

Monthly Seasonal Factors of Select Economic Time Series*

Analysis of seasonal behaviour of economic time series, which helps differentiate between the seasonal changes and long-run changes in the variables, is useful from the policy perspective in understanding the underlying economic phenomenon. In this backdrop, the Reserve Bank of India (RBI) has been publishing monthly seasonal factors for select economic and financial time series of the Indian economy on an annual basis in the RBI Bulletin from 1980 onwards. This article presents the estimated monthly seasonal factors of select 82 economic/financial time series taken from broad sectors, namely, monetary and banking, price; industrial production and services sector, covering the period 2003-04 to 2012-13. The estimated seasonal factors revealed that seasonal variations of M3, M1 and Reserve Money (RM) declined gradually. For Scheduled Commercial Banks (SCBs) an upward movement in the seasonal variation of investments was observed in recent years, while the seasonal variation of aggregate deposits showed a decrease. Seasonal variation for WPI-All commodities remained low and exhibited steady decline in recent years. The variation in seasonality for WPI-Primary Articles was much higher than that of WPI-Manufactured products. Seasonal variation of CPI-IW was observed to be stable in recent years, however, consistently higher than in WPI-All Commodities. Seasonal variation of IIP-General Index increased steadily over the time period. Among the use-based classification of IIP, 'Consumer Non-Durable Goods' and 'Intermediate Goods' showed the highest and lowest seasonal variations, respectively.

1. Introduction: Economic time series, when measured at an interval of less than a year, exhibit seasonal fluctuations around its annual trend path. Such repetitive seasonal variations can result from climatic conditions, production cycle characteristics, seasonal nature of economic activity, festivals, vacation practices, etc. While the seasonal variations occur regularly, yet they may vary in magnitude from year to year. Analysis of the direction and magnitude of seasonal fluctuations is useful in interpretation of movements in economic

variables over time. Seasonal adjustment, *i.e.*, removal of seasonal effects from a time series, which helps differentiate between the seasonal changes and long-run changes in the variables, is useful from the policy perspective in understanding the underlying economic phenomenon. Moreover, understanding about the predictable recurring of seasonal fluctuations also allows the economic agents to set up policies or measurements to attenuate the impact. In this backdrop, monthly seasonal factors for select economic and financial time series of the Indian economy are being regularly published in the RBI Bulletin from 1980 onwards¹.

2. Data Coverage and Methodology

For estimating and analysing the seasonal factors, 82 monthly economic/financial time series covering broad sectors, namely (i) Monetary and Banking Indicators (17 series); (ii) Wholesale Price Index (WPI) (26 series); (iii) Consumer Price Index (CPI) (3 series); (iv) Industrial Production (30 series) and (v) Services Sector Indicators (6 series) have been considered in this article.

The reference period was broadly considered as 'April 1994 to March 2013', *i.e.*, 19 years period. For some series, the reference period was less than 10 years depending on the available time series data (Table 2).

The seasonal factors have been estimated using X-13ARIMA-SEATS software package, developed by the US Bureau of Census², taking care of major festivals/national holidays as well as trading day effects. The seasonality of the series is further subjected to a series of parametric and non-parametric statistical test procedures for their statistical significance.

3. Salient Findings

Seasonal Variation during 2003-04 to 2012-13

The average monthly seasonal factors over the ten years period (2003-04 to 2012-13) are presented in Table 1. The annual estimates of dispersion in seasonal factors, in terms of range (difference between peak and trough values), over the time, are presented in Table 2.

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¹ Previous article in this series was published in September 2012 issue of the Reserve Bank of India Bulletin.

² <http://www.census.gov/srd/www/x13as/>

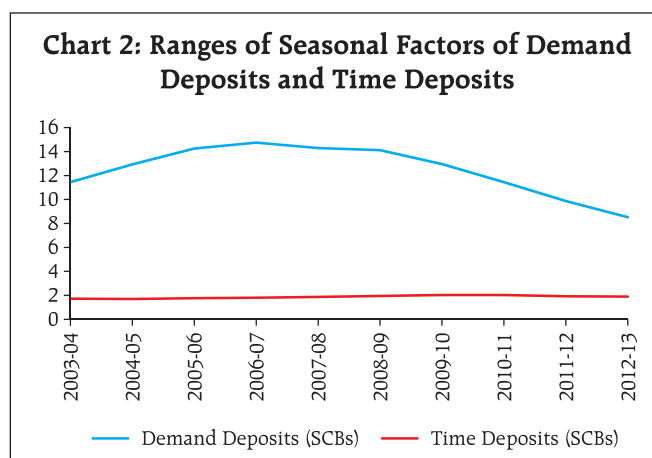
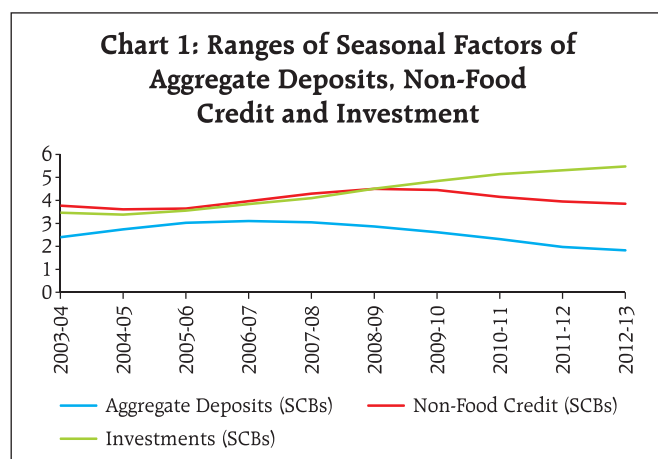
The change in seasonal variation in 2012-13 *vis-à-vis* previous five years (2007-08 to 2011-12) is presented in Table 3. The list of top-twenty and bottom-twenty series based on the averages range of monthly seasonal factors, during the last five years (*i.e.*, 2008-09 to 2012-13), and the corresponding peak and trough months are presented in Table 4. The salient features of observed seasonal variation for some select series during the last ten years are briefly discussed below.

3.1 Monetary and Banking Indicators

3.1.1 Over the years, the intra-year seasonal variations, measured in terms of range, *i.e.*, the difference between peak and trough values of seasonal factors, of non-food credit (SCBs) and investments (SCBs) exhibited similar movements up to 2008-09. The seasonal variation of aggregate deposits (SCBs) exhibited downward movement since 2007-08 (Table 2 & Chart 1). The seasonal variation in aggregate deposits (SCBs) was lower as compared with those in non-food credit (SCBs) and investments (SCBs) during the reference period.

3.1.2 Seasonal variation in Broad Money (M3) was observed to be lower than that for Currency in circulation, Narrow Money (M1) and Reserve Money (RM) over the years. After showing an upward movement till 2005-06, the seasonal variations of M3 declined gradually (Table 2).

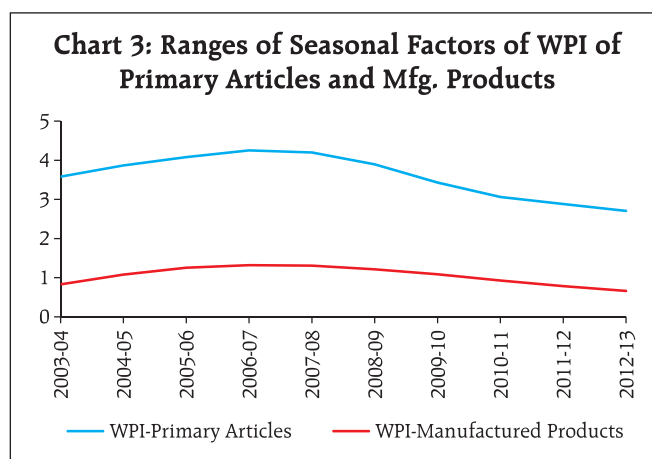
3.1.3 During 2003-04 to 2012-13, demand deposits of SCBs have shown higher seasonal fluctuations than that of time deposits, which remained stable within the narrow band of 1.7 to 2.0 (Table 2 & Chart 2). The range of seasonal factors of demand deposits rose gradually till 2006-07 and started declining steadily thereafter.

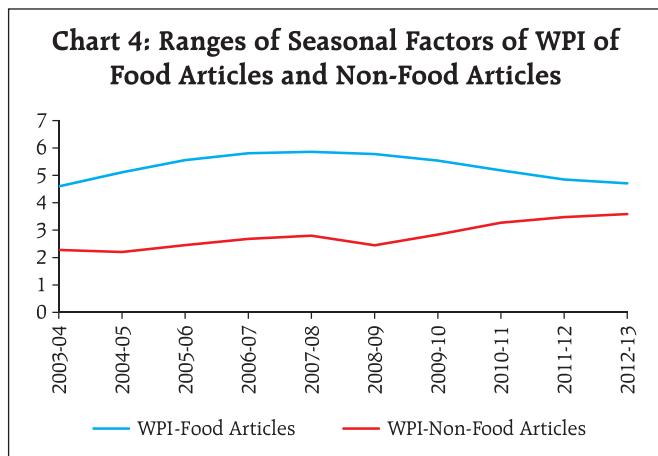


3.2 Wholesale Price Index

3.2.1 The range (*i.e.*, difference between peak and trough values) of seasonal factors of WPI-All Commodities increased from 1.1 in 2003-04 to 1.9 in 2007-08, and thereafter, witnessed a steady decline to 1.0 in 2012-13 (Table 2). Between the two broad groups of WPI-All Commodities, *viz.*, WPI-Primary Articles and WPI-Manufactured Products, the range of seasonal factors for Primary Articles prices was more than double the seasonal fluctuations in the WPI-Manufactured Products. However, the intra-year seasonal variation in these two price series narrowed down substantially during the last four years (Table 2 & Chart 3).

3.2.2 Within the Primary Articles group, the intra-year seasonal variation in WPI of 'Food Articles' increased from 4.6 in 2003-04 to 5.9 in 2007-08, and thereafter, witnessed a steady decline to 4.7 in 2012-13. Though the seasonal variation of WPI-Non-Food Articles was



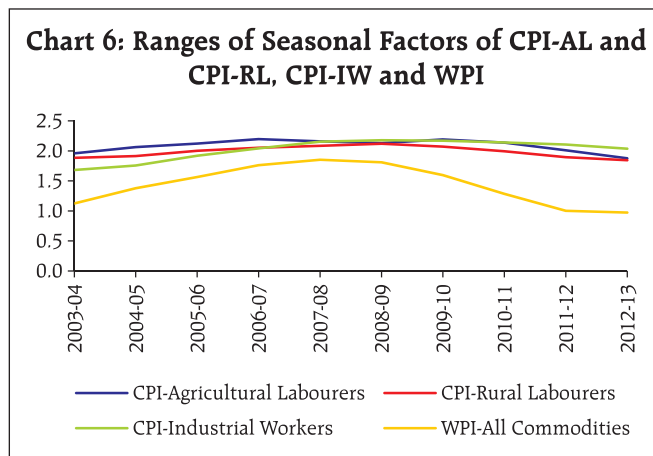
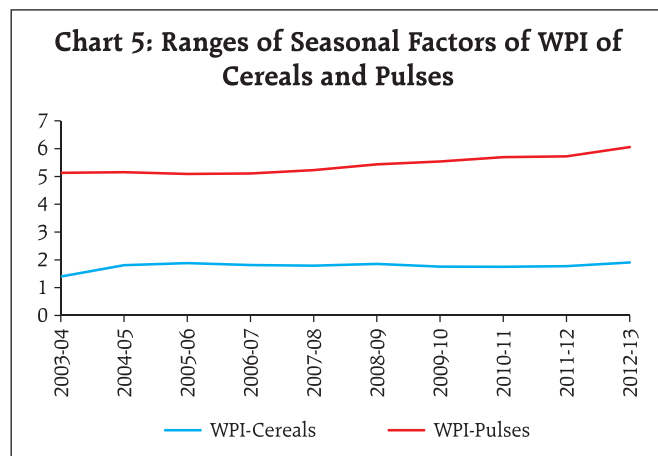


lower than that of Food Articles over the reference period, the difference narrowed down since 2009-10 (Table 2 & Chart 4).

3.2.3 Within the Food Articles, the Pulses group displayed more seasonal variation than the Cereals group. WPI-Cereals seasonal variation remained stable at around 1.9 during 2004-05 to 2012-13 (Table 2 & Chart 5).

3.3 Consumer Price Index

3.3.1 In the case of CPI for Agricultural and Rural Labourers, similar movement in seasonal variations was observed during the last ten years with CPI-Agricultural Labourers having slightly higher variation than the CPI-Rural Labourers. The seasonal variation of CPI-IW was consistently higher than that of WPI-All Commodities. The difference between the seasonal variations of the two series had, however, widened during the period 2009-10 to 2012-13. Among the four price series, the seasonal variation was lowest for WPI-All Commodities (Table 2 & Chart 6).

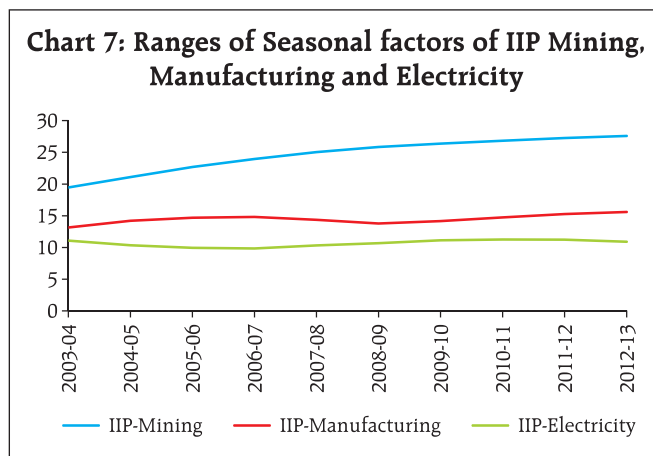


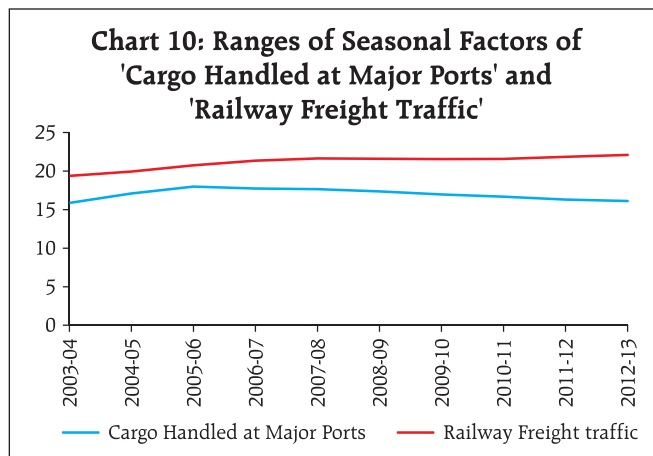
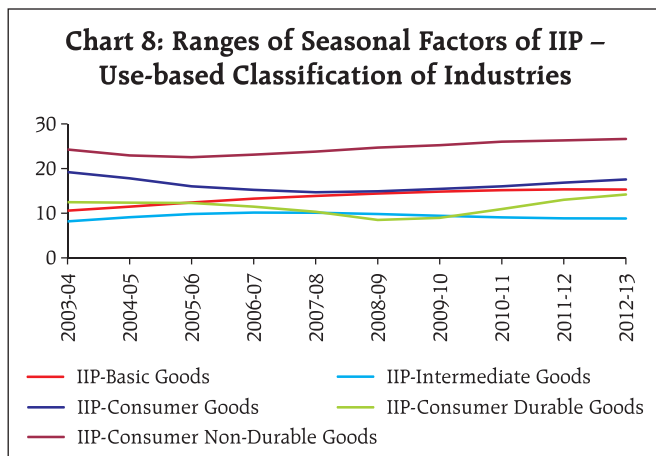
3.4 Industrial Production

3.4.1 Seasonal variation of IIP-General Index exhibited upward movement during the reference period. Among the three major sectors of IIP, viz., Mining, Manufacturing and Electricity, IIP-Mining exhibited the highest seasonal variation, whereas IIP-Electricity exhibited the lowest seasonal variation (Table 2 & Chart 7).

3.4.2 Among the use-based classification goods, IIP-Intermediate Goods experienced the lowest seasonal variations throughout the reference period, except for 2008-09 and 2009-10. In contrast, IIP-Consumer Non-durable goods exhibited the highest seasonal variations in all the years under reference (Chart 8). Seasonal variations in IIP for Basic goods and Consumer goods increased in recent years.

3.4.3 The seasonal variations of production of 'Cement' and 'Steel' exhibited opposite movements, during 2003-04 to 2012-13 with higher magnitude of seasonality in Cement than in Steel (Table 2 & Chart 9). The widening of gap between the seasonal variations of the two series





during the last six years is also evident. The seasonal variations in 'Production of Commercial Motor Vehicles' decreased from 44.5 in 2003-04 to 28.5 in 2007-08, and thereafter, witnessed a steady rise to 30.9 in 2012-13 (Table 2).

3.5 Services Sector Indicators

3.5.1 Over the reference period, the seasonal variation, in terms of range of seasonal factors, for 'Railway Freight Traffic' was higher as compared to that of 'Cargo Handled at Major Ports' (Table 2 & Chart 10).

3.5.2 The seasonal variation of 'Passenger flown Domestic' was higher than that of 'Passenger flown International' (Table 2 & Chart 11). The difference between the seasonal variations of the two series had, however, widened from 2007-08 onwards.

4. High and Low Seasonal Variation

Based on the average range of monthly seasonal factors during last five years (*i.e.*, 2008-09 to 2012-13), the top five series to register the highest seasonal

variations were 'IIP – Food products and beverages', 'IIP – Fabricated metal products, except machinery & equipment', 'Sales of Commercial Motor Vehicles', 'Coal Production', and 'Production of Commercial Motor Vehicles'; and the bottom five series were: 'WPI-All Commodities', 'WPI-Non-Food Non-Fuel', 'WPI-Manufactured Products', 'WPI-Non-Food Manufactured Products' and 'WPI-Milk' (Table 4).

5. Post Crisis: Seasonal Variation

It was observed that out of 82 select series the seasonal variation for 37 series increased post crisis (after 2008-09). The series with substantial increase in seasonal variation post crisis are 'Assets with Banking System (SCBs)', 'WPI-Sugar', 'IIP-Basic Goods Industries', 'IIP-Consumer Non-Durable Goods Industries', 'IIP-Mining', 'IIP-Fabricated metal products, except machinery & equipment', 'Coal Production', 'Passenger flown (Km)-Domestic' and 'Freight Tonne Km flown-Domestic' (Table 2).

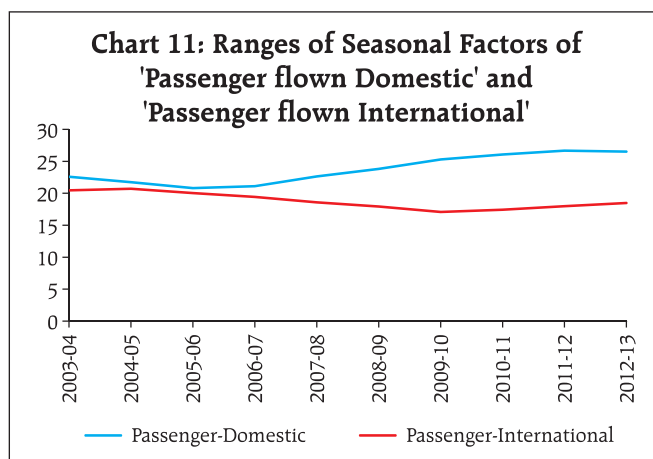
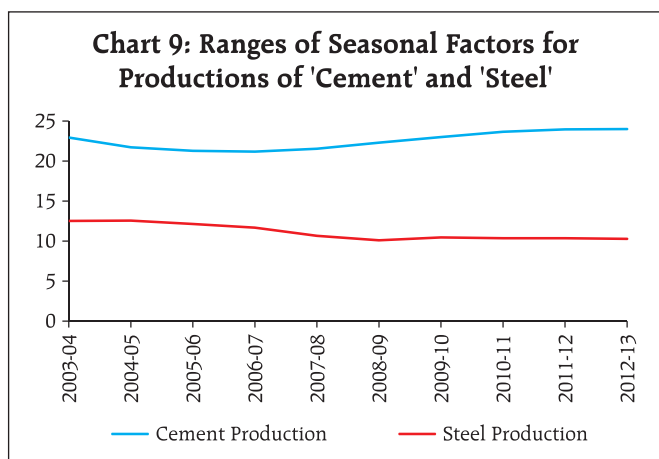


Table 1: Average Monthly Seasonal Factors of Selected Economic Time Series

Series Name	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar
1	2	3	4	5	6	7	8	9	10	11	12	13
A.1.1 Broad Money (M3)	101.4	100.9	100.2	100.1	99.8	99.7	99.7	99.4	99.0	99.3	99.7	100.7
A.1.1.1 Net Bank Credit to Government	101.8	101.5	101.1	101.8	100.9	99.6	99.2	99.6	97.2	98.7	98.6	100.1
A.1.1.2 Bank Credit to Commercial Sector	101.2	100.1	99.9	99.0	98.8	99.9	99.2	99.3	99.9	99.7	100.2	102.6
A.1.2 Narrow Money (M1)	102.7	101.5	100.6	98.9	98.5	99.4	98.3	98.3	99.1	99.1	100.0	103.8
A.1.2.1 Currency with Public	103.2	103.5	102.1	99.4	98.3	97.1	98.2	99.1	99.1	99.5	100.3	100.2
A.1.3 Reserve Money (RM)	103.4	101.9	101.2	99.7	98.9	97.6	98.6	99.0	98.4	98.7	98.9	103.9
A.1.3.1 Currency in Circulation	103.0	103.5	102.2	99.4	98.4	97.0	98.3	99.1	99.1	99.5	100.1	100.5
A.1.3.1.1 Notes in Circulation	103.1	103.5	102.2	99.2	98.3	96.9	98.3	99.3	99.0	99.5	100.2	100.5
A.2.1 Aggregate Deposits (SCBs)	101.3	100.5	100.0	100.4	100.1	100.1	99.9	99.4	98.7	99.1	99.4	100.9
A.2.1.1 Demand Deposits (SCBs)	102.3	98.5	98.1	98.0	98.4	102.3	98.1	97.4	99.3	98.7	100.2	109.3
A.2.1.2 Time Deposits (SCBs)	100.8	100.7	100.1	100.7	100.3	99.8	100.2	99.9	99.0	99.6	99.5	99.5
A.3.1 Cash in Hand and Balances with RBI (SCBs)	105.4	98.9	100.9	101.5	101.7	101.3	99.8	100.0	97.6	97.5	98.0	98.3
A.3.2 Assets with the Banking System (SCBs)	102.3	100.4	101.6	97.7	99.5	100.5	98.6	94.3	98.0	96.0	99.5	112.0
A.3.3 Bank Credit (SCBs)	101.4	100.3	100.1	99.3	98.9	99.4	99.0	99.1	99.8	99.8	100.3	102.7
A.3.3.1 Loans, Cash, Credits and Overdrafts (SCBs)	100.7	100.0	100.0	98.9	98.6	100.6	99.3	99.3	100.4	99.8	100.0	102.4
A.3.3.2 Non-Food Credit (SCBs)	101.5	100.0	99.8	99.4	98.8	99.6	99.1	99.1	99.8	99.8	100.2	102.8
A.3.4 Investments (SCBs)	100.6	100.7	100.2	101.4	101.9	101.1	101.0	100.2	98.3	98.4	98.6	97.6
B. WPI (Base: 2004-05=100) All Commodities	100.2	100.1	100.2	100.5	100.6	100.5	100.3	100.1	99.3	99.5	99.2	99.3
B.1 WPI - Primary Articles	99.7	99.9	100.8	101.1	101.5	101.1	101.1	101.0	99.0	98.8	98.0	98.0
B.1.1 WPI - Food Articles	99.4	99.5	100.0	101.1	101.5	101.5	102.4	102.0	98.7	98.8	97.8	97.2
B.1.1.1 WPI - Food Grains (Cereals+Pulses)	99.2	99.1	99.1	99.6	100.1	100.2	101.1	101.0	100.6	100.4	100.3	99.4
B.1.1.1.1 WPI - Cereals	99.4	99.3	99.3	99.4	99.8	99.9	100.6	100.6	100.4	100.7	100.6	99.9
B.1.1.1.1.1 WPI - Wheat	98.8	98.1	98.3	98.7	99.2	99.6	99.4	101.2	101.9	102.2	102.2	100.2
B.1.1.1.1.2 WPI - Rice	99.4	99.5	99.5	99.9	100.4	100.6	101.2	100.8	100.1	99.7	99.6	99.4
B.1.1.1.2 WPI - Pulses	98.3	98.0	98.3	100.3	101.7	101.6	102.7	102.9	101.2	99.6	98.1	97.6
B.1.1.2 WPI - Fruits & Vegetables	98.9	98.6	101.0	103.2	104.4	105.1	108.0	107.0	96.3	94.9	90.8	91.3
B.1.1.3 WPI - Milk	100.0	99.9	100.1	100.4	100.1	100.1	100.1	100.0	99.8	99.9	99.9	99.8
B.1.1.4 WPI - Egg, Meat and Fish	98.7	100.8	100.9	101.8	100.8	100.4	98.6	99.6	99.7	100.2	100.0	98.6
B.1.1.4.1 WPI - Egg	95.3	95.5	98.0	98.0	97.6	99.0	100.6	104.2	104.8	105.2	102.2	99.1
B.1.1.4.2 WPI - Meat	98.5	99.6	100.5	100.5	99.8	99.1	99.0	100.0	100.4	101.3	101.0	100.1
B.1.1.4.3 WPI - Fish	99.7	102.4	101.8	102.9	102.6	100.8	98.1	98.9	98.4	98.5	98.6	98.2
B.1.1.5 WPI - Protein Items (viz., Pulses, Milk, Egg, Meat and Fish) Group	99.3	100.0	100.1	100.9	100.8	100.7	100.2	100.1	99.7	99.8	99.8	98.9
B.1.2 WPI - Non-Food Articles	100.4	100.3	100.5	100.4	101.0	100.4	99.0	99.1	99.4	99.8	99.3	100.4
B.1.2.1 WPI - Fibres	99.2	99.6	100.3	102.2	101.8	101.5	99.8	99.6	99.2	99.8	98.7	98.5
B.1.2.1.1 WPI - Raw Cotton	98.9	99.5	100.5	103.0	102.7	103.3	99.7	99.6	98.3	99.3	97.8	97.8
B.1.2.2 WPI - Oil Seeds	100.2	100.7	101.5	101.5	101.6	100.9	98.4	98.2	98.7	99.8	99.3	99.3
B.2 WPI - Manufactured Products	100.5	100.5	100.3	100.2	100.2	100.1	99.9	99.6	99.5	99.7	99.7	99.8
B.2.1 WPI - Food Products	99.9	99.7	99.8	100.3	100.4	100.7	100.2	100.0	99.7	100.1	99.9	99.4
B.2.1.1 WPI - Grain Mill Products	98.8	98.0	98.2	99.1	99.3	100.0	100.5	101.1	101.0	101.7	101.6	100.5
B.2.1.2 WPI - Sugar	99.1	98.6	98.2	99.0	100.2	101.4	101.3	101.6	101.4	100.8	99.6	99.2
B.2.1.3 WPI - Edible Oils	99.7	100.0	100.0	100.5	100.9	100.5	99.6	99.4	100.2	100.1	99.7	99.5
B.3 WPI - Non Food Manufactured Products	100.4	100.4	100.3	100.2	100.1	100.0	99.8	99.6	99.5	99.7	99.8	100.1
B.4 WPI - Non Food Non-Fuel	100.5	100.7	100.5	100.2	100.2	100.0	99.8	99.5	99.3	99.6	99.7	100.0
C.1 Consumer Price Index for Industrial Workers (Base: 2001=100)	99.2	99.3	99.7	100.7	100.7	100.5	101.0	100.8	99.9	99.7	99.4	99.0
C.2 Consumer Price Index for Agricultural Labourers (Base: 1986-87=100)	99.0	99.1	99.7	100.2	100.6	100.8	101.0	101.0	100.4	99.8	99.4	99.0
C.3 Consumer Price Index for Rural Labourers (Base: 1986-87=100)	99.0	99.2	99.6	100.3	100.6	100.7	101.0	101.0	100.3	99.8	99.5	99.1

Series Name	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar
1	2	3	4	5	6	7	8	9	10	11	12	13
D. IIP (Base 2004-05 = 100) General Index	96.4	98.5	97.8	98.0	96.0	97.3	98.9	98.4	104.7	104.5	99.6	110.1
D.1.1 IIP - Basic Goods Industries	98.0	100.8	98.1	98.5	97.6	95.2	100.0	98.1	103.1	104.5	97.6	108.9
D.1.2 IIP - Intermediate Goods Industries	96.4	100.3	99.5	101.7	100.4	98.7	99.3	98.0	102.8	100.7	96.7	105.7
D.1.3 IIP - Consumer Goods Industries	98.7	98.0	96.0	97.2	93.1	95.0	95.6	97.1	106.8	109.0	104.4	108.4
D.1.3.1 IIP - Consumer Durable Goods Industries	97.5	100.8	97.8	99.6	96.7	101.9	105.6	101.8	97.1	99.5	97.0	104.7
D.1.3.2 IIP - Consumer Non-Durable Goods Industries	98.7	96.1	94.6	94.7	90.8	90.3	90.3	96.7	114.4	114.2	108.8	110.0
D.2.1 IIP - Mining	97.5	100.2	95.8	94.5	92.5	90.8	98.3	100.0	106.3	107.6	101.5	115.4
D.2.2 IIP - Manufacturing	95.8	97.7	97.6	98.1	96.3	98.1	98.5	98.3	105.1	104.4	100.5	109.8
D.2.2.1 IIP - Food products and beverages	97.4	90.0	88.8	81.4	72.7	70.2	76.7	98.3	136.3	135.6	126.5	125.6
D.2.2.2 IIP - Textiles	98.4	99.7	98.2	102.6	102.3	100.3	101.6	99.8	101.5	101.4	94.2	100.1
D.2.2.3 IIP - Wood and products of wood & cork except furniture; articles of straw & plating materials	89.5	102.5	98.7	101.1	99.6	94.2	96.0	98.6	108.4	101.5	104.4	105.8
D.2.2.4 IIP - Paper and paper products	96.8	101.4	99.0	102.5	101.7	99.6	100.3	98.3	100.2	99.7	95.5	105.7
D.2.2.5 IIP - Publishing, printing & reproduction of recorded media	98.8	101.5	98.7	103.0	101.3	98.1	102.8	99.2	102.0	100.0	94.8	99.9
D.2.2.6 IIP - Coke, refined petroleum products & nuclear fuel	95.0	99.2	100.5	102.2	100.3	95.7	101.1	97.6	101.7	104.0	96.7	105.9
D.2.2.7 IIP - Chemicals and chemical products	96.3	101.0	102.0	103.8	102.2	101.9	100.6	98.6	100.4	99.0	93.9	100.3
D.2.2.8 IIP - Rubber and plastics products	99.2	103.2	102.0	99.6	95.5	97.2	99.2	98.8	101.9	101.2	96.8	105.4
D.2.2.9 IIP - Other non-metallic mineral products	101.2	101.5	97.8	98.8	95.0	93.9	100.6	95.1	102.5	103.1	99.3	111.6
D.2.2.10 IIP - Basic metals	98.3	100.2	98.5	99.1	100.4	97.8	100.4	97.7	101.1	102.3	97.5	107.3
D.2.2.11 IIP - Fabricated metal products, except machinery & equipment	84.4	91.7	97.4	94.7	95.1	102.4	95.1	98.1	104.9	100.1	101.3	136.1
D.2.2.12 IIP - Motor vehicles, trailers & semi-trailers	95.9	97.7	89.5	98.0	96.1	97.8	103.0	104.7	93.3	103.8	104.5	115.7
D.2.2.13 IIP - Other transport equipment	91.4	95.6	94.7	96.8	98.7	102.7	108.9	105.6	96.3	100.4	98.3	110.6
D.2.3 IIP - Electricity	100.2	103.8	98.5	100.0	99.9	98.0	101.9	96.2	100.1	101.8	94.2	104.9
D.3 Cement Production	104.7	104.3	100.3	96.9	90.9	91.2	98.4	93.3	101.8	105.0	100.6	113.3
D.4 Steel Production	96.6	99.6	97.8	98.7	100.2	97.8	101.4	97.3	101.2	104.1	98.2	106.7
D.5 Coal Production	91.2	93.3	89.0	87.1	85.5	83.7	97.7	103.3	112.6	115.8	109.6	132.1
D.6 Crude Oil Production	98.5	100.8	99.0	101.6	101.2	98.3	102.3	99.1	101.9	101.7	92.7	102.7
D.7 Petroleum Refinery Production	96.2	100.7	100.3	101.6	100.6	96.1	100.2	97.9	101.5	103.6	96.6	104.7
D.8 Fertiliser Production	81.2	93.0	98.4	104.6	105.2	103.3	107.8	107.7	108.9	103.0	94.3	92.5
D.9 Natural Gas Production	97.5	101.4	98.3	102.1	100.8	98.0	103.0	99.7	102.6	101.9	92.0	102.6
D.10 Production of Commercial Motor Vehicles	89.1	93.6	90.1	96.7	96.1	100.1	100.4	104.1	97.4	108.3	103.8	118.9
E.1 Cargo handled at Major Ports	99.4	102.8	94.8	97.4	95.9	92.6	100.4	100.3	103.4	105.4	97.5	109.5
E.2 Railway Freight Traffic	97.3	101.1	96.8	97.5	95.3	92.7	98.1	98.3	104.4	105.8	98.7	113.9
E.3 Sales of Commercial Motor Vehicles	80.9	88.5	95.1	90.7	94.7	106.3	100.5	96.7	102.0	106.3	106.6	130.0
E.4 Passenger flown (Km) - Domestic	100.4	111.8	103.8	95.5	93.0	88.8	98.6	100.4	109.8	104.5	96.5	96.3
E.5 Passenger flown (Km) - International	96.0	99.7	101.5	107.7	104.9	92.5	91.6	94.7	106.7	110.3	94.5	100.5
E.6 Freight Tonne Km flown - Domestic	94.4	99.8	96.4	99.9	102.2	104.0	108.8	102.0	102.8	94.8	91.9	102.8

Note: Average figures relate to the reference period 2003-04 to 2012-13.

Table 2: Range (Difference Between Peak and Trough) of Seasonal Factors

Series \ Year	2003-04	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13	Average Range
1	2	3	4	5	6	7	8	9	10	11	12
A.1.1 Broad Money (M3)	2.5	2.6	2.8	2.8	2.8	2.7	2.5	2.3	2.0	1.8	2.5
A.1.1.1 Net Bank Credit to Government	4.1	4.3	4.8	5.2	5.4	5.4	5.1	4.7	4.5	4.4	4.7
A.1.1.2 Bank Credit to Commercial Sector	3.6	3.8	4.0	4.2	4.3	4.2	4.0	3.8	3.5	3.4	3.8
A.1.2 Narrow Money (M1)	5.6	5.7	5.9	6.3	6.3	6.2	5.8	5.6	5.3	5.1	5.5
A.1.2.1 Currency with Public	7.0	6.9	6.8	6.9	6.7	6.6	6.3	6.0	5.8	5.7	6.5
A.1.3 Reserve Money (RM)	7.2	7.5	7.4	7.0	6.4	6.5	6.6	6.4	6.2	5.9	6.3
A.1.3.1 Currency in Circulation	7.1	7.0	6.9	6.9	6.8	6.6	6.3	6.0	5.7	5.6	6.5
A.1.3.1.1 Notes in Circulation	7.3	7.1	7.0	7.0	6.9	6.7	6.4	6.1	5.8	5.7	6.6
A.2.1 Aggregate Deposits (SCBs)	2.4	2.7	3.0	3.1	3.0	2.9	2.6	2.3	2.0	1.8	2.6
A.2.1.1 Demand Deposits (SCBs)	11.4	12.9	14.3	14.8	14.3	14.1	13.0	11.5	9.9	8.5	11.9
A.2.1.2 Time Deposits (SCBs)	1.7	1.7	1.8	1.8	1.9	1.9	2.0	2.0	1.9	1.9	1.8
A.3.1 Cash in Hand and Balances with RBI (SCBs)	15.3	14.0	13.7	12.7	11.1	9.7	7.4	5.4	4.5	5.4	7.9
A.3.2 Assets with the Banking System (SCBs)	11.7	13.0	14.2	16.2	17.9	19.0	20.1	21.3	22.0	21.8	17.6
A.3.3 Bank Credit (SCBs)	3.4	3.5	3.7	3.9	4.2	4.3	4.3	4.1	4.0	3.9	3.9
A.3.3.1 Loans, Cash, Credits and Overdrafts (SCBs)	3.0	3.3	3.6	4.0	4.2	4.3	4.2	4.0	3.9	3.7	3.8
A.3.3.2 Non-Food Credit (SCBs)	3.8	3.6	3.6	4.0	4.3	4.5	4.5	4.2	4.0	3.9	4.0
A.3.4 Investments (SCBs)	3.5	3.4	3.6	3.8	4.1	4.5	4.8	5.1	5.3	5.5	4.3
B. WPI (Base 2004-05=100) All Commodities	1.1	1.4	1.6	1.8	1.9	1.8	1.6	1.3	1.0	1.0	1.4
B.1 WPI - Primary Articles	3.6	3.9	4.1	4.3	4.2	3.9	3.4	3.1	2.9	2.7	3.5
B.1.1 WPI - Food Articles	4.6	5.1	5.6	5.8	5.9	5.8	5.5	5.2	4.8	4.7	5.3
B.1.1.1 WPI - Food Grains (Cereals+Pulses)	1.4	1.6	1.8	2.1	2.4	2.4	2.3	2.3	2.4	2.6	2.1
B.1.1.1.1 WPI - Cereals	1.4	1.8	1.9	1.8	1.8	1.9	1.8	1.8	1.8	1.9	1.8
B.1.1.1.1.1 WPI - Wheat	5.6	5.8	5.4	4.7	4.2	3.8	3.5	3.3	3.3	3.4	4.3
B.1.1.1.1.2 WPI - Rice	2.4	2.0	1.8	1.4	1.4	1.6	1.9	2.3	2.7	3.1	2.1
B.1.1.1.2 WPI - Pulses	5.1	5.2	5.1	5.1	5.2	5.4	5.5	5.7	5.7	6.1	5.4
B.1.1.2 WPI - Fruits & Vegetables	19.3	19.4	19.5	19.0	18.3	17.4	16.4	15.4	15.7	15.8	17.6
B.1.1.3 WPI - Milk	1.3	1.2	1.0	0.7	0.5	0.4	0.6	1.0	1.3	1.6	1.0
B.1.1.4 WPI - Egg, Meat and Fish	5.1	5.2	5.1	4.6	3.8	3.0	2.6	3.5	4.0	4.3	4.1
B.1.1.4.1 WPI - Egg	15.4	13.8	12.2	10.5	8.9	7.9	7.3	7.9	8.9	9.4	10.2
B.1.1.4.2 WPI - Meat	5.3	5.2	4.7	3.8	2.9	2.0	1.6	1.6	2.0	2.6	3.2
B.1.1.4.3 WPI - Fish	7.9	7.6	8.1	7.4	5.9	4.8	3.8	3.8	4.2	4.3	5.8
B.1.1.5 WPI - Protein Items (viz., Pulses, Milk, Egg, Meat and Fish) Group	1.8	1.8	1.9	1.9	1.9	2.0	2.2	2.5	2.7	2.9	2.1
B.1.2 WPI - Non-Food Articles	2.3	2.2	2.5	2.7	2.8	2.4	2.8	3.3	3.5	3.6	2.8
B.1.2.1 WPI - Fibres	4.1	3.9	4.4	5.0	5.1	4.3	3.5	3.1	3.0	3.1	4.0
B.1.2.1.1 WPI - Raw Cotton	5.8	6.1	7.2	7.8	7.5	6.9	6.1	5.4	4.9	4.6	6.2
B.1.2.2 WPI - Oil Seeds	3.9	3.5	3.3	3.3	3.4	3.7	3.8	3.9	4.1	4.3	3.7
B.2 WPI - Manufactured Products	0.8	1.1	1.3	1.3	1.3	1.2	1.1	0.9	0.8	0.7	1.0
B.2.1 WPI - Food Products	2.0	1.8	1.6	1.2	1.0	1.1	1.3	1.5	1.7	1.8	1.5
B.2.1.1 WPI - Grain Mill Products	5.4	4.9	4.3	3.8	3.4	3.2	3.1	3.1	3.3	3.4	3.8
B.2.1.2 WPI - Sugar	2.4	2.1	1.9	2.2	2.9	4.0	5.1	5.7	5.8	5.6	3.8
B.2.1.3 WPI - Edible Oils	1.4	1.3	1.5	1.5	1.7	1.9	1.9	1.8	1.8	1.8	1.7
B.3 WPI - Non Food Manufactured Products	0.5	0.7	0.9	1.1	1.2	1.2	1.2	1.1	1.0	0.9	1.0
B.4 WPI - Non Food Non-Fuel	0.7	0.9	1.1	1.4	1.6	1.8	1.8	1.6	1.4	1.2	1.4
C.1 Consumer Price Index for Industrial Workers (2001=100)	1.7	1.8	1.9	2.0	2.2	2.2	2.2	2.1	2.1	2.0	2.0
C.2 Consumer Price Index for Agricultural Labourers (Base: 1986-87=100)	2.0	2.1	2.1	2.2	2.2	2.1	2.2	2.1	2.0	1.9	2.1
C.3 Consumer Price Index for Rural Labourers (Base: 1986-87=100)	1.9	1.9	2.0	2.1	2.1	2.1	2.1	2.0	1.9	1.8	2.0

Series \ Year	2003-04	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13	Average Range
1	2	3	4	5	6	7	8	9	10	11	12
D. IIP (Base 2004-05 = 100) General Index	12.7	13.5	13.9	14.1	14.0	14.4	14.9	15.4	15.8	16.0	14.5
D.1.1 IIP - Basic Goods Industries	10.6	11.5	12.4	13.3	13.9	14.4	14.9	15.2	15.3	15.3	13.7
D.1.2 IIP - Intermediate Goods Industries	8.2	9.1	9.8	10.1	10.1	9.8	9.4	9.1	8.8	8.8	9.3
D.1.3 IIP - Consumer Goods Industries	19.2	17.8	16.0	15.2	14.7	14.9	15.5	16.0	16.9	17.6	16.4
D.1.3.1 IIP - Consumer Durable Goods Industries	12.5	12.4	12.3	11.5	10.3	8.5	9.0	10.9	13.0	14.2	11.5
D.1.3.1 IIP - Consumer Non-Durable Goods Industries	24.3	23.0	22.5	23.1	23.8	24.7	25.2	26.0	26.3	26.7	24.6
D.2.1 IIP - Mining	19.5	21.1	22.7	23.9	25.0	25.8	26.4	26.8	27.3	27.6	24.6
D.2.2 IIP - Manufacturing	13.1	14.2	14.7	14.8	14.4	13.8	14.2	14.7	15.3	15.6	14.5
D.2.2.1 IIP - Food products and beverages*			68.0	67.7	66.6	65.7	65.1	65.1	65.0	65.6	66.1
D.2.2.2 IIP - Textiles*			9.2	9.2	9.0	8.6	8.1	7.9	8.2	8.4	8.6
D.2.2.3 IIP - Wood and products of wood & cork except furniture; articles of straw & plating materials*			20.9	20.6	19.9	19.3	18.6	17.9	17.2	16.6	18.9
D.2.2.4 IIP - Paper and paper products*			11.0	11.1	11.0	10.6	10.1	9.7	9.9	10.2	10.4
D.2.2.5 IIP - Publishing, printing & reproduction of recorded media*			8.8	8.7	8.6	8.3	8.1	7.9	8.0	8.0	8.3
D.2.2.6 IIP - Coke, refined petroleum products & nuclear fuel*			11.4	11.1	10.9	10.9	10.9	10.6	11.0	11.4	11.0
D.2.2.7 IIP - Chemicals and chemical products*			9.8	10.1	10.6	10.7	10.6	10.0	9.4	8.7	10.0
D.2.2.8 IIP - Rubber and plastics products*			8.5	8.9	9.2	9.6	10.0	10.6	11.0	11.4	9.9
D.2.2.9 IIP - Other non-metallic mineral products*			16.3	16.4	16.7	17.3	17.9	18.5	19.0	19.2	17.7
D.2.2.10 IIP - Basic metals*			10.6	10.7	10.6	10.3	10.1	10.4	10.5	10.2	10.4
D.2.2.11 IIP - Fabricated metal products, except machinery & equipment*			42.4	43.8	46.4	49.9	53.9	57.1	59.4	60.7	51.7
D.2.2.12 IIP - Motor vehicles, trailers & semi-trailers*			25.5	25.5	25.6	25.8	26.1	26.3	26.9	27.6	26.2
D.2.2.13 IIP - Other transport equipment*			22.8	22.0	20.5	20.3	20.3	19.4	18.3	17.5	20.1
D.2.3 IIP - Electricity	11.1	10.3	9.9	9.8	10.3	10.7	11.1	11.2	11.2	10.9	10.7
D.3 Cement Production	22.9	21.7	21.3	21.2	21.5	22.3	23.0	23.7	24.0	24.0	24.2
D.4 Steel Production	12.5	12.6	12.1	11.7	10.7	10.1	10.4	10.4	10.4	10.3	11.1
D.5 Coal Production	36.3	39.2	42.2	45.7	48.5	50.3	52.4	54.8	57.0	58.2	48.5
D.6 Crude Oil Production	10.3	10.1	10.1	10.0	10.0	9.9	10.1	10.1	10.2	10.3	10.1
D.7 Petroleum Refinery Production	9.7	9.5	9.2	8.9	8.6	8.1	9.2	10.4	11.7	12.4	9.8
D.8 Fertiliser Production*		28.5	28.5	28.4	28.0	27.6	27.1	27.0	26.9	27.0	27.7
D.9 Natural Gas Production*		11.1	11.5	12.0	12.1	11.8	11.1	10.8	10.6	10.4	11.3
D.10 Production of Commercial Motor Vehicles	44.5	37.5	32.5	28.8	28.5	28.8	29.3	29.9	30.2	30.9	32.1
E.1 Cargo handled at Major Ports	15.9	17.1	18.0	17.7	17.7	17.4	17.0	16.7	16.3	16.1	17.0
E.2 Railway Freight Traffic	19.4	19.9	20.7	21.4	21.6	21.6	21.6	21.6	21.9	22.1	21.2
E.3 Sales of Commercial Motor Vehicles	63.9	57.6	53.5	50.8	48.0	45.6	43.9	42.7	42.3	42.6	49.1
E.4 Passenger flown (Km) - Domestic	22.6	21.7	20.8	21.1	22.6	23.8	25.3	26.1	26.7	26.5	23.7
E.5 Passenger flown (Km) - International	20.5	20.7	20.0	19.4	18.6	17.9	17.1	17.4	18.0	18.5	18.8
E.6 Freight Tonne Km flown - Domestic	13.2	13.6	14.5	16.2	17.8	18.8	19.5	19.6	19.0	18.1	17.0

*Seasonal adjustment for these series is based on 8 to 9 years data depending on availability. Guidelines of both, Office of National Statistics (ONS), UK, and US Census Bureau, however, suggest using more than ten years data for estimating stable monthly seasonal factors.

Table 3: Change in seasonal variation in 2012-13 vis-à-vis previous 5-years (2007-08 to 2011-12)

Name of Variable	2012-13	Average*	Change	Name of Variable	2012-13	Average*	Change
1	2	3	4	5	6	7	8
A.1.1 Broad Money (M3)	1.8	2.5	-0.7	B.3 WPI - Non Food Manufactured Products	0.9	1.1	-0.2
A.1.1.1 Net Bank Credit to Government	4.4	4.9	-0.5	B.4 WPI - Non Food Non-Fuel	1.2	1.6	-0.4
A.1.1.2 Bank Credit to Commercial Sector	3.4	3.9	-0.6	C.1 Consumer Price Index for Industrial Workers (Base: 2001=100)	2.0	2.0	0.0
A.1.2 Narrow Money (M1)	5.1	5.8	-0.7	C.2 Consumer Price Index for Agricultural Labourers (Base: 1986-87=100)	1.9	2.1	-0.2
A.1.2.1 Currency with Public	5.7	6.3	-0.6	C.3 Consumer Price Index for Rural Labourers (Base: 1986-87=100)	1.8	2.0	-0.1
A.1.3 Reserve Money (RM)	5.9	6.4	-0.5	D.IIP (Base: 2004-05=100) General Index	16.0	14.5	1.6
A.1.3.1 Currency in Circulation	5.6	6.3	-0.7	D.1.1 IIP - Basic Goods Industries	15.3	13.7	1.7
A.1.3.1.1 Notes in Circulation	5.7	6.4	-0.7	D.1.2 IIP - Intermediate Goods Industries	8.8	9.3	-0.5
A.2.1 Aggregate Deposits (SCBs)	1.8	2.6	-0.7	D.1.3 IIP - Consumer Goods Industries	17.6	16.4	1.2
A.2.1.1 Demand Deposits (SCBs)	8.5	12.5	-4.0	D.1.3.1 IIP - Consumer Durable Goods Industries	14.2	11.5	2.8
A.2.1.2 Time Deposits (SCBs)	1.9	2.0	-0.1	D.1.3.2 IIP - Consumer Non-Durable Goods Industries	26.7	24.6	2.1
A.3.1 Cash in Hand and Balances with RBI (SCBs)	5.4	7.3	-1.8	D.2.1 IIP - Mining	27.6	24.6	3.0
A.3.2 Assets with the Banking System (SCBs)	21.8	19.9	1.8	D.2.2 IIP - Manufacturing	15.6	14.5	1.1
A.3.3 Bank Credit (SCBs)	3.9	4.1	-0.3	D.2.2.1 IIP - Food products and beverages	65.6	66.1	-0.5
A.3.3.1 Loans, Cash, Credits and Overdrafts (SCBs)	3.7	4.1	-0.4	D.2.2.2 IIP - Textiles	8.4	8.6	-0.2
A.3.3.2 Non-Food Credit (SCBs)	3.9	4.2	-0.4	D.2.2.3 IIP - Wood and products of wood & cork except furniture; articles of straw & plating materials	16.6	18.9	-2.3
A.3.4 Investments (SCBs)	5.5	4.8	0.7	D.2.2.4 IIP - Paper and paper products	10.2	10.4	-0.3
B. WPI (BASE 2004-05=100) All Commodities	1.0	1.5	-0.5	D.2.2.5 IIP - Publishing, printing & reproduction of recorded media	8.0	8.3	-0.3
B.1 WPI - Primary Article	2.7	3.4	-0.7	D.2.2.6 IIP - Coke, refined petroleum products & nuclear fuel	11.4	11.0	0.4
B.1.1 WPI - Food Articles	4.7	5.4	-0.7	D.2.2.7 IIP - Chemicals and chemical products	8.7	10.0	-1.3
B.1.1.1 WPI - Food Grains (Cereals+Pulses)	2.6	2.3	0.3	D.2.2.8 IIP - Rubber and plastics products	11.4	9.9	1.5
B.1.1.1.1 WPI - Cereals	1.9	1.7	0.2	D.2.2.9 IIP - Other non-metallic mineral products	19.2	17.7	1.5
B.1.1.1.1.1 WPI - Wheat	3.4	3.6	-0.2	D.2.2.10 IIP - Basic metals	10.2	10.4	-0.2
B.1.1.1.1.2 WPI - Rice	3.1	1.9	1.2	D.2.2.11 IIP - Fabricated metal products, except machinery & equipment	60.7	51.7	9.0
B.1.1.1.2 WPI - Pulses	6.1	5.5	0.5	D.2.2.12 IIP - Motor vehicles, trailers & semi-trailers	27.6	26.2	1.4
B.1.1.2 WPI - Fruits & Vegetables	15.8	16.2	-0.4	D.2.2.13 IIP - Other transport equipment	17.5	20.1	-2.7
B.1.1.3 WPI - Milk	1.6	0.7	1.0	D.2.3 IIP - Electricity	10.9	10.7	0.2
B.1.1.4 WPI - Egg, Meat and Fish	4.3	2.8	1.5	D.3 Cement Production	24.0	23.4	0.6
B.1.1.4.1 WPI - Egg	9.4	7.9	1.5	D.4 Steel Production	10.3	10.3	0.0
B.1.1.4.2 WPI - Meat	2.6	1.7	0.8	D.5 Coal Production	58.2	54.6	3.6
B.1.1.4.3 WPI - Fish	4.3	3.9	0.4	D.6 Crude Oil Production	10.3	10.0	0.3
B.1.1.5 WPI - Protein Items (viz., Pulses, Milk, Egg, Meat and Fish) Group	2.9	2.1	0.8	D.7 Petroleum Refinery Production	12.4	10.3	2.1
B.1.2 WPI - Non-Food Articles	3.6	2.5	1.1	D.8 Fertiliser Production	27.0	27.3	-0.2
B.1.2.1 WPI - Fibres	3.1	3.5	-0.4	D.9 Natural Gas Production	10.4	10.7	-0.3
B.1.2.1.1 WPI - Raw Cotton	4.6	5.9	-1.3	D.10 Production of Commercial Motor Vehicles	30.9	29.8	1.0
B.1.2.2 WPI - Oil Seeds	4.3	3.6	0.8	E.1 Cargo handled at Major Ports	16.1	16.7	-0.6
B.2 WPI - Manufactured Products	0.7	1.1	-0.4	E.2 Railway Freight Traffic	22.1	21.7	0.4
B.2.1 WPI - Food Products	1.8	1.2	0.6	E.3 Sales of Commercial Motor Vehicles	42.6	43.4	-0.8
B.2.1.1 WPI - Grain Mill Products	3.4	3.2	0.2	E.4 Passenger flown (Km) - Domestic	26.5	25.7	0.9
B.2.1.2 WPI - Sugar	5.6	4.7	0.9	E.5 Passenger flown (Km) - International	18.5	17.5	1.0
B.2.1.3 WPI - Edible Oils	1.8	1.8	0.0	E.6 Freight Tonne Km flown - Domestic	18.1	19.0	-0.9

*Average Range of Monthly Seasonal Factors for the last 5-years (2007-08 to 2011-12)

Note: Downward Change (for 41 series), Upward Change (for 38 series), and No Change (for 3 series)

Table 4: List of Top-Twenty and Bottom-Twenty Series based on Average Range of Monthly Seasonal Factors during Last Five Years (2008-09 to 2012-13) and corresponding Peak and Trough Months

Name of Top-Twenty Series	Average Range	Peak Month	Trough Month	Name of Bottom-Twenty Series	Average Range	Peak Month	Trough Month
1	2	3	4	5	6	7	8
D.2.2.1 IIP - Food products and beverages	66.3	Dec	Sep	B.1 WPI - Primary Articles	3.5	Aug	Mar
D.2.2.11 IIP - Fabricated metal products, except machinery & equipment	51.9	Mar	Apr	B.1.1.4.2 WPI - Meat	3.2	Jan	Apr
E.3 Sales of Commercial Motor Vehicles	49.1	Mar	Apr	B.1.2 WPI - Non-Food Articles	2.8	Aug	Oct
D.5 Coal Production	48.5	Mar	Sep	A.2.3 Aggregate Deposits (SCBs)	2.6	Apr	Dec
D.10 Production of Commercial Motor Vehicles	32.1	Mar	Apr	A.1.1 Broad Money (M3)	2.5	Apr	Dec
D.8 Fertiliser Production	27.7	Dec	Apr	B.1.1.5 WPI - Protein Items (viz., Pulses, Milk,	2.1	Jul	Mar
D.2.2.12 IIP - Motor vehicles, trailers & semi-trailers	25.5	Mar	Jun	B.1.1.1 WPI - Food Grains	2.1	Oct	May
D.2.1 IIP - Mining	24.7	Mar	Sep	C.1 Consumer Price Index for Industrial Workers (2001=100)	2.1	Oct	Mar
D.1.3.1 IIP - Consumer Non-Durable Goods Industries	24.6	Dec	Oct	B.1.1.1.1.2 WPI - Rice	2.1	Oct	Apr
D.3 Cement Production	24.2	Mar	Aug	C.2 Consumer Price Index for Agricultural Labourers (Base: 1986-87=100)	2.1	Nov	Apr
E.4 Passenger flown (Km) - Domestic	23.7	May	Sep	C.3 Consumer Price Index for Rural Labourers (Base: 1986-87=100)	2.0	Nov	Apr
E.2 Railway Freight Traffic	21.2	Mar	Sep	A.2.3.2 Time Deposits (SCBs)	1.8	Apr	Dec
D.2.2.13 IIP - Other transport equipment	20.2	Mar	Apr	B.1.1.1.1 WPI - Cereals	1.8	Jan	Jun
D.2.2.3 IIP - Wood and products of wood & cork except furniture; articles of straw & plating materials	18.9	Dec	Apr	B.2.1.3 WPI - Edible Oils	1.7	Aug	Nov
E.5 Passenger flown (Km) - International	18.8	Jan	Oct	B.2.1 WPI - Food Products	1.5	Sep	Mar
B.1.1.2 WPI - Fruits & Vegetables	17.6	Oct	Feb	B. WPI (Base 2004-05=100) All Commodities	1.4	Aug	Feb
A.3.2 Assets with the Banking System (SCBs)	17.6	Mar	Nov	B.4 WPI - Non Food Non-Fuel	1.4	May	Dec
D.2.2.9 IIP - Other non-metallic mineral products	17.5	Mar	Sep	B.2 WPI - Manufactured Products	1.0	May	Dec
E.6 Freight Tonne Km flown - Domestic	17.0	Oct	Feb	B.3 WPI - Non Food Manufactured Products	1.0	May	Dec
E.1 Cargo handled at Major Ports	17.0	Mar	Sep	B.1.1.3 WPI - Milk	1.0	Jul	Dec