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INTRODUCTION

REVIEW OF LITERATURE

NEED/IMPORTANCE OF THE STUDY

STATEMENT OF THE PROBLEM

OBJECTIVES

HYPOTHESIS (ES)

RESEARCH METHODOLOGY

RESULTS & DISCUSSION

FINDINGS

RECOMMENDATIONS/SUGGESTIONS

CONCLUSIONS

LIMITATIONS

SCOPE FOR FURTHER RESEARCH

REFERENCES

APPENDIX/ANNEXURE

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- Bowersox, Donald J., Closs, David J., (1996), "Logistical Management." Tata McGraw, Hill, New Delhi.
- Hunker, H.L. and A.J. Wright (1963), "Factors of Industrial Location in Ohio" Ohio State University, Nigeria.

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- Garg, Sambhav (2011): "Business Ethics" Paper presented at the Annual International Conference for the All India Management Association, New Delhi, India, 19–23

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- Kumar S. (2011): "Customer Value: A Comparative Study of Rural and Urban Customers," Thesis, Kurukshetra University, Kurukshetra.

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- Garg, Bhavet (2011): Towards a New Gas Policy, Political Weekly, Viewed on January 01, 2012 http://epw.in/user/viewabstract.jsp

MODELING THE RELATIONSHIP BETWEEN MONEY SUPPLY & CRUDE OIL PRICES WITH GDP & INFLATION IN INDIA

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ABSTRACT

Purpose- *Government's budgetary arrangement can be a vital part to curb the hike. To such a degree, specie stock clout the boom and GDP. This paper marks the relationship between money supply & crude oil prices on GDP & inflation in India.*

Methodology- *A 25 year's data, from 1991 to 2015, has been taken to know the significance of money supply and crude oil prices on GDP and inflation in developing country like India. Canonical Correlation Analysis is used to know the linear relationship between dependent and predictor variables.*

Findings- *Money supply, crude oil prices has positive relationship with GDP and inflation. With increasing the money supply and hike price of crude oil inflation will increase and GDP increase in certain level with increasing rate then in decreasing rate.*

Research Limitations- *The present study pinpoints a micro level prospective consisting only CPI and WPI for measuring inflation and M2, M3 measuring for money supply. In this efforts certain conspicuous coin siding aspects are not devilled deeply which also demands an elaborated analysis. These areas are money and money supply was considered as one and same thing but these two are different. Only one international variable is used there may be other variables that may affect like NSE & BSE and other listed stock exchange commodity prices, international exchange rates of currency etc.*

Practical implication- *It contribute well-built pillar to Central Bank of India for strategic approach. The outcomes are not only constructive for policy makers but also other analyzer and developing & developed countries.*

KEYWORDS

CPI, WPI, GDP, M1, M3.

INTRODUCTION

"Money is a matter of functions four: A medium, a measure, a standard, a store".

GDP (Gross Domestic Product) is the leading index for economic growth of a country. For the bread and butter unfolding, it is crucial to prolong money supply in country and Inflation is studied as "Taxation without Legislation" both key indicators are influenced by money supply (M1, M3) and crude oil prices in India.

Government's macroeconomic policies one and only monetary policy smash hit an invigorating act in economic development. Its target to make allowance for desire transforms in income and employment. Diffusion and deflating of money supply are two weighty factors of monetary policy. The quantity of money can shoot up rapidly in three course of action: first, increment of government budgetary deficit financing; second, government payoff and last but not the least, low interest rate. Money impact on economy can be seen through the multiplier and accelerator. Multiplier show there is an increment of aggregate investment when income will increase by an amount which is k time of increment of investment. It may be defines as the ratio of change in national income due to change in investment. Science, ΔY is the result of ΔI. It is called investment multiplier.

Im = 1⁄1-b = ΔY⁄ΔI

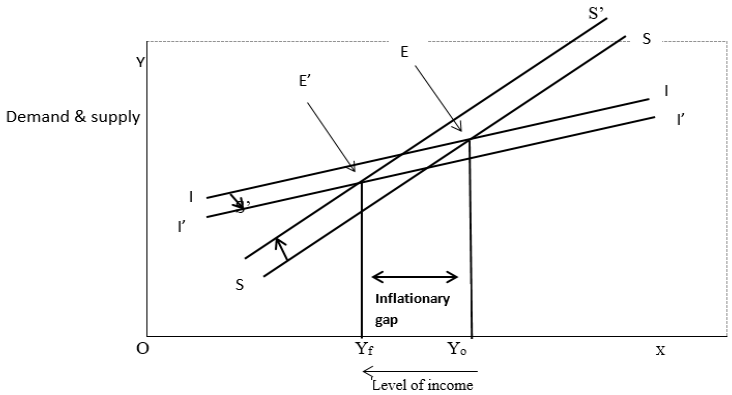
Accelerator describe the net investment depends on the rate of change in final output.

According to standard macroeconomic theory "Expansionary monetary policy results in decrease interest rate, increase purchasing power, investment and simultaneously increases aggregate demand. Because of scare resources and excess of demand, raising the price level and give birth to demand push inflation. Vaguely, monetary policy device recycled by government undertaking like double edged sword. To keep safe the economy from raising prices know one's onion's charge demand through various instruments like raising bank rate, auction of bond and securities, raising cash reserve ratio, upsurge in rate of interest on deposits and loans, put on its end the margin requirement, moral persuasion and credit rationing. Entire dimensions will through cold water on consumption and investment in the economy, level of aggregate demand will go downhill and help in regulating inflation.

This can be elaborated through following figure 1:

In the first place, saving function and investment function cut one another at point E. Hence, the economy is in stability at Yo level of income which is Y-Yo above the full employment level of income Yf. In the outline Yf Yo represents inflationary disparity. By exercising several monetary policy techniques, investment function shifts downward to I-I' and saving function shifts upward to S-S'. Now, economy is counterbalance at E'. in such a way, monetary policy is helping hand to wire pulling inflation.

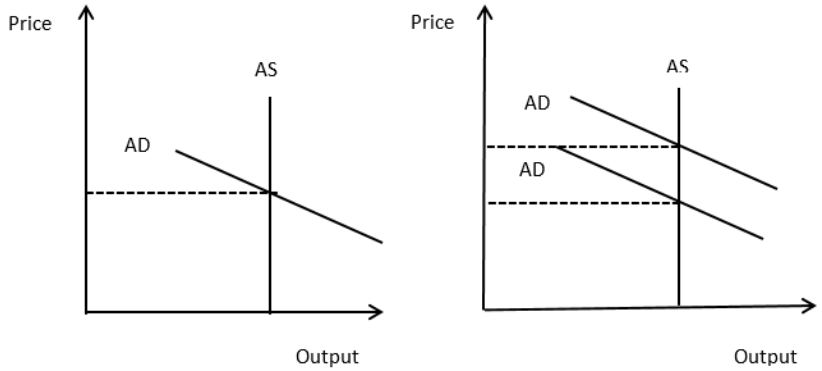
FIG. 1.1: MONETARY POLICY IN INFLATION



Economic schools of thoughts best shot reveal the impact of prices on demand and output on GDP and inflation over their prospect like:

1) **Classical Economist**: The Wealth of Nation in 1776 is usually considered to mark the beginning of classical economics. The believers of classical economist assume that the economy will automatically attain the condition of equilibrium without government interference. In short run, expansionary in money supply does not impact on prices but in long run cause the inflation. So, price and wages are flexible and supply curve is vertical.

FIG. 2: OUTCOME OF INCREASING MONETARY POLICY ON PRICE AND OUTPUT IN CLASSICAL SCHOOL



2) **Keynesians Economist:** John Maynard Keynes in his Book "The General Theory of Employment, Interest and Money (1936)" propounded the Keynesians theory. According to this theory, the economy requires government interventions for achieving equilibrium. Because the private sector is working for profit maximization which leads to inefficient macroeconomic outcomes which require government actions in form of monetary policy & fiscal policy to regulate the business cycle. So, money affects the output but there is a problem like liquidity constraint.
3) **Neo-Classical Economist:** This theory gives birth to rational expectations for flexibility in prices and wages. It is based on the assumptions to maximize utility on the basis of rational expectations. New classicalists assume that just unpredictable monetary policy can affect the output.

MONETARY AGGREGATIONS IN INDIA

ORIGINAL CALCULATION

M_1= Currency + Demand Deposit with Banks + Other Deposit with RBI
M_2= M_1 + Post Office Saving Bank Deposits
M_3= M_1 + Time Deposit with Banks
M_4=M_3 + Total Post Office Deposits (both saving deposits and term deposits)

REVISED CALCULATION

M_1= Currency + Demand Deposit with Banks + Other Deposit with RBI (Unchanged)
M_2= M_1 + Time Liability Portion of Savings Deposits with banks + Certificates of Deposits Issued by banks (CD's) + Term Deposit Maturity within one year
M_3= M_2 + term deposits over one year maturity + call/term borrowings of banks
M_4= Abolished
RBI working group on Money Supply has introduced New Concept of Liquid Resources in India.

LIQUIDITY AGGREGATES

L_1= New M_3 + All Deposits with Post Office Savings Banks (excluding National Saving Certificates)
L_2= L_1 + Term Deposits with Term lending institutions + Term Borrowing of Financial Institutions (FI's) + CD's issued by FI's
L_3= L_2 + Public Deposits of Non- Banking Financial Company's (NBFC's)

RELATIONSHIP BETWEEN MONEY SUPPLY AND PRICE LEVEL: MILTON FRIEDMAN GIVES QUANTITY THEORY OF MONEY AS:

MV = PY
Where,
M = Money supply/ Quantity of money
V = Velocity of circulation of money
P = General Price level
Y = Real national income

This quantity theory of money explains the impact of changes in money supply through M_1 and M_3 on the price level. This relationship reveals that the total value of payments equals the money value of national output. This equation is called 'equation of exchange'. If 'V' (Velocity of circulation of money) assume constant then a single change in M (money supply) will equal to any change in P (price level) or Y (national income). In case of full employment and near to full employment the change in Y will be least so, any change in Money due to Price level and if there is less than full employment, then any change in quantity of money reflected by real national income. So, money supply changes either change in P or Y when V remains constant. In such a way, money supply effect on P (inflation). Inflation is cause of excessive increase in money supply.

LITERATURE REVIEW

Many researches and study has been done so far about the relationship between money, GDP and inflation but the outcomes are disparate because of methodology, economic conditions of the country. Review of some researches that were done in this field as:

Pawan Kumar and Amit Kumar in his paper "The Long Run Determinants of Inflation in India: a Co Integration Approach" (Aug. 2014) describes through co integration methods using annual data of 43 years that in long run exchange rate, government expenditures and money supply contribute in raising inflation but inflation index decrease because of high government revenue and GDP.

Riccardo Cristadoro and Giovanni Veronese in "Monetary policy in India: is something amiss?" (2011) purpose to find out how the satisfying evidences are blunt these days in the act of tremendously increasing inflation, besides uncertainty, habitual rising prices succeed suit. His finding says that RBI framework should be revised and monetary policy to control inflation.

Abdur Chowdhury, in "Inflation and inflation-uncertainty in India: the policy implications of the relationship" (2014) find out through GARCH model that the strong support for the positive relationship between level of inflation and uncertainty.

Rudrani Bhattacharya and Ila Patnaik, in his research "Monetary policy analysis in an inflation targeting framework in emerging economies: The case of India" (Feb. 2014) reveals the importance of monetary policy in controlling the rate of inflation. In her paper, she try to establish a semi structural New Keynesian open economy model for developing country like India and found that monetary policies should be relevant so that minimum level of inflation can be maintain in economy.

YuvrajsinhVala, in "Is there any link between commodity price and monetary policy? Evidence from india" (Jan. 2013) try to examine the pivotal role of commodity indices in predicting GDP, inflation, interest rate and money supply in India, on the basis of data from March-1997 to Sep.-2012. For this purpose he used advance time series econometric models like cointegration, VECM and Granger causality. His results said that CPI is helpful to predict GDP and Inflation but not the interest rate and money supply but non-monetary information variables can be useful in predicting some monetary variables.

RaghbendraJha and Versha S. Kulkarni, in article (2015) "Inflation, its volatility and the inflation-growth tradeoff in India" find out the correlation between inflation volatility and expected change in inflation through amending the New Keynesian Phillips Curve model. He use ordinary least squares, autoregressive distributed

tags model and ECM (Error Correction Model) to prove his hypothesis. The conclusion represents that the expected inflation is specific and rich to influence the growth rate in India while the level of inflation has negative and insignificant impact.

Arif and Ali (2012) have shed light on the determinants of inflation in Banagladesh by using data for the period 1978 to 2010. The study employed johansen-juselius co integration methodology and found existence of long run relationship between inflation and its determinants namely, GDP, government expenditure, government revenue, export, import and money supply. This study concludes that government expenditure and money supply are the most important long run determinants of inflation in Bangladesh.

Srinivasan et. Al. (2006) estimated an augmented Philips curve to study the impact of supply on inflation in India by employing ordinary least square framework. The study found that supply shock have only a transitory effect on both headline inflation and core inflation. Moreover, the study concludes that monetary policy in India is more focused towards the core inflation.

Supriya (2014) in her article "Dichotomy of two inflation indices" explains the three indicators of measuring inflation any developing country- WPI, CPI and GDP but these represents the disparity in rate of inflation over the period of time from 1996-2007. According to her, WPI and CPI is not true indicator of inflation in India and do not reveal the true picture of GPD. An alternative can be HICP (Harmonized Index of Consumer Price), which is estimated by linking the current CPI series.

Mehdi Sadeghi and Seyyed Yahya Alavi (2013) in his paper "Modeling the impact of money on GDP and inflation in Iran:Vector-error-correction-model (VECM) approach" document the purpose of evaluate the impact of money supply on Gross Domestic Product (GDP) and inflation in Iran country. It represents the short run and long run consequences of narrow money and broad money on inflation and Gross Domestic Product. The outcome shows in short-period M2 has no significant impact on output and inflation but in long period increasing money supply cause inflation.

Karam Pal Ruhee Mittal, (2011), in his fact-finding inquest "Impact of macroeconomic indicators on Indian capital markets" declare the shock of macro-economic variates like rate of interest, exchange rate in US$ and inflation rate and Gross Domestic Savings on Indian capital market. After evaluation of ECM model the results indicate that in long period the variable effects Indian capital markets in one or other way. The foreign exchange rate effect only BES Sensex, inflation rate influence both BSE Sensex and S&P CNX Nifty, on the other hand interest rate shows its impact only on S&P CNX Nifty but GDS is insignificant with both.

Prasanna V Salian and Gopakumar. K^2 in paper named "Inflation and Economic Growth in India- an Empirical Analysis" pursue to check out the association among hike prices and Gross Domestic Product (GDP). Through Cointegration and Error Correction Model his findings shows in long time period the relationship between inflation and GDP is negative.

CANONICAL CORRELATION ANALYSIS

Canonical correlation analysis is an arithmetical expression for judging those variables whose relationship can't be directly observed. It is a multi-variate analysis of linear relationships. In CCA multiple-X, multiple-Y correlation is observed. The canonical correlation coefficient used to quantum the tenacity of association among two sets of canonical variates.

CCA reveals the two sets of variates by producing weighted linear composites for each of them in bunch of predictive equations. Each weighted linear composite the dependent variables and the covariates. The equation that depicts the relationship of the dependent and predictor variates is called a canonical function or canonical root.

$w^* DV_{11} + w^* DV_{12} + \ldots + w^* DV_{1u} = w^* IV_{11} + w^* IV_{12} + \ldots + w^* IV_{1v}$

$w^* DV_{21} + w^* DV_{22} + \ldots + w^* DV_{2u} = w^* IV_{21} + w^* IV_{22} + \ldots + w^* IV_{2v}$

w- Canonical coefficient of dependent variable or independent variable in the respective variate

DV_{12} – second dependent variable in the first canonical function

IV_{2v} – vth predictor of second function

Discriminant Analysis is an exceptional case of CCA. Canonical variates can't be explained just as factor in factor analysis by virtue of canonical variables are not factors. Alone, the early combination of canonical variates set the variables in a manner that interrelationship among them is magnify. In other hand, expressly, they are independent of one another.

Identical to factor analysis, the outcomes of CCA are canonical linear relation, factor loading and canonical weights. They can be taken to measure the redundancy. It is significant in designing of questionnaire and development of scaling. Arithmetically, it exhibits the magnitude of variance of one group of variables interpreted through variant of another group of variable.

The CCC (canonical correlation coefficient) is yardstick of continuation of comprehensive relation among two groups of variables and redundancy measures the significance of association. Wilk's Lambda, also known as U value, is used to test the significance of prime CCC, moreover Bartlett's V are used to test the significance of all CCC.

APPLICATION OF CCA WITH THE HELP OF SPSS

ANALYSIS OF VARIANCEDESIGN 1

EFFECT.. WITHIN CELLS Regression

Multivariate Tests of Significance (S = 3, M = 0, N = 7 1/2)

Test Name	Value	Approx. F	Hypoth. DF	Error DF	Sig. of F
Pillais	1.39946	4.15326	12.00	57.00	.000
Hotellings	1738.94571	2270.29023	12.00	47.00	.000
Wilks	.00037	71.18843	12.00	45.27	.000
Roys	.99943				

Description: The table shows the Pillais, Hotellings, Wilk's, Roys values. Pillais test the H_0 that correlation is null. It represent that there is no correlation among two sets of variables. Hotellings is same as Pillais which reveals there is no significant relationship among set of variables. Wilk's Lambda is other multivariate measured by SPSS, usually used to test the level of significance. It is significant with p<.05. Roys is largest root. In our case, the values are not statistically significant except Roys but it will be considered as not significant.

EIGENVALUES AND CANONICAL CORRELATIONS

Root No.	Eigenvalue	Pct.	Cum. Pct.	Canon Cor.	Sq. Cor
1	1738.44279	99.97108	99.97108	.99971	.99943
2	.29375	.01689	99.98797	.47650	.22705
3	.20917	.01203	100.00000	.41591	.17298

Description: This table dispatch the 3 canonical functions or root extracted of eigenvalues and canonical correlation. First canonical correlation is .99971 which is 99.97% of explained variance moreover the eigenvalue is positive and highest at 1738.44. this represent that hypothesis is correctly estimated and found the strong correlation between money supply, crude oil price and GDP as well as inflation.

DIMENSION REDUCTION ANALYSIS

Roots	Wilks L.	F	Hypoth. DF	Error DF	Sig. of F
1 TO 3	.00037	71.18843	12.00	45.27	.000
2 TO 3	.63924	1.50446	6.00	36.00	.205
3 TO 3	.82702	1.98709	2.00	19.00	.165

Description: Till now, the result represented the thorough model-fit. This table shows three canonical dimensions as roots. The first row test the 1to3 dimension to know the statistically significance. The root first is statistically significant at p<.05. it explain all 3 (1to3) roots are significance with F-71.18843,p<.05 and the second row reveals the 2to3 roots (.205) by excluding first root. Moreover the last row tests the 3to3 roots (.165) itself. Only the first root is statistically significant.

EFFECT.. WITHIN CELLS Regression (Cont.)

Univariate F-tests with (3,20) D. F.

Variable	Sq. Mul. R	Adj. R-sq.	Hypoth. MS	Error MS	F	Sig. of F
CPIW	.11607	.00000	5234.11317	5979.27850	.87538	.470
CPIAL	.20164	.08189	5156.02889	3062.10354	1.68382	.202
WPI	.94971	.94216	9486.62306	75.35535	125.89183	.000
GDPMP	.99858	.99837	9610455441.804	2042889.11981	4704.34511	.000

Description: The present segment of SPSS explains the output individually for each two set of variable. Inward all group, SPSS provide raw canonical coefficient, standardized coefficient, linear relation among observed variables, canonical variant and percentage of variance measured by canonical variant. In this table, there are 4 test variable i.e. CPIW, CPIAL, WPI, GDPMP.

RAW CANONICAL COEFFICIENTS FOR DEPENDENT VARIABLES

Function No.			
Variable	1	2	3
CPIW	.00018	.00511	-.00140
CPIAL	-.00029	-.01068	.00894
WPI	-.00171	-.04057	-.10053
GDPMP	-.00003	.00004	.00010

Description: This table shows that the raw canonical coefficients are same as in linear regression. It is simple to describe with standardized coefficient at mean=0, st. dev.=1. Here, one and only first root is suitable as second and third are not statistically significant. The substantial impact on beginning root is variable CPIW.

STANDARDIZED CANONICAL COEFFICIENTS FOR DEPENDENT VARIABLES

Function No.			
Variable	1	2	3
CPIW	.01408	.39160	-.10707
CPIAL	-.01700	-.61684	.51646
WPI	-.06161	-1.46455	-3.62860
GDPMP	-.94299	1.34362	3.57741

CORRELATIONS BETWEEN DEPENDENT AND CANONICAL VARIABLES

Function No.			
Variable	1	2	3
CPIW	-.02373	.65185	-.33163
CPIAL	.10893	-.87223	.31389
WPI	-.96915	-.11112	-.21758
GDPMP	-.99946	.03272	.00360

VARIANCE IN DEPENDENT VARIABLES EXPLAINED BY CANONICAL VARIABLES

CAN. VAR.	Pct Var DEP	Cum Pct DEP	Pct Var COV	Cum Pct COV
1	48.76495	48.76495	48.73692	48.73692
2	29.97808	78.74303	6.80663	55.54355
3	6.39654	85.13957	1.10650	56.65005

Description: This section of SPSS represents the same information i.e. standardized canonical coefficient for dependent variables, linear relationship among observed variable and canonical variants moreover the percentage of variance describe by canonical variant for independent variables.

CORRELATIONS BETWEEN COVARIATES AND CANONICAL VARIABLES

CAN. VAR.			
Covariate	1	2	3
M1	-.99436	.07890	-.07093
M3	-.99998	.00522	.00356
COP	-.89501	.07813	-.43915

Description: The interpretation of these variates-

- The effect of M1 is highest with structural coefficient.07890.
- The effect of COP higher with structural coefficient.07813.
- The effect of M3 is high with structural coefficient.00522.

REPORTING CANONICAL CORRELATION ANALYSIS

A Canonical Correlation Analysis explores the association among group of variates. Here, dependent variables are GDP and inflation. GDP is taken at market price and for the purpose of measuring inflation, two indices CPI (consumer price index) and WPI (wholesale price index) are used. Furthermore, in CPI two indicators IW (Industrial Worker) or AL (Agriculture Labour) and in WPI all commodities (AC) are used to know the impact of inflation. On the other hand, independent variables are money supply and crude oil prices. In money supply M1 (narrow money), M3 (broad money) and crude oil prices are taken at annual average basis. From the data 1991-2015, all cases are accepted for study. After analysing the output, the relation among the group of variables found statistically significant. The value of U (Wilk's Lambda) was statistically significant with p<.05. The eigenvalue was highest with 1738.44 which is 99.97% of explained variance. In table 1.3, dimension reduction analysis, only the first root 1to3 was statistically significant. Table 1.5, raw canonical coefficient for dependent/covariate variable define one unit increase in CPIW consequent to a 0.00018 unit increment in first variate. Table 1.6, reveals the effect of M1, M3 and COP. The effect is highest M1, M3, COP sequentially.

CONCLUSION

The purpose of the study was to know the relationship of money supply & crude oil price with GDP and inflation in India. Here, there were two dependent and two independent variables used. GDP and inflation was dependent on money supply (M1 and M3) and crude oil prices. To obtain the conclusion Canonical Correlation analysis was used with the help of SPSS software. Multivariate analysis table revealed the sig of F value. Correlations between COVARIATES and canonical variables table expedite that independent variable M1, M3; crude oil prices have higher level of effect on dependent variables. So the monetary policy framing authority should consider the changes or fluctuations in money supply (M1, M3) and crude oil prices time to time.

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APPENDIX

TABLE 1

Years	COP	M1	M3	CPI(IW)	CPI(AL)	WPI	GDP at MP
1991-92	20.81	1039.7	2924.03	50.22	169.85	83.85	6738.75
1992-93	20.91	1200.5	3442.38	55.04	190.78	92.29	7745.45
1993-94	17.11	1363.53	3990.48	55.72	197.51	100.00	8913.55
1994-95	18.4	1692	4781.96	61.33	221.09	60.11	10455.90
1995-96	18.64	1982.83	5529.53	67.6	224.85	64.92	12267.25
1996-97	22.23	2217.64	6426.31	73.86	45.39	67.91	14192.77
1997-98	18.99	2484.65	7520.28	79.04	46.8	70.90	15723.94
1998-99	13.99	2796.38	9012.94	89.41	51.95	75.12	18033.78
1999-00	23.23	3206.3	10560.25	92.44	54.25	77.57	20121.98
2000-01	29.52	3565.88	12240.87	95.89	54.07	83.12	21686.52
2001-02	24	3976.83	14200.07	100	54.78	86.11	23483.30
2002-03	29.36	4455.13	16479.54	224.18	56.56	89.05	25306.63
2003-04	31.15	5146.36	18615.8	232.55	58.68	93.91	28379.00
2004-05	45.79	6003.43	21214.59	241.86	60.28	100.00	32422.09
2005-06	60.66	7164.7	24589.25	252.09	62.58	104.50	36933.69
2006-07	66.11	8586.75	29501.86	327.43	67.37	111.40	42947.06
2007-08	84.58	9950.28	36034.44	61.86	72.25	116.60	49870.90
2008-09	85.32	11396.07	43436.64	67.44	79.78	126.00	56300.63
2009-10	72.27	13198.51	51778.82	75.81	90.95	130.80	64778.28
2010-11	84.94	15415.27	60151.65	83.72	100	143.30	77841.16
2011-12	98.05	16312.42	69688.05	90.69	90.92	156.10	88320.12
2012-13	92.23	17863.11	79089.42	100	100	167.60	99885.39
2013-14	98.84	19573.29	89822.12	109.76	111.6	177.60	113450.56
2014-15	78.22	21649.35	100502.2	116.74	119.04	181.20	125412.08

Sources:

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Note: For obtaining the CPI, WPI index in series base shifting and base splicing methods are used.

Base shifting: when base year is shift from one period to another is known as base shifting.

Shifted price index = Original price index/Price index for new base year * 100

Base Splicing: it is the process of joining two or more index numbers that cover divergent bases into one series is called splicing.

Backward splicing: index A of current year/ index A of common year *100

Forward splicing: index of B of current year* index A of common year/100.

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