Biases in Consumer Price Index Methodology in Pakistan: Suggestions for Improvements

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The issues relating to the complexity of the measurement of the Consumer Price Index (CPI) which is regarded as the best and most well known indicator of inflationary trends and without referring to which economic policies cannot be evaluated have long been debated. Any measurement error in CPI may over or understate inflation, which can have serious repercussions on monetary, fiscal and other economic management policies. The report of the Boskin Commission [Boskin, *et al.* (1996)] has identified the possible sources of bias in the CPI. These biases which this study has also corroborated through a primary survey of selected households relate to commodity and outlet substitution, quality adjustment and new product introduction as well as index calculation in the existing methodologies. In this paper these biases have been evaluated for Pakistan and ways to improve the construction of the Index have been suggested. Other issues in Pakistan relate to selecting a representative product (or good), defining average quality, data collection, weights determination and base year change. The use of the Geometric means index formula and Laspeyre's Index to reduce the formula bias has been proposed in this study.

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1. INTRODUCTION

The Consumer Price Index (CPI) is an index number measuring the average price of consumer goods and services purchased by households. It is one of the several price indices calculated by national statistical agencies. The percent change in the CPI is considered as a measure of inflation. The CPI can be used to index (i.e., adjust for the effects of inflation) wages, salaries, pensions, or regulated or contracted prices. The CPI, along with the population census and the National Income and Product Accounts, is one of the most closely watched national economic statistics.

The relative prices of different goods and services change frequently in a time interval due to various factors and these changes lead to change in the consumers' buying

behaviour. As there has been sizeable increase in the population of the lower and the middle class,[1] demand patterns have tended to shift increasingly to services[2] away from goods, and to characteristics of goods and services like better quality, variety and greater convenience. But all these factors, plus others, mean a larger part of what is produced and consumed in an economy is more complex to measure than it was a couple of decades ago when the economy largely consisted of smaller number of easier to measure items such as flour and onions.[3] Inflation in a complex dynamic market economy is hard to measure. Further, the rapidly changing behaviour of economic agents puts tremendous pressure on a statistical system to keep up with the change and provide the coverage of context and scope. However, agencies which construct the CPI are constantly engaged in research to improve the measurement. The Federal Bureau of Statistics (FBS) is the main agency doing this work in Pakistan. Like several other developing countries[4] the FBS has no research programme to improve the CPI estimation methodology. As a result it could not incorporate any remedial measure for several biases which were pointed out by the Boskin Commission more than a decade ago. The report of the Boskin Commission [Boskin, *et al.* (1998)] has focused a great deal of attention on the CPI issues. This report created much interest in research circles. It identified possible sources of bias in the CPI like substitution, outlet, quality and new product. This report has called into question the accuracy and relevancy of the CPI even when international standards are followed.

Since the release of this report, major revisions in the CPI have been under consideration in various countries in the light of the issues raised in it. New Zealand, Australia, Canada, Japan and European countries have taken a lead in this regard. Many issues on CPI methodology, like outlet and substitution biases have been the object of considerable research in these countries. On the contrary developing countries are facing two main constraints in revising the construction of the CPI. The first one is the shortage of trained economists and statisticians in the area of price statistics, and the second is the concerned agencies' limited funding capacity.

So if the CPI contains measurement errors and shows the trend inaccurately, the cost of such bias can be substantial both for macroeconomic management policies and indexations by various agents. Consider, for example, inflation targeting in case of monetary policy which requires an accurate and timely reading of the rate.[5] As consumer price data collected by the Federal Bureau of Statistics are also used for national income statistics, errors of measurement in CPI can also lead to serious errors in GDP statistics as well.

All these concern are dealt with in this study, however, considering the limitations of its size and scope, a more comprehensive study would be needed to correctly measure inflation for different purposes.

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[1]As also noted in a recent PIDE Working Paper [Nayab (2011)], that the middle class for Pakistan, using the economic definition, on Pakistan Social and Living Measurement Survey (PSLM) 200708 data set, ranged upto 60 percent of the total population.

[2]The share of services sector in the GDP is around 54 percent (2009-10) and it has been increasing overtime, it was 39 percent in 1960-61 [Ahmed and Henna (2011)].

[3]Boskin, *et al.* (1988) *Journal of Economic Perspectives* 12:1.

[4]In terms of deficient research and resource capacity.

[5]Mismeasurement of CPI by K. Ariga and K. Matsui. NBER Working Paper No. 9436, Issued in January 2003.

In section two the possible biases in CPI measurement and other measurement issues are discussed. Section three discusses the representativeness of the CPI basket. In section four, the results of a small survey of around 450 urban households of Rawalpindi to determine the existence of biases in consumer buying patterns are given. The next section is about the importance of using the geometric mean index formula besides the Laspeyre's index to cover for formula bias. Finally, in the concluding Section some policy recommendations have been suggested.

2. POSSIBLE BIASES IN THE CPI

Since the CPI is constructed by surveying prices of specific goods and services at specific outlets for a fixed consumption basket at a specified base period, it does not properly reflect changes in consumers' purchasing behaviour in response to relative price changes over time. The CPI provides an estimate of 'representative' price change. The issue of 'bias' arises in the choice of items to be priced and the selection of outlets. This task runs the risk of becoming unrepresentative over time.[6] Some of the main limitations in constructing CPI are as follows:

- Substitution over time in the items purchased by consumers (item substitution bias).
- Substitution over time in the outlets where those purchases are made and new outlets entering the market where those prices are not being collected from (outlet and new outlet substitution bias).
- New product entering market and not being incorporated in the CPI (new product bias).
- Making adjustment to reflect changes in the quality of products (quality change bias).

2.1. Accounting for Substitution Bias

Substitution can take several forms corresponding to the type of item and outlet specific prices used. These could be:

- Substitution among the brand of products.
- Substitution among the sizes of product.
- Substitution among outlet.
- Substitution across time.
- Substitution among type of item.
- Substitution among specific items in different index categories.

The substitution bias reflects the failure of the fixed basket index to account for the fact that consumers will tend to substitute relatively less expensive items in place of items that have become relatively more expensive. Several empirical strategies have been employed to estimate the substitution bias. A strategy that was frequently employed prior to 1980 was to estimate a system of demand equations and then, using this information about what substitution would occur as prices changed, to calculate directly the exact cost-of-living index associated with the demand system.

[6]For detailed discussion and the practice adopted by FBS in Pakistan please see Khalid and Zahid (2010).

When prices change, consumers prefer to purchase goods having comparably low prices but which are still very close substitutes. If the price of a commodity goes up consumers start purchasing less of that item and/or delay its purchase if the goods are not an essential item of use. A fixed basket index does not reflect this type of substitution behaviour and thus may over or understate the price index.

2.2. Representative Goods Selection

The FBS in Pakistan selects only one item from each range of products and declares it as of an average quality without any further justification and keep on collecting data on this particular brand for the next ten years. Our survey results show that this practice needs to be improved and a random sample from a group of categories, or strata, should be used instead of a single item or goods. The whole idea of average quality goods used by the FBS is vague and the data collector reports the price of that brand whether that good is of average quality any more or not.

2.3. Quality Change

This is the most difficult challenge in estimating the CPI, as the quality of available goods and services remains under change owing to consumer preferences and improvement in production technologies. There is no simple way to deal with the issue and the FBS is required to work on this issue thoroughly. There are countries which have spared lot of resources to tackle with the issue.

2.4. Outlets

This is another potential source of bias while measuring inflation indices. It has been found in this study that consumers always switch from one outlet to another to get the best deal and some outlets become non-representative overtime due to opening of new outlets. But FBS ignores this factor.

2.5. New Product

The improvement in the standard of living in the modern world owes much to new products, including major innovations such as in energy, transportation, communications etc. Therefore, this should be given due consideration. When a new product enters the market and if it is a near substitute of the older product, then it may be rotated in. However, if a new product does not fit neatly into an existing category, or is "missed" for other reasons, it takes at least 10 years before it is introduced into the CPI again. It is very difficult to handle the problem of new products but quantitatively it is very important.

2.6. Formula Issue

There are several index formulas which are potential candidates for calculating the CPI and are used by the agencies of several countries but FBS has yet to make use of them. Our results show that the difference in inflation rates between the Laspeyre's index and the Geometric index may vary from a very minor difference to 5 percent for the categories included. These results are also in line with the results for other countries.

3. METHODOLOGY

In order to assess whether the biases mentioned in section two and three are relevant to our CPI calculation or not, we have conducted a small survey in Rawalpindi (one of the main cities of Pakistan) and analysed its results in this section.

There are many sampling techniques for surveys; among them the most popular and sound is the multi-stage sampling technique. Usually in the first stage the clusters are selected randomly. On the basis of selected clusters, the stratified proportional sampling technique is used to select wards especially in urban areas. Finally, in household surveys, the number of households is selected on the population proportionate to size (PPS) criterion and the sampling technique is usually systematic with random start, while in respondents/individual surveys the number of individuals is selected randomly.

In this study, for the first stage, the random sampling technique was adopted for the selection of Union Councils (UCs) from the Rawalpindi city. In the selected UCs, stratified proportional sampling techniques were used for the selection of wards. In the third stage the households were interviewed randomly from that ward. The multi-stage systematic random sampling technique was used to collect the information of in respect of some four hundred (488) individuals/respondents. The total population of Rawal Town (main area of Rawalpindi other than cantonment, for more detail http://www.rawalpindi.gov.pk/MRawal.aspx) is 4.9 million approximately. In the first stage ten (10) union councils were selected randomly out of forty seven (47) councils of Rawal Town. Then a sample of 48 to 50 households was randomly selected from these randomly selected union councils. This survey was conducted in May-June 2008.[7]

Secondly as the consumption weights are different for different characteristics-based groups and also change when inflation is high or low, because of the goods substitution possibility, their price consumption path and the Engel curves for different groups. The use of different formulas such as the Geometric Mean (G.M) instead of the Laspeyre's index method can lead to a significant difference in estimates. In order to identify the difference coming from "lower level substitution bias" in the Laspeyre's CPI data for two years i.e., 2001 and 2002, for inflation in the food category for each month of the stated year was used and for yearly comparison the data set for 2007 and 2008 was used.

4. SURVEY RESULTS

This survey included some baskets of household expenditures but here only a few of them are reported [for details of the questionnaire and results please see Khalid and Zahid (2010)].

4.1. Is the CPI basket in Pakistan Representative?

The FBS calculates the CPI by collecting data either on one item or very few items for each product and assumes that to be a representative basket. Whether this

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[7]The novel contribution of the study is to show that there are several issues related to CPI construction issue, however we have collected data only from one city, for few brands and few outlets only which is not representative of the whole population or the whole consumption basket at all. However the results indicate the significance of the issues raised. Therefore, while constructing for the country as a whole these biases may vary even more significantly.

item is representative or not is open to question. For example, there are varieties of lawns (cloth) available in the market, particularly for ladies. Which of these is representative is hard to know. The results of this survey indicate that even for one city there are several choices for the type of cloth women purchase, what to talk of the whole country.

This problem of representative item selection exists in almost all the categories ranging from vegetables to electronics goods. How the price of a TV set, which varies from a few thousand rupees to more than a hundred thousand rupees, is collected, is hardly justified by the FBS. Yet quality change is another issue. Even the price of an average quality apple would be hard to determine.

Most of the items of the CPI basket have to be selected for their average quality. In this survey information was collected from households in Rawalpindi city about their choices regarding clothing and footwear and the results indicate that FBS should use some advanced statistical mechanism for selecting goods for the CPI basket to avoid biased results. The results indicate that in the matter of choice for both items the FBS mechanism of selecting one item is clearly biased either upward or downward. FBS collects the price of only one item from among a group and claims to have picked the average quality item. This is not the correct position because one item picked from a class of hundreds of items cannot be classified as an average good.

4.1.1. *Cloth*

The results of the survey show that one brand/variety of the cloth is not representative of the whole lot in the market even for the purpose of this small sample. It cannot be treated as a representative to provide information for the whole urban population. There are numerous brands like *Al-janat, Al karam, Classic lawn, Gul Ahmed, Firdaus lawn, Sitara lawn* in addition *to non branded varieties* that are the women's first choice. For gents, *Al karam, Bonanza, Gul Ahmed,* jeans, latha, wash & wear and other non-branded cloth have more market share than others. It does not look sound therefore to take one brand of cotton or lawn as representative item for cloth in general.

4.1.2. *Footwear*

FBS takes Bata (one of the branded shoe makers in Pakistan) as the representative footwear whereas this sample shows only 12 percent of the respondents take Bata as their first priority and for women Metro is the brand of choice for over 25 percent against 5.6 percent local brands, 12.5 percent non-branded, Service 9.4 percent and Stylo (branded ladies shoe maker): 8.5 percent as their first priority. Therefore, it is unfair to represent the shoe market with Bata shoes only. Men who take Bata as first choice are 29.5 percent compared to Service: 18.6 percent, Metro: 7 percent, non-branded: 12.5 percent and Hush Puppies (international branded shoe maker): 3 percent. It is therefore suggested that either the best possible market representative should be taken or the mean value of more than two most popular and in use brands should be taken as representative for footwear.

4.2. Outlet Bias

FBS collects data on prices from the same outlet for a period of ten years and it has no mechanism to adjust for introducing new outlets in the system. There is a chance of ignoring those outlets which capture a major share of consumer spending during the span of revision for outlet choices. Consumers prefer to purchase products depending on prices, quality, brand name etc., which means they can switch to places where their preferences are reflected better. When we asked questions to capture outlet bias, it was found that it was a significant issue which needed to be addressed immediately. Although it was difficult to gauge the exact magnitude of such bias, the survey analysis clearly pointed to the prevalence of the issue.

It has also been found that consumer's choice of outlets is very much dependent on price differential from outlet to outlet. Moreover, FBS does not incorporate any concession in prices in estimating the CPI which consumers often get during off season. This introduces bias in the CPI towards prices higher than the actual.

When a new outlet opens in any locality most of the consumer visit that at least once. If its prices are competitive, buyers throng it, often ignoring the quality factor at the old shop. New outlets generally offer discounted rates in the beginning which reflects in the price level at least in the first month of its opening. That effect has also to be captured as it can also cause an outlet bias in the price data.

The following graphs show the outlet bias for the sample:

Fig. 4.1. Do You Think that after Sometime New Shops in the Same Market Become More Popular?
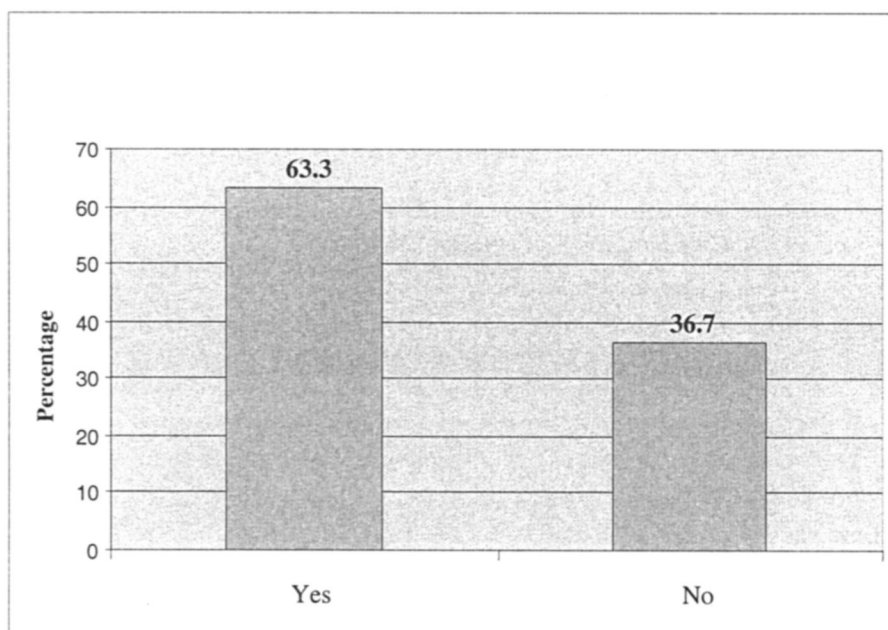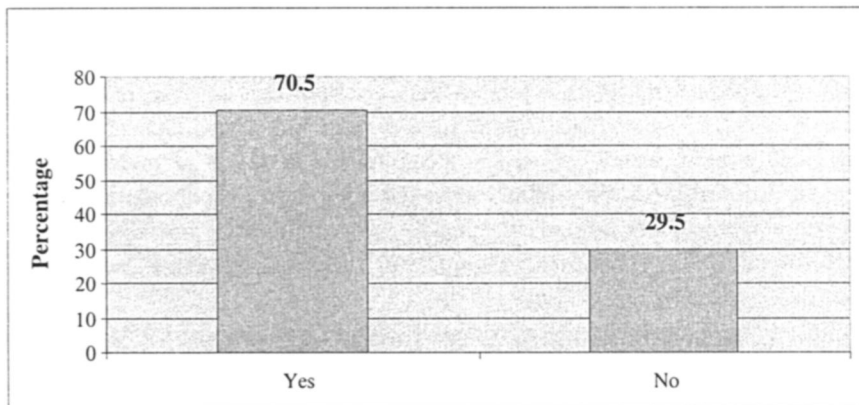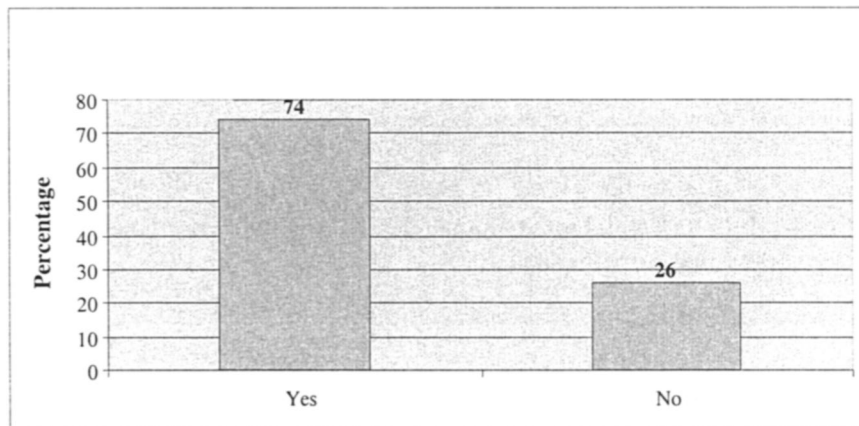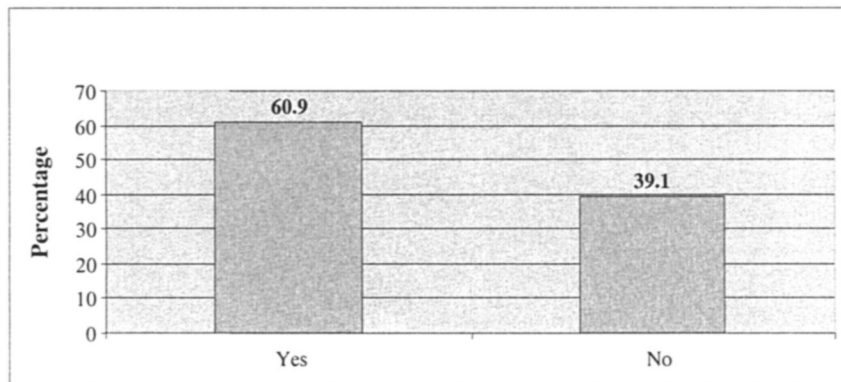
Fig. 4.2. Do You Switch from One Market to Another?

Fig. 4.3. Do You Think that Some Shops Change Prices more Frequently than Others?

Fig. 4.4. Do You Think that Same Quality is Available in Less Price Just Due to Change of Outlet (Shop) Market?

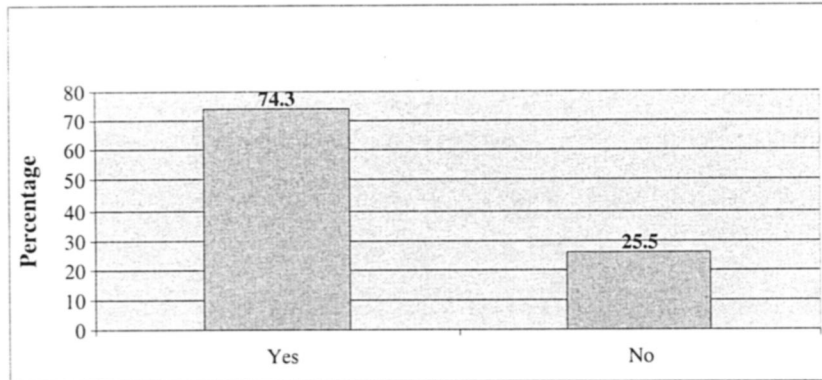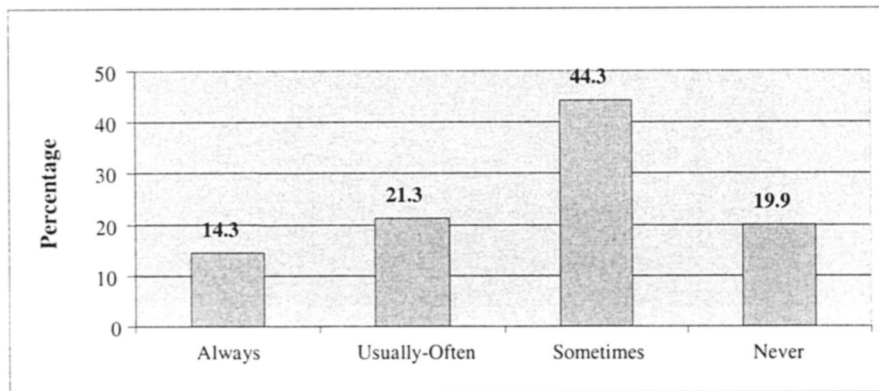**Fig. 4.5. Do You Think that Prices of Footwear (Almost Same Quality) are Different at Different Markets?**

Fig. 4.6. When a New Outlet is Advertised, Do You Visit It?

It appears the new outlet bias is the most important in this aspect because it reduces the lags in data collection. Figure 4.1 shows that 63.3 percent of the respondents think that new shops become more popular with buyers after some time and ignoring them for 10 years introduces a strong outlet bias. Figure 4.2 also shows that 70 percent respondents switch outlets which makes it wrong to retain the same outlet as the representative for such a long time. Figures 4.3, 4.4, 4.5 and 4.6 similarly prove the existence of outlet bias in the present CPI in respect of price change frequency, quality considerations and preference for new outlets.

4.3. New Product Bias

Now if a new product becomes part of the consumption basket, its price would not be included in the CPI due to its methodology, as the basket is based on a family budget survey exercise, which is carried out at a 10 year interval. For example the cell phone handset expenditure has not been part of the CPI but when it would show in the index it would miss the high prices that the mobile service charged in the beginning and will show only the reduced rates that are currently being charged. There are several other

items similarly which the CPI misses in its basket but which contribute a major share in families' monthly or annual budget. For example there is no information on home generators or UPS systems in the under progress family budget survey and the CPI would not reflect these new items of family budget for another 10 to 15 years. And it is possible that in the meanwhile people stop using these items due to better availability of electricity. This implies that these items which consume a large portion of our income will never be included in our CPI basket thus introducing a bias in respect of new products.

The following graphs show the results based on this survey of some of the items which are not part of undergoing family budget survey, but are part of our daily life:

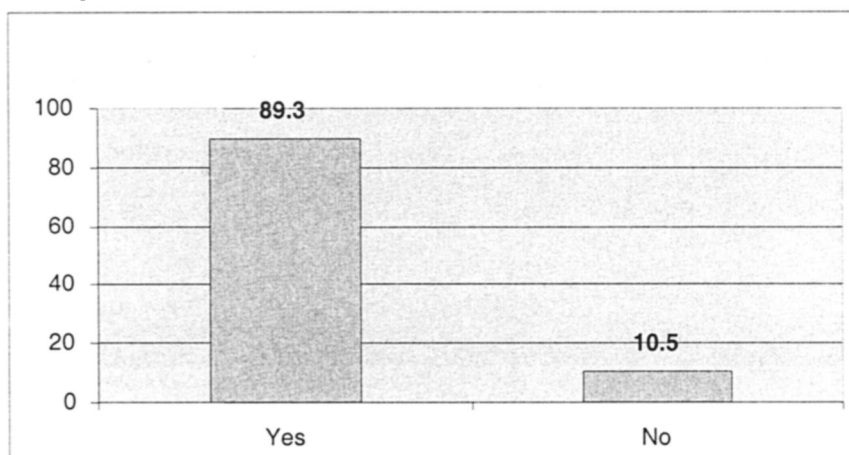**Fig. 4.7. Do You have Electric Water Pump (Motor) at Your Home?**

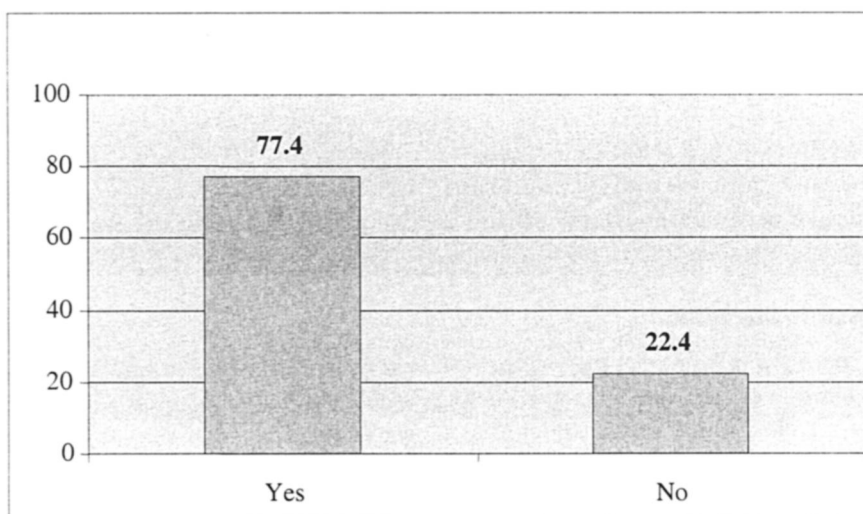**Fig. 4.8. Do You have Exhaust Fan at Your Home?**

Fig. 4.9. Do You have Blender-Grinder or Food Factory at Your Home?
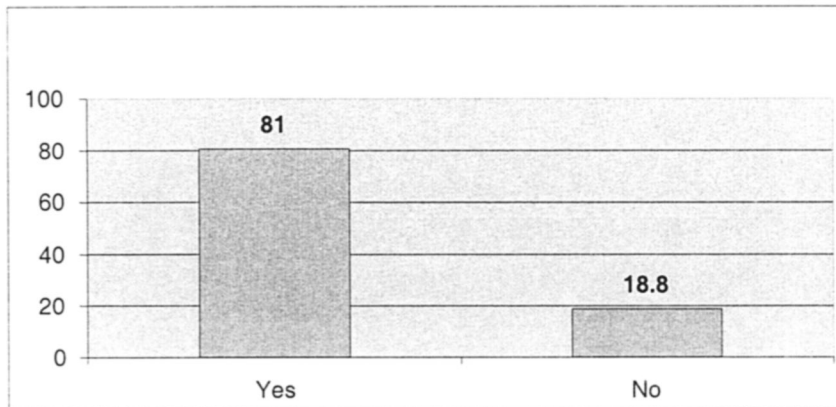

Fig. 4.10. Do You have Vacuum Cleaner at Your Home?
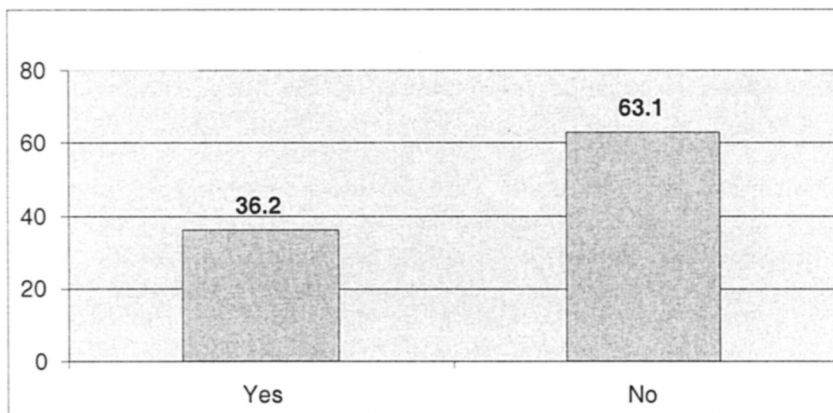

Fig. 4.11. Do You have Toaster-Sandwich Maker at Your Home?
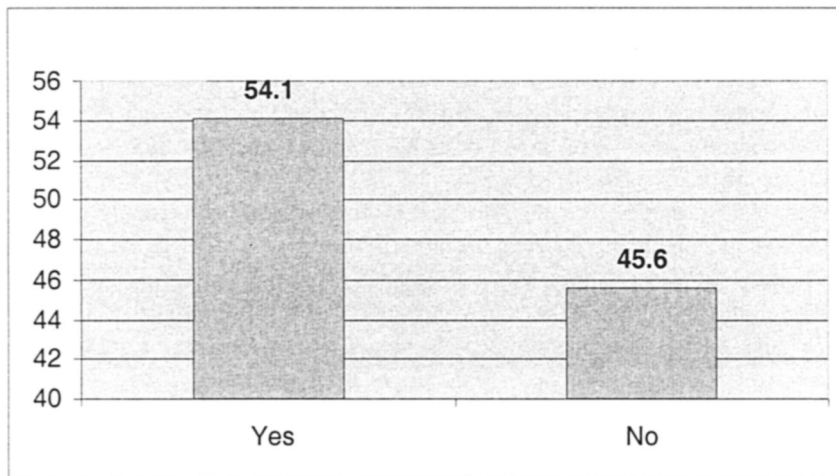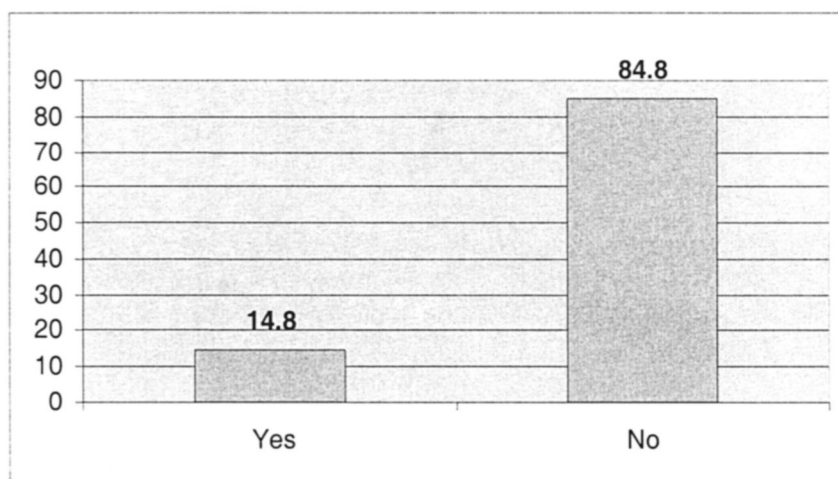
Fig. 4.12. Do You have Generator-UPS at Your Home?

From the above graphs it is evident that in spite of the general domestic use of these items, these are yet to be incorporated in the CPI basket. Our results are also supported by a recent Gallup Survey of alternative/additional expenditures that are not reflected in the CPI basket. The results of a Gilani Research Foundation Survey carried out by Gallup Pakistan revealed that "Pakistanis use a range of coping mechanism to fight electricity shortages and load-shedding: 28 percent use Emergency lights; 15 percent use UPS; 10 percent use Gas Lamps; 10 percent use Generators. But 15 percent say they stop working". So there are many new products which have either become part of our daily life or have become obsolete and these items cannot be ignored. It is, therefore, suggested that most of these should be incorporated in the relevant category of Family Budget Survey so that these could be captured in the price information collected for CPI construction.

4.4. Substitution Effect

In order to see whether there is substitution bias in the current CPI or not, we analysed some of the questions which we asked in our survey regarding substitution among and within a category of expenditure. Our findings suggest that consumers do switch significantly from one item to another among the substitutable categories depending on the prices of the items.

Moreover consumers use flexible baskets of goods and services. It reflects that respondents substitute among different categories depending on the prices and/or quality of these items. Figure 4.13 shows that 69 percent of the respondents change their mind after asking for price of fruits if the price is high and they either go for other fruits or they buy some other edible. Whereas Figure 4.14 shows that 74 percent of the respondents claim that vegetables are substitutable if the price of one vegetable goes up On the other hand Figure 4.15 shows that 57 percent consumers responded that they will buy beef and 17 percent will buy chicken in substitution if price of mutton went up by Rs 50 per Kg. So among the meat category substitution is also possible. Further, around 42 percent will

buy less of mutton; hence the expenditure share of meat will also go down. Therefore the weight assigned to it while calculating the index for inflation would give wrong results until such substitution possibilities with price changes are not incorporated.

Figure 4.16 shows that with increase in price of cloth, 28 percent of the respondents would find a substitute of a brand of low quality which proves that substitution does occur and it should not be ignored. Further those who do not substitute with different items, they lessen the quantity in use i.e. purchase less (65 percent in our survey results) or they substitute the time period of purchase, i.e. they delay or buy in advance depending on the price and availability, which changes the expenditure weight assigned to it on the basis of a static family budget survey. Figure 4.17 shows that increase in price drives 47 percent of the respondents to find a substitute brand of footwear. Those who do not substitute, either delay the purchase or purchase less (52 percent in our survey responses, Figure 4.17).

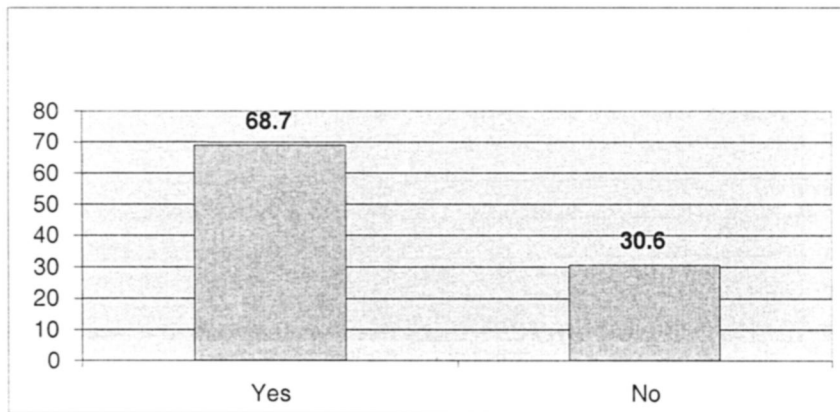**Fig. 4.13. Do You Change Your Mind for Purchasing Fruits after Asking for Prices?**
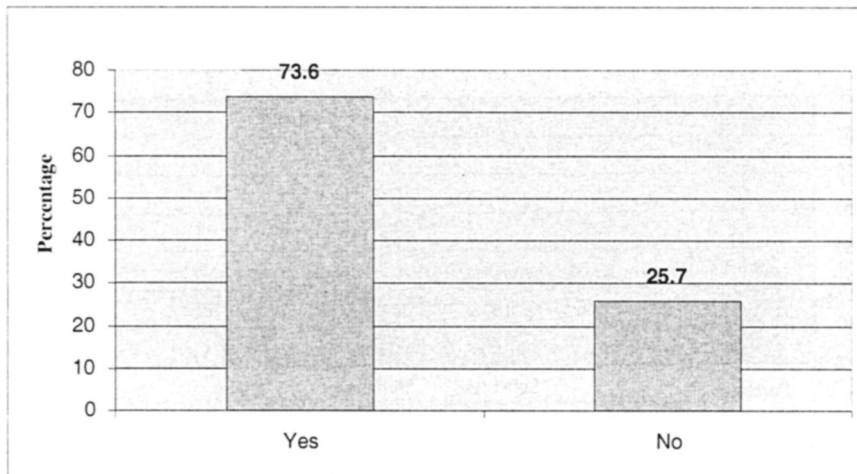

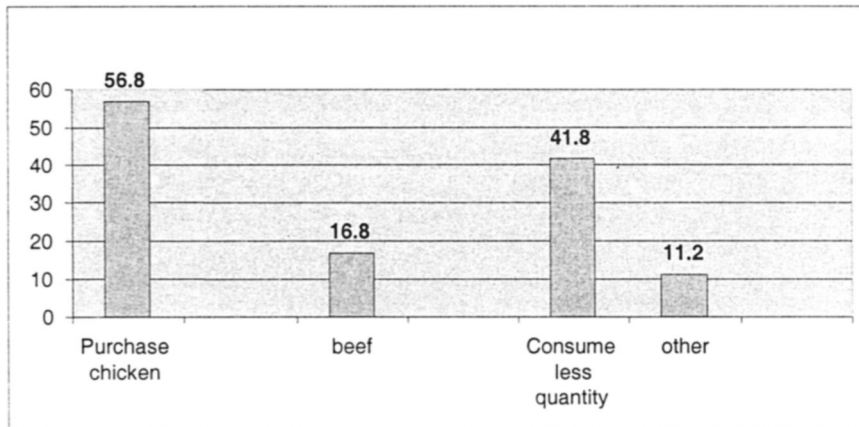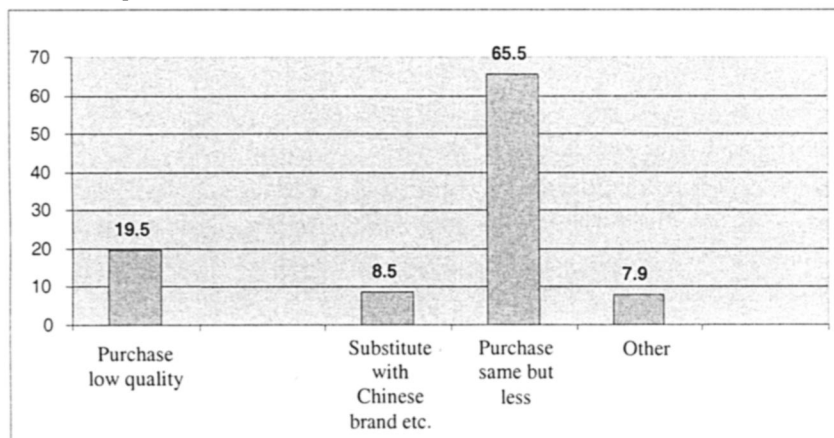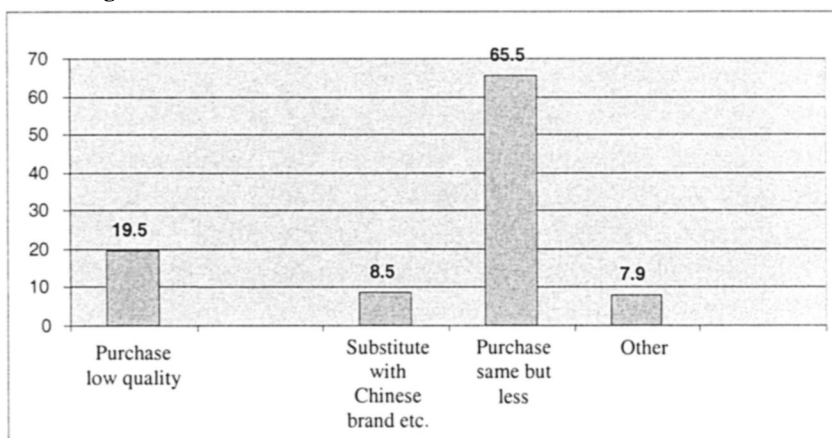**Fig. 4.14. Do Vegetables Substitute of Each Other?**

Fig. 4.15. If Price of Mutton Goes Up by Rs 50 Per Kg What You Do?

Fig. 4.16. With Increase in Prices of Clothes What You Do?

Fig. 4.17. With Increase in Prices of Footwear What You Do?

5. G.M INDEX AND LASPEYRE'S INDEX

Finally, the issue of biases arising from formula usage is described in this section. The use of the geometric mean estimator at the basic level of index calculation in the CPI can be expected to produce an overall index that better reflects the impact of changing prices on the average consumer. Besides the suitability of geometric mean due to the possibility of capturing the substitution effect is also noteworthy, beside other considerations as well. The comparison between the two is given below:

Firstly, it is not adversely affected by persistent functional form bias that is found in Laspeyres before special correction measures which have not yet been carried out for Pakistani data. Thus using the geometric mean frees us from the need to apply the specific procedure to calculate the Laspeyre's index in the case of Pakistan.

Secondly, index calculation formulas are often evaluated with respect to how well they satisfy certain performance criteria, often referred to as tests i.e., the context of the list of tests generally imposed on price indices. The geometric mean formula performs at least as well as the Laspeyre's index.

Thirdly, Forsyth and Fowller (1981) studied the chaining of Laspeyre's indices. Their, results showed that when the Laspeyre's indices are chained together, they can be subjected to "drift", i.e. chained Laspeyres may grow at a faster rate than an unchained index. The drift tends to be largest when price oscillates or bounces as it is common for fresh fruits and vegetables. But there is no such problem with geometric indices.

5.1. Comparison of Geometric Mean and Laspeyre's Price Index for Pakistan

In view of the above discussion we have calculated geometric mean index and Laspeyre's index by using data collected by the FBS.[8] It can be shown from the monthly data on prices that the geometric mean value at the aggregation level gives better results than that of the Laspeyre's index as in practice. For evidence let us have two years data for 2001 and 2002 for the inflation in food category for each month of the stated year.[9] In the first column the Laspeyre's value and in the second the geometric mean value are shown for the same months.

[8]**Laspeyres index**

$$L = = \frac{\sum_i^n Q_{0i} P_{ti}}{\sum_i^n Q_{0i} P_{0i}}$$

Where L is the simple two-period Laspeyres index, P_{0i} represents the price of ith good in period 0 (base year) ,P_{ti} is the price of ith good in period t, Q_{0i} represents the quantity of good i sold in period 0 (base year).

Geometric mean index

$$G = \prod_i^n \left(\frac{P_{ti}}{P_{0i}}\right)^{S_{0i}} \text{ or } G = exp\left\{\sum_i^n S_{ib} log\left(\frac{P_{i,t}}{P_{i,t-1}}\right)\right\}$$

Where $S_{ib}=W_{ib}/\sum W_{ib}$ is the base-period expenditure share weight for specific item i.

[9]Since data sets with all weights, with new base was available for monthly frequency for 2001 and 2002 and for yearly frequency for 2007 and 2008 only, so these were used. However, it does not invalidate our point of biases in construction of CPI.

Table 1

Laspeyres Index and Geometric Mean Measures for Inflation in Pakistan

	December		October		July	
	Laspeyres	G.M	Laspeyres	G.M	Laspeyres	G.M
2001	−0.17124	−1.01515	0.980861	−0.07112	3.605605	2.188498
2002	10.8918	9.447832	6.073435	5.314308	0.742872	0.392852

From the above Table 1, it is evident that the inflation value obtained by the G.M is less than that from Laspeyre's. The latter gives us the upper bound of inflation as reported by many other authors also. Further we have also selected those categories which are considered as substitutes for each other. There are two levels of substitution biases namely lower level (between same categories) and upper level (among different categories). We have incorporated only the upper level substitution for the results depicted in the following graphs. Lower substitution cannot be calculated due to non availability of data. Moreover, while doing calculations we have also picked those sub-categories of CPI basket which are commonly considered as close substitutes of each other to see the substitution possibilities and the results thereof.

We found from our analysis that there was a difference between two indices for the food category. As an example we focused on the data of March 2007 and March 2008 to calculate the year on year inflation. Generally, vegetables and pulses are substitutes for each other and fruits category and vegetables are also substitutes of each other within the category. We found that the Laspeyre's index almost all the times gave values higher then geometric mean, thus supporting the fact that it gives an upper bound but not a good approximation of the true cost of the living index. Nevertheless, if prices of some of the items decrease and other items increase, we notice that these differences are not very large for some categories. But there are also categories for which these differences are quite significant. These differences indicate that there is need to think over the issue of using an appropriate statistical index for measuring the CPI.

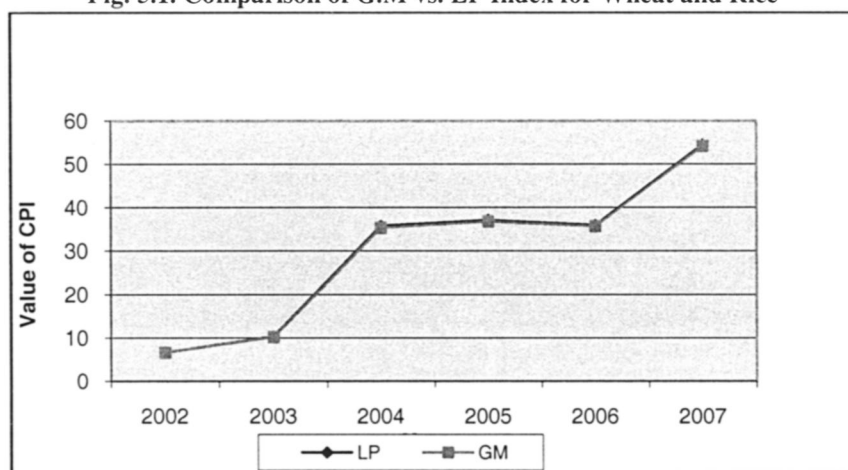**Fig. 5.1. Comparison of G.M vs. LP Index for Wheat and Rice**

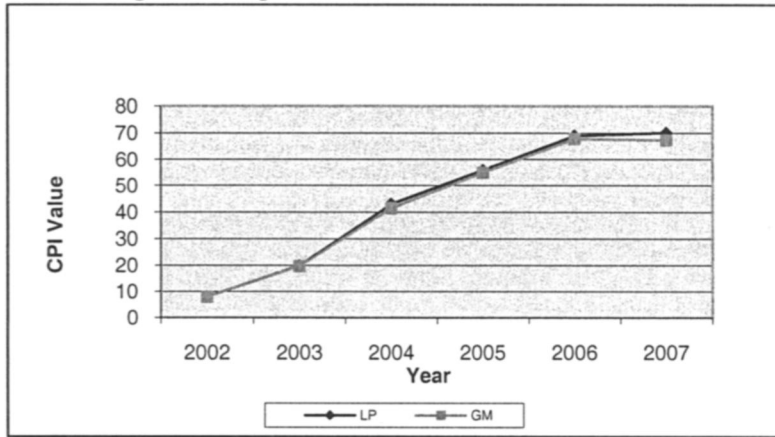**Fig. 5.2. Comparison of G.M vs. LP Index for Meat**

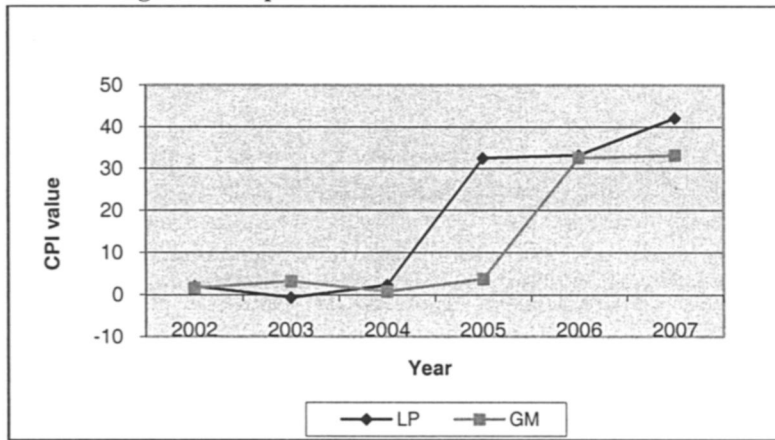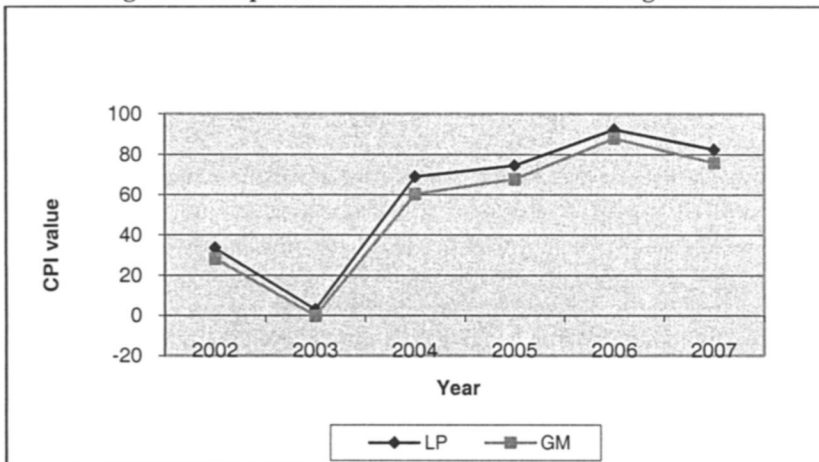**Fig. 5.3. Comparison of G.M vs. LP Index for Rice**

Fig. 5.4. Comparison of G.M vs. LP Index for Vegetables

Further if we see the above time series plot of the two methods to calculate the CPI, then the same points emerge as have been discussed in this connection.
The results show that:

- The Geometric Mean index does not exceed the Laspeyre's value, which is consistent with other studies. Nevertheless, occasionally the Laspeyre's index is less than Geometric Mean index. This may happen where there is sudden fall and rise in prices as Laspeyre's index overstates an increase and understates decrease in prices.
- The difference in inflation rates between the Laspeyre's index and the Geometric index varied from a very minor difference to 5 percent for the categories included in the estimation. These results are also in line with the results for other countries.
- The differences between the Laspeyre's and Geometric indices accumulate over time. The longer the period between re-weighting the CPI basket, the larger the formula biases.
- The best solution to account for item substitution is to use Geometric mean index formula besides Laspeyre's index.

Thus at the basic index level the calculation of CPI using geometric mean is the most potential mechanism for reflecting consumer substitution behaviour, thereby eliminating the so called "lower level substitution bias" in the Laspeyre's CPI. However, a Superlative index cannot be constructed at the basic level because only the base period expenditure information is available at the basic level of aggregation. Sometimes the issue that we cannot measure and meet the assumption of constant expenditure share is raised but it is more plausible than the assumption of fixed consumption quantities as taken by Laspeyre's Index.

6. CONCLUSIONS AND POLICY RECOMMENDATIONS

Although there is lot of research on the agenda of agencies of advanced countries, yet this area is new and requires a good deal and more research for a developing country like Pakistan. We have applied an exploratory research approach to investigate and assess the issues mentioned in this paper at a small scale. It is suggested that the Bureau of Statistics should conduct research on a larger scale in collaboration with some other research organisation like Pakistan Institute of Development Economics (PIDE) and the State Bank of Pakistan (SBP) in order to have better price indices for policy formulation specifically and indexation in general.

Our findings suggest that there is a need to work on the formula used by the FBS for calculating the overall CPI at different levels of aggregations from its price data. Although issues like accounting for quality change and adjusting for new goods are very difficult to handle, yet there is a need to start working on them to improve the CPI in future. Further, out of the several statistical problems we may overcome some of the simple ones by following the low hanging fruit principle on our statistical tree. On the other hand, the definition of representative goods needs to be elaborated. For example, the average quality cloth price may be calculated by having a random sample of few selected categories from a large number of cloth qualities available. The geometric mean to find out the average price of a representative cloth can then be used.

The FBS spent almost four years for changing the base from 2000-01 to 2005-06 and there is no chance that the new base will be implemented in the near future. This time lapse is open to several questions. There are several changes particularly related to IT products, high food and energy price volatility etc. in that time period. Therefore, there is need to gauge the impact of these changes before the base is changed. Moreover, change of base requires very careful thought on issues like: resetting indices, revision of items, revision of weights etc. Most of the countries also calculate the level of bias between old and new base years. Further revision of Base Year after every five years is open to serious limitations as the 2005-06 base year will not be implemented earlier than 2011. Therefore, there is need to analyse the impact of this time lag of base year change on the CPI. This issue assumes importance as the dynamics of prices in the last six or seven years are very hard to grasp otherwise as well.

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