CHAPTER 9
CONCLUSION

9.1 Summary of Findings and Conclusions

Inflation is considered as a chronic problem in each economy, which has to take different monetary and fiscal measures to reduce inflation. High inflation has always penalized the poor and the fixed income groups and brings macroeconomic instability. It has been found that most of the western countries are focusing on multiple target – multiple instrument approach. Our government has also brought lot of changes and have at present adopted target based inflation by introducing the new series of CPIs. A few of the traditional theories (Fischer theory) are found to be invalid at the present context as supported by researchers like Behera (2014), and Saxena (2013). This is mainly due to the rising middle-class income and overall demand for various products and services.

The findings of the present study is expected to contribute greatly to the existing research and literatures on the topic of inflation, which are discussed below.

i. The distinguishing characteristics (as given in the table 9.1 below) of the different nations with respect to their CPI methodology were found to be the following:

- Base Year Differences: The base year used to compose the CPI of the different South Asian Countries were found to be different. In case of India it was the year
Commodity Composition Differences: The composition of the commodity basket was also found to be quite different. In India, the CPI basket composed of six broad categories, while it is eight for Bangladesh, China and U.S.A, and twelve for Pakistan, Sri Lanka and U.K.

Besides, it was also found that some of these countries had categorized the CPI index into broad divisions before compiling the general CPI index, whereas the others countries directly compile the general CPI index only. For example, India compiled the CPI-Rural (CPI-R) and CPI-Urban (CPI-U) before compiling the CPI-Combined (CPI-C). Similarly, Bangladesh also compiled the CPI-Rural and CPI-Urban, and U.S.A. too compiled the CPI for Urban Wage Earners and Clerical Workers (CPI-W) and CPI for All Urban Consumers (CPI-U). However, the other countries like Pakistan, China, Sri Lanka, and U.K. compiled the general CPI index only.

Weightage differences: After analyzing the commodity basket of the different countries and their weightage, it could be concluded that each country differed from each other in terms of assigning weights to the CPI commodity groups. But, one very important conclusion that could be derived was that while the South Asian Countries like India, Bangladesh, Pakistan, Sri Lanka and China had assigned the highest weightage to the “Food” component, the developed nations
like U.K. and U.S.A. assigned very low weights to the CPI “food” component. It meant that the South Asian Countries had given more prominence to the “food” component and therefore were more vulnerable to food-inflation in case of temporary food price rise, compared to the developed nations.

Table: 9.1 Differences in CPI Methodology of the Countries

<table>
<thead>
<tr>
<th>Countries</th>
<th>Base Years</th>
<th>CPI Compilation Categories</th>
<th>Number of Commodity Groups</th>
<th>Highest Weights (%) assigned component</th>
</tr>
</thead>
<tbody>
<tr>
<td>India</td>
<td>2012</td>
<td>CPI-R, CPI-U, CPI-C</td>
<td>6</td>
<td>Food (45.86)</td>
</tr>
<tr>
<td>Bangladesh</td>
<td>1995-96</td>
<td>CPI-Rural, CPI-Urban</td>
<td>8</td>
<td>Food (48.8)</td>
</tr>
<tr>
<td>Pakistan</td>
<td>2007-08</td>
<td>CPI General Index</td>
<td>12</td>
<td>Food (34.8)</td>
</tr>
<tr>
<td>Sri Lanka</td>
<td>2013</td>
<td>CPI General Index</td>
<td>12</td>
<td>Food (44.04)</td>
</tr>
<tr>
<td>China</td>
<td>2007</td>
<td>CPI General Index</td>
<td>8</td>
<td>Food (34)</td>
</tr>
<tr>
<td>U.K.</td>
<td>2015</td>
<td>CPI General Index</td>
<td>12</td>
<td>Transport (15.3)</td>
</tr>
<tr>
<td>U.S.A.</td>
<td>2013-14</td>
<td>CPI(U), CPI(W)</td>
<td>8</td>
<td>Housing (42.235)</td>
</tr>
</tbody>
</table>

ii. The CPI (base year 2012) and WPI (base year 2004-05) differed conceptually from each other on the following grounds:

- Consumer price index (CPI) measures changes in the price level of consumer goods and services purchased by households, whereas WPI measures the changes in the price level of commodities after they leave factory premises, i.e. at the wholesale level.
While the New CPI was measured on base year 2012, the revised WPI was measured on base year 2004-05.

The New CPI with base year 2012 comprises 299 commodities, whereas the revised WPI with base year 2004-05 incorporated a basket with 676 commodities.

The CPI basket of goods is very different from the WPI basket. The CPI is like our shopping basket. The new CPI has six sub-groups including food and beverages, fuel and light, housing and clothing, bedding and footwear, Miscellaneous and Pan, tobacco and intoxicants. The weightage differ for the rural and urban baskets. On the other hand, WPI comprised of three major commodity divisions, namely, Primary Articles, Fuel & Power and Manufactured Products. Different weights have been assigned to each of the product groups.

The weighting pattern in CPI revealed that the highest weightage in Combined CPI has been assigned to the Food and Beverages group (45.86%). However, the internal weighting pattern shows that the CPI Rural gets the maximum weights (54.18%) compared to the CPI Urban and CPI Combined. The second highest weight in Combined CPI has been assigned to the Miscellaneous category (28.32%) that includes services like Transport and Communication, Health, Education etc. In this segment, the maximum internal weight has been assigned to the CPI Urban (29.53%). The third rank in Combined CPI weights has been assigned to Housing category with 10.07%. But, an interesting feature is that CPI
Urban has been given the maximum internal weightage of 21.67%, while no compilation is done in case of CPI Rural housing. Among the rest of the commodity groups, fourth rank has been assigned to Fuel and Light group (6.84%), followed by Clothing, bedding and footwear (6.53%), and Pan, tobacco and intoxicants (2.38%).

On the other hand, in case of WPI weighting pattern, the highest weightage has been given to the Manufacturing Products (64.97%). There are many subgroups in this category; some of the main ones are chemical and chemical products, basic metals, alloys and metal products, food products, machinery and machine tools and textiles. Though these items may not affect us directly, but indirectly, it means that price changes in products, such as vehicles, clothes, furniture, soaps and shampoo, etc. would affect the common masses. The second highest weightage has been assigned to the Primary articles (20.11%), the prices of which impact our daily sustenance and it hits the poor the hardest. Among food articles, some of the main heads are foodgrain, fruits and vegetables, eggs, meat and fish. In the non-food subgroup, some of the major heads are fibre and oil seeds. The lowest weightage has been assigned to the Fuel and Power group (14.91%) that consists of prices for all materials and items needed to produce power and fuel. This group consists of three subgroups—coal, mineral oils and electricity. The subgroup mineral oil has the maximum weight of 9.36% (of the overall index). Items such as kerosene, diesel, liquefied petroleum gas (LPG) and petrol fall in this category.
There are some common components in both the CPI and WPI baskets—such as food and fuel. But, the composition of the two indices is such that while food has a higher weightage in CPI, manufacturing has a higher weightage in WPI. The weight of Food Products is much higher in CPI (45.86%) as compared to WPI around (25% approx.). As a result, the CPI is more susceptible to changes in food prices than the WPI. Again, in case of Fuel and Power the weight is 6.84 in New CPI, whereas it is 14.91 in WPI. Thus, WPI is more sensitive to changes in fuel prices.

Another important difference arises from the fact that while WPI does not cover services, the commodity basket of New CPI includes certain personal services such as medical care, education, recreation and amusement, transport and communication and personal care and effects. Considering that Indian economy is a services economy, these domestic services are important if we want to assess the price increase for the general population.

iii. The analysis of the causal and cointegrating relationship between inflation rate (as measured by CPI and WPI) and different macroeconomic variables suggested the following:

- All the ten macro variables and the WPI, CPI(Rural), CPI(Urban) and CPI(Combined) are found to be non-stationary at levels and stationary at first difference, indicating same order of integration at I (1) for all the variables.
- Bidirectional Granger causality has been found between WPI and the five macro variables GDP, M1, Export, Oil Exports and Oil Imports. Earlier researchers like
Patnaik (2010), and Ashwini (2014) found that with other variables GDP and Broad Money contributed to inflation significantly.

- On the other hand, CPI (Rural) is found to have bidirectional granger causality with the three macro variables i.e. IIP, Export and Import.
- India’s present main inflation indicator CPI (Combined) is found to make short-run adjustment with changes in GDP, IIP, M3, Oil Imports and Oil Export products. GDP and IIP, no doubt, are used as measure of economic growth of a country by most of the researchers. The short-run relationship is supported by researchers like Patnaik (2010), and Madhu and Giri (2013).
- GDP is found to have a positive significant relationship with CPI (Combined). With 1% increase in GDP, there is expected to be only 0.001 % rise in inflation CPI inflation. This may be due to the rising disposable income of the people. Though this finding is in contradictory to the traditional theory of Fischer (1993) that states that inflation falls with a rise in GDP, but it has been supported by recent research works on inflation dynamics like Behera (2014), Saxena et al (2013) and Arif et al (2012).

- IIP is found to have a significant relationship with CPI Combined; however the negative coefficient indicates that CPI Combined would fall 1.678 percent with 1percent rise in IIP. This may be due to higher supply leading to lower price level.
- The significant relationship of M3 with CPI Combined indicates that 1 percent increase in M3 may lead to 0.02 percent increase in price level.
- The significant relationship of M1 with CPI Combined indicates that 1 percent increase in M1 would lead to 0.09 percent increase in price level.
• Exports (EXP) is also found to have significant relationship with CPI Combined and indicates that 1 percent increase in Export would lead to rise in 4.2 percent in price level. Looking into the nature of exports (like rice, jewellery, drugs, textiles, electronic goods among many others), the domestic supply may be reduced, whereas the aggregate demand may be high, resulting in increase in price level.

• Imports (IMP) is found to have significant relationship with CPI Combined and indicates that 1 percent increase in import would lead to rise in 2 percent in price level on the average in the long run. Imports mostly consist of raw-materials, semi-processed materials which are used as inputs in Indian manufacturing industries (mentioned in section 6.1). Hence it may be concluded that because of imports, cost of production may rise, which in turn lead to increase in general price level. Another reason may be that income level of the manufacturing houses and importers may decline leading to lesser investments in production of goods and services which may more reduce the supply thereby increasing inflation. This finding has been supported by researcher Kumar (2013).

iv. While analyzing the importance of the concept of core inflation as a reflector of long-term trend in price level, the following conclusions could be derived:

a. Predictability

• In this study, in case of headline inflation CPI (Rural), it has been found that it fully reverts to the core inflation measure CPI (Rural) Excluding Food for a time-period of 1 month. Whereas, the headline inflation CPI (Urban) and CPI (Combined) do not revert back to the core measure i.e. CPI-Urban Excluding
Food and CPI-Combined Excluding Food, for time-period of 1 month. The food volatility is expected to be of transient nature for 1 month period.

- The Headline CPI (Urban) is the only measure that reverts back to the core CPI (Urban) Excluding Food and Fuel for the three time-periods. Thereby, CPI (Urban) Excluding Food and Fuel is found to a stable measure.

- Similarly, it could be found that, for a time-period of 1, 2 and 3 months, the headline inflation WPI is found to revert back to the core measure WPI Excluding Fuel. It may be due to the volatility component of fuel prices in the 1, 2 and 3 months period. Fuel prices are found to be very volatile affecting WPI.

- Headline inflation WPI is found to revert back to the core measure WPI Excluding Food for period of 2 months and 3 months respectively. Wholesale food prices are found to be volatile in period of 2 to 3 months rather than 1 month period as in the case of retail prices of CPI.

b. Volatility

- The core measures of CPI Rural, CPI Rural excluding Food and CPI Rural Excluding Food & Fuel, both the terms ARCH(1) and GARCH (1) are found to be significant at 5% level of significance with p< 0.000 . However the sum of the ARCH and GARCH coefficients are 0.88 and 0.89 for CPI Rural excluding Food and CPI Rural Excluding Food & Fuel, indicating that volatility shocks are quite persistent.

- For CPI Urban Excluding Food, both the ARCH (1) (p <0.008) and GARCH (1) (p< 0.000) are found to be significant at 5% level of significance. The sum
of the ARCH (1) and GARCH (1) coefficient is 0.80, indicating medium persistency in volatility shocks.

- However, for CPI Urban Excluding Food & Fuel, both ARCH (1) and GARCH (1) terms are found to be insignificant at 5% level of significance.
- For CPI Combined excluding Food and CPI Combined Excluding Food & Fuel, both the terms ARCH (1) and GARCH (1) are found to be significant at 5% level of significance with p< 0.000. The sum of the ARCH and GARCH coefficients are 0.84 and 0.98 for CPI Combined excluding Food and CPI Combined Excluding Food & Fuel, indicating that volatility shocks are quite persistent. Especially for CPI Combined Excluding Food & Fuel, the sum of ARCH and GARCH coefficients being almost 1 implies that the movements of the conditional variance away from its long-run mean last for a long time.

c. Causality

- The direction of causality indicated that, CPI-Urban and CPI-Urban Excluding Food and Fuel has one-way causality as the null-hypothesis “CPI-Urban does not Granger Cause CPI-Urban Excluding Food and Fuel” is rejected at 5% level of significance at both the lags 1 and 2. Similarly, it is found that there is one-way causality between the CPI-Combined and CPI-Combined Excluding Food as well as CPI-Combined and CPI-Combined Excluding Food & Fuel, for both the lags 1 and 2.
- WPI and WPI excluding Food exhibits two way causality at lag 1, as the null hypothesis that “WPI does not Granger Cause WPI excluding Food” is rejected at 5% level of significance as p< 0.024. Similarly the null hypothesis
that “WPI excluding Food does not Granger Cause WPI” is rejected at 5% level of significance as p< 0.016.

- At lag 2, Headline WPI is found to Granger cause WPI excluding Fuel at 5% level of significance as p< 0.036.

- Similarly WPI and WPI excluding Food and Fuel exhibits two way causality at lag 1, as the null hypothesis that “WPI does not Granger Cause WPI excluding Food and Fuel and Fuel” is rejected at 5% level of significance as p< 0.006. Similarly the null hypothesis that “WPI excluding Food does not Granger Cause WPI” is rejected at 5% level of significance as p< 0.0003.

Thus, after analyzing the predictive, volatility and causality components of the core measures, CPI (Urban) Excluding Food and Fuel can be considered as a suitable measure for core inflation.

vi. The questionnaire survey revealed the monthly consumption behaviour of the common masses in terms of mean values of consumption. In all the different food segments, it was found that the affordable capacity of the high income group (as evident) is more than the other groups. The survey also revealed certain food items which were initially not covered by the WPI commodity basket. But, later in 2014, when the government of India decided to consider the CPI as the major indicator of inflation in India, it was found that the New CPI basket had included most of the items that were not included in the WPI basket. Hence, after this shift from WPI to CPI as the main inflation indicator, the survey concentrated mainly on
finding the average consumption of the different food items in the New CPI basket by the common masses.

However, in a very recent development, that is in May 2017, undertaken by the Government of India, regarding the further revision of base year of WPI from (2004-05) to (2011-12), certain changes had been introduced in the commodity basket of the Revised WPI. It deserves special mention because these recent changes had been done keeping in view the inadequacy of the commodity basket in representing the consumption behaviour of the common masses. In fact, it could be found that the food items which had been found missing in the WPI series 2004-05 (though these items were of high importance to consumers) had been introduced in the New Revised WPI series with base year 2011-2012.

The following table shows the newly added items to the revised WPI (2011-12).

Table: 9.2 List of food items newly added to Revised WPI (2011-12 base year)

<table>
<thead>
<tr>
<th>Serial No</th>
<th>New Food Items Added to Revised WPI with base 2011-12</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Peas, Rajma under Pulses</td>
</tr>
<tr>
<td>2</td>
<td>Radish, Carrot, Cucumber, Pointed gourd, Bitter gourd, Bottle gourd, Beans, Pumpkin and Drumstick under Vegetables</td>
</tr>
<tr>
<td>3</td>
<td>Mosambi (Sweet Orange), Pomegranate, Amla, Jackfruit, Pear Almond, and Walnut under Fruits</td>
</tr>
<tr>
<td>4</td>
<td>Tamarind under Condiment and Spices</td>
</tr>
<tr>
<td>5</td>
<td>Betel Leaves under Other Food Articles</td>
</tr>
</tbody>
</table>
Thus, it could be mentioned that this research work had been quite productive because the findings of this survey had been already implemented by the government of India in the form of recent revision of the WPI base year.

Finally, therefore, it could be concluded that, the research topic is quite dynamic as it is subject continuous changes. The government of India had been engaged in continuous revision of the inflation indices owing to the structural changes over time in the economy, products and their specifications. Under the fixed basket approach the base year is changed at regular intervals. Simultaneously index basket weights and source agencies are also updated to keep the index series representative.

9.2 Scope for Further Research

Though this research work on inflation dynamics deals on multiple dimensions, it cannot be considered to be an exhaustive work. Still, there is scope for further research in different areas.

i. This research work has already identified the differences in CPI methodology of a few South Asian countries along with the developed countries of China, U.K. and U.S.A. Further study can be carried out on the differences in the CPI methodology by taking into consideration other countries of the world, to get a broader outlook of the inflation measure.

ii. This study has concentrated on the causal and cointegrating relationship of ten macroeconomic determinants of inflation in India. There is still scope to
further analyze the other determinants such as interest rates, stock market, exchange rates, deposit rate, prime lending rate, and others in the context of Indian economy.

iii. Policymakers in many countries focus more on “Core Inflation” that gives the persistent movements in inflation, over a long period. A good measure of core inflation helps in predicting the future trends in inflation. In this context therefore, the use of core inflation for monetary policy purposes assumes importance. In case of India too, the Reserve Bank of India (RBI) uses non-food manufacturing as an indicator of core inflation. However, many other countries use headline excluding food and energy as measures of core inflation. This study has already focused on the exclusion based measures of WPI and CPI, i.e. headline excluding food and energy as measures of core inflation. Further study could be done by analyzing the core measure “non-food manufacturing inflation” in terms of predictability, volatility and causality.

iv. Another area of research could be the understanding the comparative differences in inflation dynamics of a few developed countries in terms of their inflations indicators and determinants of long-run inflation.