

Monetary Policy Announcements and Market  
Interest Rates in Pakistan:  
An Event Study Approach

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## Abstract:

*The objective of this paper is to analyze the impact of monetary policy announcements on market interest rates at different nine maturities (1-Week, 2-Week, 1-Month, 3-Months, 6-Months, 9-Months, 1-Year, 2-Years & 3-Years) in Pakistan. The Event window of 11 days and an estimation window of 250 days have been used for analysis. The ARCH effect is analyzed in market interest rates at each maturity by using Breusch Pagen ARCH Test. The study also applied GARCH model where ARCH effect was observed to forecast the normal rate. However we did not find significant evidence of ARCH effect in market interest rates at (1-Year, 2-Years & 3-Years) maturities. The ARIMA model was applied to calculate the normal rates from estimation window ( $t-250$ ). The abnormal rates were calculated by taking the difference between actual and normal/estimated rates. Then abnormal returns were aggregated as Aggregated Abnormal Rates (AAR) within event window and Cumulative Abnormal Rates (CAR) across the event window. The AAR & CAR at 28.8731 showed an impact of monetary policy announcements on market interest rates at different nine maturities. Null hypothesis of zero abnormal returns was rejected since the results were found in critical region under normal distribution.*

**Key Words:** Monetary Policy, market Interest Rates, Normal Rates, Abnormal Rates, GARCH, ARIMA.

## 1. Introduction:

The short term interest rates in the market are directly affected by the decision of Monetary Policy Committee. But, it also depends upon the expectations of market participants. If they have forward-thinking then their expectations towards policy rate will affect money market rates. It is an important aspect of MP transmission. The Participants of the market may predict the

upcoming policy decisions if they have good understanding of MP. So, we can say that money market interest rates have some information about upcoming policy rate changes.

This fact has laid down the groundwork for a rich literature investigating the role of information in financial markets. One important aspect of this literature focuses on the effects of macroeconomic announcements on various markets including currencies, bonds & equities. Monetary policy announcement is one of the important macroeconomic announcements. There have been 8 regularly scheduled meetings of the FOMC (Federal Open Market Committee) per year since 1981 in USA. Similar is the case of UK and other developed economies. A lot of studies have been conducted to analyze the impact of monetary policy announcement on market interest rates. In Pakistan, these meetings were conducted on irregular intervals but from 2005 onwards, monetary policy committee of the central board is conducting regular meetings. To the best of our knowledge, no one has analyzed the impact of monetary policy announcements on market interest rates using event study methodology in Pakistan. Thus the use of market interest rates should help to identify a direct and immediate effect of monetary policy and improve our understanding of transmission mechanism in Pakistan.

Andersen and Bollerslev (1998), Jones, Lamont, and Lumsdaine (1998), Berry and Howe (1994), Mitchell and Mulherin (1994), Ederington and Lee (1993), Cutler, Poterba, and Summers (1989), Roll (1988), Bomfim and Reinhart (2000), Kuttner (1999), Roley and Sellon (1998), Thornton (1998), Jensen and Johnson (1995) and Reinhart and Simin (1997) measured the financial market's reaction to monetary policy actions by following event study approach.

This study is an effort to add to the literature enlightening the impact of monetary policy announcements on interest rates by analyzing the Pakistani markets. Pakistan is an emerging market and not been much studied. This study will be a value addition in this regard.

The objective of this paper is to analyze the impact of monetary policy announcements on the market interest rates at nine different maturities (1-Week, 2-Week, 1-Month, 3-Months, 6-Months, 9-Months, 1-Year, 2-Years & 3-Years) in Pakistan. As a first step of my analysis, I analyzed the impact of monetary policy announcements on market interest rates at different nine maturities by using event study methodology by using daily data from Jan 2005 to Mar 2011 on

discount rate and Karachi Inter Bank Offered Rate (KIBOR). The source of this daily data is State Bank of Pakistan. I constructed the economic impact of event by using market interest observed over relatively short time period. An 11-days event window is applied, consisting of 5 pre-event days, the event day, and 5 post-event days. A 250 days period prior to the event window is used as the estimation window for each event/announcement (MacKinlay, A. Craig, 1997). Abnormal Rates were calculated by taking the difference of normal/forecasted rates and actual interest rates at different maturities prevailing in the market. So, the normal/forecasted rates were estimated by using GARCH & ARIMA (p,d,q) on the estimation window. Breusch Pagen ARCH Test was applied at the market interest rates of all maturities and GARCH model was applied for forecasting of six maturities (1-Week, 2-Week, 1-Month, 3-Months, 6-Months, 9-Months) having ARCH effect at 0.05. No ARCH effect was observed by applying Breusch Pagen ARCH Test at last three maturities (1-Year, 2-Years & 3-Years). ARIMA (p,d,q) was applied to measure the normal/forecasted rates at last three maturities. After finding the Abnormal rates and their day-wise & event-wise aggregation, t-test was applied to check the null hypothesis that event has no impact on the market interest rates at nine different maturities.

## 2. Literature Review

Cook & Hahn (1989) is the prior study on the linkage between policy rate & the market interest rates using event study methodology. They used the following ordinary least squared to analyze the effect of policy rate in USA on market interest rates at different maturities on and around the day of change.

$$\Delta R_t = \beta_1 + \beta_2 \Delta RFF_1 + \mu_t$$

He concluded with the reverse proportion of rates & maturity.

Pederson (1997) concluded with a significant effect of Danish discount rate on the market rates. He further analyzed a decline in this effect with maturity. Hardy (1998) reported the similar results showing the significant impact of policy rate changes on the market interest rates. He further decomposed the policy rates in expected and un-expected interest rates and then analyzed their impact. This impact became stronger with this decomposition of policy rates into

anticipated and un-anticipated rates. Hardy (1998) also reported sequentially smaller effects with the increase in asset's maturity.

Andersen and Bollerslev (1998), Jones, Lamont, and Lumsdaine (1998), Berry and Howe (1994), Mitchell and Mulherin (1994), Ederington and Lee (1993), Cutler, Poterba, and Summers (1989), Roll (1988), Bomfim and Reinhart (2000), Kuttner (1999), Roley and Sellon (1998), Thornton (1998), Jensen and Johnson (1995) and Reinhart and Simin (1997) measured the financial market's reaction to monetary policy actions by following event study approach.

Perez-Quiros and Timmermann (2000). Patelis (1997) conducted an event study by using Vector Autoregressive (VAR) model and arrived at similar results. He also showed that the overall explanatory power of monetary policy is rather low. Conover, Jensen and Johnson (1999) analyzed 16 industrial countries and found that markets react both to the local as well as US monetary environment.

Jochen, Geoffery & Natalia (2005) examines the impact of macroeconomic announcements on emerging bonds markets and concluded that all announcements had an impact on market interest rates volatility. Bernanke and Blinder (1992) and Kashyap, Stein and Wilcox (1993) analyzed that there is a strong impact of a tightening the monetary policy on highly bank-dependant borrowing firms as the overall supply of credit is affected.

Agha, Ahmed, Mubarik & Shah (2005) analyzed the transmission Mechanism of monetary policy in Pakistan by using Vector Autoregressive (VAR) and concluded that the linkage of monetary policy with the real sector is direct; that is, through the bank lending channel.

Hardy (1998)

Thorton (1998) used event study methodology to study the impact of Federal Fund Rate (FFR) on the market interest rates by analyzing only the event day. He concluded that market participant's expectations have more weight age in case of longer maturities and the direct liquidity is the major factor in case of short rates. Thorton & Garfinkel (1995) concluded that short term market interest rate is a good indicator of MP than the FFR. Dale (1993) analyzed the impact of policy rate on the market interest rates at seven different maturities by using event study approach. He reported a significant impact of policy rate changes on market interest rates having maturities from one month to five years and for both expected and un-expected rates.

Thorton (1986 & 1994), Cook & Hahn (1988), Rudebuch (1995), Dueker (1992), Paquet & Perez (1995) & Kuttner (2000) conducted the same studies with the findings of linkage between changes in policy rates and market interest rates in united states.

We will discuss Study Design and Methodology in Section # 3. Section # 4 will comprise of Data Analysis & Results and we will conclude it in Section # 5.

### 3. Methodology:

We used the event study approach by following MacKinlay (1997). This approach has following three steps;

#### 3.1. Event Window for the Study

The study constructed the economic impact of event by using market interest rates observed over relatively short time period. The time line for our event study is illustrated below;



Time Line for an Event Study

The Estimation and event windows should not overlap. This design provides estimators for parameters of the normal return model which are not inclined by the returns around the event. If the event window is included in estimation of normal rates, then the parameters could lead to the event rates having a large influence on the normal rates measure. Then, normal and abnormal rates both would capture the event impact. This would be problematic because the assumption of this methodology is that the event impact is captured by the abnormal returns.

An 11-day event window is **applied**, comprising 5 pre-event days, the event day, and 5 post-event days. For each announcement the 250 trading day period prior to the event window is used as the estimation window (MacKinlay, A. Craig, 1997).

### 3.2. Determining the impact of Intervention Rate

One method to determine the effect of policy rate on market interest rate is to run the following regression;

$$\Delta R_t = \alpha_1 + \alpha_2 \Delta(\text{Intv}) + \mu_t$$

Where:

$\Delta R_t$  → is the change in the market interest rates at specific time t;

$\Delta(\text{Intv})$  → is the respective change in policy rate at specific time t;

Here only the change in rates within event window will be used for this regression analysis. Estimation window and the Post event window will not be included in this regression analysis. Dale (1993) & A. Kaketsis, N. Sarantis (2006) pointed out that for obtaining unbiased results of co-efficient  $\beta$ , other external factors should be included in this regression. As these missing explanatory variables can be qualitative, so it will be very difficult, if not impossible, to measure their impact in this regression analysis. They further pointed out that this analysis is limited with the number of observations only in event window so the results will not be significant. Cook & Hahn (1989) have used same regression analysis by using following equation;

$$\Delta R_t = \beta_1 + \beta_2 \Delta RFF_1 + \mu_t$$

But, Dale (1993) suggested the mean responses of abnormal change and their aggregation within & across the event window which we applied here in our study.



### 3.3. Significance of Results

A. Kaketsis, N. Sarantis (2006) proposed not to compare policy rate changes directly with the rates observed over the sample. In case of event studies MacKinlay (1997) proposed the following three steps for measuring the significance of results.

#### 3.3.1. Calculating the Abnormal Change

The abnormal rates were calculated by taking the difference of actual interest rates and normal/forecasted rates at different maturities prevailing in the market within the event window. So, the normal/forecasted rates were estimated by using GARCH & ARIMA (p,d,q) on the estimation window after finding out the ARCH effect in market interest rate at each maturity. Breusch Pagen ARCH Test was applied at the market interest rates of all maturities. GARCH model was applied on the market interest rate having ARCH effect. In case of having no ARCH effect, unit root test was applied to check the stationary and then ARIMA (p,d,q) was applied for the forecasting of normal rates.

#### 3.3.2. Abnormal Rate-Aggregation

Abnormal Rates must be aggregated across the days within event window ( $\tau-5, \tau-4, \tau-3, \tau-2, \tau-1, 0, \tau+1, \tau+2, \tau+3, \tau+4, \tau+5$ ) and across the events.

##### 3.3.2.1. Day wise Aggregation

Let ( $\tau-5, \tau-4, \tau-3, \tau-2, \tau-1, \tau+1, \tau+2, \tau+3, \tau+4, \tau+5$ ) days are surrounding within event day. Aggregated Abnormal Rate (AAR) is here defined as the cumulative abnormal rate on the  $n$ th event for the  $i$ th market:

$$AAR_{in} = \sum_{\tau-5}^{\tau+5} AAR_{in}$$

Average of  $AAR_{in}$  is calculated as follows:

$$\overline{AAR}_{in} = \frac{1}{11} \sum_{\tau-5}^{\tau+5} AAR_{in}$$

### 3.3.2.2. Aggregation across Event Window

As we were interested in the overall significance of results so we aggregated the abnormal returns across event windows.

We calculated CAC (Cumulative Abnormal Rate) for the interest rate  $i$  across all the events;

$$CAR_{in} = \sum_{n=1}^N AR_{in}$$

Then its average is calculated as follows:

$$\overline{CAR}_{in} = \frac{1}{N} \sum_{n=1}^N CAR_{in}$$

### 3.3.3. Hypothesis Testing

The study applies t-test to check the null hypothesis that event has no impact on the market interest rates by assuming that rates are distributed normally with zero mean. Jarque-Bera state & their respective p-values shows the normality of data (Table # 6). Following are the hypotheses of our study;

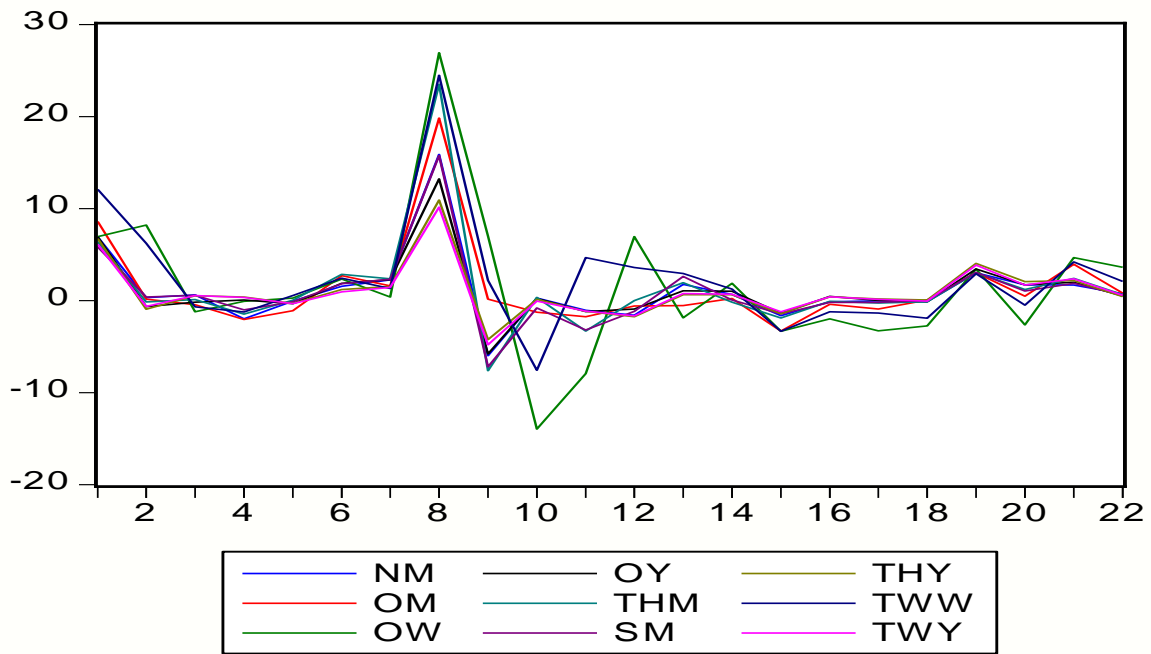
Ho: Event has no significant impact on the market interest rates,

H1: Event has a significant impact on the market interest rates.

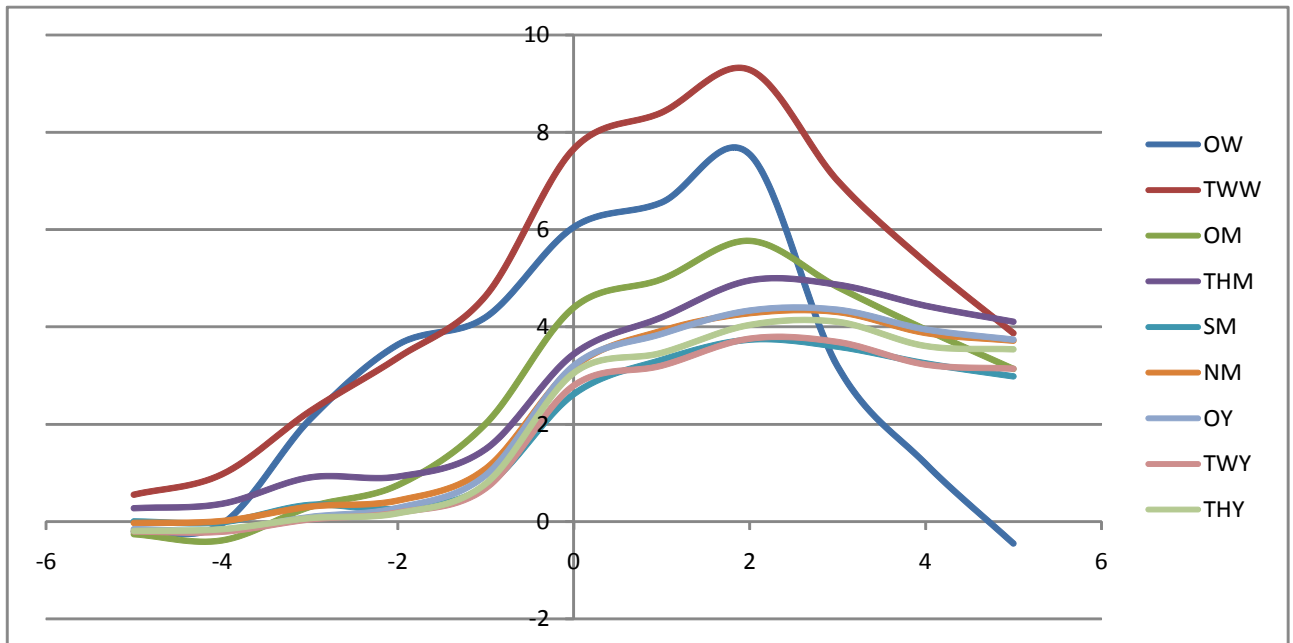
### 4. Estimation & Discussion of Results

Figure # 1 & 2 shows that reaction of market rates is event specific and using regression analysis is unwise. So, here measuring the average change in abnormal rates within & across the event window will clarify the results.

**Figure # 1: Event-wise Abnormal Returns**



**Figure # 2: Day-wise Abnormal Returns**



The abnormal returns were analyzed from two dimensions; within event window (where abnormal returns were analyzed at  $(\tau-5, \tau-4, \tau-3, \tau-2, \tau-1, 0, \tau+1, \tau+2, \tau+3, \tau+4, \tau+5)$ ) and across the event window. Abnormal Rates were calculated by taking the difference of actual interest rates and normal/forecasted rates at different maturities prevailing in the market within the event window. So, the normal/forecasted rates were estimated by using GARCH & ARIMA (p,d,q) on the estimation window. Breusch Pagen ARCH Test was applied at the market interest rates of all maturities and GARCH model was applied for forecasting of six maturities (1-Week, 2-Week, 1-Month, 3-Months, 6-Months, 9-Months) having ARCH effect at 0.05 (Table # 1).

**Table # 1**

**Breusch-Pagan ARCH Test:**

Test Equation:

Dependent Variable: RESID<sup>2</sup>

Method: Least Squares

Sample (adjusted): 1/04/2005 3/31/2011

Included observations: 2278 after adjustments

<b>1-Week ARCH (1) Effect:</b>			
F-statistic	51.90508	Prob. F(1,2276)	0.00000
Obs*R-squared	50.79235	Prob. Chi-Square(1)	<b>0.00000</b>

<b>2-Week ARCH (1) Effect:</b>			
F-statistic	31.07646	Prob. F(1,2276)	0.00000
Obs*R-squared	30.68480	Prob. Chi-Square(1)	<b>0.00000</b>

<b>1-Month ARCH (1) Effect:</b>			
F-statistic	16.17531	Prob. F(1,2276)	0.00006
Obs*R-squared	16.07528	Prob. Chi-Square(1)	<b>0.00006</b>

<b>3-Month ARCH (1) Effect:</b>			
F-statistic	8.80197	Prob. F(1,2276)	0.00304
Obs*R-squared	8.77577	Prob. Chi-Square(1)	<b>0.00305</b>

<b>6-Month ARCH (1) Effect:</b>			
F-statistic	8.33394	Prob. F(1,2276)	0.00393
Obs*R-squared	8.31083	Prob. Chi-Square(1)	<b>0.00394</b>

<b>9-Month ARCH (1) Effect:</b>			
F-statistic	4.13689	Prob. F(1,2276)	0.04207
Obs*R-squared	4.13302	Prob. Chi-Square(1)	<b>0.04205</b>

<b>1-Year ARCH (1) Effect:</b>			
F-statistic	1.91624	Prob. F(1,2276)	0.16641
Obs*R-squared	1.91631	Prob. Chi-Square(1)	0.16626

<b>2-Year ARCH (1) Effect:</b>			
F-statistic	0.05537	Prob. F(1,2276)	0.81399
Obs*R-squared	0.05542	Prob. Chi-Square(1)	0.81389

<b>3-Year ARCH (1) Effect:</b>			
F-statistic	0.08780	Prob. F(1,2276)	0.76702
Obs*R-squared	0.08787	Prob. Chi-Square(1)	0.76690

No ARCH effect was observed by applying Breusch Pagen ARCH Test at last three maturities (1-Year, 2-Years & 3-Years). So, ARIMA (p,d,q) was applied to measure the normal/forecasted rates at last three maturities. Before moving towards the ARIMA (p,d,q) process, unit root tests were applied to clear the order of (d).

**Table # 2: Unit Root Test**

Variables	Augmented Dickey-Fuller test Statistics		Phillips-Perron Test Statistics		Kwiatkowski-Phillips-Schmidt-Shin test statistic	
	Null Hypothesis: Variable is Nonstationary		Null Hypothesis: Variable is Nonstationary		Null Hypothesis: Variable is Stationary	
	Level	1st Difference	Level	1st Difference	Level	1st Difference
1-Year	-2.1238	*-22.15845	-2.2449	*-41.81464	4.1012	*0.211026
2-Year	-2.1001	*-22.20074	-2.2820	*-45.64057	4.0319	*0.232992
3-Year	-2.1595	*-28.31471	-2.2587	*-46.20714	3.9336	*0.230053
Test critical values						
1% Level	-3.4330		-3.4330		0.74	
5% Level	-2.8626		-2.8626		0.46	
10% Level	-2.5674		-2.5674		0.35	
* implies that the co-efficient is significant at 0.05 probability level.						

All of the market interest rates having no ARCH effect (1-Year, 2-Years & 3-Years) were integrated of orders one (Table # 2).

➤ AR(p) denotes the autoregressive equation/model of p order:

$$Y_t = \beta_0 + \sum_{i=1}^p \phi_i Y_{t-i} + \mu_t$$

➤ MA(q) denotes the moving average equation/model of q order:

$$Y_t = \mu_t + \varepsilon_t + \sum_{i=1}^q \theta_i \varepsilon_{t-i}$$

- ARMA ( $p, q$ ) denotes the equation/model with  $p$  autoregressive terms and  $q$  moving average terms. This model contains the AR( $p$ ) and MA( $q$ ) models:

$$Y_t = \beta_0 + \varepsilon_t + \sum_{\tau i=1}^p \varphi_i Y_{t-i} + \sum_{i=1}^q \theta_i \varepsilon_{t-i}$$

ARIMA model is fitted on basis of following criteria:

- Relatively small of BIC (Schwarz criterion),
- Relatively small of SEE,
- Relatively high adjusted R2,
- Q- Statistics and correlogram show that there is no significant pattern left in the ACFs and PACFs of the residuals; it means that the residuals of the selected model are white noise. We used 1<sup>st</sup> three criteria to find out the order of ARIMA (p,d,q).

Detailed calculation is provided in Table # 3, 4 & 5 for ARIMA ordering on the basis of this criterion.

After calculating the normal/forecasted rates, Aggregated Abnormal Rate (AAR) was calculated as 28.8731 (Table # 9 & Figure # 3) which shows a positive impact of Monetary Policy announcement on market interest rates. Table # 9 shows that there is significant impact of monetary policy on market interest rates within event window form  $\tau-3$  to  $\tau+5$ . Then we analyzed the impact of events one by one and Cumulative Abnormal Rate (CAR) was calculated as 28.8731 (Table # 10 & Figure # 4). Table # 10 shows that 19 of 22 events had significant impact on market interest rates at different nine maturities (1-Week, 2-Week, 1-Month, 3-Months, 6-Months, 9-Months, 1-Year, 2-Years & 3-Years).

## **5. Conclusion:**

This paper investigated the impact of monetary policy announcements on market interest rates at different nine maturities (1-Week, 2-Week, 1-Month, 3-Months, 6-Months, 9-Months, 1-Year, 2-Years & 3-Years) in Pakistan. The Event window of 11 days and an estimation window of 250 days were constructed. ARCH effect is analyzed in market interest rates at each maturity by using Breusch Pagen ARCH Test. Furthermore, GARCH model was applied where ARCH effect was observed to forecast the normal rate. The study could not find significant ARCH effect in market interest rates at (1-Year, 2-Years & 3-Years) maturities and ARIMA model was applied to calculate the normal rates from estimation window (t-250). The abnormal rates were calculated by taking the difference between actual and normal/estimated rates. Then abnormal returns were aggregated as Aggregated Abnormal Rates (AAR) within event window and Cumulative Abnormal Rates (CAR) across the event window. The AAR & CAR at 28.8731 showed an impact of monetary policy announcements on market interest rates at different nine maturities. The null hypothesis of zero abnormal returns was rejected since the results were found in critical region under normal distribution.



## Appendix

Table # 3

## ARIMA Model Fitting at One Year Maturity

MP Announcements	ARIMA (p,d,q)	Adjusted R2	SEE	SIC	MP Announcements	ARIMA (p,d,q)	Adjusted R2	SEE	SIC
1st Meeting dt: 4/11/2005	(1, 1, 0)	-0.00311	0.03739	-3.65875	2nd Meeting dt: 7/21/2005	(1, 1, 0)	-0.00475	0.07885	-2.19832
	<b>(1, 1, 1)</b>	<b>0.11011</b>	<b>0.03521</b>	<b>-3.74053</b>		(1, 1, 1)	0.04263	0.07697	-2.22461
	(2, 1, 0)	-0.01317	0.03771	-3.60286		(2, 1, 0)	0.12254	0.07388	-2.30646
	(0, 1, 1)	-0.00270	0.03733	-3.66252		(0, 1, 1)	-0.00493	0.07868	-2.20301
3rd Meeting dt: 1/26/2006	(0, 1, 2)	-0.01375	0.03753	-3.61387	<b>(0, 1, 2)</b>	<b>0.12964</b>	<b>0.07322</b>	<b>-2.32484</b>	
	(1, 1, 0)	0.05257	0.03629	-3.75834	<b>(1, 1, 0)</b>	<b>0.00012</b>	<b>0.04356</b>	<b>-3.39314</b>	
	(1, 1, 1)	0.05431	0.03626	-3.74213	(1, 1, 1)	-0.00393	0.04365	-3.37106	
	(2, 1, 0)	0.05437	0.03626	-3.74220	(2, 1, 0)	-0.00390	0.04365	-3.37109	
5th Meeting dt: 1/18/2007	<b>(0, 1, 1)</b>	<b>0.05812</b>	<b>0.03619</b>	<b>-3.76421</b>	(0, 1, 1)	0.00000	0.04356	-3.39303	
	(0, 1, 2)	0.05432	0.03626	-3.74214	(0, 1, 2)	-0.00343	0.04364	-3.37156	
	(1, 1, 0)	-0.00335	0.04081	-3.52376	(1, 1, 0)	0.00130	0.01743	-5.22561	
	<b>(1, 1, 1)</b>	<b>0.03625</b>	<b>0.03999</b>	<b>-3.54598</b>	<b>(1, 1, 1)</b>	<b>0.00614</b>	<b>0.01738</b>	<b>-5.21242</b>	
7th Meeting dt: 2/1/2008	(2, 1, 0)	-0.00741	0.04089	-3.50168	(2, 1, 0)	0.00158	0.01742	-5.20785	
	(0, 1, 1)	-0.00334	0.04081	-3.52377	(0, 1, 1)	0.00209	0.01742	-5.22641	
	(0, 1, 2)	-0.00718	0.04089	-3.50191	(0, 1, 2)	0.00247	0.01742	-5.20874	
	<b>(1, 1, 0)</b>	<b>0.01631</b>	<b>0.02196</b>	<b>-4.76326</b>	(1, 1, 0)	0.05143	0.02713	-4.34041	
9th Meeting dt: 7/30/2008	(1, 1, 1)	0.01237	0.02200	-4.74122	(1, 1, 1)	0.11675	0.02618	-4.39371	
	(2, 1, 0)	0.01392	0.02198	-4.74279	<b>(2, 1, 0)</b>	<b>0.17637</b>	<b>0.02528</b>	<b>-4.46360</b>	
	(0, 1, 1)	0.01569	0.02197	-4.76263	(0, 1, 1)	0.02945	0.02744	-4.31750	
	(0, 1, 2)	0.01189	0.02201	-4.74072	(0, 1, 2)	0.15008	0.02568	-4.43218	
11th Meeting dt: 1/31/2009	<b>(1, 1, 0)</b>	<b>0.03994</b>	<b>0.13434</b>	<b>-1.14078</b>	<b>(1, 1, 0)</b>	<b>0.05168</b>	<b>0.13715</b>	<b>-1.09929</b>	
	(1, 1, 1)	0.03861	0.13443	-1.12135	(1, 1, 1)	0.04967	0.13730	-1.07913	
	(2, 1, 0)	0.03783	0.13449	-1.12053	(2, 1, 0)	0.04901	0.13735	-1.07843	
	(0, 1, 1)	0.03640	0.13459	-1.13710	(0, 1, 1)	0.04775	0.13744	-1.09515	
13th Meeting dt: 8/17/2009	(0, 1, 2)	0.03432	0.13473	-1.11689	(0, 1, 2)	0.04537	0.13761	-1.07460	
	(1, 1, 0)	0.04996	0.13629	-1.11197	<b>(1, 1, 0)</b>	<b>0.11599</b>	<b>0.05944</b>	<b>-2.77146</b>	
	<b>(1, 1, 1)</b>	<b>0.14079</b>	<b>0.12961</b>	<b>-1.19441</b>	(1, 1, 1)	0.11288	0.05955	-2.74990	
	(2, 1, 0)	0.04709	0.13649	-1.09091	(2, 1, 0)	0.11268	0.05955	-2.74967	
15th Meeting dt: 11/25/2009	(0, 1, 1)	0.04546	0.13661	-1.10725	(0, 1, 1)	0.10427	0.05984	-2.75829	
	(0, 1, 2)	0.04507	0.13664	-1.08879	(0, 1, 2)	0.10849	0.05970	-2.74496	
	<b>(1, 1, 0)</b>	<b>0.06695</b>	<b>0.05589</b>	<b>-2.89482</b>	<b>(1, 1, 0)</b>	<b>0.06842</b>	<b>0.05623</b>	<b>-2.88274</b>	
	(1, 1, 1)	0.06320	0.05600	-2.87277	(1, 1, 1)	0.06501	0.05633	-2.86104	
17th Meeting dt: 3/27/2010	(2, 1, 0)	0.06322	0.05600	-2.87279	(2, 1, 0)	0.06488	0.05633	-2.86089	
	(0, 1, 1)	0.06268	0.05602	-2.89026	(0, 1, 1)	0.06282	0.05640	-2.87675	
	(0, 1, 2)	0.06258	0.05602	-2.87211	(0, 1, 2)	0.06354	0.05637	-2.85946	
	(1, 1, 0)	0.04566	0.03085	-4.08306	(1, 1, 0)	0.06085	0.02734	-4.32512	
19th Meeting dt: 8/2/2010	<b>(1, 1, 1)</b>	<b>0.08420</b>	<b>0.03022</b>	<b>-4.10624</b>	<b>(1, 1, 1)</b>	<b>0.12196</b>	<b>0.02643</b>	<b>-4.37435</b>	
	(2, 1, 0)	0.04320	0.03089	-4.06244	(2, 1, 0)	0.07131	0.02718	-4.31826	
	(0, 1, 1)	0.04139	0.03092	-4.07859	(0, 1, 1)	0.04549	0.02756	-4.30889	
	(0, 1, 2)	0.04036	0.03094	-4.05948	(0, 1, 2)	0.05817	0.02738	-4.30422	
21st Meeting dt: 30-Nov-2010	<b>(1, 1, 0)</b>	<b>0.00415</b>	<b>0.02010</b>	<b>-4.93963</b>	<b>(1, 1, 0)</b>	<b>0.00811</b>	<b>0.01955</b>	<b>-4.99544</b>	
	(1, 1, 1)	0.00051	0.02014	-4.91794	(1, 1, 1)	0.00438	0.01959	-4.97364	
	(2, 1, 0)	0.00055	0.02014	-4.91797	(2, 1, 0)	0.00419	0.01959	-4.97345	
	(0, 1, 1)	0.00384	0.02011	-4.93931	(0, 1, 1)	0.00723	0.01956	-4.99455	
22nd Meeting dt: 29-Jan-2011	(0, 1, 2)	0.00069	0.02014	-4.91811	(0, 1, 2)	0.00334	0.01960	-4.97260	
	(1, 1, 0)	0.00060	0.02484	-4.51686	(1, 1, 0)	0.04327	0.02037	-4.91382	
	(1, 1, 1)	-0.00330	0.02489	-4.49491	<b>(1, 1, 1)</b>	<b>0.06328</b>	<b>0.02015</b>	<b>-4.91691</b>	
	(2, 1, 0)	-0.00332	0.02489	-4.49490	(2, 1, 0)	0.06235	0.02016	-4.91592	
23rd Meeting dt: 8/2/2010	<b>(0, 1, 1)</b>	<b>0.00068</b>	<b>0.02484</b>	<b>-4.51694</b>	(0, 1, 1)	0.03176	0.02049	-4.90187	
	(0, 1, 2)	-0.00330	0.02489	-4.49491	(0, 1, 2)	0.05140	0.02028	-4.90430	
	<b>(1, 1, 0)</b>	<b>0.00457</b>	<b>0.03144</b>	<b>-4.04528</b>	(1, 1, 0)	0.01679	0.03243	-3.98347	
	(1, 1, 1)	0.00448	0.03144	-4.02714	<b>(1, 1, 1)</b>	<b>0.01777</b>	<b>0.03241</b>	<b>-3.96642</b>	
24th Meeting dt: 30-Nov-2010	(2, 1, 0)	0.00286	0.03147	-4.02551	(2, 1, 0)	0.01652	0.03243	-3.96514	
	(0, 1, 1)	0.00380	0.03145	-4.04451	(0, 1, 1)	0.01462	0.03246	-3.98126	
	(0, 1, 2)	0.00208	0.03148	-4.02474	(0, 1, 2)	0.01503	0.03246	-3.96363	

# Monetary Policy Changes and Market Interest Rates in Pakistan: An Event Study Approach

**Table # 4**

## ARIMA Model Fitting at Two Year Maturity

MP Announcements	ARIMA (p,d,q)	Adjusted R2	SEE	SIC	MP Announcements	ARIMA (p,d,q)	Adjusted R2	SEE	SIC
1st Meeting dt: 4/11/2005	(1, 1, 0)	-0.00567	0.03312	-3.90086	2nd Meeting dt: 7/21/2005	(1, 1, 0)	0.00048	0.07660	-2.25630
	<b>(1, 1, 1)</b>	<b>0.20247</b>	<b>0.02950</b>	<b>-4.09478</b>		(1, 1, 1)	0.01565	0.07602	-2.24958
	(2, 1, 0)	-0.01844	0.03263	-3.89216		<b>(2, 1, 0)</b>	<b>0.09572</b>	<b>0.07291</b>	<b>-2.33267</b>
	(0, 1, 1)	-0.00571	0.03460	-3.81418		(0, 1, 1)	-0.00171	0.07679	-2.25159
3rd Meeting dt: 1/26/2006	(0, 1, 2)	-0.01270	0.03472	-3.76957	(0, 1, 2)	0.09465	0.07300	-2.33081	
	(1, 1, 0)	0.07223	0.03842	-3.64436	4th Meeting dt: 7/31/2006	<b>(1, 1, 0)</b>	<b>0.01682</b>	<b>0.04245</b>	<b>-3.44470</b>
	<b>(1, 1, 1)</b>	<b>0.10590</b>	<b>0.03772</b>	<b>-3.66328</b>		(1, 1, 1)	0.01308	0.04253	-3.42286
	(2, 1, 0)	0.08980	0.03805	-3.64544		(2, 1, 0)	0.01394	0.04252	-3.42374
(0, 1, 1)	0.10218	0.03779	-3.67718	(0, 1, 1)		0.01663	0.04246	-3.44451	
5th Meeting dt: 1/18/2007	(0, 1, 2)	0.10560	0.03772	-3.66295	(0, 1, 2)	0.01358	0.04252	-3.42336	
	<b>(1, 1, 0)</b>	<b>-0.00350</b>	<b>0.03788</b>	<b>-3.67270</b>	(1, 1, 0)	0.01554	0.01789	-5.17285	
	(1, 1, 1)	-0.00757	0.03796	-3.65062	<b>(1, 1, 1)</b>	<b>0.02471</b>	<b>0.01781</b>	<b>-5.16416</b>	
	(2, 1, 0)	-0.00755	0.03796	-3.65063	(2, 1, 0)	0.01809	0.01787	-5.15739	
7th Meeting dt: 2/1/2008	(0, 1, 1)	-0.00351	0.03788	-3.67270	6th Meeting dt: 8/1/2007	(0, 1, 1)	0.01929	0.01786	-5.17666
	(0, 1, 2)	-0.00750	0.03795	-3.65068		(0, 1, 2)	0.02181	0.01783	-5.16119
	(1, 1, 0)	0.03402	0.01620	-5.37205		(1, 1, 0)	0.13902	0.02374	-4.60711
	<b>(1, 1, 1)</b>	<b>0.05761</b>	<b>0.01600</b>	<b>-5.37873</b>		(1, 1, 1)	0.22064	0.02259	-4.68865
9th Meeting dt: 7/30/2008	(2, 1, 0)	0.04536	0.01610	-5.36581	8th Meeting dt: 5/23/2008	<b>(2, 1, 0)</b>	<b>0.26479</b>	<b>0.02194</b>	<b>-4.74698</b>
	(0, 1, 1)	0.04452	0.01611	-5.38298		(0, 1, 1)	0.08294	0.02450	-4.54401
	(0, 1, 2)	0.04985	0.01606	-5.37053		(0, 1, 2)	0.21231	0.02271	-4.67803
	(1, 1, 0)	0.01011	0.13363	-1.15142		(1, 1, 0)	0.01575	0.13699	-1.10169
11th Meeting dt: 1/31/2009	<b>(1, 1, 1)</b>	<b>0.01445</b>	<b>0.13333</b>	<b>-1.13776</b>	10th Meeting dt: 11/13/2008	<b>(1, 1, 1)</b>	<b>0.01975</b>	<b>0.13671</b>	<b>-1.08772</b>
	(2, 1, 0)	0.01368	0.13338	-1.13699		(2, 1, 0)	0.01848	0.13680	-1.08642
	(0, 1, 1)	0.00811	0.13376	-1.14940		(0, 1, 1)	0.01309	0.13717	-1.09900
	(0, 1, 2)	0.01086	0.13357	-1.13413		(0, 1, 2)	0.01502	0.13704	-1.08291
13th Meeting dt: 8/17/2009	(1, 1, 0)	0.01386	0.13605	-1.11548	12th Meeting dt: 4/21/2009	(1, 1, 0)	0.09291	0.05662	-2.86873
	<b>(1, 1, 1)</b>	<b>0.14058</b>	<b>0.12701</b>	<b>-1.23497</b>		<b>(1, 1, 1)</b>	<b>0.09520</b>	<b>0.05655</b>	<b>-2.85321</b>
	(2, 1, 0)	0.01589	0.13591	-1.09950		(2, 1, 0)	0.09177	0.05666	-2.84943
	(0, 1, 1)	0.01133	0.13622	-1.11292		(0, 1, 1)	0.07952	0.05704	-2.85408
15th Meeting dt: 11/25/2009	(0, 1, 2)	0.01435	0.13601	-1.09793	(0, 1, 2)	0.08703	0.05680	-2.84423	
	<b>(1, 1, 0)</b>	<b>0.04025</b>	<b>0.05211</b>	<b>-3.03464</b>	14th Meeting dt: 9/29/2009	<b>(1, 1, 0)</b>	<b>0.04072</b>	<b>0.05209</b>	<b>-3.03566</b>
	(1, 1, 1)	0.03752	0.05219	-3.01375		(1, 1, 1)	0.03833	0.05215	-3.01512
	(2, 1, 0)	0.03767	0.05218	-3.01391		(2, 1, 0)	0.03820	0.05216	-3.01500
(0, 1, 1)	0.03586	0.05223	-3.03008	(0, 1, 1)		0.03621	0.05221	-3.03097	
17th Meeting dt: 3/27/2010	(0, 1, 2)	0.03745	0.05219	-3.01367	16th Meeting dt: 1/30/2010	(0, 1, 2)	0.03783	0.05217	-3.01460
	<b>(1, 1, 0)</b>	<b>0.04031</b>	<b>0.02328</b>	<b>-4.64678</b>		(1, 1, 0)	0.01000	0.02402	-4.58375
	(1, 1, 1)	0.03646	0.02332	-4.62473		<b>(1, 1, 1)</b>	<b>0.02194</b>	<b>0.02387</b>	<b>-4.57784</b>
	(2, 1, 0)	0.03703	0.02331	-4.62532		(2, 1, 0)	0.01055	0.02401	-4.56626
19th Meeting dt: 8/2/2010	(0, 1, 1)	0.03770	0.02331	-4.64406	18th Meeting dt: 5/24/2010	(0, 1, 1)	0.00856	0.02404	-4.58229
	(0, 1, 2)	0.03872	0.02329	-4.62708		(0, 1, 2)	0.01124	0.02401	-4.56696
	<b>(1, 1, 0)</b>	<b>0.00857</b>	<b>0.01945</b>	<b>-5.00564</b>		(1, 1, 0)	0.01325	0.01915	-5.03653
	(1, 1, 1)	0.00662	0.01947	-4.98563		(1, 1, 1)	0.01016	0.01918	-5.01536
21st Meeting dt: 30-Nov-2010	(2, 1, 0)	0.00489	0.01949	-4.98389	20th Meeting dt: 9/29/2010	(2, 1, 0)	0.00982	0.01919	-5.01501
	(0, 1, 1)	0.00820	0.01946	-5.00527		<b>(0, 1, 1)</b>	<b>0.01397</b>	<b>0.01915</b>	<b>-5.03726</b>
	(0, 1, 2)	0.00426	0.01949	-4.98326		(0, 1, 2)	0.01009	0.01918	-5.01528
	<b>(1, 1, 0)</b>	<b>-0.00069</b>	<b>0.02497</b>	<b>-4.50637</b>		(1, 1, 0)	0.05227	0.02116	-4.83690
22nd Meeting dt: 29-Jan-2011	(1, 1, 1)	-0.00456	0.02502	-4.48446	21st Meeting dt: 30-Nov-2010	(1, 1, 1)	0.09249	0.02071	-4.86222
	(2, 1, 0)	-0.00455	0.02502	-4.48447		<b>(2, 1, 0)</b>	<b>0.10392</b>	<b>0.02058</b>	<b>-4.87489</b>
	(0, 1, 1)	-0.00078	0.02497	-4.50628		(0, 1, 1)	0.03389	0.02137	-4.81770
	(0, 1, 2)	-0.00456	0.02502	-4.48447		(0, 1, 2)	0.08128	0.02084	-4.84995
23rd Meeting dt: 29-Jan-2011	(1, 1, 0)	0.00472	0.03169	-4.02970	22nd Meeting dt: 29-Jan-2011	(1, 1, 0)	0.01780	0.03324	-3.93395
	(1, 1, 1)	0.01266	0.03156	-4.01966		(1, 1, 1)	0.02898	0.03305	-3.92735
	<b>(2, 1, 0)</b>	<b>0.01270</b>	<b>0.03156</b>	<b>-4.01971</b>		<b>(2, 1, 0)</b>	<b>0.03059</b>	<b>0.03302</b>	<b>-3.92901</b>
	(0, 1, 1)	0.00317	0.03171	-4.02814		(0, 1, 1)	0.01316	0.03332	-3.92924
	(0, 1, 2)	0.01029	0.03160	-4.01727	(0, 1, 2)	0.02706	0.03308	-3.92537	

# Monetary Policy Changes and Market Interest Rates in Pakistan: An Event Study Approach

**Table # 5**

## ARIMA Model Fitting at Three Year Maturity

MP Announcements	ARIMA (p,d,q)	Adjusted R2	SEE	SIC	MP Announcements	ARIMA (p,d,q)	Adjusted R2	SEE	SIC
1st Meeting dt: 4/11/2005	(1, 1, 0)	-0.01098	0.03874	-3.58745	2nd Meeting dt: 7/21/2005	(1, 1, 0)	0.00901	0.08281	-2.10046
	<b>(1, 1, 1)</b>	<b>0.23889</b>	<b>0.03362</b>	<b>-3.83337</b>		(1, 1, 1)	0.04069	0.08147	-2.11093
	(2, 1, 0)	-0.01779	0.03752	-3.61289		(2, 1, 0)	0.12130	0.07792	-2.19999
	(0, 1, 1)	-0.01085	0.03927	-3.56122		(0, 1, 1)	0.00321	0.08296	-2.09688
	(0, 1, 2)	-0.02208	0.03948	-3.51248		<b>(0, 1, 2)</b>	<b>0.12088</b>	<b>0.07791</b>	<b>-2.20057</b>
3rd Meeting dt: 1/26/2006	(1, 1, 0)	0.07005	0.04135	-3.49739	4th Meeting dt: 7/31/2006	(1, 1, 0)	0.02754	0.01966	-4.98393
	<b>(1, 1, 1)</b>	<b>0.13492</b>	<b>0.03988</b>	<b>-3.55165</b>		<b>(1, 1, 1)</b>	<b>0.06383</b>	<b>0.01929</b>	<b>-5.00392</b>
	(2, 1, 0)	0.09261	0.04084	-3.50391		(2, 1, 0)	0.04755	0.01946	-4.98668
	(0, 1, 1)	0.10955	0.04046	-3.54080		(0, 1, 1)	0.03972	0.01954	-4.99654
5th Meeting dt: 1/18/2007	(0, 1, 2)	0.13033	0.03999	-3.54636	6th Meeting dt: 8/1/2007	(0, 1, 2)	0.05311	0.01940	-4.99254
	(1, 1, 0)	-0.00083	0.03691	-3.72472		(1, 1, 0)	0.01605	0.01925	-5.02695
	(1, 1, 1)	-0.00482	0.03698	-3.70271		<b>(1, 1, 1)</b>	<b>0.03887</b>	<b>0.01902</b>	<b>-5.03238</b>
	(2, 1, 0)	-0.00411	0.03697	-3.70341		(2, 1, 0)	0.02136	0.01919	-5.01432
	<b>(0, 1, 1)</b>	<b>-0.00076</b>	<b>0.03691</b>	<b>-3.72479</b>		(0, 1, 1)	0.02128	0.01919	-5.03229
7th Meeting dt: 2/1/2008	(0, 1, 2)	-0.00481	0.03698	-3.70271	8th Meeting dt: 5/23/2008	(0, 1, 2)	0.03201	0.01909	-5.02527
	(1, 1, 0)	0.02754	0.01966	-4.98393		(1, 1, 0)	0.02991	0.02789	-4.28476
	<b>(1, 1, 1)</b>	<b>0.06383</b>	<b>0.01929</b>	<b>-5.00392</b>		(1, 1, 1)	0.10223	0.02683	-4.34419
	(2, 1, 0)	0.04755	0.01946	-4.98668		<b>(2, 1, 0)</b>	<b>0.15540</b>	<b>0.02603</b>	<b>-4.40523</b>
	(0, 1, 1)	0.03972	0.01954	-4.99654		(0, 1, 1)	0.01767	0.02807	-4.27222
9th Meeting dt: 7/30/2008	(0, 1, 2)	0.05311	0.01940	-4.99254	10th Meeting dt: 11/13/2008	(0, 1, 2)	0.13268	0.02637	-4.37869
	(1, 1, 0)	0.00985	0.13503	-1.13044		(1, 1, 0)	0.01479	0.13757	-1.09318
	(1, 1, 1)	0.01194	0.13489	-1.11450		<b>(1, 1, 1)</b>	<b>0.01644</b>	<b>0.13746</b>	<b>-1.07682</b>
	<b>(2, 1, 0)</b>	<b>0.01197</b>	<b>0.13489</b>	<b>-1.11453</b>		(2, 1, 0)	0.01606	0.13748	-1.07643
	(0, 1, 1)	0.00800	0.13516	-1.12857		(0, 1, 1)	0.01240	0.13774	-1.09076
11th Meeting dt: 1/31/2009	(0, 1, 2)	0.01018	0.13501	-1.11273	12th Meeting dt: 4/21/2009	(0, 1, 2)	0.01390	0.13764	-1.07424
	(1, 1, 0)	0.01399	0.13635	-1.11110		<b>(1, 1, 0)</b>	<b>0.13825</b>	<b>0.04968</b>	<b>-3.13047</b>
	<b>(1, 1, 1)</b>	<b>0.14393</b>	<b>0.12705</b>	<b>-1.23436</b>		(1, 1, 1)	0.13478	0.04978	-3.10840
	(2, 1, 0)	0.01477	0.13629	-1.09385		(2, 1, 0)	0.13479	0.04978	-3.10842
	(0, 1, 1)	0.01171	0.13650	-1.10879		(0, 1, 1)	0.12354	0.05010	-3.11354
13th Meeting dt: 8/17/2009	(0, 1, 2)	0.01381	0.13636	-1.09287	14th Meeting dt: 9/29/2009	(0, 1, 2)	0.13153	0.04987	-3.10466
	<b>(1, 1, 0)</b>	<b>0.06720</b>	<b>0.04619</b>	<b>-3.27606</b>		<b>(1, 1, 0)</b>	<b>0.06769</b>	<b>0.04613</b>	<b>-3.27876</b>
	(1, 1, 1)	0.06343	0.04628	-3.25398		(1, 1, 1)	0.06392	0.04622	-3.25668
	(2, 1, 0)	0.06343	0.04628	-3.25398		(2, 1, 0)	0.06392	0.04622	-3.25668
	(0, 1, 1)	0.06304	0.04629	-3.27161		(0, 1, 1)	0.06359	0.04623	-3.27437
15th Meeting dt: 11/25/2009	(0, 1, 2)	0.06321	0.04629	-3.25374	16th Meeting dt: 1/30/2010	(0, 1, 2)	0.06367	0.04623	-3.25642
	(1, 1, 0)	0.03374	0.02303	-4.66820		(1, 1, 0)	0.00034	0.02552	-4.46231
	<b>(1, 1, 1)</b>	<b>0.04222</b>	<b>0.02293</b>	<b>-4.65897</b>		<b>(1, 1, 1)</b>	<b>0.01869</b>	<b>0.02529</b>	<b>-4.46279</b>
	(2, 1, 0)	0.03382	0.02303	-4.65024		(2, 1, 0)	0.00273	0.02549	-4.44666
	(0, 1, 1)	0.02798	0.02310	-4.66226		(0, 1, 1)	-0.00008	0.02553	-4.46189
17th Meeting dt: 3/27/2010	(0, 1, 2)	0.03341	0.02303	-4.64982	18th Meeting dt: 5/24/2010	(0, 1, 2)	0.00255	0.02550	-4.44648
	(1, 1, 0)	0.01046	0.02080	-4.87189		(1, 1, 0)	0.00964	0.02086	-4.86571
	(1, 1, 1)	0.00939	0.02081	-4.85276		(1, 1, 1)	0.00657	0.02089	-4.84457
	(2, 1, 0)	0.00679	0.02084	-4.85014		(2, 1, 0)	0.00603	0.02090	-4.84402
	<b>(0, 1, 1)</b>	<b>0.01112</b>	<b>0.02079</b>	<b>-4.87255</b>		<b>(0, 1, 1)</b>	<b>0.01032</b>	<b>0.02085</b>	<b>-4.86640</b>
19th Meeting dt: 8/2/2010	(0, 1, 2)	0.00715	0.02083	-4.85050	20th Meeting dt: 9/29/2010	(0, 1, 2)	0.00633	0.02090	-4.84433
	<b>(1, 1, 0)</b>	<b>-0.00154</b>	<b>0.02598</b>	<b>-4.42718</b>		(1, 1, 0)	0.08047	0.02095	-4.85707
	(1, 1, 1)	-0.00550	0.02603	-4.40519		(1, 1, 1)	0.11470	0.02056	-4.87697
	(2, 1, 0)	-0.00542	0.02603	-4.40526		<b>(2, 1, 0)</b>	<b>0.12227</b>	<b>0.02047</b>	<b>-4.88556</b>
	(0, 1, 1)	-0.00164	0.02598	-4.42708		(0, 1, 1)	0.05409	0.02125	-4.82879
21st Meeting dt: 30-Nov-2010	(0, 1, 2)	-0.00541	0.02603	-4.40528	22nd Meeting dt: 29-Jan-2011	(0, 1, 2)	0.09801	0.02075	-4.85828
	(1, 1, 0)	0.01384	0.03307	-3.94416		(1, 1, 0)	0.03068	0.03460	-3.85360
	<b>(1, 1, 1)</b>	<b>0.01943</b>	<b>0.03298</b>	<b>-3.93179</b>		(1, 1, 1)	0.03703	0.03449	-3.84213
	(2, 1, 0)	0.01873	0.03299	-3.93109		<b>(2, 1, 0)</b>	<b>0.03871</b>	<b>0.03446</b>	<b>-3.84388</b>
	(0, 1, 1)	0.01094	0.03312	-3.94123		(0, 1, 1)	0.02427	0.03472	-3.84701
	(0, 1, 2)	0.01602	0.03304	-3.92833		(0, 1, 2)	0.03570	0.03451	-3.84074

**Table # 6:**

Descriptive Statistics									
Sample: 1/02/2005 3/31/2011									
	OW	TWW	OM	THM	SM	NM	OY	TWY	THY
Mean	10.52	10.44	10.69	10.99	11.23	11.50	11.68	11.92	12.12
Median	10.15	9.88	9.97	10.30	10.55	10.75	10.92	11.16	11.39
Maximum	15.68	14.91	14.90	15.52	15.76	16.02	16.11	16.19	16.30
Minimum	2.40	3.09	4.22	5.07	5.80	6.12	6.41	6.79	7.18
Std. Dev.	2.17	2.24	2.25	2.22	2.14	2.17	2.12	2.06	2.00
Skewness	-0.76	-0.56	-0.41	-0.15	-0.05	-0.01	0.01	0.06	0.09
Kurtosis	4.18	3.17	2.62	2.56	2.58	2.52	2.57	2.51	2.52
Jarque-Bera	351.04	121.59	76.53	26.70	17.61	21.54	17.56	24.49	24.63
Probability	<b>0.0000*</b>	<b>0.0000*</b>	<b>0.0000*</b>	<b>0.0000*</b>	<b>0.0001*</b>	<b>0.0000*</b>	<b>0.0001*</b>	<b>0.0000*</b>	<b>0.0000*</b>
Sum	23,986	23,814	24,382	25,056	25,608	26,213	26,630	27,177	27,641
Sum Sq. Dev.	10,750	11,453	11,586	11,239	10,394	10,693	10,233	9,627	9,126
Observations	2280	2280	2280	2280	2280	2280	2280	2280	2280

**Table # 7:**

Day-wise Mean Responses in the Event Window: Jan 05 to Mar 11									
	1-Week	2-Week	1-Month	3-Month	6-Month	9-Month	1-Year	2-Year	3-Year
-5	- 0.2056	0.5556	- 0.2597	0.2769	0.0036	- 0.0277	- 0.1517	- 0.2045	- 0.1928
-4	- 0.0503	0.9735	- 0.3892	0.3681	- 0.0131	0.0102	- 0.1739	- 0.2097	- 0.1565
-3	2.0969	2.2670	0.2993	0.9098	0.3431	0.3068	0.0970	0.0445	0.0725
-2	3.6359	3.3702	0.7471	0.9259	0.2662	0.4321	0.2837	0.1851	0.1716
-1	4.2004	4.6409	2.0087	1.4917	0.7305	1.0861	0.9553	0.6853	0.7802
0	6.0518	7.6602	4.3963	3.4410	2.6210	3.1789	3.2014	2.7933	3.0547
<b>1</b>	<b>6.5599</b>	<b>8.4086</b>	<b>4.9807</b>	<b>4.1979</b>	<b>3.3260</b>	<b>3.9225</b>	<b>3.8560</b>	<b>3.2045</b>	<b>3.4689</b>
<b>2</b>	<b>7.5538</b>	<b>9.2898</b>	<b>5.7708</b>	<b>4.9556</b>	<b>3.7430</b>	<b>4.2849</b>	<b>4.3353</b>	<b>3.7603</b>	<b>4.0442</b>
<b>3</b>	<b>3.1956</b>	<b>7.0134</b>	<b>4.8243</b>	<b>4.8695</b>	<b>3.5996</b>	<b>4.3110</b>	<b>4.3529</b>	<b>3.6930</b>	<b>4.1083</b>
4	1.1939	5.3327	3.9480	4.4366	3.2558	3.8793	3.9496	3.2288	3.6118
5	- 0.4504	3.8758	3.1372	4.1087	2.9882	3.7197	3.7388	3.1434	3.5437

**Table # 8:**

Day-wise Cumulative Mean Responses in the Event Window: Jan 05 to Mar 11									
	1-Week	2-Week	1-Month	3-Month	6-Month	9-Month	1-Year	2-Year	3-Year
-5	- 0.2056	0.5556	- 0.2597	0.2769	0.0036	- 0.0277	- 0.1517	- 0.2045	- 0.1928
-4	- 0.2558	1.5291	- 0.6488	0.6450	- 0.0095	- 0.0176	- 0.3256	- 0.4142	- 0.3493
-3	1.8411	3.7961	- 0.3495	1.5548	0.3336	0.2892	- 0.2286	- 0.3698	- 0.2768
-2	5.4771	7.1663	0.3975	2.4807	0.5998	0.7213	0.0551	- 0.1847	- 0.1051
-1	9.6775	11.8073	2.4062	3.9724	1.3303	1.8074	1.0104	0.5007	0.6751
0	15.7293	19.4675	6.8025	7.4134	3.9512	4.9864	4.2118	3.2940	3.7298
<b>1</b>	<b>22.2891</b>	<b>27.8761</b>	<b>11.7832</b>	<b>11.6113</b>	<b>7.2772</b>	<b>8.9089</b>	<b>8.0678</b>	<b>6.4985</b>	<b>7.1987</b>
<b>2</b>	<b>29.8429</b>	<b>37.1658</b>	<b>17.5540</b>	<b>16.5669</b>	<b>11.0202</b>	<b>13.1937</b>	<b>12.4031</b>	<b>10.2588</b>	<b>11.2429</b>
<b>3</b>	<b>33.0385</b>	<b>44.1793</b>	<b>22.3783</b>	<b>21.4364</b>	<b>14.6198</b>	<b>17.5047</b>	<b>16.7560</b>	<b>13.9518</b>	<b>15.3512</b>
4	34.2324	49.5120	26.3263	25.8730	17.8756	21.3840	20.7055	17.1806	18.9630
5	33.7820	53.3878	29.4636	29.9817	20.8638	25.1037	24.4444	20.3240	22.5067

**Table # 9:**

**Rates & Individual day significance: Jan 05 to Mar 11**

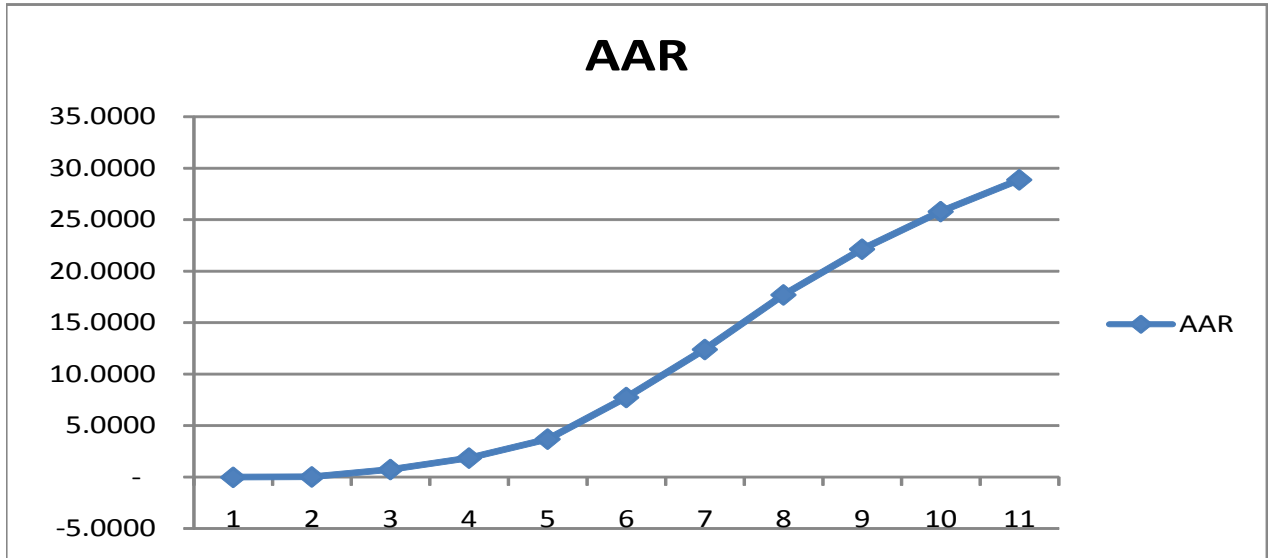
Days in Eventn Window	Actaul Rate	Normal/Forecasted Rate	Abnormal Rate	AAR	t-value
-5	260.7811	260.8040	- 0.0229	- 0.0229	- 0.2522
-4	260.9136	260.8736	0.0399	0.0170	0.2946
-3	261.6519	260.9367	0.7152	0.7322	<b>2.4615*</b>
-2	262.1000	260.9869	1.1131	1.8453	<b>2.4190*</b>
-1	262.8748	261.0326	1.8421	3.6875	<b>3.6238*</b>
<b>0</b>	<b>265.1158</b>	<b>261.0715</b>	<b>4.0443</b>	<b>7.7318</b>	<b>7.0607*</b>
<b>1</b>	<b>265.7656</b>	<b>261.1072</b>	<b>4.6583</b>	<b>12.3901</b>	<b>7.9881*</b>
<b>2</b>	<b>266.4433</b>	<b>261.1392</b>	<b>5.3042</b>	<b>17.6943</b>	<b>8.2626*</b>
<b>3</b>	<b>265.6098</b>	<b>261.1690</b>	<b>4.4408</b>	<b>22.1351</b>	<b>11.9749*</b>
<b>4</b>	<b>264.8452</b>	<b>261.1967</b>	<b>3.6485</b>	<b>25.7836</b>	<b>9.7664*</b>
<b>5</b>	<b>264.3126</b>	<b>261.2231</b>	<b>3.0895</b>	<b>28.8731</b>	<b>6.7177*</b>

**Table # 10:**

**Rates & Event Wise significance: Jan 05 to Mar 11**

Days in Eventn Window	Actaul Rate	Normal/Forcasted Rate	Abnormal Rate	CAR	t-value
Event 1	75.3522	67.9443	7.4080	7.4080	<b>18.0585*</b>
Event 2	100.8250	99.3769	1.4481	8.8561	<b>2.0305*</b>
Event 3	102.2111	102.2166	-0.0055	8.8506	(0.0391)
Event 4	114.2944	115.0654	-0.7709	8.0797	<b>(3.6975)*</b>
Event 5	115.2628	115.4023	-0.1396	7.9401	(1.4245)*
Event 6	111.2650	109.2789	1.9861	9.9262	<b>14.0075*</b>
Event 7	112.7933	111.0624	1.7309	11.6571	<b>12.4643*</b>
Event 8	140.1200	122.2642	17.8558	29.5129	<b>13.7039*</b>
Event 9	147.7550	150.6632	-2.9082	26.6047	<b>(2.7448)*</b>
Event 10	164.3444	166.8517	-2.5072	24.0975	<b>(2.3678)*</b>
Event 11	156.8222	158.5994	-1.7772	22.3203	<b>(2.5528)*</b>
Event 12	150.8872	150.5597	0.3276	22.6478	0.5155
Event 13	139.3917	138.3434	1.0483	23.6961	<b>3.2203*</b>
Event 14	141.5072	140.8013	0.7059	24.4020	<b>5.2880*</b>
Event 15	139.8756	141.9715	-2.0960	22.3060	<b>(10.5819)*</b>
Event 16	137.5650	137.8600	-0.2950	22.0110	-1.6912
Event 17	138.0600	138.6838	-0.6238	21.3872	<b>(2.6103)*</b>
Event 18	135.9483	136.4884	-0.5401	20.8471	<b>(2.4462)*</b>
Event 19	138.8070	135.4828	3.3243	24.1713	<b>38.5478*</b>
Event 20	141.1389	140.3797	0.7592	24.9305	<b>2.3864*</b>
Event 21	146.1483	143.3243	2.8241	27.7546	<b>11.7370*</b>
Event 22	150.0389	148.9204	1.1185	28.8731	<b>4.9310*</b>

**Figure # 3: AAR within Event Window**



**Figure # 4: CAR across Event Window**

