# DISCOUNT RATE CHANGES AND INDUSTRY STOCK RETURNS IN PAKISTAN

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#### Abstract

This study examines the short-term and the long-term effects of discount rate changes made by State Bank of Pakistan on aggregate market and industry stocks' returns in Pakistan over the period 2005 to 2014. The Findings suggest that the market and the various sector returns in Pakistan do not react significantly on the days when interest rates are changed. Though the aggregate market and various sectors do perform better during the low-rate period, there is no evidence of significant inverse relationship between the changes in the discount rate and the market or sector returns. Finally, the financial sector of Pakistan which operates in a less competitive environment, earns positive returns following the rate increase and negative returns following the rate decrease but these returns are not statistically significant.

Keywords: Discount Rate, State Bank of Pakistan, Financial Sector, Event Study

**JEL Classification:** G 120

### Introduction

Policy makers use the monetary policy to achieve their targets for certain macroeconomic variables like unemployment, output and inflation. The monetary policy actions, such as the discount rate changes, directly and immediately affect the equity prices and returns. An increase in the discount rate signals tightening of the monetary policy and a decrease in discount rate is a signal of expansionary monetary policy. The issue of stock price reaction to the discount rate changes has been studied widely by the researchers in developed economies and the evidence suggests that the stock returns are consistently higher following the reduction in the discount rate. Little research has been conducted on the issue in developing economies and no research has been conducted on the topic in Pakistan.

Discount rate is the interest rate that State Bank of Pakistan (SBP) charges banks and financial institutions when they borrow funds from SBP on an overnight basis. SBP changes this rate, as and when required, to give a monetary policy signal. By raising the discount rate SBP discourages

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banks to borrow money, indicating that more restrictive monetary policies are in store. If and when the goal is to increase the money supply, the Bank lowers its discount rate to encourage borrowing by the banks and, thus, helps increasing the money supply. Understanding the relationship between the discount rate changes and the equity returns will enable the policy makers in Pakistan to be more careful in designing the monetary policies with an aim of achieving financial and equity market stability. Moreover, evidence on the impact of discount rate changes on stock returns will be useful for the professional investors while performing the fundamental analysis of stocks in Pakistan.

This research has three principal objectives. First, it investigates the manner in which the stock market, in aggregate, reacts to the changes in discount rate by State Bank of Pakistan, both in the short-run and in the long-run. Second, since the stock returns vary across industries based on the sensitivity of the industry to the changes in the discount rate, the study will examine the stock price reaction to the changes in discount rate for different industrial sectors of Pakistan. Lastly, impact of the interest rate changes on financial sectors' returns will be examined in detail.

#### Literature Review

According to the discounted cash flow techniques, stock price of a firm is calculated as the discounted value of the expected cash flows in future. A change in discount rate can alter the stock price by changing either the stock's required return or by changing the expectations about the company's future profits and cash flows. A number of studies have been conducted in the developed countries to investigate the stock price reaction to the announcements of discount rate changes. These studies have examined the impact of discount rate changes both on aggregate stock market and on stocks of financial and non-financial companies. Studies (e.g Pearce & Roley, 1985 and Bernanke & Kuttner, 2005) have reported the equity returns to be fluctuating more days when the monetary policy changes are announced. Moreover, the price response to the unexpected policy actions was found to be fairly strong.

Literature supports that most industries show a positive price reaction when the interest rates are decreased and a negative price reaction when interest rates are increased (Jensen et al., 1997). Studies have also been conducted to find the reasons for the positive (negative) price impact of decreases (increases) in the discount rate on the equity prices. Bernanke and Kuttner (2005), for example, found that the anticipated future surplus returns account for the biggest part of the stock price reaction to the change in interest rate. With an increase in interest rate, financing costs for the firm increases which makes the equity riskier. Moreover, high interest rate mean higher returns in debt markets which reduces the attractiveness to stock investment, thus adding to the stock's required return. On the other hand, Nissim and Penman (2003) reported the interest rates to be positively associated with the subsequent periods' earnings; however, the increase in expected earnings resulting from increasing interest rate is insufficient to compensate for the impact of the increasing required return and hence the final consequence is the decline in stock value.

Booth and Officer (1985) documented that the stock returns for banks are more sensitive to the changes in interest rates compared to the non-financial firms' stock returns. Moreover, the reaction of the bank stock returns to the changes in interest rate varied depending on the competition within the sector. In a competitive credit environment, banks' profits might not grow with the increases in the interest rates as under such circumstances the banks would ration their lending and charge lesser rates than what the market would be willing to pay. If the banks increase the lending rates, the less risky clients switch the banks and more risky clients are attracted. The increased income resulting from higher interest rates is thus negatively offset by the additional risk inherent in such loans. This increased risk increases the required return on the banks stocks and results in the decline in the value of banks' stocks. This evidence is provided by numerous studies conducted on banking sector in US (Stiglitz, Weiss, 1981, Madura & Schnusenberg, 2000). Kaen et al. (1997) have reported similar results for German bank stocks. As opposed to the mechanism in a competitive banking environment, when the interest rates increase in a less competitive market, the banks are able to pass the costs to the clients, increasing the net interest margins/interest spreads which leads to increase in their profits and returns. This evidence is found in Australia where the banking sector lacks adequate competition and comprises of a few banks having major market power (Ho & Saunders, 2007). Vaz et al. (2008) also reported that for Australian banks, the stock returns are not negatively impacted by the cash rate increases. For rate increases, they found an increase in the cumulative abnormal returns up to two days prior to the event. The CARs dropped after announcement but the overall impact was positive. In case of rate decreases, the CARs were positive for both pre-event and on-event sub-periods.

The reaction of stock returns to the policy rate changes is reported to be inconsistent across different industries and firms. As reported by Gertler and Gilchrist (1994), for example, stocks of small size firms are more responsive to the alterations in policy rate. Moreover, Conover et al. (2005) found the monetary policy-related return patterns in stock prices of small size firms to be consistent over time. Nowak (1993) and Jensen et al. (1997) reported that the reaction of stock prices to policy rate variations is more intense for the sectors which are heavily dependent on consumer spending and on trade conditions as well as for the sectors which are interest-rate sensitive. Conover et al. (2005) documented the cyclical stocks to have a much higher sensitivity to the changes in the monetary conditions than defensive stocks.

A number of studies have been conducted in Pakistan to examine the relationship between the stock market returns and various macroeconomic variables including interest rates, money supply, exchange rates and inflation rates (Nishat & Saghir, 1991; Hussain & Mahmood, 2001; Nishat & Shaheen, 2004; Hasan & Javed, 2009; Mohammad et al., 2009; Rukh et al., 2012; Akbar et al., 2012). These studies have documented that money supply and interest rates have significant impacts on equity market returns (Mohammad et al., 2009; Akbar et al., 2012) and the equity market returns are positively related to money supply and negatively related to interest rates (Hasan & Javed, (2009). Moreover, literature also documents a negative relationship between the trading volume and the policy rates in Pakistan (Rukh et al., 2012). This study provides a rigorous evaluation of the impact of the discount rate changes on the stock returns, an area which has not been investigated so far in Pakistan. The study contributes to the existing literature in a number of ways. First, all studies conducted on the topic in Pakistan have examined the association between the aggregate equity market returns and macroeconomic variables. These studies have not investigated how the firms in different industries show different sensitivities towards the changes in the discount rates. This study aims to find the impact of discount rate on the aggregate stock market and examine the cross-sectional consistency of this influence by separately evaluating the stock performance of firms in different industries with a detailed examination of the financial sector. Second, all prior studies have either used monthly data or quarterly data to determine the association between the equity returns and macroeconomic variables. This study uses daily stock price data which allows for a more accurate depiction of the influence of discount rate changes on stock returns.

#### **Research Hypotheses**

The international evidence suggests the presence of a systematic relationship between the interest rate changes and the stock returns. Stock returns increase when the central bank announces to tighten the monetary policy and the stock returns decrease when the monetary policy is expansive. Consistent with the international evidence, the aggregate stocks' returns are expected to be negatively affected by rate increases and positively affected by rate decreases. Aggregate equity returns are measured using the daily returns of KSE-100 index across restrictive and expansive monetary periods. *H1*: KSE-100 index returns are negatively (positively) affected by SBP's announced increases (decreases) in discount rates.

The degree to which the stock returns are affected by the change in the discount rate is not same for all industries in the non-financial sector. Numerous studies reported the deviation in the stocks response among different sectors (Nowak, 1993 and Jensen et al., 1997). For this purpose, this study aims at examining the cross-sectional differences in returns of the non-financial sector followed by the discount rate changes.

*H2*: Returns for industry i of the non-financial sector are negatively (positively) affected by SBP's announced increases (decreases) in discount rates.

The impact of interest rate change on the financial sector returns depends on the market characteristic. For competitive market, financial sector returns are negatively related to the rate changes whereas in a non-competitive market, financial sector returns are related positively to the rate changes. Financial sector of Pakistan comprises of the commercial banks, investment banks, leasing companies and modarabas. The sector is not highly competitive. Table 1 reports the statistics to measure the extent of concentration in the banking sector which constitutes a major part of financial sector of Pakistan. These statistics are presented for the beginning and the end of the sample period. Herfindahl-Hirschman index for December 2005 is 1125 which shows the banking sector was not

highly competitive at that time. This index has reduced to 877 for the year ended December 2013, but the top four banks continue to hold a high share of the market. Based on the less competitive market structure of Pakistan's financial sector, the sector returns are expected to be positively related to the interest rate changes.

*H3*: Returns for financial sector are positively (negatively) affected by SBP's announced increases (decreases) in discount rates.

	Four Firm	Eight Firm	Herfindahl-Hirschman	
	Concentration Ratio	Concentration Ratio	Index	
	Based on Total Assets			
December 2005	50.37	73.29	1125	
December 2013	49.79	72.65	877	
	Based on Total Sales			
December 2005	56.74	78.54	1082	
December 2013	50.37	73.29	877	

 Table 1

 Pakistan's Banking Sector Concentration

### **Data and Research Methodology**

For the purpose of this study, the relevant sample of events is defined as the union of all days when the discount rate was changed by State Bank of Pakistan (SBP). Since the inception of SBP in 1948 till November 2014, discount rate has been changed 45 times, including 25 upward rate changes and 20 downward rate changes. The study uses the discount rate changes made during the period from 2005 to 2014. The discount rate changes made before 2005 are excluded due to the lack of availability of stock price data. Altogether, the sample contains 22 discount rate changes, including 12 rate increases and 10 rate decreases. Maximum discount rate over the sample period is 15% and the minimum is 9%. The total sample period is divided into three sub-periods: low-rate period, medium-rate period and high-rate period. Table 2 presents the sample events with their respective dates and sub-period category. The study uses the firm-level panel data for all companies listed on Karachi Stock Exchange of Pakistan over the sample period. As of December 2014, there were 557 stocks listed on Karachi Stock Exchange. All listed firms for which the price data is available for at least one rate change period have been examined. Stock price data is taken from State Bank of Pakistan.

Discount Rate	e Change	Event	Dates
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		<b>Discount Rate</b>	
Date	Rate Change	(After Change)	<b>Type of Period</b>
4/1/2005	1.50	9	Low-rate
7/31/2006	0.50	9.5	Low-rate
8/1/2007	0.50	10	Low-rate
2/1/2008	0.50	10.5	Low-rate
5/23/2008	1.50	12	Medium-rate
7/30/2008	1.00	13	High-rate
11/12/2008	2.00	15	High-rate
4/21/2009	-1.00	14	High-rate
8/17/2009	-1.00	13	High-rate
11/25/2009	-0.50	12.5	Medium-rate
8/2/2010	0.50	13	High-rate
9/30/2010	0.50	13.5	High-rate
11/30/2010	0.50	14	High-rate
8/1/2011	-0.50	13.5	High-rate
10/10/2011	-1.50	12	Medium-rate
8/13/2012	-1.50	10.5	Low-rate
10/8/2012	-0.50	10	Low-rate
12/17/2012	-0.50	9.5	Low-rate
6/24/2013	-0.50	9	Low-rate
9/16/2013	0.50	9.5	Low-rate
11/18/2013	0.50	10	Low-rate
11/17/2014	-0.50	9.5	Low-rate

The sample firms are categorized into a financial and ten non-financial sectors for the purpose of analysis. Financial sector comprises of the commercial banks, investment banks, leasing companies and modarabas. Table 3 shows the composition of sample at the beginning and the end of the sample period. KSE-100 index, which is a value-weighted index based on 100 stocks listed on Karachi Stock Exchange, is used as a proxy for market. For the eleven sectors, equally weighted sector indices are formed. These sector indices are constructed for each discount rate change period

which starts from the announcement of a change in discount rate and continues until the next rate change is announced.

Industry	Number of firms			
	Apr-05	Nov-14		
Textile	48	33		
Chemicals	15	20		
Construction	23	23		
Financial	60	52		
Food	17	12		
Industrial Metals	16	19		
Oil & Gas	10	11		
Others	15	13		
Pharmaceuticals	7	8		
Automobile	7	7		
Utilities	10	16		
Total	228	214		

# Table 3Composition of Sample

The study analyzes the reaction of discount rate changes on market and industry returns in both short-term and long-term. Event study analysis is used to examine the short-run stocks' returns following the changes in discount rate on the day of discount rate change. Cumulative returns are examined in the pre- and post- event windows for both the rate increases and decreases to see the pattern of returns accumulated in these periods. For the long-run analysis, returns are examined for the three sub-periods: low-rate period, medium-rate period and high-rate period. Long-run returns are also computed for periods following rate increases and rate decreases. Return of the rate-change day is excluded in this computation. Lastly, the following regression model is used to see the impact of rate change on the long run returns of market, all-stock portfolio and individual sector returns:

Where  $R_t$  represents the stocks' return,  $\Delta D_t$  is the change in discount rate and the error term  $\varepsilon_t$  represents factors other than the discount rate changes that affect the stock prices. A separate analysis of the financial stocks is also conducted.

## **Empirical Results**

Annualized mean returns and the beta coefficients for eleven sectors and the market are presented in Table 4. Over the 10-year study period, market yielded a mean annual return of 21%. Financial sector earned the highest mean return (81%) and utilities sectors earned the lowest mean return (12%). Oil and gas sector reported the highest beta coefficient  $(1.05\times)$  and the food sector reported the lowest beta coefficient  $(0.34\times)$ .

#### Table 4

Annualized Mean Returns and Beta Coefficients

	Annualized Mean	Beta	
Industry	Return (%)	Co-efficient	
Textile	73.08	0.3414	
Chemicals	25.66	0.8434	
Construction	27.40	0.8005	
Financial	80.92	0.6962	
Food	70.20	0.3413	
Industrial Metals	35.20	0.4314	
Oil and Gas	23.68	1.0499	
Others	19.98	0.4064	
Pharmaceuticals	29.28	0.4322	
Automobile	24.04	0.6287	
Utilities	12.31	0.9171	
Market	20.78	1.0000	

#### Short-term Analysis

Table 5 presents the results of short-term event study. The rate-change day (1-day) returns for eleven sectors and the market are reported in the table. Market returns are negative for both the positive and negative rate changes; however the return difference is positive. As evident from the reported figures, there is no clear direction in which the sector indices react as a result of the interest rate increase or decrease. Return differences are positive for some sectors (textile, automobiles, Pharmaceuticals, utilities and industrial metals) whereas negative for others (cement, chemicals, oil and gas, financials and food). Moreover, the return differences are insignificant for the market and all sectors.

# Table 5Rate Change Day Returns

	Increase	Decrease	Return Difference	t-Statistic
Textiles	-0.2854	0.2551	0.5405	0.8265
Automobiles	-0.1827	-0.1337	0.0490	0.0650
Cement	0.1373	-0.1088	-0.2462	-0.3100
Chemicals	0.1294	-0.1769	-0.3063	-0.3330
Oil & Gas	0.2417	-0.3953	-0.6370	-0.7040
Pharmaceuticals	-0.0535	0.2355	0.2889	0.4782
Financials	0.3621	-0.5409	-0.9030	-1.1934
Utilities	-0.3763	0.0808	0.4571	0.4872
Industrial Metals	-0.3822	-0.3246	0.0576	0.1000
Food	0.0225	0.0093	-0.0132	-0.0225
Others	0.4001	-0.1682	-0.5684	-0.9488
Overall	0.0012	-0.1153	-0.1164	-0.1919
Market	-0.5348	-0.0621	0.4728	0.3951

Table 6 presents the 11-day cumulative returns for the pre- and post-event periods for interest rate increases and decreases. The pre-event period comprises of 11 days from event day -11 to event day -1 and the post-event period comprises of 11 days from event day +1 to event day +11. In the pre-event window, cumulative returns are positive and quite high for the rate increases for all sectors as well as the market which indicates that a very good performance of stock market before the interest rates are revised in a positive direction. For the rate decreases, the pre-event window has a mix of positive and negative returns. The post-event cumulative returns are negative for most sectors, in case of both rate increase and decrease.

	11-day (-11 to -1)		11-day (+1 to +11)	
	Increase	Decrease	Increase	Decrease
Textiles	2.7511	2.4432	1.3644	0.2102
Automobiles	1.5204	-0.7872	-2.9847	-1.3668
Cement	1.1696	-0.6003	-1.5758	0.6862
Chemicals	2.0744	-0.8174	-0.5751	-0.5592
Oil & Gas	2.5874	-1.0358	-0.9345	-0.9683
Pharmaceuticals	4.0284	0.0987	-0.3755	-0.4271
Financials	3.7124	1.0360	0.9329	-0.1113
Utilities	1.3520	0.3127	-1.7242	1.0940
Industrial Metals	3.1422	0.5030	3.8602	-1.7946
Food	0.4270	1.0385	6.4371	-1.7291
Others	2.7269	-0.7935	-1.0143	-2.7181
Overall	2.3174	0.1271	0.3100	-0.6985
Market	2.2382	-1.6593	-1.1266	-0.3509

#### Cumulative Returns in Pre- and Post-Event Windows

#### Long-term Analysis

Table 7 reports the mean annualized percentage returns for market, all-stocks portfolio and individual sectors over the three sub-periods: low-, medium- and high-rate periods. Mean returns presented in the table which are calculated as the annualized geometric mean daily return show that the market, all-stock portfolio and all sectors except textile, cement and financials have earned highest returns in the low interest rate period. While textile, cement and financial sectors yielded highest returns in the medium-rate period, none of the sectors has performed best in the high interest rate period. These results are suggestive of the inverse relationship between the interest rates and the stock returns.

	Low	Medium	High
Textiles	46.36	83.02	67.32
Automobiles	39.31	9.13	-3.94
Cement	31.82	58.34	-16.76
Chemicals	30.34	7.91	23.42
Oil & Gas	32.71	-13.82	8.41
Pharmaceuticals	48.48	13.65	-9.12
Financials	65.08	72.41	53.58
Utilities	21.84	9.66	-12.20
Industrial Metals	39.96	26.61	15.24
Food	78.62	28.13	23.30
Others	28.18	13.73	16.90
Overall	42.06	28.07	15.10
Market	27.05	6.81	2.59

Annualized Returns over the Low, Medium and High Interest rate Periods

Table 8 reports the mean annualized percentage returns following the discount rate changes. For both the market index and all stocks portfolio the long-run return following the interest rate decrease is greater than the long-run return following the interest rate increase, hence indicating the negative long-run link between the rate change and stocks' returns. However, this finding is not consistent for all eleven sectors. Moreover, the differences in the long-run returns for market index, different sectors and all stocks' portfolio reported for rate increase and rate decrease are not significant. To enhance the robustness of the findings, regression model is run relating the market, all-stocks and individual sector returns to the interest rate changes. Table 9 presents the regression results. Negative coefficient is found for the market, all-stocks and all sectors except financial sector. However, none of these co-efficient is found to be statistically significant.

Based on the short-run and long-run analysis, we are able to reject H1 and H2 and conclude that the market and the various sector returns in Pakistan are not inversely impacted by the changes in the discount rate by State Bank of Pakistan.

	Increase	Decrease	Return Difference	T-Statistic
Textiles	11.0490	25.7641	14.7152	1.4296
Automobiles	6.1089	12.7178	6.6089	0.7592
Cement	5.1669	13.4598	8.2929	0.7757
Chemicals	6.5147	8.4379	1.9232	0.3736
Oil and Gas	7.0582	5.2239	-1.8342	-0.3555
Pharmaceuticals	10.3358	6.7711	-3.5647	-0.4481
Financials	21.3829	19.8295	-1.5534	-0.1441
Utilities	-1.2008	8.0912	9.2919	1.2919
Industrial Metals	6.8092	9.7973	2.9881	0.4890
Food	21.8227	8.6641	-13.1586	-0.7769
Others	6.1934	10.1056	3.9122	0.7200
Overall	9.2037	11.7148	2.5110	0.3826
Market	4.8901	7.5714	2.6813	0.5232

# Mean Annualized Long-run Returns Following the Rate Change

## Table 9

Regression Results

	Co-efficient	<b>T-Statistic</b>	P-Value
Textiles	-0.595	1.830	0.830
Automobiles	-0.277	-0.680	0.506
Cement	-0.216	-0.520	0.608
Chemicals	-0.269	-0.520	0.610
Oil & Gas	-0.064	-0.130	0.899
Pharma	-0.354	-1.160	0.260
Financials	0.116	0.270	0.789
Utilities	-0.662	-1.370	0.187
Industrial Metals	-0.123	-0.410	0.686
Food	-0.103	-0.330	0.741
Others	-0.029	-0.090	0.932
Overall	-0.234	-0.720	0.480
Market	-0.578	-0.870	0.392

#### Financial Sector

Financial sector makes around one-fourth of the study sample. The results show that the sector accumulates positive returns in the pre-event windows regardless of the direction of interest rate change. However, the pre-event cumulative return is much higher in case of the rate increase (3.7% as compared to 1% for 11-day pre-event period). On the rate change day, the sector has earned a positive return (0.4% on average) in case of rate increase and a negative return (-0.5% on average) in case of rate decrease. Following the rate change, returns continue to be positive in case of rate increase (0.9% on average for 11-day post-event period) and negative in case of rate decrease (-0.1% on average for 11-day post-event period). For the total period of 23 days surrounding the rate changes in the study sample, the investors have earned around 5% in case of positive rate change and 0.4% in case of negative rate change.

In the long-run, the sector has earned an annualized return of 21% following rate increases and 19.8% following rate decreases. However, the difference in the returns of financial sector following the rate increases and decreases, in short-run or long-run, is not significant. Thus we reject H3 lending support to the view that the financial sector returns are not positively related to the discount rate changes made by State Bank of Pakistan.

#### Conclusion

This study examines the short-term and the long-term effect of discount rate changes made by State Bank of Pakistan on aggregate market and industry stocks' returns in Pakistan over the period from 2005 to 2014. The findings suggest that the market and the various sector returns in Pakistan do not react significantly on the days when interest rates are changed. The aggregate market and various sectors do perform better during the low-rate period, but there is no evidence of significant inverse relationship between the changes in the discount rate and the market or sector returns. The financial sector of Pakistan which operates in a less competitive environment, earns positive returns following the rate increase and negative returns following the rate decrease. This is consistent with the findings reported by Vaz et al. (2008) for the Australian Banking stocks. However, the results of this study are not statistically significant.

Further research can be done to examine the impact of interest rates on portfolio returns using different methodology, for example by adding the interest rate factor in the Fama-French (1992) three factor model.

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