

A Note on the relationship between common items of Wholesale Price Index (WPI) and Consumer Price Index (Industrial Workers)

Saju K. Surendran
Deputy Director

Abstract

This note is an attempt to gauge the long run relationship between common items of Wholesale Price Index (WPI) and Consumer Price Index (Industrial Workers). For the empirical analysis the Johansen's Trace test for co-integration has been applied on monthly data (January, 2006 to January, 2011) of WPI and CPI (IW). This analysis found that the Index for common items, which carriage about 70% weights in terms of CPI (IW) weights, are co-integrated in the long run. Therefore, inflation computed from WPI can be used as official measure of inflation without worrying for the short run divergence between WPI and CPI (IW).

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Contact details:-

Saju K. Surendran
Deputy Director, Room No.:522-D,
Office of the Economic Adviser,
Department of Industrial Policy & Promotion,
Ministry of Commerce & Industry,
Udyog Bhavan, New Delhi-11
Telephone No. 011-23061532
Fax No. 011-23063335
E-mail: saju.ks@nic.in
sajuies@gmail.com

A Note on the relationship between common items of Wholesale Price Index (WPI) and Consumer Price Index (Industrial Workers)*

Introduction

In India, like many other countries, a variety of inflation indices are constructed. The multiplicity of the indices is at times blamed for policy blinks.¹ There is, however, nothing wrong in purpose specific price indices and many countries construct these indices specifically for exporters, importers, producers and consumers.²

Wholesale Price Index (WPI) and the Consumer Price Index-Industrial Workers (CPI-IW) are, however the two main indexes for tracing price movements in India at national level. WPI is often preferred as the measure of headline inflation because of its wider commodity coverage, its high frequency³ and its weighting diagram, drawn from the National Accounts.

Both WPI and CPI-IW are constructed at commodity level and then to a higher order of aggregation based on commodity weights. In CPI-IW weights to individual commodities are assigned on the basis of their relative importance in expenditure of the industrial workers. WPI, on the other hand, follows a three stage approach in assigning weights to commodities⁴.

- a. At the first stage, the weights of three major groups (Primary Articles, Fuel & Power and Manufactured Products) are decided on the basis of the value of transaction. The value of transaction has been worked out on the basis of value of output as obtained from National Accounts and adjusted for international trade. The weights so assigned are in proportion

¹ "In India, we have one wholesale price index and four consumer price indices. There are ongoing efforts at a technical level to reduce the number of consumer price indices, but that still will not give us a single representative inflation rate." D Subbarao, Governor, Reserve Bank of India

² NIPFP Working Paper 2011-83, February 2011- How to measure inflation- Ila Patnaik, Ajay Shah, Giovanni Veronese

³ For Primary Articles and the commodities in the broad group 'fuel and power' WPI has a weekly release mechanism. Index is released with a timelag of 11 days.

⁴ Office of Economic Adviser, Paper No 33- Wholesale and Retail Price Trends of Selected Commodities- Do They Converge- M C Singhi

of the value of transactions and are, therefore, imposed from above.

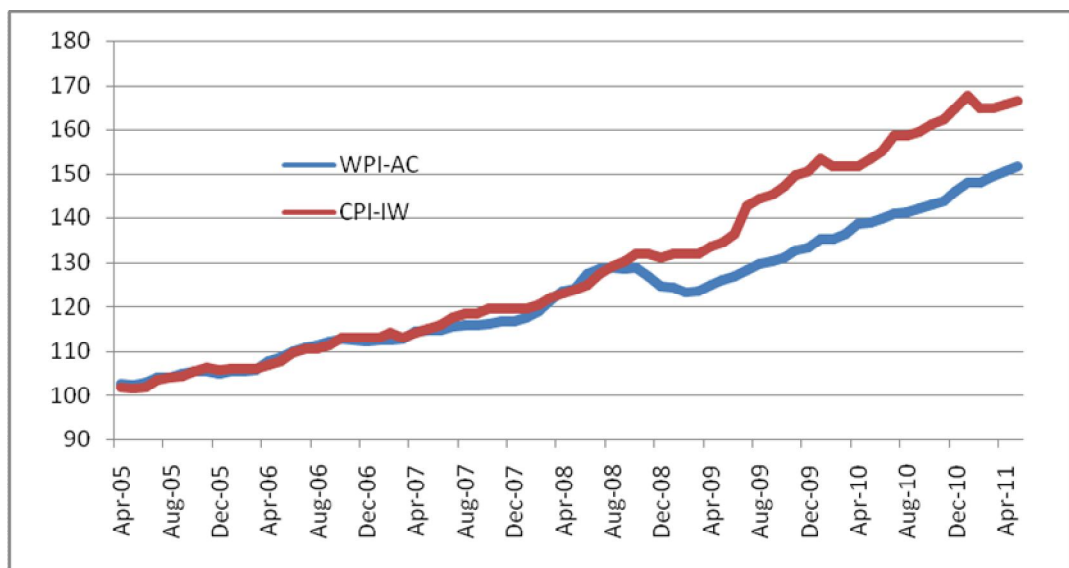
b. In second stage, the weights of the items at the broad group level are decided. Within the three major groups, for the Primary Articles, the weights for food articles, non-food articles and minerals; for the Fuel group, weights for coal, minerals, oils and electricity; and for Manufactured Products, weights at the two digit NIC classification of the industrial groups level, are again imposed from above and are in proportion of the value of transactions.

c. At the third stage, weights at commodity level are decided based on the relative output of the selected commodities in such a manner that the total weights of the commodities within a group would be equal to the weights assigned at the broad group level. For the agricultural commodities within the Primary Articles, weights of the items are based on the presumed marketed surplus.

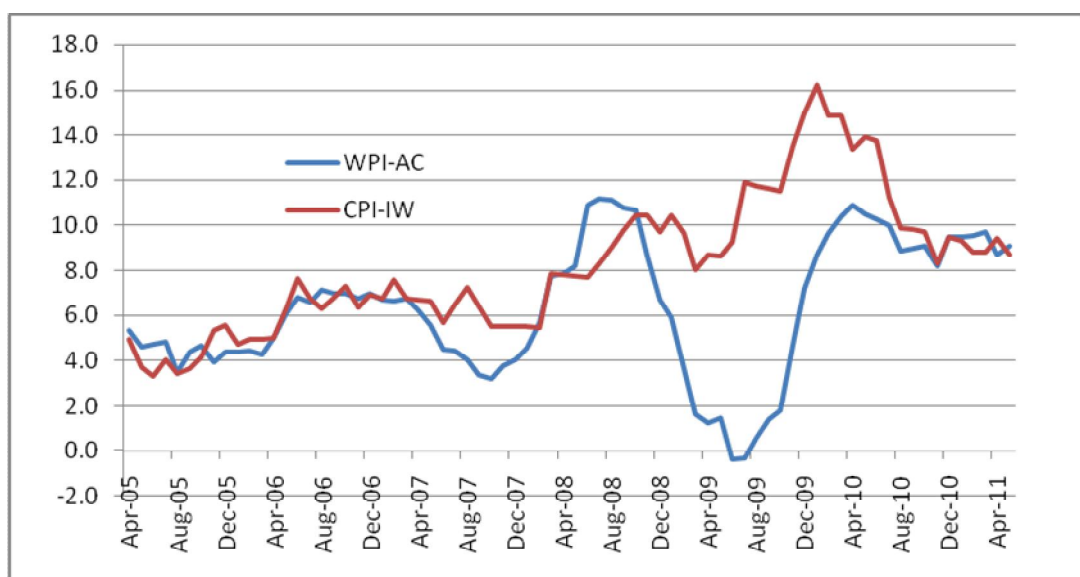
Questions have been raised regarding the usefulness and reliability of WPI for policy making, particularly the monetary policy. A strong argument against using WPI as the headline inflation in the country is its non coverage of Service Sector which accounts for more than 55% of GDP. Though this criticism is valid, by assigning weights on the basis of output (or turnover) rather than the value addition, to a significant extent the services implicit in delivery of products are in a way taken note of. The wholesale prices, implicitly take the mark up on account of storage, transportation, banking and insurance. The Office of the Economic Adviser (OEA), Department of Industrial Policy & Promotion (DIPP) is, however, at an advanced stage of releasing an index for service sector, namely, 'Business Service Price Index', which would address the issue of non coverage of service sector in WPI, once it is incorporated into the WPI framework. Further, since WPI covers tradable commodities, it is considered to follow the global commodity prices, which monetary policy could hardly influence, except through the exchange rate route.

Conceptually, WPI and CPI (IW) can differ on many counts. While WPI does not cover services, the commodity basket of CPI (IW) includes certain personal services such as medical care, education, recreation and amusement, transport and communication and personal care and effects. They can also differ due to difference in the weighting diagram and also due to the existence of commodities/ items exclusive to one series. Inflation based on WPI and CPI (IW) began to show a divergence from the beginning of 2008 and questions have been raised on the measurement of inflation in the country. At aggregate level, CPI-IW and WPI have differed in the movement of index and inflation.

Trends in WPI (All Commodities) and CPI (Industrial Workers)



Inflation-WPI (AC) and CPI (IW)



Methodology

The present exercise is attempt to look at the relationship of common items of CPI (IW) and WPI. This is a first attempt in this direction as commodity/item level indices for CPI (IW) are not available in the public domain.

CPI (IW) compiled and released by Labour Bureau is available only at Group and sub Group levels whereas WPI, compiled and released by the Office of the Economic Adviser (OEA), Ministry of Commerce & Industry is available at Group, Sub Group and item levels. For the purpose of this analysis, item level indices of CPI (IW) were obtained from Labour Bureau.

First, we have identified the items which are common to both WPI & CPI (IW). Accordingly, the following 14 Groups/Sub Groups, consisting of identical items, were formed. Finally, aggregate level index for WPI and CPI (IW) are compiled as a weighted average of the Group/ Sub Group indexes. The complete list is given in Annexure I

Common Groups/ sub Groups

1. Cereals & Products
2. Pulses & Products
3. Oil & Fats
4. Meat, Fish & Eggs
5. Milk & Products
6. Condiments & Spices
7. Vegetables & Fruits
8. Other Foods
9. Pan, Supari, Tobacco & Intoxicants
10. Fuel & Light
11. Clothing, Bedding & Footwear
12. Transport & Communication
13. Personal care & Effects
14. Other Miscellaneous items

Variation in both the series may arise due to one or more of the following reasons:

- (a) Difference in price
- (b) Difference in weights
- (c) Difference in methodology for compilation.
- (d) Difference in base year.

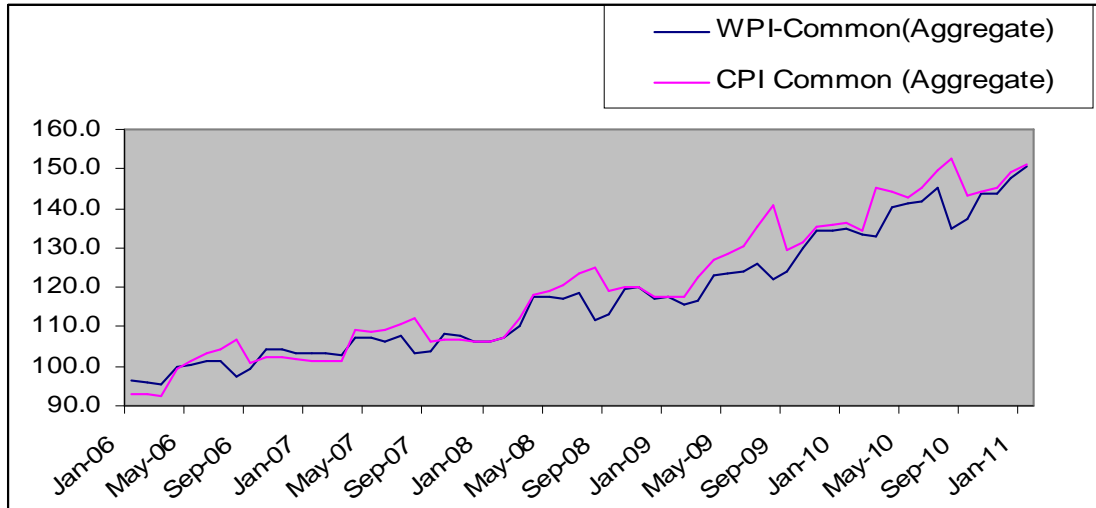
In order to nullify the effect of difference in the weighting diagram of the two series, the WPI weights are assigned to the item level indexes of both series.

The methodology followed for compiling item level index for CPI (IW) and WPI are different. In CPI (IW), average price of the quotations for the item is calculated first and price relative of this average price with the base price is taken which is the index for that item. In WPI, instead of going for the average price of various quotations of the item, price relative of each quotation with its base price is calculated first and then, the average of the price relative is calculated, which is the index for that item. In short, while in WPI average of the price relative is taken as the index for the item, in CPI, price relative of the average price of various quotations is taken as the index for the item. Notwithstanding the differences in the methodology, there seems to be no significant variation in the index at item/commodity level.

CPI (IW) is available with base year 2001 whereas the base year of WPI is 2004-05. Therefore, normalization of the series to a common base year (2006=100) was made in order to make the two series comparable. The Sub Group and Group indexes are compiled as the weighted average of the items/sub-group following the standard practice. Monthly index from January, 2006 to December, 2010 is being used for the comparison.

In this paper, aggregated WPI and CPI (IW) with base year 2006 has been used. Aggregated index for WPI and CPI (IW) were compiled from the 14 Groups/ Sub Groups listed above following the standard methodology. Johansson's technique is used to test co-integration of the series.

The graph below gives the movement of CPI (IW) and WPI. Both series move identically and have increasing trends.



Before proceeding with Johansen's co-integration technique, the variables need to be tested for stationarity. For identifying the possibilities of unit root in levels and first differences of the series, Augmented Dickey Fuller (ADF) test has been conducted.

Findings

The results of the ADF test at levels and first difference, Johansen's trace test for co-integration and VAR estimates, Error Correction Models and Granger causality test are given in Annexure II.

The ADF test confirms that the variables, WPI and CPI (for common items) are integrated of order 1 (1). The result validates that all the variables are non stationary at level and stationary at first difference. Hence the variables fulfill the necessary condition for co-integration approach. Johansen's trace test for co-integration test establishes that WPI and CPI (IW) are co-integrated at 5% level. Co-integration describes the long run equilibrium relation amongst variables. To explore how the short run deviations in the variables are restored, the Error Correction model is used. The result shows that the rate of adjustment is 0.43 per period. This means that any difference in the long run equilibrium path between WPI and CPI (IW) would get reduced by 0.43 points every period.

Granger causality test was also performed to explore the direction and magnitude of the relation between WPI and CPI (IW).

The results show that at 5% significance level, WPI granger causes CPI could not be rejected.

Conclusion

This paper is an attempt to explore the relationship between common items of WPI and CPI (IW). This has been done through the co-integration and error correction models. Further, this paper also explore the nature of dependence between WPI and CPI (IW), i.e., whether WPI causes CPI (IW) or vice versa. The empirical results demonstrate that there exists a long run equilibrium relationship between common items of WPI and CPI (IW).

On a group basis, average monthly build up of prices in CPI-IW has been higher than WPI, but that difference is just 10 basis points, or annualized 1.2 percentage points. The CPI-IW build up of inflation has been higher for all commodity groups except 'condiments & spices'. In case of 'milk & milk products', 'transport & communication', 'fuel & light' and 'personal care products' the WPI and CPI-IW build up of inflation during the analysis period has remained virtually same. The comparison of the average inflation during the analysis period indicate that the mean inflation has been higher for WPI in respect of 'milk & milk products', 'condiments & spices' and 'fuel & light'. Volatility of inflation in both series follows a common pattern across commodity groups. Pulses, edible oils, other foods and transport groups exhibit greater relative volatility.

	WPI			CPI-IW		
	Ave Monthly Build up prices	Mean Inflation	Standard Deviation	Ave Monthly Build up prices	Mean Inflation	Standard Deviation
Cereals & Products	0.92	9.57	2.95	1.02	10.49	3.93
Pulses & Products	0.83	9.02	11.75	0.94	9.72	13.04
Oil & Fats	0.67	4.78	8.47	0.85	6.09	14.92
Meat, Fish & Eggs	0.94	12.98	13.54	1.18	13.54	3.95
Milk & Products	1.17	12.68	7.54	1.20	12.23	3.78
Condiments & Spices	2.76	22.53	18.39	2.48	19.91	16.82
Vegetables & Fruits	1.38	11.40	10.86	1.53	14.05	12.03
Other Foods	0.83	11.00	18.66	0.89	12.58	23.01
Pan, Supari, Tobacco & Intoxicants	0.79	7.64	2.86	1.02	10.98	3.08
Fuel & Light	0.52	5.31	6.00	0.55	5.06	4.24
Clothing, Bedding & Footwear	0.37	3.87	2.02	0.66	6.06	2.17
Transport & Communication	0.55	3.22	11.22	0.56	3.26	10.81
Personal Care & Effects	0.51	5.08	2.85	0.53	6.25	3.65
Other Miscell. Items	0.46	4.52	1.63	0.78	7.52	4.70

The common items between WPI and CPI (IW) carry approximately 29% weights (in terms of WPI weight) and about 70% (in terms of CPI (IW) weights). On the basis of the findings of this paper we may conclude that RBI should focus on WPI for monetary policy purpose. Major chunk of tradable goods are covered in the present analysis and RBI's monetary policy has a direct bearing on these goods only (services are less likely to be affected by rate changes).

This study concludes that use of WPI for monetary policy purpose would bring the desired effects in the long run. Any deviation between WPI and CPI (IW) are of short term nature which would get corrected in the long run. Moreover, WPI can be considered as a precursor for CPI (IW). Considering the frequency of release, coverage of commodities and the base period not far from the present, WPI can be considered as giving the most valuable information for assessing inflationary pressures in the country and the most effective tool for policy making in India, at present.

Annexure I

1. Cereals & Products (Weight 4.47113)

No. of common items 12

	2006	2007	2008	2009	2010
WPI	100	109.3	119.6	133.3	144.7
CPI	100	109.5	121.7	133.4	149.4
Inflation WPI		9.28	9.45	11.47	8.51
Inflation CPI		9.50	11.10	9.62	12.06

2. Pulses & Products (Weight 0.81396)

No. of common items 6

	2006	2007	2008	2009	2010
WPI	100	104.3	108.6	126.8	140.2
CPI	100	105.2	112.2	136.7	142.8
Inflation WPI		4.27	4.17	16.72	10.62
Inflation CPI		5.25	6.58	21.86	4.48

3. Oil & Fats (Weight 3.04293)

No. of common items 10

	2006	2007	2008	2009	2010
WPI	100	113.1	124.7	115.8	118.4
CPI	100	114.7	136.2	114.7	120.1
Inflation WPI		13.07	10.28	-7.17	2.29
Inflation CPI		14.67	18.74	-15.74	4.69

4. Meat, Fish & Eggs (Weight 1.69125)

No. of common items 6

	2006	2007	2008	2009	2010
WPI	100	105.2	107.5	126.1	159.2
CPI	100	113.8	126.8	145.5	166.0
Inflation WPI		5.19	2.17	17.35	26.22
Inflation CPI		13.81	11.39	14.73	14.13

5. Milk & Products (Weight 3.71592)

No. of common items 4

	2006	2007	2008	2009	2010
WPI	100	107.0	114.0	129.8	159.8
CPI	100	108.1	122.6	135.8	158.2
Inflation WPI		6.98	6.52	13.89	23.16
Inflation CPI		8.13	13.39	10.76	16.46

Annexure I

6. Condiments & Spices (Weight 0.68322)

No. of common items 9

	2006	2007	2008	2009	2010
WPI	100	134.8	132.0	162.2	210.9
CPI	100	129.0	125.6	156.2	195.4
Inflation WPI		34.83	-2.07	22.82	30.03
Inflation CPI		28.97	-2.58	24.30	25.11

7. Vegetables & Fruits (Weight 3.47956)

No. of common items 19

	2006	2007	2008	2009	2010
WPI	100	108.9	125.0	128.2	150.0
CPI	100	107.6	117.3	142.5	162.8
Inflation WPI		8.92	14.77	2.59	16.96
Inflation CPI		7.62	8.97	21.50	14.27

8. Other Foods (Weight 2.65019)

No. of common items 9

	2006	2007	2008	2009	2010
WPI	100	90.1	96.9	129.5	146.4
CPI	100	87.9	96.3	134.9	152.0
Inflation WPI		-9.87	7.45	33.66	13.09
Inflation CPI		-12.10	9.58	40.01	12.74

9. Pan, Supari, Tobacco & Intoxicants (Weight 1.29216)

No. of common items 7

	2006	2007	2008	2009	2010
WPI	100	106.6	119.2	126.8	133.8
CPI	100	112.2	123.1	134.3	151.3
Inflation WPI		6.65	11.79	6.34	5.51
Inflation CPI		12.22	9.73	9.05	12.69

10. Fuel & Light (Weight 3.30877)

No. of common items 6

	2006	2007	2008	2009	2010
WPI	100	100.9	111.5	113.6	121.8
CPI	100	102.0	105.9	110.5	120.9
Inflation WPI		0.94	10.50	1.86	7.20
Inflation CPI		1.95	3.84	4.36	9.46

Annexure I

11. Clothing, Bedding & Footwear (Weight 1.15035)

No. of common items 12

	2006	2007	2008	2009	2010
WPI	100	101.8	106.0	111.7	115.9
CPI	100	104.9	110.0	116.7	125.8
Inflation WPI		1.78	4.16	5.36	3.80
Inflation CPI		4.91	4.82	6.16	7.78

12. Transport & Communication (Weight 1.16721)

No. of common items 2

	2006	2007	2008	2009	2010
WPI	100	96.3	104.7	95.4	109.1
CPI	100	96.4	105.1	96.2	109.5
Inflation WPI		-3.69	8.75	-8.87	14.35
Inflation CPI		-3.55	8.95	-8.47	13.89

13. Personal Care & Effects (Weight 0.75989)

No. of common items 9

	2006	2007	2008	2009	2010
WPI	100	105.6	114.5	120.6	122.2
CPI	100	105.7	115.2	125.7	127.8
Inflation WPI		5.59	8.42	5.32	1.31
Inflation CPI		5.66	8.99	9.17	1.66

14. Other Miscell. Items (Weight 1.21036)

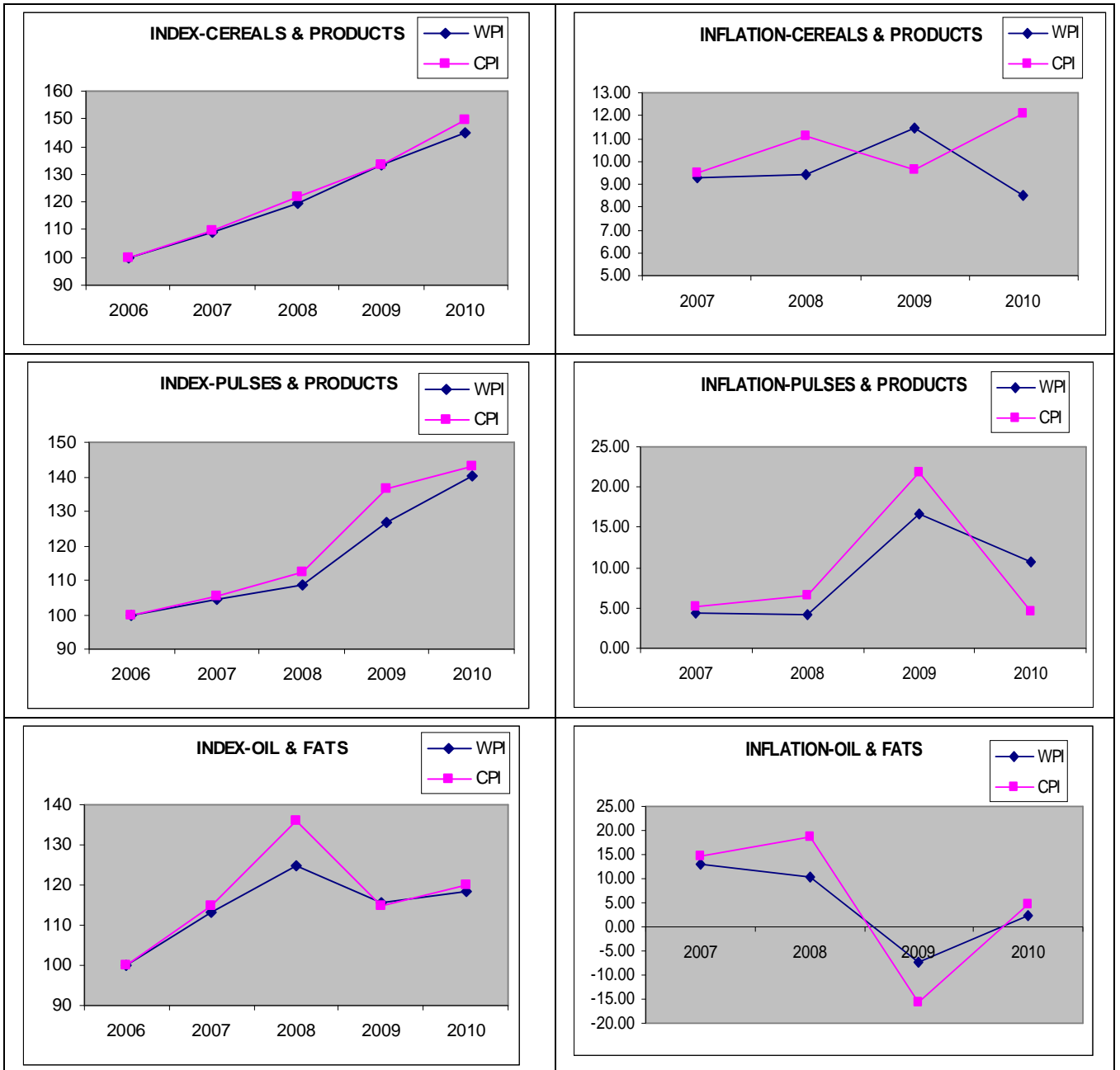
No. of common items 13

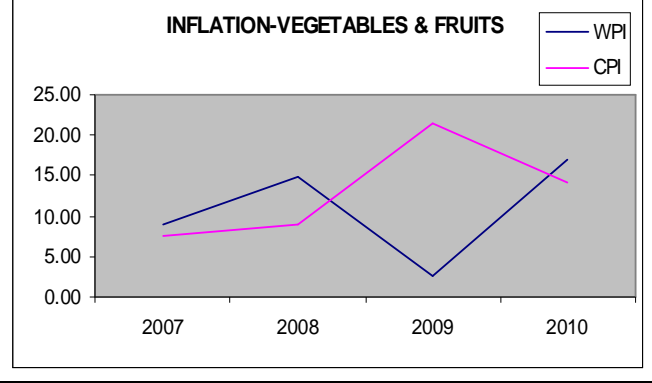
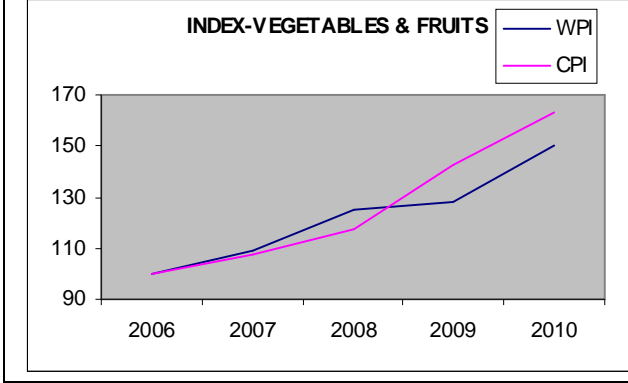
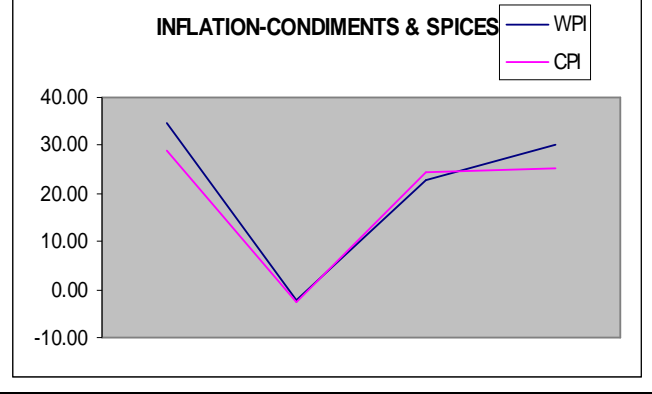
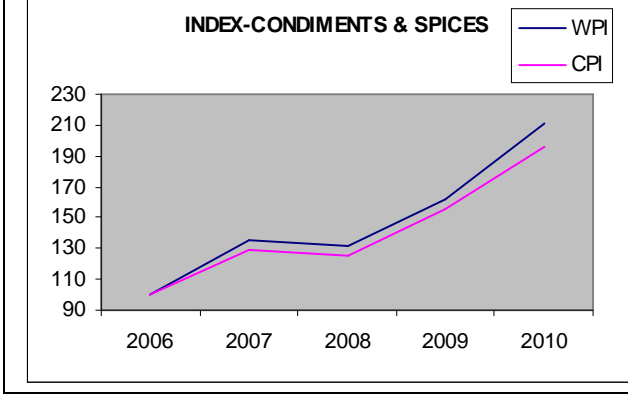
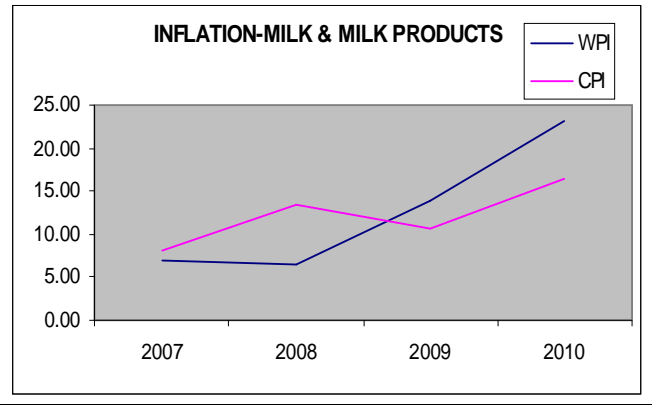
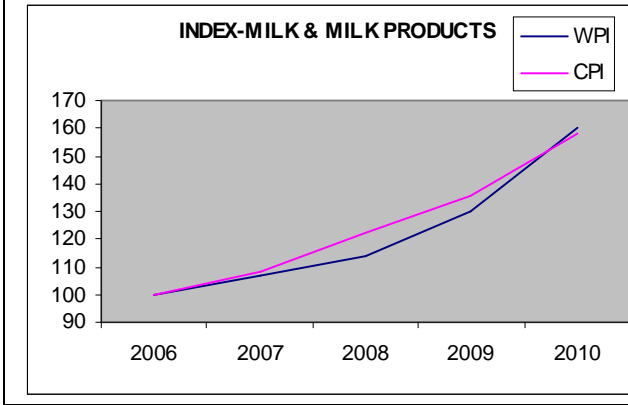
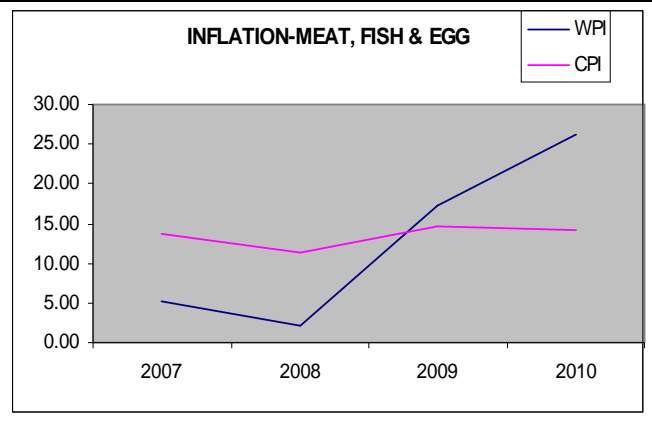
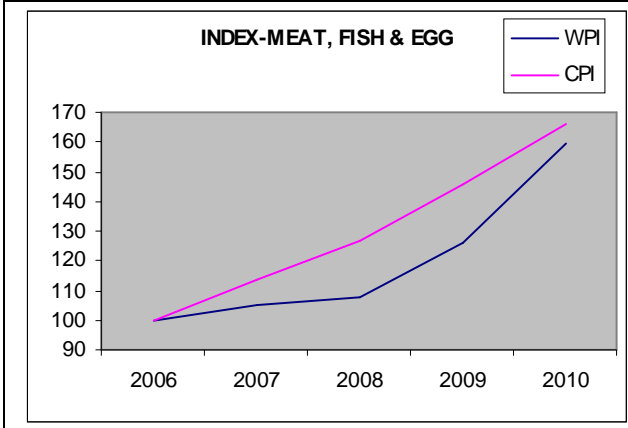
	2006	2007	2008	2009	2010
WPI	100	104.5	109.2	116.5	119.3
CPI	100	108.1	117.7	130.5	133.7
Inflation WPI		4.50	4.52	6.66	2.43
Inflation CPI		8.09	8.89	10.92	2.42

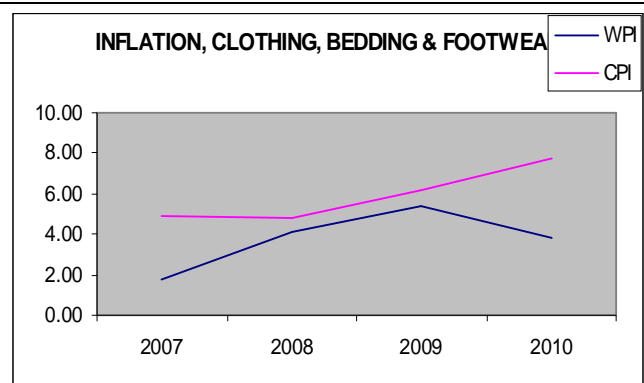
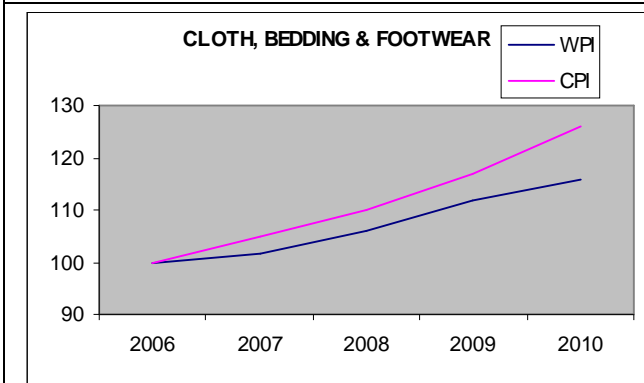
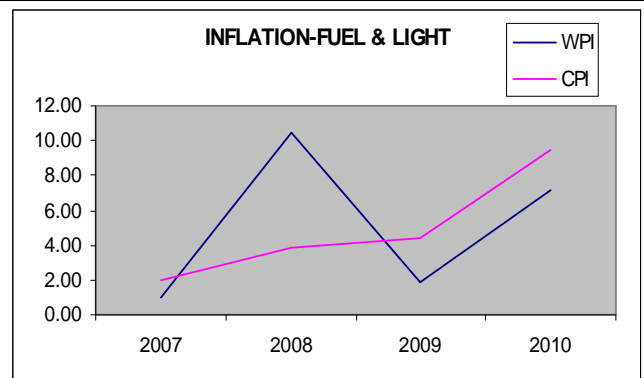
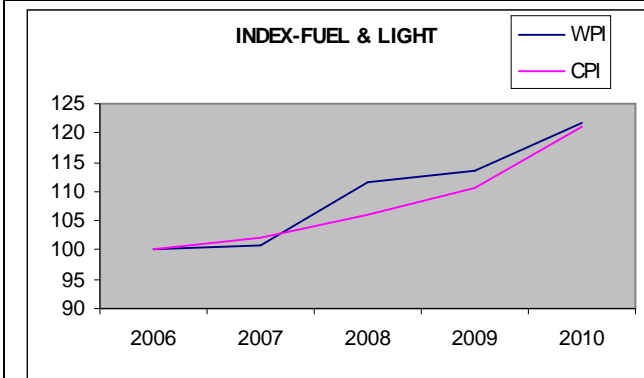
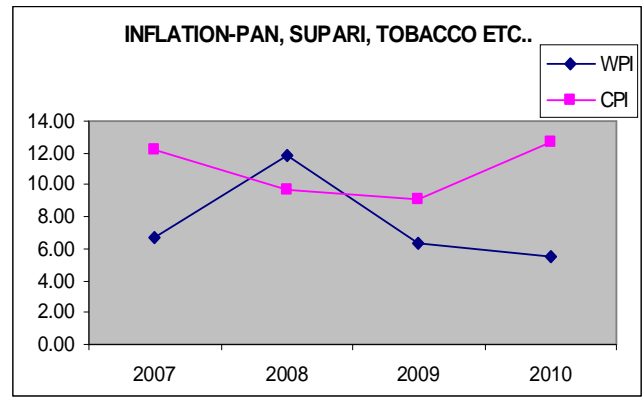
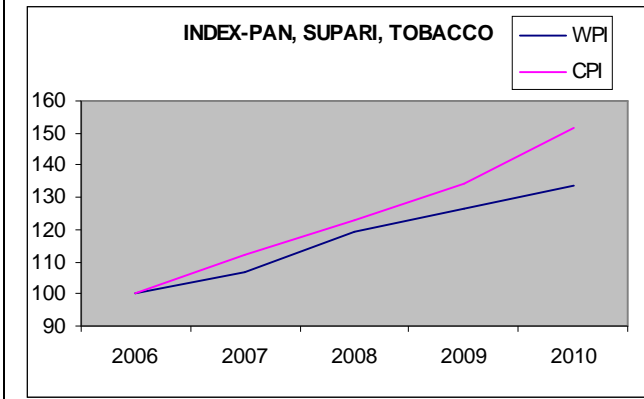
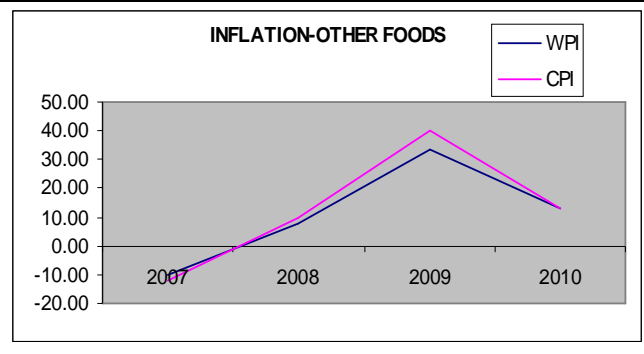
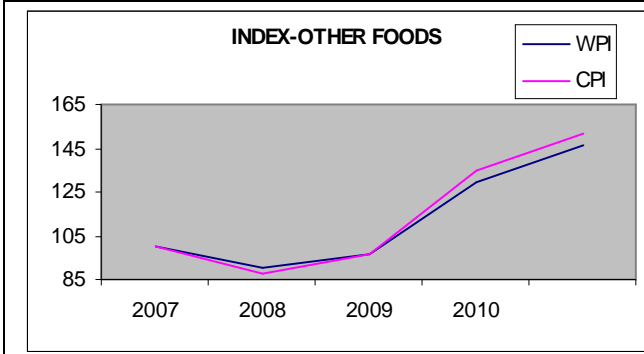
15. All India General Index & Inflation (Weight 100)

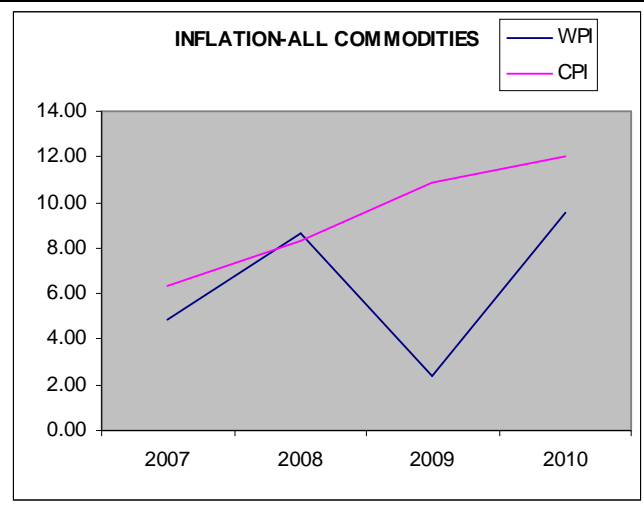
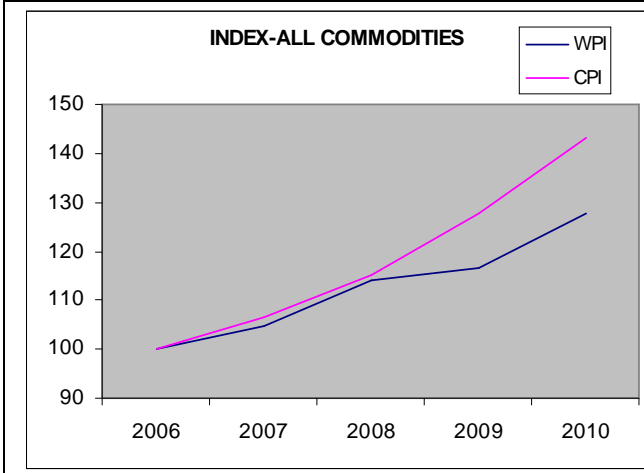
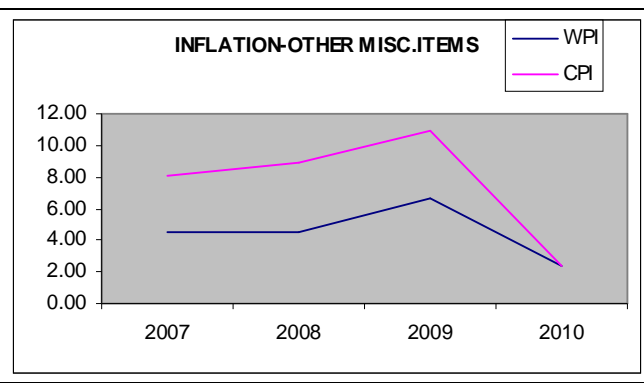
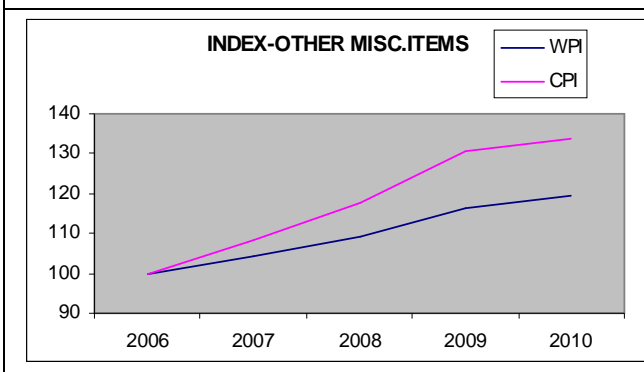
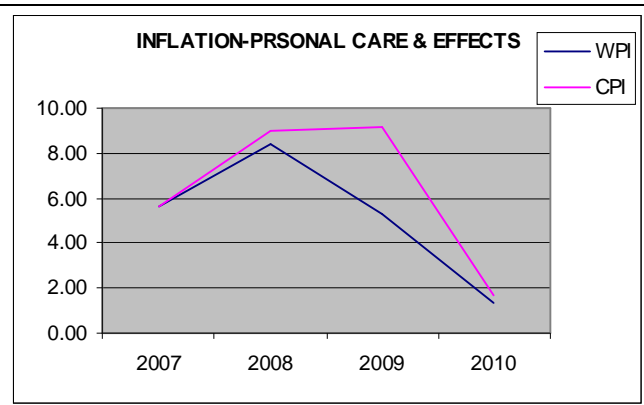
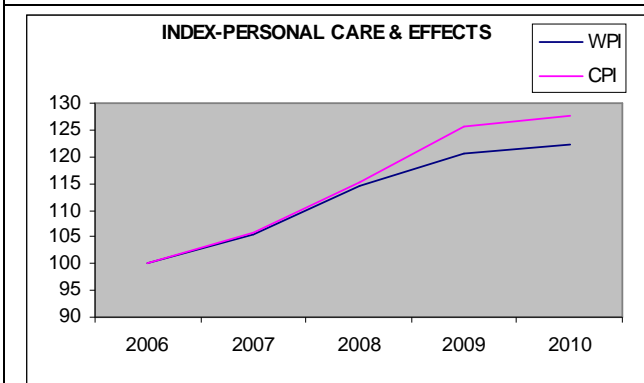
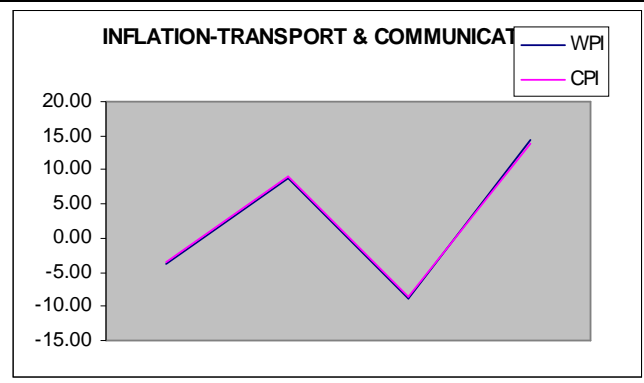
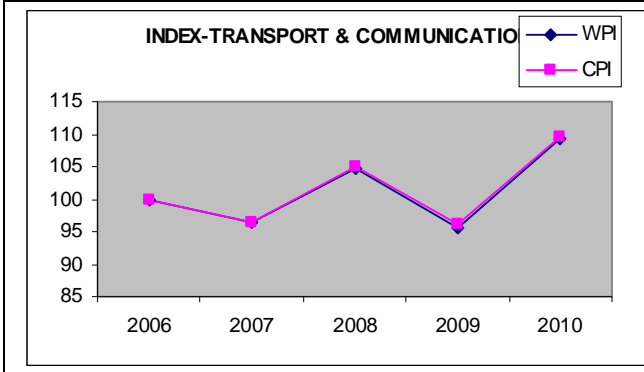
	2006	2007	2008	2009	2010
WPI	100.0	104.9	114.0	116.7	127.8
CPI	100.0	106.4	115.3	127.8	143.1
Inflation WPI		4.88	8.68	2.35	9.56
Inflation CPI		6.37	8.35	10.88	11.99

Graph of Indices and Inflation- WPI & CPI(IW)









WPI**ADF at levels**

Null Hypothesis: WPI has a unit root

Exogenous: Constant

Lag Length: 10 (Automatic - based on SIC, maxlag=10)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	2.455116	1.0000
Test critical values: 1% level	-3.568308	
5% level	-2.921175	
10% level	-2.598551	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation

Dependent Variable: D(WPI)

Method: Least Squares

Date: 06/01/11 Time: 12:47

Sample (adjusted): 12 61

Included observations: 50 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
WPI(-1)	0.076935	0.031337	2.455116	0.0188
D(WPI(-1))	-0.211090	0.145323	-1.452561	0.1546
D(WPI(-2))	-0.548069	0.145879	-3.757021	0.0006
D(WPI(-3))	0.068414	0.149059	0.458970	0.6489
D(WPI(-4))	-0.647602	0.151757	-4.267365	0.0001
D(WPI(-5))	0.019537	0.177522	0.110054	0.9129
D(WPI(-6))	-0.278641	0.200946	-1.386645	0.1736
D(WPI(-7))	0.207961	0.169147	1.229472	0.2265
D(WPI(-8))	-0.629921	0.180576	-3.488392	0.0012
D(WPI(-9))	-0.027543	0.167019	-0.164908	0.8699
D(WPI(-10))	-0.644658	0.164347	-3.922536	0.0004
C	-6.127852	3.302816	-1.855341	0.0713
R-squared	0.710965	Mean dependent var		0.930576
Adjusted R-squared	0.627297	S.D. dependent var		3.424944
S.E. of regression	2.090907	Akaike info criterion		4.518636
Sum squared resid	166.1319	Schwarz criterion		4.977522
Log likelihood	-100.9659	Hannan-Quinn criter.		4.693382
F-statistic	8.497462	Durbin-Watson stat		2.400876
Prob(F-statistic)	0.000000			

Annexure II

ADF at first difference

Null Hypothesis: D(WPI) has a unit root
Exogenous: Constant
Lag Length: 3 (Automatic - based on SIC, maxlag=10)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-8.678565	0.0000
Test critical values: 1% level	-3.552666	
5% level	-2.914517	
10% level	-2.595033	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(WPI,2)
Method: Least Squares
Date: 06/01/11 Time: 12:47
Sample (adjusted): 6 61
Included observations: 56 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(WPI(-1))	-2.379719	0.274206	-8.678565	0.0000
D(WPI(-1),2)	1.291674	0.231199	5.586843	0.0000
D(WPI(-2),2)	0.705926	0.165749	4.258999	0.0001
D(WPI(-3),2)	0.669836	0.112116	5.974486	0.0000
C	1.999422	0.403460	4.955692	0.0000
R-squared	0.762110	Mean dependent var		0.043807
Adjusted R-squared	0.743452	S.D. dependent var		4.935919
S.E. of regression	2.500073	Akaike info criterion		4.755562
Sum squared resid	318.7686	Schwarz criterion		4.936397
Log likelihood	-128.1557	Hannan-Quinn criter.		4.825672
F-statistic	40.84611	Durbin-Watson stat		2.083554
Prob(F-statistic)	0.000000			

CPI

ADF at level

Null Hypothesis: CPI has a unit root
Exogenous: Constant
Lag Length: 8 (Automatic - based on SIC, maxlag=10)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	1.772687	0.9996
Test critical values: 1% level	-3.562669	
5% level	-2.918778	
10% level	-2.597285	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(CPI)
Method: Least Squares
Date: 06/01/11 Time: 12:48
Sample (adjusted): 10 61
Included observations: 52 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
CPI(-1)	0.051543	0.029076	1.772687	0.0835
D(CPI(-1))	-0.566708	0.152774	-3.709453	0.0006
D(CPI(-2))	-0.414135	0.153496	-2.698012	0.0100
D(CPI(-3))	-0.112172	0.118388	-0.947501	0.3488
D(CPI(-4))	-0.012827	0.112120	-0.114401	0.9095
D(CPI(-5))	-0.147956	0.122470	-1.208103	0.2338
D(CPI(-6))	-0.721630	0.121717	-5.928737	0.0000
D(CPI(-7))	-0.558533	0.156389	-3.571435	0.0009
D(CPI(-8))	-0.339816	0.156786	-2.167380	0.0359
C	-2.636246	3.358899	-0.784854	0.4369
R-squared	0.515738	Mean dependent var		0.967164
Adjusted R-squared	0.411968	S.D. dependent var		3.678182
S.E. of regression	2.820549	Akaike info criterion		5.082782
Sum squared resid	334.1309	Schwarz criterion		5.458021
Log likelihood	-122.1523	Hannan-Quinn criter.		5.226639
F-statistic	4.969998	Durbin-Watson stat		1.907919
Prob(F-statistic)	0.000145			

ADF at first difference

Null Hypothesis: D(CPI) has a unit root
Exogenous: Constant
Lag Length: 6 (Automatic - based on SIC, maxlag=10)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-6.116048	0.0000
Test critical values: 1% level	-3.560019	
5% level	-2.917650	
10% level	-2.596689	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(CPI,2)
Method: Least Squares
Date: 06/01/11 Time: 12:49
Sample (adjusted): 9 61
Included observations: 53 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(CPI(-1))	-2.747841	0.449284	-6.116048	0.0000
D(CPI(-1),2)	1.375211	0.375281	3.664488	0.0007
D(CPI(-2),2)	1.209042	0.335368	3.605116	0.0008
D(CPI(-3),2)	1.180179	0.302662	3.899325	0.0003
D(CPI(-4),2)	1.178947	0.260097	4.532712	0.0000
D(CPI(-5),2)	1.005113	0.215521	4.663652	0.0000
D(CPI(-6),2)	0.373293	0.151478	2.464338	0.0176
C	2.550399	0.594600	4.289267	0.0001

R-squared	0.738370	Mean dependent var	0.007306
Adjusted R-squared	0.697672	S.D. dependent var	5.619648
S.E. of regression	3.089927	Akaike info criterion	5.232429
Sum squared resid	429.6442	Schwarz criterion	5.529832
Log likelihood	-130.6594	Hannan-Quinn criter.	5.346796
F-statistic	18.14267	Durbin-Watson stat	1.978488
Prob(F-statistic)	0.000000		

Annexure II

Johansen's Cointegration test

Date: 06/01/11 Time: 12:32				
Sample (adjusted): 3 61				
Included observations: 59 after adjustments				
Trend assumption: Linear deterministic trend				
Series: CPI WPI				
Lags interval (in first differences): 1 to 1				
Unrestricted Cointegration Rank Test (Trace)				
Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.276989	19.16381	15.49471	0.0134
At most 1	0.000479	0.028267	3.841466	0.8664
Trace test indicates 1 cointegrating eqn(s) at the 0.05 level				
* denotes rejection of the hypothesis at the 0.05 level				
**MacKinnon-Haug-Michelis (1999) p-values				

VAR model

Vector Autoregression Estimates		
Date: 06/01/11 Time: 12:34		
Sample (adjusted): 2 61		
Included observations: 60 after adjustments		
Standard errors in () & t-statistics in []		
	CPI	WPI
CPI(-1)	0.532054 (0.09179) [5.79658]	0.137271 (0.09873) [1.39038]
WPI(-1)	0.530516 (0.10431) [5.08596]	0.850828 (0.11220) [7.58326]
C	-5.087238 (3.25902) [-1.56097]	1.928075 (3.50548) [0.55002]
R-squared	0.968696	0.954977
Adj. R-squared	0.967598	0.953397
Sum sq. resids	532.0053	615.5138
S.E. equation	3.055066	3.286105
F-statistic	881.9391	604.5063
Log likelihood	-150.6056	-154.9797
Akaike AIC	5.120186	5.265990
Schwarz SC	5.224903	5.370707
Mean dependent	120.5275	117.7810
S.D. dependent	16.97208	15.22210
Determinant resid covariance (dof adj.)		94.36931
Determinant resid covariance		85.16830
Log likelihood		-303.6115
Akaike information criterion		10.32038
Schwarz criterion		10.52982

Annexure II

VEC model

Vector Error Correction Estimates		
Date: 06/01/11 Time: 12:36		
Sample (adjusted): 3 61		
Included observations: 59 after adjustments		
Standard errors in () & t-statistics in []		
<hr/>		
Cointegrating Eq:	CointEq1	
<hr/>		
CPI(-1)	1.000000	
WPI(-1)	-1.109727 (0.05164) [-21.4891]	
C	10.07487	
<hr/>		
Error Correction:	D(CPI)	D(WPI)
<hr/>		
CointEq1	-0.431155 (0.11861) [-3.63497]	0.220005 (0.12408) [1.77309]
D(CPI(-1))	-0.013097 (0.11670) [-0.11223]	-0.256734 (0.12208) [-2.10293]
D(WPI(-1))	0.109645 (0.15356) [0.71402]	0.099763 (0.16064) [0.62105]
C	0.904239 (0.42757) [2.11485]	1.083488 (0.44727) [2.42242]
<hr/>		
R-squared	0.330628	0.103220
Adj. R-squared	0.294117	0.054305
Sum sq. resids	520.2974	569.3668
S.E. equation	3.075704	3.217472
F-statistic	9.055521	2.110185
Log likelihood	-147.9348	-150.5935
Akaike AIC	5.150333	5.240458
Schwarz SC	5.291183	5.381308
Mean dependent	0.987453	0.925746
S.D. dependent	3.660817	3.308561
<hr/>		
Determinant resid covariance (dof adj.)	91.44234	
Determinant resid covariance	79.46368	
Log likelihood	-296.5061	
Akaike information criterion	10.39004	
Schwarz criterion	10.74216	
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Annexure II

Granger causality test

Pair wise Granger Causality Tests			
Date: 06/01/11 Time: 12:36			
Sample: 1 61			
Lags: 2			
Null Hypothesis:	Obs	F-Statistic	Prob.
WPI does not Granger Cause CPI	59	12.6859	3.E-05
CPI does not Granger Cause WPI		2.85395	0.0663

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