Detection and Forecasting of Islamic Calendar Effects in Time Series Data: Revisited

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Abstract

This paper is an attempt to revisit the pioneering work of Riazuddin and Khan (2002). A complete business cycle has been elapsed (2002-2010) since their study, so there is need to review the results with additional information. This revisited attempt, based on a theoretically specified framework, arrived at similar results and found significant impact of Islamic calendar. The Islamic months of Ramadan and Zilhaj have positive impact on currency holdings and negative impact on deposits. Although stylized facts indicate that consumer prices are significantly higher during Ramadan but econometric investigation rejects the upward exogenous shifts in prices during Ramadan. Therefore, structural relationship analyzed in co-integration framework has shown that inflation is not directly impacted by the Ramadan but indirectly through increase in its determinants. Inflationary tendencies during Ramadan are not due to exogenous increase by producers and retailers but possibly due to demand surge in the wake of redistribution of income. The months of June and December have positive effects on deposits and negative effects on currency in circulation indicating the presence of window dressing. Finally, as seasonal factors have important role in determining economic time series, therefore, ignoring those in monthly time series models will lead to omitted variable bias and inappropriate forecasts.

JEL Classification: E3, E4, E5,
Key Words: currency in circulation, deposits, cointegration, seasonal factors

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Introduction

The forecasting of economic variables capturing the seasonal impact is not difficult, particularly in those economies where economic activities are tied with a single calendar, say the Gregorian calendar. For those economies, which follow more than one calendar, this is however not that simple. For example, in countries where Islam is a dominant religion (or has significant presence), though the Gregorian calendar is generally followed, Islamic calendar has a profound impact on economic activities. Many of the religious obligations following the Islamic calendar are fulfilled en masse and cause significant upsurge in economic activities. Due to the difference between Islamic and Gregorian calendar these activities fall in different months every year with respect to the latter. Consequently, the seasonal behavior of economic variables does not remain constant in every Gregorian calendar year. Riazuddin and Khan (2002), in their pioneering contribution, have found significant impact of Islamic calendar months on currency holdings behavior in Pakistan. They have pointed out that Islamic months (Ramadan, Shawwal, Zilhaj, and Muharram) in which Islamic festivals or mourning are observed have significant impact on the currency holdings pattern. Therefore, empirical investigation on the monthly data may have the tendency to provide misleading results without considering seasonal effects of Islamic calendar.

This paper is an attempt to revisit the work of Riazuddin and Khan (2002). They have performed atheoretical univariate analysis of the currency in circulation and have found significant impact of Islamic months on the pattern of currency holdings in Pakistan. There are three reasons to revisit the paper of Riazuddin and Khan (2002). First, the seasonal factors help in explaining the economic time series monthly data. And after a lapse of a decade, which has witnessed a complete business cycle, the study needs to be updated. Second, the seasonal factors may impact economic variables with different magnitude and the theoretical relationship among these impacted economic variables adjusts the seasonal shocks according to the dynamic theoretical association. Therefore, there is need to explore the role of seasonal factors in a theoretically specified model. It will also provide the associations of seasonal factors with the explanatory variables. Third, omitting the Islamic calendar effects will result in biased findings about the impact of Gregorian months. For instance, August may have varied impact on the economic variables with few or more days of Ramadan falling in August. [1]

It is generally believed that the retailers and producers artificially restrict the supply to increase the prices of commodities and earn higher profits during Ramadan. However, according to alternative viewpoint, there is redistribution of income from rich to poor due to Islamic instruments of safety nets such as Zakat, Fitra and charity in Ramadan. Therefore, increase in income of the deprived

[1] As Islamic calendar is shorter than Gregorian calendar so each month of Gregorian calendar coincides with different Islamic months, therefore leading towards changing impact of Gregorian months on the monthly economic times series.

members of the population results in higher demand for essential goods that subsequently derive the prices up and cause inflation. According to the structural model analyzed in cointegration framework, if there is exogenous shift in prices due to Ramadan then it empirically supports the former viewpoint of controlling of supply and if there is exogenous shift in the currency holdings and deposits in Ramadan then it supports the alternative viewpoint that the increase in prices is due to redistribution and demand surge.

This paper explores the impact of Islamic months on the pattern of currency holdings in a dynamic theoretical framework. This framework captures the impact of seasonal factors through causal relationship between economic time series. The seasonal factors may disturb only one variable in the system and shifting the shocks to other, as these are structurally related due to theoretical linkages. For instance, according to the Quantity Theory of Money (QTM), the money, prices and income move along in one to one relationships. Therefore, exogenous seasonal shifts in prices may cause similar deviation in the path of money and income, which is basically initiated by the seasonal factor in prices and transferred to other economic time series (income and money) due to their theoretical relationship with prices. Therefore, univariate analysis may provide biased results compared to a well specified structural model.

In this revisited attempt, the effects of seasonal factors are investigated on the monetary aggregates such as currency in circulation, demand and time deposits. The causal relationship between the components of broad money, general price level, income and interest rate is jointly estimated in a cointegrated dynamic system. In order to improve the specification, the cointegration model is augmented with the seasonal (dummy variables for selected Islamic and Gregorian months) as well as exogenous economic variables (public sector budgetary borrowing, workers' remittances and international oil prices).

After discussing the purpose of research, the second section highlights the role of seasonal factors in time series data. The third section elaborates the theoretical and methodological framework. The fourth and fifth sections present the interpretation of the results and conclusion.

Stylized Facts on Existence of Seasonality

It is hypothesized on the basis of Riazuddin and Khan (2002) that currency holdings are directly or indirectly impacted by seasonal variations associated with Islamic and Gregorian months. The Gregorian calendar effects are discussed in the monthly time series of currency in circulation, time and demand deposits, CPI, and industrial production index.

Gregorian Calendar Effects

The impact of Gregorian months is presented in Table 1. The overall average monthly growth as well as monthly growth in the specific months is reported by taking monthly time series from 1978 to 2010.[2] Relative to overall average monthly growth, the currency holding witnesses higher growth during January, May, October, November, and December, and observes lower growth in March, April, June, August and September. Time and demand deposits grow at higher rate in May, June, November, and December, and witness sluggish growth in the January, July and October compared to overall average monthly growth. CPI does not witness many fluctuations due to changes of months but remains higher than average during April, July, and August whereas remain subdued during February, May and December. Industrial production index is highly volatile and witnesses higher fluctuations over months, therefore, the 12 month moving average of the industrial production is taken to smooth the income effects.

Table 1: Average Monthly Growth in Selected Economic Time Series in Months (1977M06 - 2010M12)

Gregorian Months	Currency in Circulation (CC)	Demand and Time Deposits (DD)	Consumer Price Index (CPI)	Industrial Production Index (IPI)	Money Market Rate (LR)	Net Budgetary Borrowings (PSBS)	Workers' Remittances (RMS)	International Oil Prices (OIL)
Overall	**1.20**	**1.25**	**0.70**	**0.51**	**0.01**	**1.80**	**3.18**	**1.21**
January	2.98	-0.55	0.42	0.48	0.23	1.97	3.33	1.28
February	1.15	1.35	0.52	0.50	-0.68	1.27	-6.48	-1.35
March	0.00	0.56	0.73	0.50	-0.19	-0.69	10.25	1.00
April	-0.02	0.42	1.16	0.51	0.44	1.21	-4.12	2.18
May	1.53	1.38	0.08	0.51	-0.40	0.84	4.18	4.60
June	-1.77	5.20	0.67	0.52	-0.10	1.34	1.27	0.02
July	1.29	-1.39	1.90	0.54	-0.45	4.54	4.65	0.06
August	-0.97	1.24	1.03	0.52	-0.14	0.64	4.50	4.27
September	-0.14	0.73	0.61	0.54	0.79	-0.17	1.61	1.53
October	3.51	-0.06	0.79	0.47	0.82	2.12	5.51	0.50
November	5.07	1.62	0.61	0.50	-1.07	2.13	2.08	-1.34
December	1.61	4.36	-0.19	0.51	0.81	-0.62	2.61	-2.10

One of the possible explanations for the seasonal variations in currency holdings and time and demand deposits is window dressing. Commercial bankers at the end of calendar and fiscal years try to show the maximum possible performance and attract as much deposits as they can. So the deposits witness higher growth during May, June, November and December. In response to higher growth in deposit mobilization, the currency in circulation plummets in June. Afterwards, in the months of January and July, this window dressing process is reversed and deposits start to decline resulting in an increase in currency holdings. During March, May, July, August, and October the

[2] The main purpose for selecting at least 33 years is to incorporate the full cycle of Islamic calendar. After 33 years the Islamic months again coincide with the similar Gregorian month.

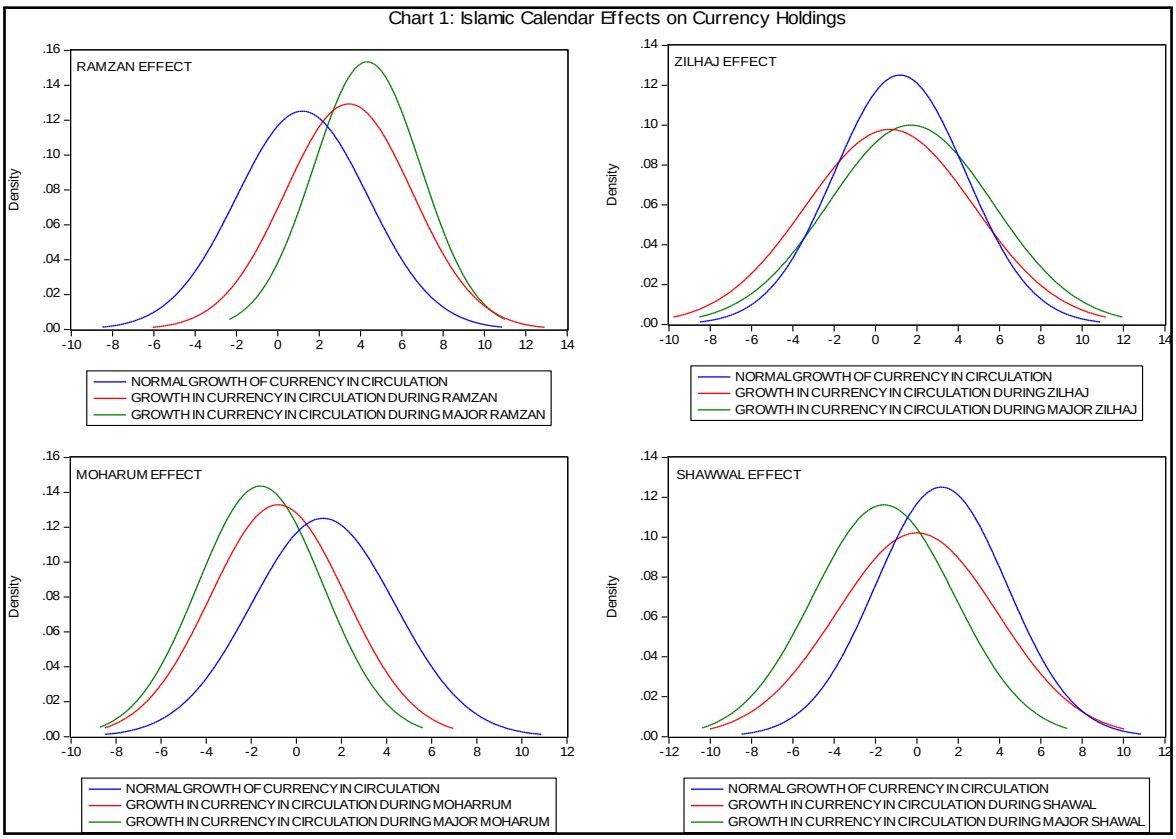
relatively higher growth in workers' remittances results in an increase in currency holdings and deposits in May, and October. The higher than average monthly growth in public sector budgetary borrowing during January, July, October, and November increases the growth of currency holdings. Therefore, the seasonal factors may either directly influence the currency holding behavior or indirectly pass through from the determinants of the currency holdings.

In the first month of Gregorian calendar, January, higher than overall average monthly growth in currency holdings is mainly due to higher than average budgetary borrowing by government and decline in total deposits. In the month of February, the CPI witnesses lower growth due to decline in remittances, and sluggish growth in budgetary borrowings.

Islamic Calendar Effects

The income distribution mechanism in Islam has a wide range of instruments such as Zakat, Fitra, charity, transfer payments, commodity donations, and others. Ramadan and Zilhaj are the Islamic months in which resource transfer from rich to poor takes place. The Zakat and Fitra distribution takes place during the month of Ramadan. According to Islam, Zakat is compulsory payment and 2.5% is deducted on accumulated savings, gold, silver, and livestock. With few exceptions, the government of Pakistan also deducted Zakat from the PLS saving accounts. Therefore, this transfer payment mechanism causes a decline in the savings of rich and increases the income of poor. On the basis of this discussion it can be hypothesized that the Ramadan has positive impact on the

Chart 1: Islamic Calendar Effects on Currency Holdings



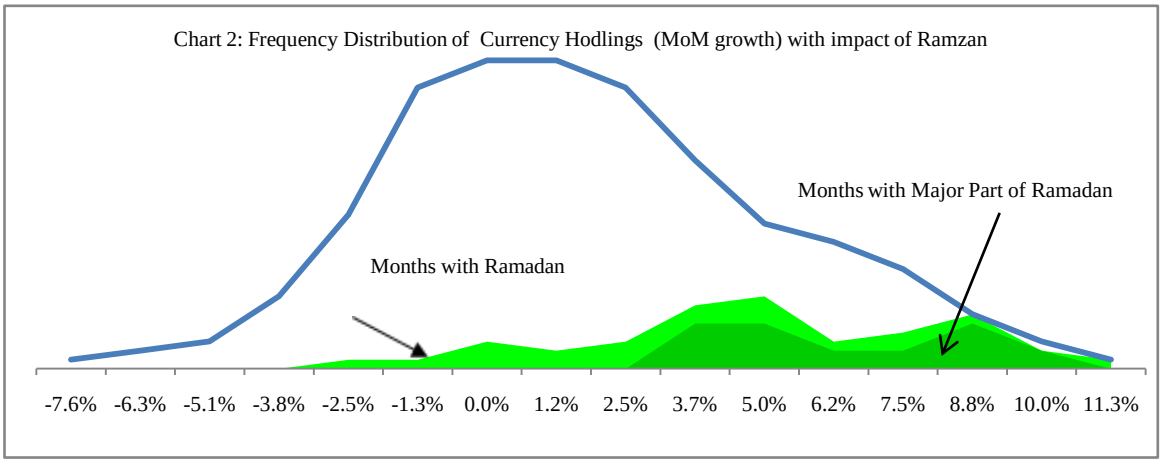
currency holdings of the masses and reduction in deposits. Further, the increase in the income level of poor reflected by the hypothesized upsurge in the currency holdings may cause an increase in demand and further leads to inflationary pressures during the month of Ramadan.

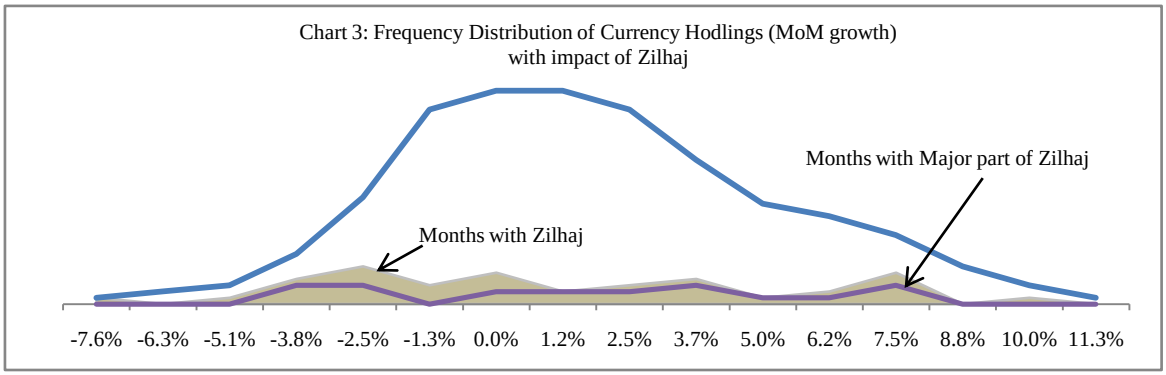
The Muslims, who have reasonable affordability of purchasing cattle, sacrifice their cattle on the 10th to 12th Zilhaj. In the urban areas, the consumers purchase cattle by withdrawing their deposits and paying to farmers. Therefore, this transaction of purchasing cattle may increase the currency in circulation because the farmers mainly belong to informal livestock sectors. In the sacrificial Eid days, one third of the meat is distributed among the poor, which may increase the real income of the poor and create demand pressures in the economy. Further, Muharram is considered as a mourning month, so wedding ceremonies are held prior to it in the month of Zilhaj, which may also cause an upward surge in the currency holdings, decline in deposits, and demand pressures in the economy.

The frequency distribution of monthly growth of currency holdings is plotted in the Chart 1. The currency holding grew at an average (mean) monthly rate of 1.2 percent. The chart shows that monthly growth in currency holding approximately follows a normal distribution. The observations of months in which minor part of Ramadan falls and the months in which major part of Ramadan falls are showing higher mean relative to normal growth. The test of equality of mean are reported in Table 2. All observations in which the month of Ramadan falls are on the right tail of the distribution showing that monthly growth in currency holdings are higher in the months in which Ramadan occurs. The frequency distribution of currency holdings further suggests that if any part of Ramadan appears in any Gregorian month then there is 83 percent probability that monthly

Table 2: Test of Equality of Mean of Currency in Circulation

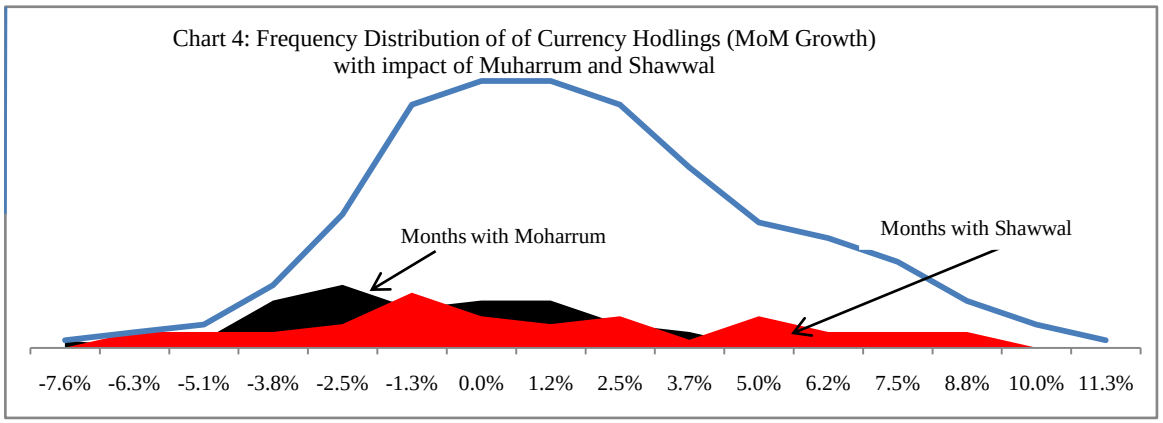
	Mean	T-Stat	Prob
Normal	1.186	-	-
Ramzan	3.431	-5.318	0.000
Major Ramzan	4.323	-5.653	0.000
Zilhaj	0.686	1.130	0.259
Major Zilhaj	1.710	-0.899	0.369
Shawwal	0.002	2.667	0.008
Major Shawwal	-1.598	4.985	0.000
Moharrum	-0.809	4.745	0.000
Major Moharrum	-1.594	4.993	0.000





growth of currency holdings in that specific month will exceed the average monthly growth of currency holding. Further, if major part of Ramadan appears in any Gregorian month then there is almost 100 percent probability that monthly growth of currency holdings in that specific Gregorian month will exceed the average monthly growth of currency holdings. For instance, on average, January observed a higher growth of 2.6 percent but due to the occurrence of any part of Ramadan in January the growth reaches 5.2 percent, whereas excluding Ramadan the average growth in January becomes 1.5 percent.

Regarding Islamic month of Zilhaj, if any part of Zilhaj falls in any Gregorian month then there is 42 percent probability that currency holdings in that specific Gregorian month will grow at higher rate than historical monthly average. In case major part of Zilhaj falls in any Gregorian month then there is 50 percent probability that currency holding growth in that specific month will exceed the historical average of monthly growth.



The remaining two Islamic calendar months of interest, i.e. Shawwal and Muharram introduce a negative exogenous shock in the growth of currency in circulation.

In case any or most part of Shawwal falls in any Gregorian month then there is 60 percent and 75 percent probability respectively that the monthly growth of currency holding in that Gregorian month will be lower than average historical monthly growth of currency holdings. In case of any

part or most part of Muharram fall in any Gregorian month then there is 80 percent and 95 percent probability respectively that the monthly growth of currency holding in that Gregorian month will be lower than average historical monthly growth of currency holdings. The above statistical analysis leads towards the hypothesis that Ramadan and Zilhaj are positively related to currency in circulation and Moharrum and Shawwal are negatively related to currency in circulation.

Theoretical and Methodological Framework

According to the Quantity Theory of Money (QTM) and Keynesian Money Demand function, money, prices, income, and interest rates are related to each other in the long run.

According to QTM

$$MV = PY \quad (1)$$

Taking logarithmic form

$$Ln(M) + Ln(V) = Ln(P) + Ln(Y) \quad (2)$$

The purpose of this paper is to analyze the impact of Islamic calendar impact on the components of money. Therefore, the money is decomposed into currency holdings and deposits, which are important components of broad money.

$$Ln(CC) + Ln(DD) + Ln(V) = Ln(P) + Ln(Y) \quad (3)$$

$$Ln(CC) = -Ln(DD) - Ln(V) + Ln(P) + Ln(Y) \quad (4)$$

Based on Cabrero et al., (2002) and Stavreski (1998), nominal interest rates are the opportunity cost of holding money, therefore, hypothesized to have negative impact on the currency holdings. Real sector activities will increase currency holding (Nenovsky and Hristov (2000)) due to income effect and further hoarding cash increases for servicing economic activity in the underground economy [Nenovsky and Hristov (2000) and Stavreski (1998)]. The empirical tests have shown that in the long run general price level tends to be related to increase in monetary aggregates (Kajanoja 2003). Therefore, the currency in circulation is inversely related to nominal interest rates and is directly related to prices and income. So the identity expression in equation (4) is augmented by incorporating interest rate, which leads to the following specification.

$$CC = f(DD, P, Y, r) \quad (5)$$

The autonomous shocks in the liquidity market generated by the public sector activities have an impact on the monetary aggregates. Therefore, role of public sector budgetary borrowing is included as an explanatory variable. The inflow of workers' remittances brings about income effect and increases the currency holdings and deposits. International oil prices are also included as explanatory variable to capture the element of uncertainty driven by exogenous changes in the international prices.

The seasonal variations generated by Gregorian and Islamic calendar may directly impact one or more determinants of the monetary aggregates. For instance, international oil prices witness hikes during winter due to the nature of demand for energy, therefore, the Gregorian months may only indirectly impact the currency in circulation. Similarly, workers usually send higher than regular tranche of remittances in the months of Islamic festivals. Therefore, incorporating seasonal factors (Islamic and Gregorian) along with the well specified set of explanatory variables will provide unbiased estimates. Therefore the exogenous variables are included in the equation to improve the specification and avoid the omitted variable bias.

$$Ln(CC_t) = \alpha + \beta_1 * \{Ln(DD_t)\} + \beta_2 * \{Ln(CPI_t)\} + \beta_3 * \{Ln(IPI_t)\} + \beta_4 * (LR_t) \quad (6)$$
$$+\gamma_1 * \{Ln(PSBS_t)\} + \gamma_2 * \{Ln(RMS_t)\} + \gamma_3 * \{Ln(OIL_t)\} + \gamma_4 * \left(SD_t^i\right) + \varepsilon_t$$

CC is the currency in circulation, DD is total deposits, CPI is the consumer price index, IPI is the industrial production index, LR is the lending rates, PSBS is the public sector borrowings, RMS is the workers' remittances, OIL is the international oil prices and SD are the seasonal dummies representing the Gregorian and Islamic months.

Currency in circulation, demand and time deposits, prices, industrial production index, and interest rates are related in causal relationships so termed as endogenous variables. Therefore, to avoid the endogeniety issues, these five variables will be determined simultaneously through unrestricted VAR. All the variables are in logarithmic form with only lending rates in levels. After identification and estimation of long run cointegrated relationship, the system of equations of short run with error correction terms will be estimated as follows.

$$\Delta y_t^i = \alpha^i\left[\sum \beta^i y_{t-1}^i + c\right] + \sum \theta_j \Delta y_{t-j}^i + \sum \Omega^j \Delta x_{t-j}^k + \sum \mu^l SD^l + \varepsilon_t \quad (7)$$

$i = CC, DD, CPI, IPI, LR \; and \; k = PSB, REM, OIL \; and \; j = 1,2, \ldots 12$

$l = 11 \; Gregorian \; months \; and \; 4 \; Islamic \; months$

y and x represents vector of endogenous and exogenous variables respectively and SD is used for the seasonal dummies of Gregorian and Islamic months.

The long run equilibrium will be computed by using the Johansen cointegration analysis. Short run movements in the endogenous variables (Currency in Circulation (CC), Demand and Time Deposits (DD), Consumer Price index (CPI), Industrial Production Index (IPI), and weighted average lending rate (LR)) is determined by the deviation of these variables from the long run path (error correction term), own optimal lag structure, lag structure of exogenous variables (Public Sector Budgetary Borrowings (PSBS), Workers' remittances (REM), International Oil Prices (OIL)) and the seasonal dummies for eleven month of Gregorian calendar and four specific months of Islamic calendar. The Data from June 1978 to December 2010 of all the variables is collected

from the Statistical Bulletin published by State Bank of Pakistan and international oil prices are taken from International Financial Statistics published by IMF.

Results

The prerequisite for the cointegration analysis is that all the endogenous variables should be integrated of same order. The order of integration is statistically tested by using Augmented Dickey Fuller Test. The results reported in Table 2 confirm the prerequisite condition that all variables under consideration are I(1). In the cointegration analysis, the first step is to search for all possible common long run relationships among the variables. The Johansen's cointegration test provides the number of significant long run relationships.

Table 3: Augmented Dickey Fuller Tests Results

Variables	Log Levels		First Difference of Log Levels	
	With Constant	With Constant & Trend	With Constant	With Constant & Trend
Currency in Circulation (CC)	-0.959	-3.182	-4.173	-4.226
	(0.768)	(0.090)	(0.001)	(0.004)
Demand & Time Deposits (DD)	-0.324	-2.627	-4.879	-4.872
	(0.918)	(0.268)	(0.000)	(0.000)
Consumer Price Index (CPI)	0.415	-1.91	-3.52	-3.563
	(0.983)	(0.647)	(0.008)	(0.034)
Industrial Production Index (IPI)	-1.061	-2.599	-3.363	-3.406
	(0.732)	(0.281)	(0.013)	(0.052)
Weighted Average Lending Rate (LR)	-1.961	-1.967	-10.262	-10.312
	(0.304)	(0.617)	(0.000)	(0.000)
Public Sector Borrowings (PSB)	0.059	-1.559	-4.296	-4.28
	(0.962)	(0.807)	(0.001)	(0.004)
International Oil Prices (OIL)	-1.093	-1.527	-9.626	-9.631
	(0.720)	(0.819)	(0.000)	(0.000)
Worker's Remittances (RMS)	0.330	-1.278	-5.874	-5.923
	(0.980)	(0.892)	(0.000)	(0.000)

In order to search the long run relationship among CC, DD, CPI, IPI and LR, simple unrestricted VAR is estimated with 12 lags specified as maximum lag length because of monthly data. Public sector borrowing, worker's remittances, international oil prices, and seasonal dummies are introduced as exogenous variables. The Akaike Information Criteria (AIC) is adopted for selection of optimal lag length and the final cointegration model. The optimal lags selected for endogenous variables are five. Cointegration model with only intercept in cointrgrating equation and VAR is selected. The details of cointegration tests are given in Table 3. According to the tests there is only one significant long run relationship among the endogenous variables under consideration.

Table 4a: Johansen's Cointegration Tests

Sample: 1980M01 2010M12
Endogenous Variables: log(CC) log(DD) log(CPI) log(IPI) LR
Exogenous Variables: Constant, 12 lags of Δlog(PSBS), 12 lags of Δlog(RMS), and Dummy variables for February, March, April, May, June, July, August, September, October, November, December, Ramadan, Zilhaj, Moharrum, Shawwal,
Optimal Lags interval (in first differences): 1 to 3

Hypothesized No. of CE(s)	Eigen value	Trace Statistic	Max-Eigen Statistic
None*	0.11	70.04 (0.05)	42.58 (0.00)
At most 1	0.04	27.46 (0.84)	15.08 (0.74)
At most 2	0.03	12.38 (0.92)	10.37 (0.71)
At most 3	0.00	2.00 (1.00)	1.26 (1.00)
At most 4	0.00	0.74 (0.39)	0.74 (0.39)

Rejection of the hypothesis is at the 5% level on the basis of MacKinnon-Haug-Michelis (1999) p-values
Trace test and Max- Eigen value test indicates 1 co integrating equation at the 5% level
Figures in parenthesis are the probability of significance

Table 4b: Significance of Long Run Cointegrating Equation

Variables	Unrestricted			Restricted		
	βs	χ^2	Prob (χ^2)	βs	χ^2	Prob (χ^2)
$Ln(CC_{t-1})$	1.00	-	-	1.00	14.98	0.00
$Ln(DD_{t-1})$	0.27	1.92	0.17	0.49	13.59	0.00
$Ln(CPI_{t-1})$	-1.57	15.58	0.00	-1.82	19.22	0.00
$Ln(IPI_{t-1})$	-0.76	8.28	0.00	-1.00	8.28	0.00
LR_{t-1}	0.04	26.49	0.00	0.04	27.20	0.00
C	2.64	-	-	3.35	-	-

The long run relationships are only useful when it is justifiable on theoretical (directional) as well as statistical (magnitude) grounds. The statistical results of unrestricted and restricted vectors are reported in the Table 4. The long run relationship among the endogenous variables is theoretically reasonable. An increase in the overall deposits is inversely related to the currency holdings. So it can be inferred that both are close substitutes. Further, we fail to reject the restriction that currency holdings and deposits are perfect substitutes. Increase in the opportunity cost of holding money that is nominal interest rates is also justified from the long run relationship. The prices and income are positively associated with the currency holdings.

So the error correction term derived from the long run relationship is as follows.

$$\varepsilon t = LN(CC_{t-1}) + 0.4922 * LN(DD_{t-1}) - 1.8242 * \{LN(CPI_{t-1})\} - 1 * \{LN(IPI_{t-1})\} + 0.0431(LR_{t-1}) - 3.3 \quad (8)$$

After computing long run relationship, the short run movements need to be captured. The short run equations are specified in a manner that log difference of the endogenous variables is regressed on the optimal lags (3) of each endogenous variable. Further, the log difference of public sector borrowings, international oil prices and workers' remittances along with the seasonal dummy of each Gregorian month and dummies for Ramadan, Shawwal, Moharrum, and Zilhaj are incorporated. All the short run equations (in log difference of endogenous variables) are separately estimated by taking the three lags (optimal length as per AIC) of each endogenous variable, four specific months of Islamic calendar, eleven months of Gregorian calendar, and twelve lags of economic exogenous variables. In order to improve the specification of the model, the insignificant variables are dropped. Further, restrictions are imposed on the coefficient for the symmetric behavior of lag structure and of dummy variables.

Currency in Circulation

The estimated short run equation of the currency is circulation, the most endogenous variable in this cointegration analysis, is reported in Table 5.

Table 5: Dependent Variable $\Delta\{LN(CC_t)\}$ [Equation-1]

Explanatory Variables	Coefficients	Explanatory Variables	Coefficients
Error Correction Term	-0.028*	$\{(Ln(PSB_{t-2})\}-(Ln(PSB_{t-5})\}$	0.047*
Constant	0.020*	$\Delta\{Ln(PSB_{t-9})\}$	0.049**
$\Delta\{Ln(CC_{t-1})\}$	-0.163*	$\{(Ln(PSB_{t-11})\}-(Ln(PSB_{t-13})\}$	-0.033***
$\{(Ln(CC_{t-4})\}-(Ln(CC_{t-6})\}$	-0.044	$\Delta\{Ln(PSB_{t-13})\}$	-0.135*
$\Delta\{Ln(CC_{t-8})\}$	0.061***	$\Delta\{Ln(RMS_{t-1})\}$	0.007
$\Delta\{Ln(CC_{t-9})\}$	-0.142*	$\Delta\{Ln(RMS_{t-3})\}$	0.008
$\Delta\{Ln(CC_{t-10})\}$	0.086**	$\Delta\{Ln(RMS_{t-11})\}$	-0.008
$\Delta\{Ln(CC_{t-12})\}$	0.108**	$\Delta\{Ln(OIL_{t-2.})\}$	0.018*
$\Delta\{Ln(DD_{t-3})\}$	-0.048	$\Delta\{Ln(OIL_{t-4.})\}$	-0.025***
$\Delta\{Ln(DD_{t-5})\}$	0.094***	$\Delta\{Ln(OIL_{t-9.})\}$	-0.028**
$\{(Ln(DD_{t-6})\}-(Ln(DD_{t-8})\}$	0.163*	$\Delta\{Ln(OIL_{t-11.})\}$	-0.015
$\Delta\{Ln(DD_{t-11})\}$	-0.093**	Ramzan	0.064*
$\Delta\{Ln(CPI_{t-1})\}$	0.211***	Zilhaj	0.012*
$\Delta\{Ln(CPI_{t-3})\}$	0.195***	Moharrum	-0.028*
$\Delta\{Ln(CPI_{t-4})\}$	-0.301*	Shawwal	-0.042*
$\Delta\{Ln(CPI_{t-7})\}$	0.274**	JUN+SEP	-0.041*
$\Delta\{Ln(CPI_{t-9})\}$	-0.143	APR+AUG+MAR	-0.023*
$\Delta\{Ln(CPI_{t-12})\}$	-0.166***	DEC+MAY+JUL	-0.011*
$\Delta\{Ln(CPI_{t-13})\}$	0.179***	NOV	0.019*
$\Delta\{Ln(IPI_{t-1})\}$	0.500*	Dummy_0607	0.052*
$\Delta\{Ln(IPI_{t-2})\}$	-0.357**	R^2	0.791
$\Delta\{(LR_{t-9})\}$	-0.0004	SE-Regression	0.015
$\Delta\{(LR_{t-12})\}$	0.001**	D-W	2.103

*, **, and *** represent the significance at 1%, 5%, and 10% respectively

The error correction term suggests that any diversions of currency holdings from its long run equilibrium path will adjust by 3% in one month, therefore, it may take almost three years for currency in circulation to fully adjust towards its equilibrium path. Own past growth in currency holding have negative impact. Deposit growth, inflation in consumer prices, and economic growth have positive impact on the currency holdings. Islamic months of Ramadan and Zilhaj have direct significant impact on the currency holding behavior. However, the months of Muharram and Shawwal have negative impact on the currency in circulation. These results are quite consistent with Riazuddin and Khan (2002). The month of November has also a direct significant impact whereas March, April, May, June, July, August, September, and December have negative significant impacts. Wald test is utilized to confirm the equality of magnitude of coefficients on months of Gregorian calendar, which shows that the months of June and September have the equal coefficients. Therefore, the one seasonal dummy for June and September is introduced in the equation.[3] Similarly, the months of March, April and August have same coefficients. Public sector borrowings and inflow of workers' remittances have significant net positive impact on the currency holdings whereas the international oil prices are significantly negatively related to currency in circulation. In order to counter the extreme outliers in the residuals, the dummy variable that takes the value of 1 in December-2006 and January-2007 and zero otherwise is introduced.

Demand and Time Deposits

The short run behavior of demand and time deposit is estimated by using the error correction term, three lags of endogenous variables, twelve lags of exogenous variables, and Islamic and Gregorian months. Following the general to specific approach, the final estimated equation is given below.

In this short run equation, the error correction term has very small magnitude and also statistically insignificant, therefore, indicating that the total deposits are weakly exogenous. Islamic month of Ramzan and Zilhaj have negative significant impact on the deposits. Further, both the Islamic months have same coefficients as tested by Wald test, therefore, one seasonal dummy for both months is introduced instead of separate two seasonal dummies. However, months of Muharram and Shawwal have remained insignificant and dropped from the equation during the model selection. Gregorian months of March, April and July have negative impact on deposits, whereas June, November and December have significant positive impact. Public sector budgetary borrowings and inflows of workers' remittances have significant positive impact on the deposits. International oil prices, the measure of uncertainty, have net positive impact on deposits. The past growth in deposits and industrial production growth have positive impact whereas currency holdings and inflation in consumer prices have significant negative impact on deposits.

[3] The diagnostics tests along with the Wald Test of coefficient restrictions are reported in the annexure.

Table 6: Dependent Variable $\Delta\{LN(DD_t)\}$ [Equation 2]

Explanatory Variables	Coefficients	Explanatory Variables	Coefficients
Error Correction Term	-0.0005	constant	0.008*
$\Delta\{Ln(CC_{t-2})\}$	-0.043***	$\Delta\{(LR_{t-4})\}$	-0.0003
$\{(Ln(CC_{t-4})\}-(Ln(CC_{t-6})\}$	0.067*	$\Delta\{(LR_{t-7})\}$	0.0004*
$\Delta\{Ln(CC_{t-8})\}$	-0.108*	$\Delta\{(LR_{t-13})\}$	0.0009
$\Delta\{Ln(CC_{t-10})\}$	-0.065**	$\{(Ln(PSB_{t-6})\}-(Ln(PSB_{t-8})\}$	0.029***
$\Delta\{Ln(CC_{t-11})\}$	-0.183*	$\Delta\{Ln(PSB_{t-11})\}$	0.033
$\{(Ln(CC_{t-12})\}-(Ln(CC_{t-14})\}$	-0.051**	$\Delta\{Ln(PSB_{t-13})\}$	0.057*
$\Delta\{Ln(DD_{t-1})\}$	-0.111**	$\Delta\{(Ln(REM_{t-4})\}$	0.011**
$\{(Ln(DD_{t-3})\}-(Ln(DD_{t-5})\}$	0.120*	$\Delta\{Ln(REM_{t-6})\}$	0.006
$\{(Ln(DD_{t-12})\}-(Ln(DD_{t-14})\}$	0.058***	$\{Ln(REM_{t-9})\}-\{Ln(REM_{t-14})\}$	0.010*
$\Delta\{Ln(CPI_{t-7})\}$	-0.126***	$\Delta\{Ln(OIL_{t-4.})\}$	0.023*
$\Delta\{Ln(CPI_{t-9})\}$	-0.147**	$\Delta\{Ln(OIL_{t-8.})\}$	-0.013
$\Delta\{Ln(CPI_{t-11})\}$	0.141	$\Delta\{Ln(OIL_{t-11.})\}$	0.024**
$\Delta\{Ln(IPI_{t-1})\}$	-0.198***	$\Delta\{Ln(OIL_{t-12.})\}$	-0.010
$\Delta\{Ln(IPI_{t-2})\}$	0.197	Ramzan+Zilhaj	-0.013*
$\Delta\{Ln(IPI_{t-7})\}$	0.275**	MAR+APR	-0.009*
$\Delta\{Ln(IPI_{t-8})\}$	-0.277**	JUN+DEC	0.038*
$\Delta\{Ln(IPI_{t-9})\}$	0.363*	JUL	-0.020*
$\Delta\{Ln(IPI_{t-11})\}$	-0.330**	NOV	0.017*
$\Delta\{Ln(IPI_{t-13})\}$	0.163	D_92	0.076*
R^2	0.706	SE-Regression	0.013
		D-W	1.941

Consumer Price Index

The coefficient of error correction term in CPI equation shows a sluggish adjustment of 1 percent each month of prices toward equilibrium level. The Gregorian months of April, July, August and October have positive significant impact whereas May and December have negative significant impact on prices. Islamic month of Ramzan has positive impact on prices but insignificant at traditional level of significance. Public sector budgetary borrowings and international oil prices

Table 7: Dependent Variable $\Delta\{LN(CPI_t)\}$ [Equation 3]

Explanatory Variables	Coefficients	Explanatory Variables	Coefficients
Error Correction Term	0.010*	constant	0.0007
$\Delta\{Ln(CC_{t-8})\}$	0.024**	$\Delta\{Ln(PSB_{t-1})\}$	0.026*
$\Delta\{Ln(DD_{t-1})\}$	0.034**	$\{(Ln(PSB_{t-4})\}-(Ln(PSB_{t-7})\}$	0.026*
$\Delta\{Ln(DD_{t-2})\}$	-0.037**	$\Delta\{Ln(REM_{t-1})\}$	-0.003
$\Delta\{Ln(DD_{t-6})\}$	0.037**	$\Delta\{Ln(REM_{t-10})\}$	-0.003***
$\{(Ln(DD_{t-8})\}-(Ln(DD_{t-10})\}$	0.046*	$\Delta\{Ln(OIL_{t-1.})\}$	0.012*
$\Delta\{Ln(CPI_{t-1})\}$	0.090**	$\Delta\{Ln(OIL_{t-3.})\}$	0.014*
$\Delta\{Ln(CPI_{t-3})\}$	0.103*	$\{(Ln(OIL_{t-7})\}-(Ln(OIL_{t-9})\}$	0.007*
$\{(Ln(CPI_{t-12})\}-(Ln(CPI_{t-14})\}$	0.058***	$\Delta\{Ln(OIL_{t-10.})\}$	0.011*
$\Delta\{Ln(IPI_{t-1})\}$	-0.149*	$\Delta\{Ln(OIL_{t-11.})\}$	-0.007**
$\Delta\{Ln(IPI_{t-6})\}$	0.097***	Ramzan	0.003
$\{((LR_{t-2})\}-((LR_{t-5})\}$	-0.0003*	APR+JUL	0.009*
$\Delta\{(LR_{t-7})\}$	-0.0002***	MAY	-0.004*
R^2	0.500	AUG+OCT	0.004*
SE-Regression	0.0063	DEC	-0.008*
		D-W	2.000

have significant positive impact on the prices. However, workers' remittances have slight negative impact on prices. Inflation inertia, growth in currency holdings and deposits growth have positive impact on inflation but the industrial growth, and interest rates have negative impact on prices.

Industrial Production Index

The error correction term, which is statistically insignificant, shows that the industrial production is weakly exogenous in the system. The Islamic month of Ramadan has negative impact on industrial production whereas Moharrum, Zilhaj and Shawwal have positive impact on economic growth. Due to high fluctuations in the series, 12 month moving average in industrial production is taken for the analysis, therefore, showing only the positive significant impact of April. Currency holding, deposits, public sector borrowing, oil prices and interest rates have positive impact but, remittances has negative impact on industrial growth.

Table 8: Dependent Variable $\Delta\{LN(IPI_t)\}$ [Equation 4]

Explanatory Variables	Coefficients	Explanatory Variables	Coefficients
Error Correction Term	0.003	constant	0.002**
$\{(Ln(CC_{t-9})\}-(Ln(CC_{t-14})\}$	0.019*	$\Delta\{Ln(PSB_{t-1})\}$	0.008
$\Delta\{Ln(DD_{t-1})\}$	0.034*	$\Delta\{Ln(PSB_{t-7})\}$	-0.008
$\{(Ln(DD_{t-3})\}-(Ln(DD_{t-5})\}$	0.022*	$\Delta\{Ln(PSB_{t-11})\}$	0.021*
$\Delta\{Ln(DD_{t-7})\}$	-0.037*	$\Delta\{Ln(REM_{t-6})\}$	-0.003**
$\Delta\{Ln(DD_{t-10})\}$	-0.025**	$\{(Ln(OIL_{t-3})\}-(Ln(OIL_{t-5})\}$	0.005*
$\Delta\{Ln(DD_{t-13})\}$	0.028**	$\Delta\{Ln(OIL_{t-7.})\}$	0.008*
$\Delta\{Ln(CPI_{t-3})\}$	-0.119*	$\Delta\{Ln(OIL_{t-9.})\}$	0.004
$\Delta\{Ln(CPI_{t-5})\}$	-0.098*	$\Delta\{Ln(OIL_{t-11.})\}$	0.006*
$\Delta\{Ln(CPI_{t-7})\}$	-0.055**	$\Delta\{Ln(OIL_{t-12.})\}$	-0.004
$\Delta\{Ln(CPI_{t-13})\}$	-0.054**	APR	0.002**
$\Delta\{Ln(IPI_{t-1})\}$	0.450*	Moharrum + Shawwal	0.005*
$\Delta\{Ln(IPI_{t-2})\}$	0.124*	Zilhaj	0.001
$\Delta\{Ln(IPI_{t-9})\}$	0.152*	Ramadan	-0.004*
$\Delta\{Ln(IPI_{t-12})\}$	-0.196*	D_11	0.011*
$\Delta\{Ln(IPI_{t-13})\}$	0.129*	D_IPI	-0.015*
$\Delta\{(LR_{t-10})\}$	-0.0002***	R^2	0.655
$\Delta\{(LR_{t-11})\}$	0.0001	SE-Regression	0.0039
$\Delta\{(LR_{t-13})\}$	0.0002**	D-W	2.0272

Weighted Average Lending Rates

The error correction term suggest a 5 percent adjustment of interest rates towards the long run equilibrium. Any diversion from the equilibrium path of interest rates will adjust in two years. Islamic months of Ramzan and Moharrum have positive impact on interest rates. The Gregorian months of July and November have negative impact on the lending rates. Past interest rates, growth of currency holding and remittances have negative impact whereas the growth of deposits, industrial production, public sector borrowing, and inflation in consumer prices and oil prices have positive impact on interest rates.

Table 9: Dependent Variable $\Delta(LR_t)$ [Equation 5]			
Explanatory Variables	Coefficients	Explanatory Variables	Coefficients
Error Correction Term	-5.037*	constant	-0.667*
$\Delta\{Ln(CC_{t-4})\}$	-8.009*	$\Delta\{(LR_{t-5})\}$	-0.204*
$\Delta\{Ln(CC_{t-7})\}$	-7.749*	$\Delta\{(LR_{t-6})\}$	0.101**
$\Delta\{Ln(CC_{t-12})\}$	15.050*	$\{((LR_{t-7})\}-((LR_{t-9})\}$	-0.115*
$\Delta\{Ln(DD_{t-1})\}$	16.873*	$\{(Ln(PSB_{t-1})\}-(Ln(PSB_{t-4})\}$	4.994*
$\{(Ln(DD_{t-5})\}-(Ln(DD_{t-7})\}$	12.040*	$\{(Ln(REM_{t-1})\}-(Ln(REM_{t-5})\}$	-1.469*
$\Delta\{Ln(DD_{t-7})\}$	-10.860**	$\{(Ln(REM_{t-6})\}-(Ln(REM_{t-8})\}$	-0.646
$\Delta\{Ln(DD_{t-11})\}$	-13.005*	$\Delta\{Ln(REM_{t-8})\}$	1.074***
$\Delta\{Ln(DD_{t-13})\}$	7.174	$\Delta\{Ln(REM_{t-10})\}$	-0.751
$\Delta\{Ln(CPI_{t-1})\}$	22.215**	$\Delta\{Ln(REM_{t-13})\}$	1.273**
$\Delta\{Ln(CPI_{t-6})\}$	-20.838**	$\Delta\{Ln(OIL_{t-6.})\}$	1.086
$\Delta\{Ln(CPI_{t-7})\}$	22.526**	$\Delta\{Ln(OIL_{t-8.})\}$	3.904*
$\Delta\{Ln(CPI_{t-12})\}$	19.692***	$\Delta\{Ln(OIL_{t-9.})\}$	-1.825***
$\Delta\{Ln(IPI_{t-2})\}$	-22.645	$\Delta\{Ln(OIL_{t-13.})\}$	1.335
$\Delta\{Ln(IPI_{t-8})\}$	-35.636**	Ramadan	0.951**
$\Delta\{Ln(IPI_{t-9})\}$	19.483	Moharrum	0.825***
$\Delta\{Ln(IPI_{t-12})\}$	42.907*	JUL	-1.514*
$\{((LR_{t-1})\}-((LR_{t-3})\}$	-0.223*	NOV	-1.797*
$\Delta\{(LR_{t-3})\}$	-0.091**	D_93	6.313
R^2	0.627	SE-Regression	1.577
		D-W	2.032

The results indicated that Islamic months of Ramzan and Zilhaj have positive impact on currency holding and negative impact on the deposits. Further, the inflation equation confirms that Ramzan has no significant impact on inflation. These results are also consistent with the study of Akmal and Abbasi (2010) that the month of Ramadan has no significant impact on the prices. But the stylized facts indicate that inflation is higher during months of Ramzan. It means that prices are not exogenously driven by the retailers or wholesalers, rather, the shocks in other economic time series drive the prices. This is consistent with the hypothesis that the redistribution of resources takes place during these two months from rich to poor so the inflation surge during Ramzan is due to income re-distribution process. The hypothesis of window dressing is also confirmed as deposits exogenously shift upward during June and December and the currency holdings witness downward shifts during these months.

To test the weak exogeniety and granger causality, Wald test is applied to all five equations. The test results indicate that all the variables except total deposits and industrial production are endogenous as the error correction term is highly significant. All the five endogenous variables are characterized with causal relationship in the short run. Public sector borrowing, workers' remittances and oil prices have significant impact on all the endogenous variables. The Islamic calendar months have no impact on prices. However, these months have significant impact on the currency in circulation, deposits, interest rates and industrial production. On the other hand, Gregorian calendar months have significant impact on all endogenous variables.

Table10: Wald Test for the Granger Causality and significance of Exogenous Variables

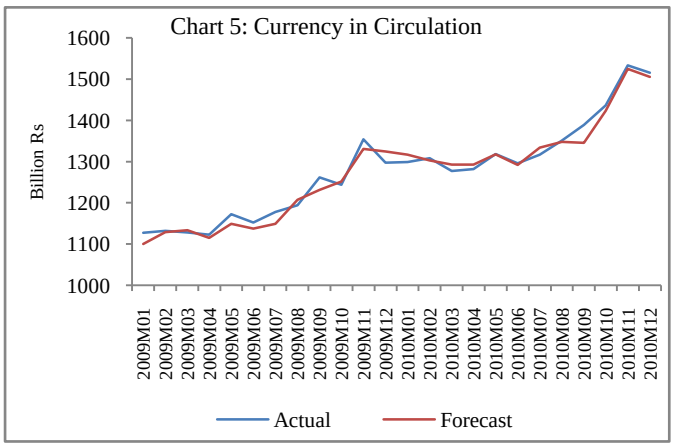
Exogenous Variables	Endogenous Variables				
	Currency in Circulation	Time and Demand Deposits	Consumer Price Index	Industrial Production Index	Weighted Average Lending Rates
Error Correction Term	10.24 (0.00)	0.006 (0.94)	11.75 (0.00)	2.38 (0.12)	25.72 (0.00)
Currency in Circulation	59.00 (0.00)	87.09 (0.00)	3.81 (0.05)	23.88 (0..00)	33.06 (0.00)
Time & Demand Deposits	23.37 (0.00)	26.65 (0.00)	24.71 (0.00)	28.28 (0.00)	36.72 (0.00)
Consumer Price Index	24.98 (0.00)	7.52 (0.06)	12.80 (0.00)	41.25 (0.00)	15.32 (0.00)
Industrial Production Index	7.97 (0.02)	22.46 (0.00)	9.56 (0.01)	272.86 (0.00)	13.23 (0.00)
Weighted Average Lending Rates	4.39 (0.11)	16.11 (0.00)	9.74 (0.01)	9.84 (0.01)	98.52 (0.00)
Public Sector Budgetary Borrowings	44.73 (0.00)	12.84 (0.01)	25.31 (0.00)	13.09 (0.00)	9.08 (0.00)
Workers' Remittances in Rupees Term	3.93 (0.27)	16.25 (0.00)	5.51 (0.06)	5.84 (0.02)	29.71 (0.00)
International Oil Prices	17.79 (0.00)	15.00 (0.00)	33.88 (0.00)	27.50 (0.00)	16.93 (0.00)
Gregorian Months	127.20 (0.00)	248.64 (0.00)	130.77 (0.00)	4.24 (0.04)	31.33 (0.00)
Islamic Months	176.83 (0.00)	20.25 (0.00)	1.95 (0.16)	20.64 (0.00)	7.12 (0.03)

Forecasting exercise

To view the performance of estimation rigor, a forecasting exercise is performed. As indicated by the significance of error correction terms in equations all the five variables are treated as endogenous variables.

Within Sample Forecasting

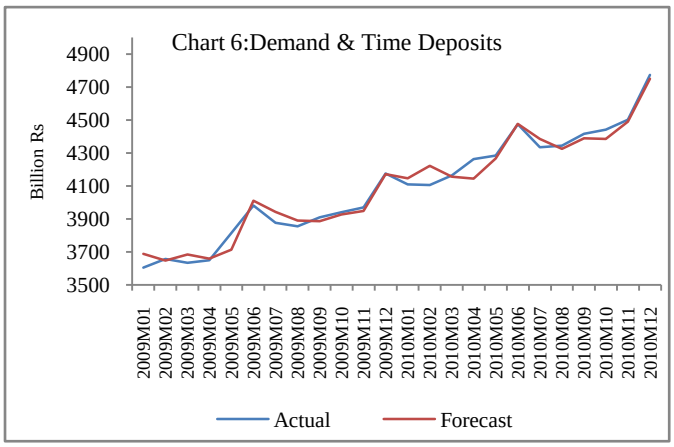
All the five equations discussed above along with the long run cointegrating relationship are solved simultaneously from June FY08 to August FY11. The actual and forecasted values are drawn in the Chart 5 to 9. According to graphical presentations, the error correction model

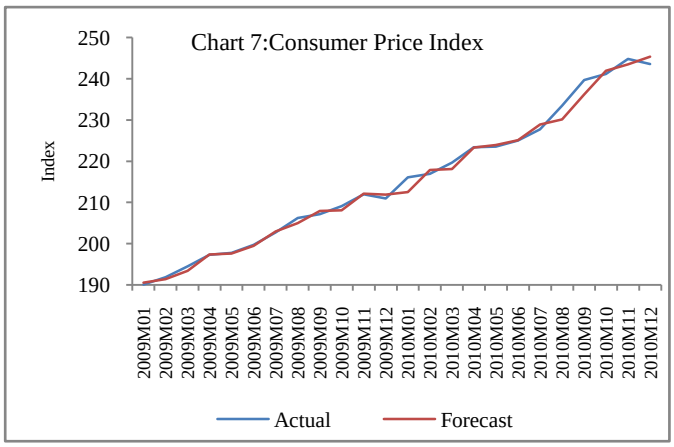


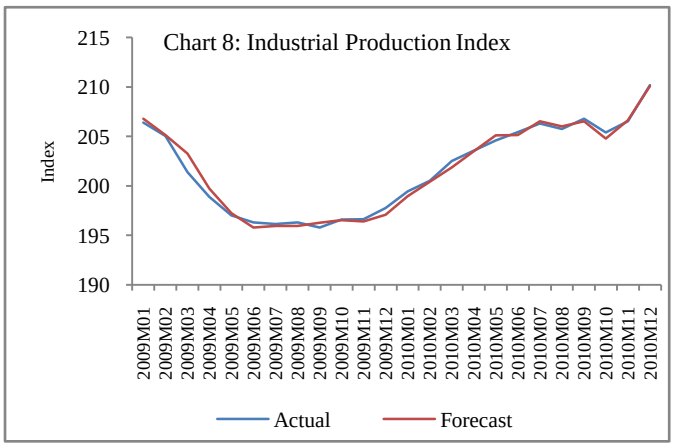
has yielded satisfactory results. The forecasts are not only tracing the trend of the actual but also capturing the shocks in the actual data. So it can be inferred that the exogenous shocks initiated in series are properly captured by the incorporation of seasonal dummies especially Islamic months. The forecasting performance is reported in the Table 11.

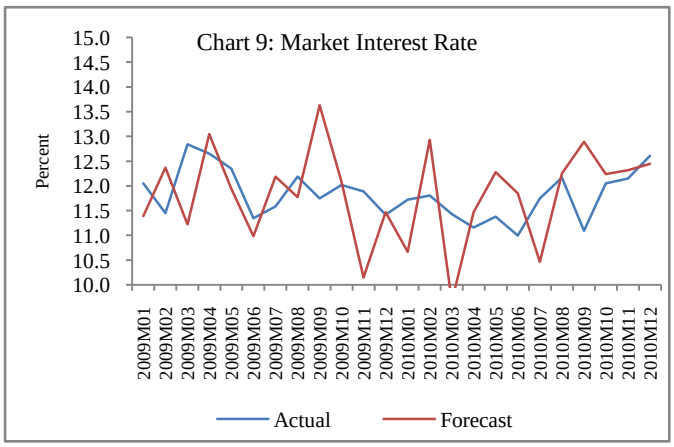
Table 11 : Forecast Performance Indicators

Forecasted Variables	Root Mean Square Error	Mean Absolute Error	Mean Absolute Percentage Error	Theil Inequality Coefficient
Currency in Circulation	18.40	15.03	118.49%	0.01
Time & Demand Deposits	51.65	38.52	95.73%	0.01
Consumer Price Index	1.48	1.05	47.19%	0.00
Industrial Production Index	0.54	0.39	19.36%	0.00
Weighted Average Lending Rates	0.99	0.78	668.53%	0.04







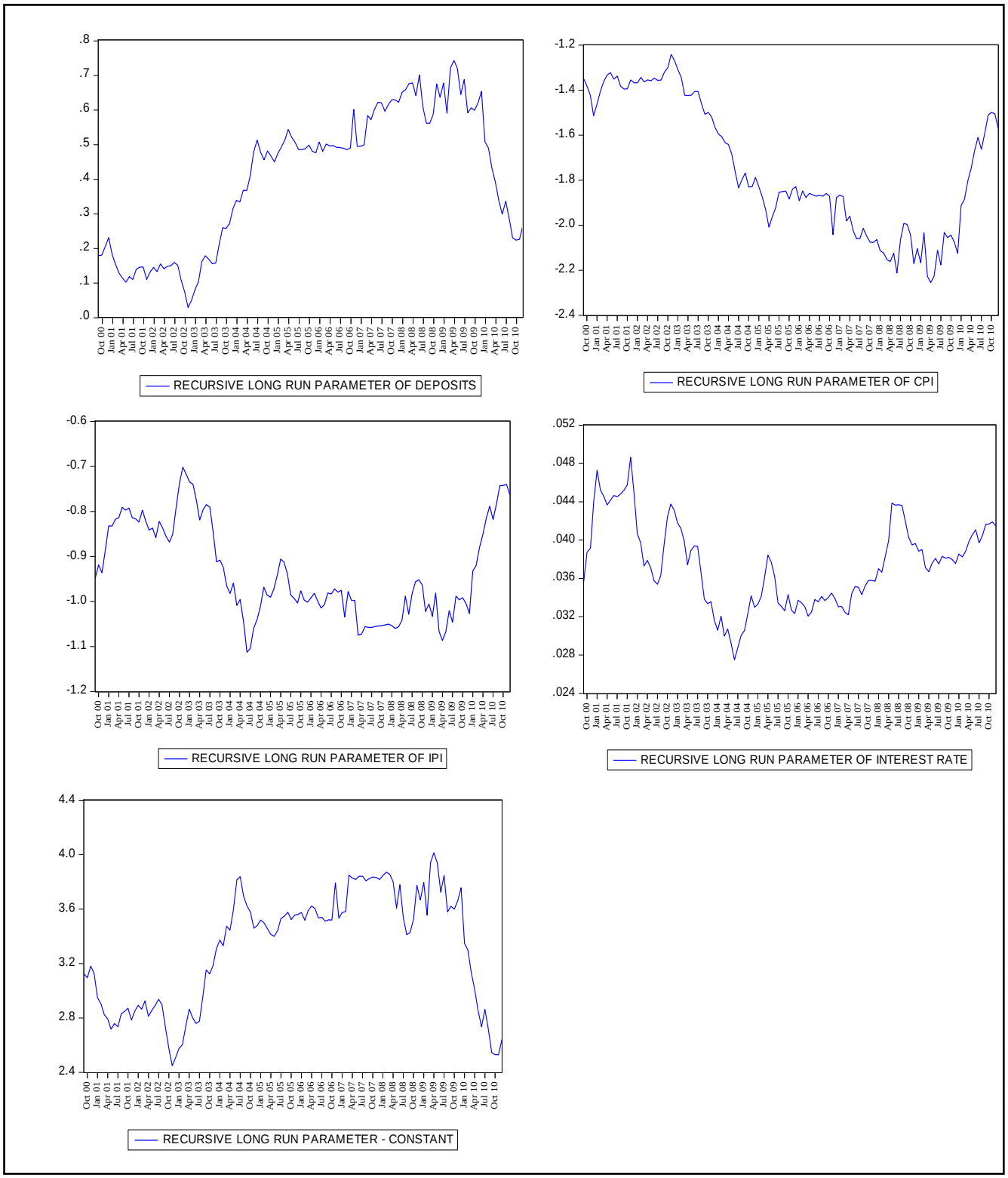


Stability analysis

In order to analyse the stability of long run relationships, the recursive long parameters are derived for the one third observations (from September 2000 to December 2010). In the first step, Johansen cointegration technique is applied to the five endogonous variables by selecting the optimal lag length by AIC and the long run parameters are recorded. Afterwards, observation of one month is

added in the data and the similar process is replicated. This process is conitnued untill the last observation added in the sample and the parameters are recorded. The recursive long run parameters are presented in the Chart 9. The recursive estimation confirms the stability of the long run coefficients.

Chart 10: Recursive Long Run Parameters



Conclusions

This paper is an attempt to revisit the pioneering contribution of Riazuddin and Khan (2002) by updating the data till December 2010 and by considering theoretically specified model instead of univariate analysis. This study only analyzes the Islamic months in which the religious festivals or morning is observed. However, this work may be extended by considering all the Islamic months. The results indicate that there is significant role of Islamic months in explaining the monthly economic time series. It can be deduced from this paper that ignoring the Islamic and Gregorian seasonal factors may lead to omitted variable bias in the estimates of parameters as these seasonal factors are correlated with the base set of explanatory variables.

The currency in circulation witnesses upsurge during the month of Ramadan and Zilhaj, and plummets during the months of Shawwal and Moharrum. Demand and time deposits decline during the months of Ramadan and Zilhaj. There is no impact of Islamic calendar on the consumer prices. The economic activity remains sluggish during the months of Ramadan. The Gregorian calendar has also significant impact on the economic time series. Regarding Gregorian calendar, the window dressing of deposits at the end of fiscal and calendar year have resulted in higher deposits and lower currency holdings.

The general belief that suppliers artificially increase the prices during the Ramadan and Zilhaj is not supported by the analysis. This paper suggests the demand side argument, which is the redistribution of income in Ramadan and Zilhaj causes the currency holdings to increase and result in increase in prices. Therefore, the upsurge in inflation during the Ramadan and Zilhaj is due to exogenous increase in currency holdings.

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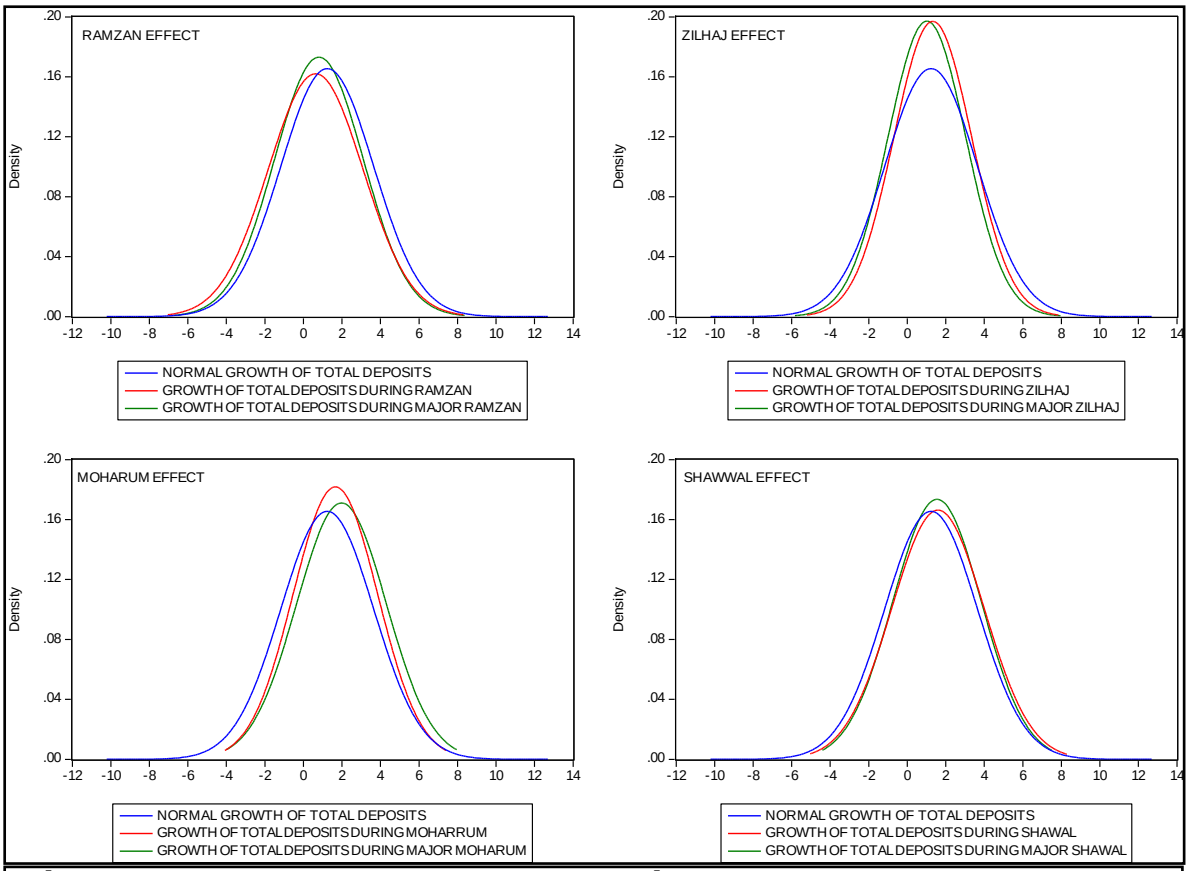
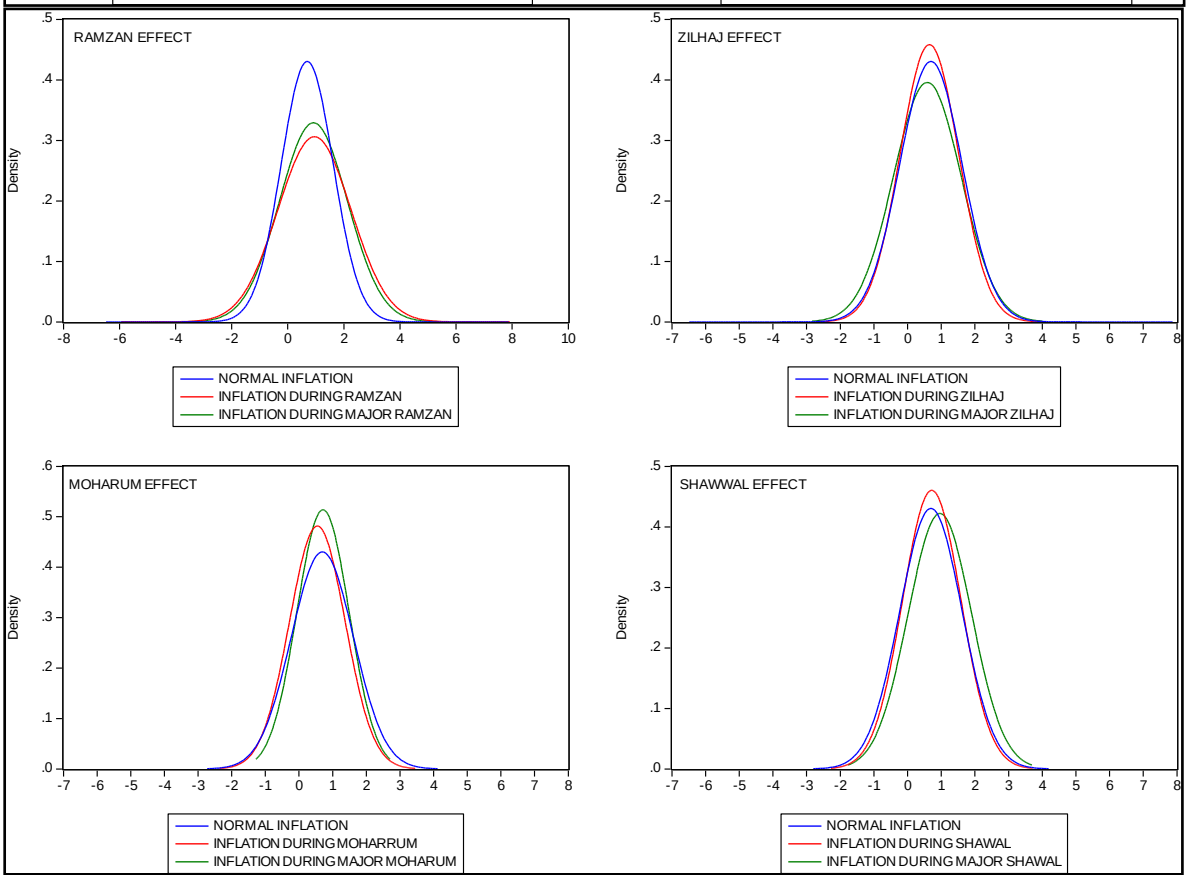
Annexure

- The average growth of deposits is significantly lower during Ramadan and higher during major Moharrum
- The average monthly inflation is significantly higher during Ramadan and Shawwal
- Interest rates are significantly lower during Shawwal and Moharrum
- International oil prices are significantly lower during Ramadan

Test of Equality of Mean						
	Total Deposits			Remittances Growth		
	Mean	T-Stat	Probability	Mean	T-Stat	Probability
Normal	1.238	-	-	2.45	-	-
Ramzan	**0.633**	**1.88**	**0.061**	-0.422	1.24	0.216
Major Ramzan	0.804	1.022	0.307	-1.066	1.142	0.254
Zilhaj	1.325	-0.279	0.781	-0.552	1.326	0.186
Major Zilhaj	1.02	0.51	0.610	-0.035	0.806	0.420
Shawwal	1.592	-1.091	0.276	2.822	-0.16	0.873
Major Shawwal	1.546	-0.738	0.461	7.04	-1.51	0.132
Moharrum	1.659	-1.331	0.184	4.027	-0.692	0.489
Major Moharrum	**1.978**	**-1.746**	**0.082**	4.537	-0.694	0.488
	Monthly Inflation			International Oil Inflation		
	Mean	T-Stat	Probability	Mean	T-Stat	Probability
Normal	0.694	-	-	0.887	-	-
Ramzan	**0.951**	**-1.959**	**0.051**	**-1.84**	**2.314**	**0.021**
Major Ramzan	0.915	-1.318	0.188	**-2.266**	**1.984**	**0.048**
Zilhaj	0.649	0.363	0.717	2.384	-1.224	0.222
Major Zilhaj	0.586	0.646	0.519	2.414	-0.925	0.355
Shawwal	0.719	-0.206	0.837	-1.007	1.572	0.117
Major Shawwal	**0.96**	**-1.647**	**0.100**	-1.004	1.211	0.227
Moharrum	0.545	1.214	0.226	2.795	-1.502	0.134
Major Moharrum	0.713	-0.119	0.905	**4.362**	**-2.075**	**0.039**
	Short Term Interest Rate Changes			Growth In Budgetary Borrowings		
	Mean	T-Stat	Probability	Mean	T-Stat	Probability
Normal	0.005	-	-	1.21	-	-
Ramzan	0.034	-0.093	0.93	0.97	0.48	0.63
Major Ramzan	-0.052	0.137	0.89	1.18	0.05	0.96
Zilhaj	-0.016	0.066	0.948	1.23	-0.03	0.97
Major Zilhaj	0.478	-1.09	0.276	1.14	0.10	0.92
Shawwal	**-0.673**	**2.153**	**0.032**	1.09	0.23	0.82
Major Shawwal	**-0.672**	**1.658**	**0.098**	0.58	0.95	0.34
Moharrum	-0.226	0.72	0.472	0.62	1.17	0.24
Major Moharrum	**-0.739**	**1.769**	**0.078**	0.58	0.94	0.35


RAMZAN EFFECT
Density
NORMAL GROWTH OF TOTAL DEPOSITS
GROWTH OF TOTAL DEPOSITS DURING RAMZAN
GROWTH OF TOTAL DEPOSITS DURING MAJOR RAMZAN
ZILHAJ EFFECT
Density
NORMAL GROWTH OF TOTAL DEPOSITS
GROWTH OF TOTAL DEPOSITS DURING ZILHAJ
GROWTH OF TOTAL DEPOSITS DURING MAJOR ZILHAJ
MOHARUM EFFECT
Density
NORMAL GROWTH OF TOTAL DEPOSITS
GROWTH OF TOTAL DEPOSITS DURING MOHARRUM
GROWTH OF TOTAL DEPOSITS DURING MAJOR MOHARUM
SHAWWAL EFFECT
Density
NORMAL GROWTH OF TOTAL DEPOSITS
GROWTH OF TOTAL DEPOSITS DURING SHAWAL
GROWTH OF TOTAL DEPOSITS DURING MAJOR SHAWAL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Density
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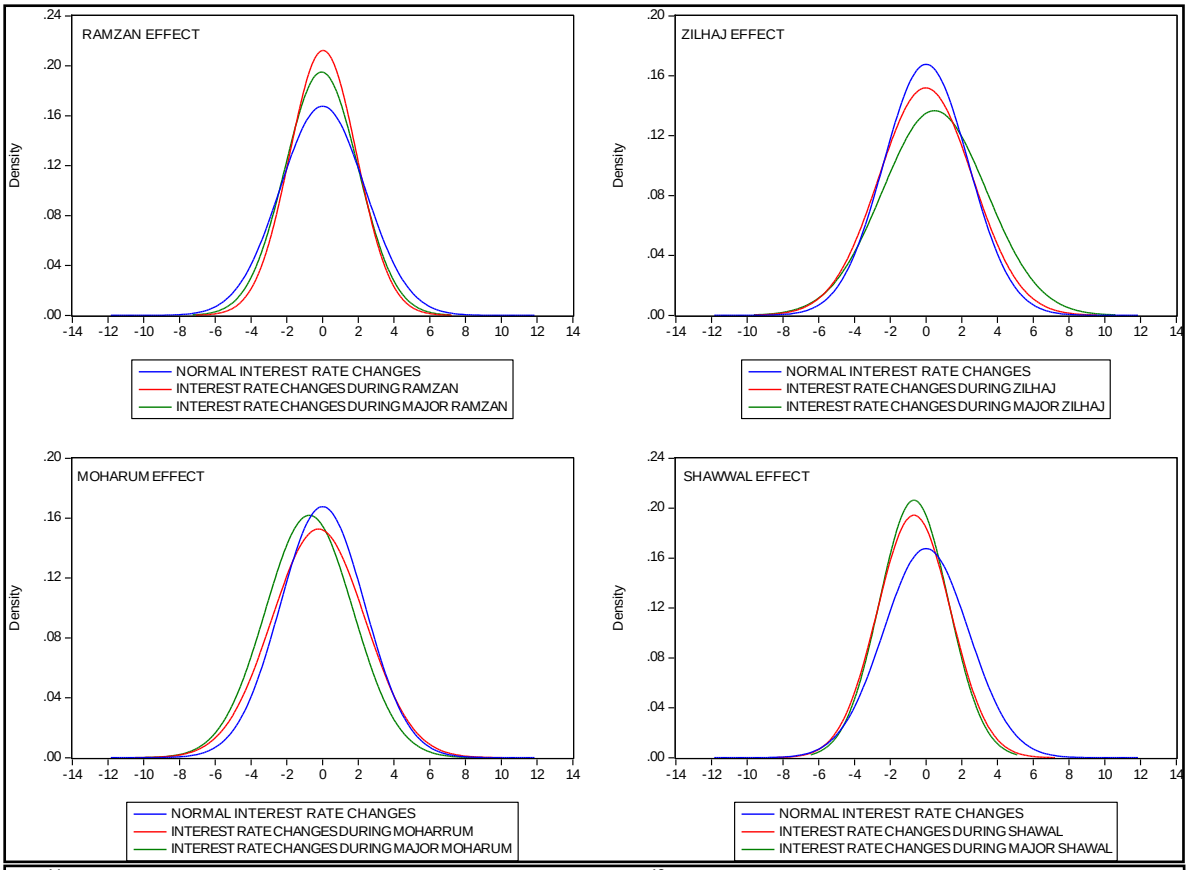
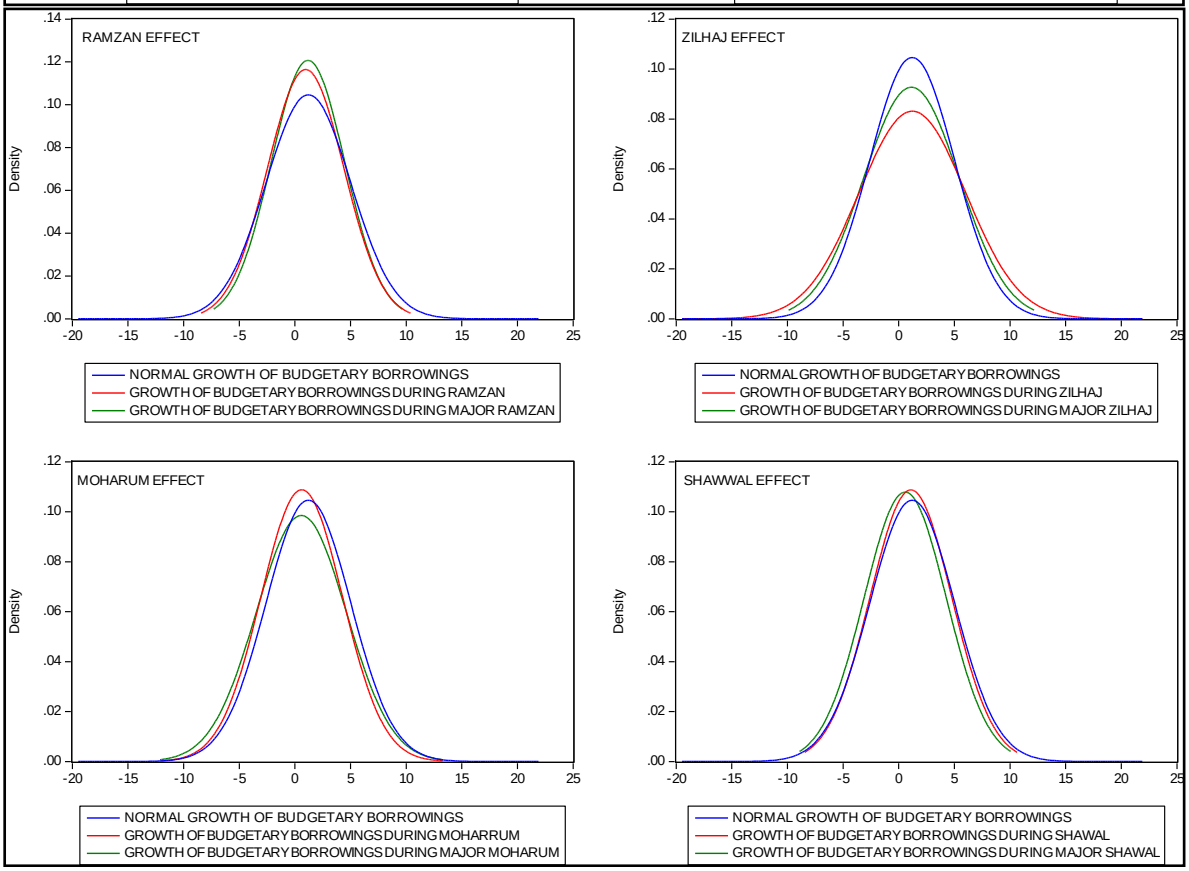
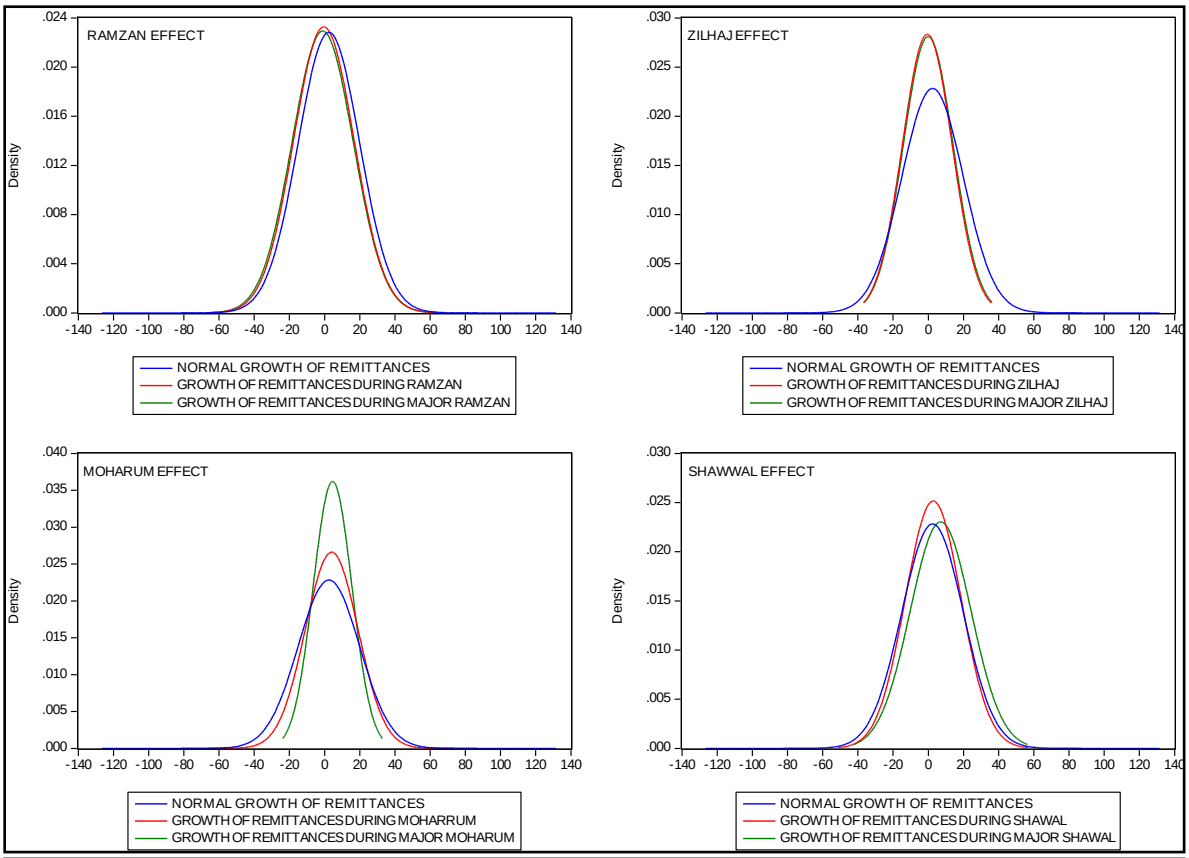
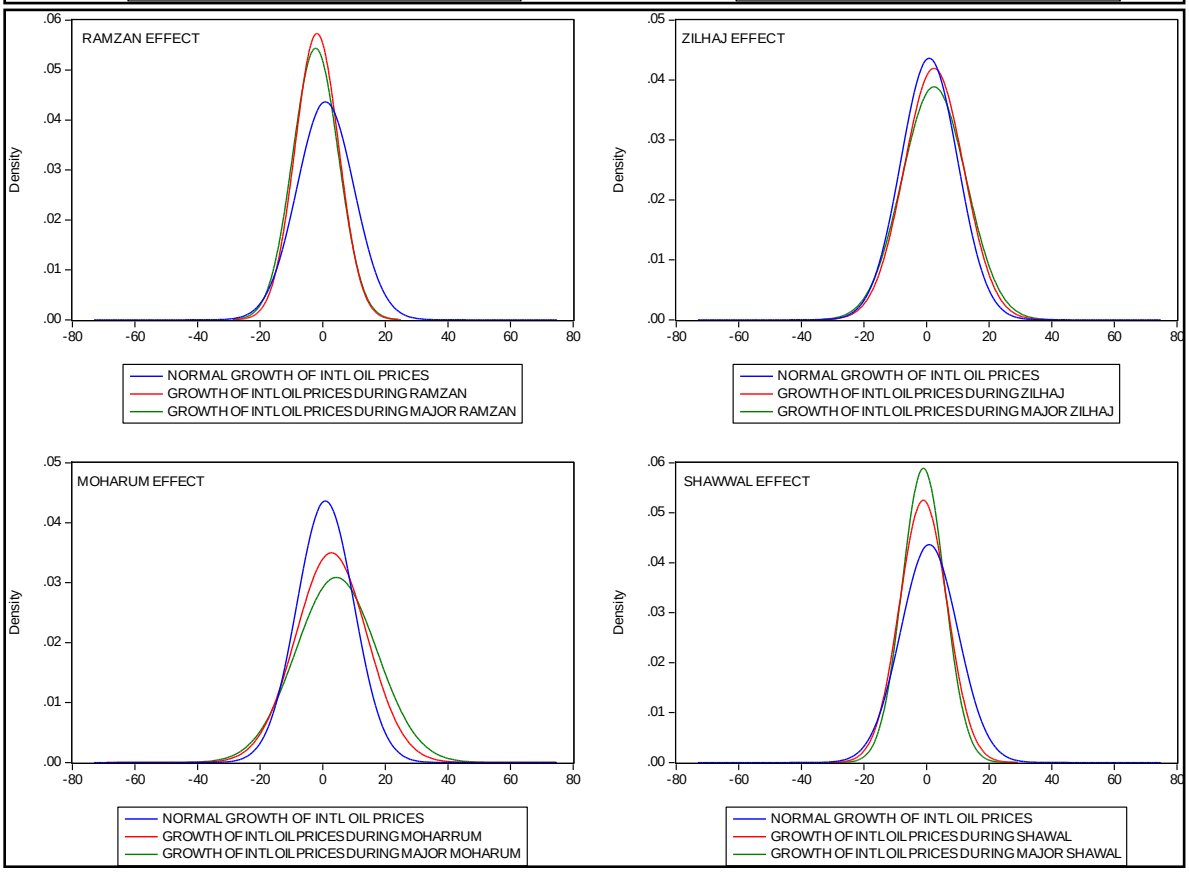
INFLATION DURING RAMZAN
INFLATION DURING MAJOR RAMZAN
ZILHAJ EFFECT
Density
NORMAL INFLATION
INFLATION DURING ZILHAJ
INFLATION DURING MAJOR ZILHAJ
MOHARUM EFFECT
Density
NORMAL INFLATION
INFLATION DURING MOHARRUM
INFLATION DURING MAJOR MOHARUM
SHAWWAL EFFECT
Density
NORMAL INFLATION
INFLATION DURING SHAWAL
INFLATION DURING MAJOR SHAWAL


RAMZAN EFFECT
Density
NORMAL INTEREST RATE CHANGES
INTEREST RATE CHANGES DURING RAMZAN
INTEREST RATE CHANGES DURING MAJOR RAMZAN
ZILHAJ EFFECT
Density
NORMAL INTEREST RATE CHANGES
INTEREST RATE CHANGES DURING ZILHAJ
INTEREST RATE CHANGES DURING MAJOR ZILHAJ
MOHARUM EFFECT
Density
NORMAL INTEREST RATE CHANGES
INTEREST RATE CHANGES DURING MOHARRUM
INTEREST RATE CHANGES DURING MAJOR MOHARUM
SHAWWAL EFFECT
Density
NORMAL INTEREST RATE CHANGES
INTEREST RATE CHANGES DURING SHAWAL
INTEREST RATE CHANGES DURING MAJOR SHAWAL


RAMZAN EFFECT
Density
NORMAL GROWTH OF BUDGETARY BORROWINGS
GROWTH OF BUDGETARY BORROWINGS DURING RAMZAN
GROWTH OF BUDGETARY BORROWINGS DURING MAJOR RAMZAN
ZILHAJ EFFECT
Density
NORMAL GROWTH OF BUDGETARY BORROWINGS
GROWTH OF BUDGETARY BORROWINGS DURING ZILHAJ
GROWTH OF BUDGETARY BORROWINGS DURING MAJOR ZILHAJ
MOHARUM EFFECT
Density
NORMAL GROWTH OF BUDGETARY BORROWINGS
GROWTH OF BUDGETARY BORROWINGS DURING MOHARRUM
GROWTH OF BUDGETARY BORROWINGS DURING MAJOR MOHARUM
SHAWWAL EFFECT
Density
NORMAL GROWTH OF BUDGETARY BORROWINGS
GROWTH OF BUDGETARY BORROWINGS DURING SHAWAL
GROWTH OF BUDGETARY BORROWINGS DURING MAJOR SHAWAL


RAMZAN EFFECT
Density
NORMAL GROWTH OF REMITTANCES
GROWTH OF REMITTANCES DURING RAMZAN
GROWTH OF REMITTANCES DURING MAJOR RAMZAN
ZILHAJ EFFECT
Density
NORMAL GROWTH OF REMITTANCES
GROWTH OF REMITTANCES DURING ZILHAJ
GROWTH OF REMITTANCES DURING MAJOR ZILHAJ
MOHARUM EFFECT
Density
NORMAL GROWTH OF REMITTANCES
GROWTH OF REMITTANCES DURING MOHARRUM
GROWTH OF REMITTANCES DURING MAJOR MOHARUM
SHAWWAL EFFECT
Density
NORMAL GROWTH OF REMITTANCES
GROWTH OF REMITTANCES DURING SHAWAL
GROWTH OF REMITTANCES DURING MAJOR SHAWAL


RAMZAN EFFECT
Density
NORMAL GROWTH OF INTL OIL PRICES
GROWTH OF INTL OIL PRICES DURING RAMZAN
GROWTH OF INTL OIL PRICES DURING MAJOR RAMZAN
ZILHAJ EFFECT
Density
NORMAL GROWTH OF INTL OIL PRICES
GROWTH OF INTL OIL PRICES DURING ZILHAJ
GROWTH OF INTL OIL PRICES DURING MAJOR ZILHAJ
MOHARUM EFFECT
Density
NORMAL GROWTH OF INTL OIL PRICES
GROWTH OF INTL OIL PRICES DURING MOHARRUM
GROWTH OF INTL OIL PRICES DURING MAJOR MOHARUM
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Density
NORMAL GROWTH OF INTL OIL PRICES
GROWTH OF INTL OIL PRICES DURING SHAWAL
GROWTH OF INTL OIL PRICES DURING MAJOR SHAWAL

The diagnostics checking is performed on all the equations in the system. There is no sign of autocorrelation in all the equations as indicated by the Q-stat and LM test. The assumption of normality in residuals is tested by Jarque-Bera test and residuals of all the equations except industrial production index and CPI satisfy the normality condition. Heteroskedasticity test results are not quite satisfactory. Therefore, White heteroskedasticity-consistent standard errors & covariance are computed for each equation. The stability test for unknown break points is also tested and all the equations satisfy the stability conditions.

	Dependent Variable				
Diagnostics Tests	$\Delta\{LN(CC_t)\}$ [Equation-1]	$\Delta\{LN(DD_t)\}$ [Equation 2]	$\Delta\{LN(CPI_t)\}$ [Equation 3]	$\Delta\{LN(IPI_t)\}$ [Equation 4]	$\Delta(LR_t)$ [Equation 5]
Autocorrelation test					
$Q_{(3)}$	2.83 (0.42)	2.04 (0.56)	0.11 (0.99)	1.23 (0.74)	0.33 (0.95)
$LM_{(3)}$	1.13 (0.34)	0.80 (0.49)	0.40 (0.96)	0.51 (0.68)	0.20 (0.90)
Normality Test: Jarque - Bera	1.65 (0.44)	2.94 (0.23)	28.76 (0.00)	5.24 (0.07)	2.99 (0.22)
Heteroskedasticity Test: Breusch-Pagan-Godfrey					
Q_3^2	1.19 (0.88)	2.43 (0.49)	4.01 (0.26)	1.72 (0.63)	29.68 (0.00)
F-statistic	1.23 (0.17)	0.88 (0.68)	1.67 (0.02)	2.21 (0.00)	1.10 (0.32)
Stability Test: Quandt-Andrews unknown breakpoint test Number of breaks compared: 260 Note: probabilities calculated using Hansen's (1997) method					
Maximum Wald F-statistic (1995M11)	18.39 (0.94)	1.42 (1.00)	2.43 (1.00)	1.70 (1.00)	1.50 (1.00)
Exp Wald F-statistic	6.30 (0.96)	0.52 (1.00)	0.77 (1.00)	0.56 (1.00)	0.48 (1.00)
Ave Wald F-statistic	5.88 (1.00)	1.03 (1.00)	1.48 (1.00)	1.09 (1.00)	0.95 (1.00)
All the probabilities are given in parenthesis					