (-3.901)	0 .930		
ΔD/E	-0.208** (-1.619)	0.129		
FINDUMMY	-16.038** (-1.702)	9.419		
CGYPREDICTED			0.107* (3.253)	0.033
INTRATE			1.763* (4.634)	0.381
No. of observations	150		150	
Adjusted R^2	0.106		0.116	
F Statistics	6.897		10.811	

* Significant at the 5 percent levels
** Significant at the 10 percent levels
t statistics are in parenthesis .

5. Conclusion and Recommendations

Results of the study reveals that inflation level negatively and significantly affects the capital gain. It is seen that the market dynamics are somehow related with soaring inflation levels which is similar outlook as in the developed and other developing economies of the region. Any change in financing decision also brings negative change in the dividend policy of the firm.

An astonishing result is found for interest rate which has positive sign in model 2. It shows that both dependent and the predictor move in the same direction. It can also be deduced that in the context of Pakistan, monetary policy and business activities improve simultaneously. If interest rate increases, corporate sector has to pay higher dividend to attract capital. Similarly, by improving the stock market in terms of stock prices, dividend also improves. Specially, when new investors come in the market, corporations have to declare higher dividend to catch the attention of these new investors.

The derivatives of the study are quite noteworthy to see the individual movement of stock return's components with two important macro-economic indicators. It was observed that the two components, dividend yield and capital gain, being different in their realization nature are not driven alike with the selected variables.

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