Chapter 7: Index Numbers

Exercises — Index Numbers

Q1 An index number which accounts for the relative importance of the items is known as
(i) weighted index
(ii) simple aggregative index
(iii) simple average of relatives

SOLUTION

An index number that assigns different levels of importance (weights) to different items reflects their relative significance in the total expenditure or production.

Option (i) — weighted index: this is the correct answer. A weighted index uses weights to account for the varying importance of different commodities. Weights represent the share of each item in total expenditure. Items that occupy a large share of expenditure receive higher weight and thus have a greater impact on the index.

Option (ii) — simple aggregative index: this treats all items as equally important regardless of their actual share. No weights are assigned.

Option (iii) — simple average of relatives: this takes the arithmetic mean of price relatives but still gives equal importance to all items.

Answer: (i) Weighted index

Q2 In most of the weighted index numbers the weight pertains to
(i) base year
(ii) current year
(iii) both base and current year

SOLUTION

In constructing a weighted price index, the weights reflect the relative importance of each commodity. The question is: which year's data is used for these weights?

Option (i) — base year: this is the correct answer. Base period quantities (or expenditure shares) are used as weights in the most widely applied weighted index — the Laspeyre's price index. Using base period weights is preferred because it keeps weights constant over time, making comparisons straightforward. Recalculating weights every year (current period weights, as in Paasche's index) is inconvenient and changes the composition of the basket, making comparisons less reliable.

The chapter states: 'In general the base period weight is preferred to the current period weight. It is because calculating the weight every year is inconvenient.'

Answer: (i) Base year

Q3 The impact of change in the price of a commodity with little weight in the index will be
(i) small
(ii) large
(iii) uncertain

SOLUTION

In a weighted index, each commodity's contribution to the overall index is proportional to its weight. The weight reflects the share of that commodity in total expenditure.

A commodity with little (low) weight occupies only a small fraction of total expenditure. Even if its price changes significantly, the product (weight × price relative) remains small, so the impact on the overall index is small.

Option (i) — small: this is the correct answer. For example, if a commodity has a weight of 2% and its price doubles, the contribution to the index is only 2 percentage points. Compare this with food, which often has a weight of 35–45%, where even a modest price rise has a large impact.

Answer: (i) Small

Q4 A consumer price index measures changes in
(i) retail prices
(ii) wholesale prices
(iii) producers prices

SOLUTION

The Consumer Price Index (CPI), also known as the cost of living index, is designed to measure the change in the cost of purchasing a typical basket of goods and services by a representative consumer.

Consumers purchase goods at retail outlets — shops, markets, and stores — at retail prices. Therefore, the CPI uses retail prices.

Option (i) — retail prices: this is the correct answer. The chapter defines the CPI as measuring 'the average change in retail prices.' Wholesale prices are tracked by the Wholesale Price Index (WPI), and producer prices refer to prices at the factory gate.

Answer: (i) Retail prices

Q5 The item having the highest weight in consumer price index for industrial workers is
(i) Food
(ii) Housing
(iii) Clothing

SOLUTION

The Consumer Price Index for Industrial Workers (CPI-IW) assigns weights to different

expenditure categories based on the actual consumption pattern of industrial workers as determined by household expenditure surveys.

Food and beverages account for the largest share of an industrial worker's household budget. This is consistent with Engel's law — as income is lower, a greater proportion is spent on food.

The revised All-India CPI (base 2012=100) weights show Food and Beverages at 45.86%, which is the highest category. Housing gets 10.07% and Clothing & Footwear gets 6.53%.

Option (i) — Food: this is the correct answer.

Answer: (i) Food

Q6 In general, inflation is calculated by using
(i) wholesale price index
(ii) consumer price index
(iii) producers' price index

SOLUTION

Inflation refers to a general and continuing increase in the overall price level. Several price indices can be used to measure it, but the chapter specifically states: 'The WPI is widely used to measure the rate of inflation.'

The Wholesale Price Index (WPI) covers a broad basket of goods at the wholesale level and is available quickly. Its 'All Commodities Inflation Rate' is referred to as 'Headline Inflation.' Because it covers the general price level across primary articles, fuel, and manufactured products, it is conventionally used for measuring economy-wide inflation in India.

Option (i) — wholesale price index: this is the correct answer as stated in the chapter.

Answer: (i) Wholesale price index

Q7 Why do we need an index number?

SOLUTION

An index number is a statistical device for measuring the relative change in a group of related variables over time or across locations. We need index numbers for the following reasons:

1. Summarising complex changes: In a market, prices of many commodities change by different proportions. Reporting individual changes is confusing. A single index number summarises all these changes in one figure.

2. Measuring purchasing power: The Consumer Price Index (CPI) tracks how much it costs to maintain a given standard of living. It helps calculate real wages — the purchasing power of a money wage after adjusting for price changes.

3. Wage negotiation and policy: CPI is used in collective bargaining between workers and employers, and in formulating income policy, taxation, rent control, and general economic

policy.

4. Measuring inflation: The Wholesale Price Index (WPI) is used to measure inflation — the rate at which the general price level is rising — which is essential for monetary policy.

5. Measuring industrial and agricultural output: The Index of Industrial Production (IIP) and agricultural production index measure changes in physical output, helping assess economic performance.

6. Stock market indicator: The Sensex measures the average performance of selected stocks, guiding investors and indicating confidence in the economy.

In short, index numbers condense complex statistical information into a single comparable measure, making them indispensable in economic analysis and policy making.

Answer: Index numbers summarise the change in a group of related variables (prices, output, cost of living) into a single measure, enabling comparisons over time. They are used for measuring inflation (WPI), cost of living (CPI), industrial output (IIP), real wages, and guiding investment decisions (Sensex).

Q8 What are the desirable properties of the base period?

SOLUTION

The base period is the reference period against which changes are measured. The index number of the base period is set to 100. The following properties make a good base period:

1. Normality: The base period should be a period of economic stability — no wars, famines, floods, unusually high or low prices, or any other abnormal economic conditions. Extreme values in the base period distort all subsequent comparisons.

2. Recency: The base period should not be too far in the past. Over time, consumption patterns change, new products emerge, and old products disappear. A base from 1960, for instance, would include many items no longer relevant today. Comparing current prices with a very old base makes the index meaningless.

3. Representativeness: The base period should reflect a typical or average pattern of the variable being measured. It should be a year with representative prices, quantities, or output.

4. Periodic updating: Because conditions change, the base year of any index number is routinely updated to maintain relevance. For example, India's WPI base was shifted from 2004-05 to 2011-12.

Answer: The base period should be normal (free from extreme events), recent (not too far in the past), and representative of typical economic conditions. It is also updated periodically as consumption patterns change.

Q9 Why is it essential to have different CPI for different categories of consumers?

SOLUTION

Different categories of consumers have different consumption patterns, income levels, and living conditions. A single CPI cannot capture the cost-of-living changes relevant to all groups simultaneously. Reasons for needing separate CPI indices are:

1. Different consumption baskets: An industrial worker spends a larger share of income on food and fuel, while an urban non-manual employee may spend more on housing, education, and recreation. A single basket cannot represent all groups equally.

2. Regional price differences: Prices vary across rural and urban areas, and across states. Agricultural labourers living in rural areas face different price conditions than urban consumers.

3. Different weights: The weight assigned to each category (food, fuel, rent, clothing, etc.) reflects the expenditure pattern of the target group. These weights differ substantially between, say, agricultural labourers and government employees.

4. Policy relevance: Wage revisions, dearness allowances, and social welfare schemes are tailored to specific groups. For example, dearness allowance for industrial workers is linked to CPI-IW, not to the general CPI.

India therefore maintains separate CPIs — for industrial workers (CPI-IW), for agricultural labourers (CPI-AL), for rural labourers (CPI-RL), and the All-India Rural/Urban/Combined CPI.

Answer: Different consumer groups (industrial workers, agricultural labourers, urban employees) have different consumption baskets and face different price conditions. A single CPI cannot represent all groups. Separate CPIs ensure that cost-of-living changes and policy adjustments (wages, dearness allowances) are relevant to each specific group.

Q10 What does a consumer price index for industrial workers measure?

SOLUTION

The Consumer Price Index for Industrial Workers (CPI-IW) measures the average change in the retail prices of goods and services consumed by industrial workers and their families over time.

It is constructed by selecting a fixed basket of commodities typically purchased by industrial workers (food, fuel, clothing, rent, and miscellaneous items) and tracking how much this basket costs in each period relative to a base year.

Uses of CPI-IW:
1. It shows by how much the cost of living of industrial workers has changed. For example, CPI-IW (2001=100) of 277 in December 2014 means that what cost Rs 100 in 2001 now costs Rs 277.
2. It is used to determine dearness allowance (DA) for industrial workers, compensating them for the rise in prices.
3. It helps in wage negotiations — unions use it to argue for wage revisions when real wages

fall.

4. It is used to calculate the purchasing power of money and real wages of industrial workers.

Answer: The CPI for industrial workers measures the average change in retail prices of goods and services consumed by industrial workers, compared to a base year. It is used to calculate dearness allowance, real wages, and the purchasing power of money for this group.

Q11 What is the difference between a price index and a quantity index?

SOLUTION

Price index and quantity index are both types of index numbers, but they measure different dimensions of economic change:

Price index: measures the change in the prices of a specified set of commodities over time, holding quantities constant. It answers the question: 'By how much have prices changed?' Examples include the Consumer Price Index (CPI) and the Wholesale Price Index (WPI). The formula for a weighted price index uses quantities as weights to compute $\Sigma p_1 q_0 / \Sigma p_0 q_0 \times 100$.

Quantity index: measures the change in the physical volume of production, trade, or employment over time, holding prices constant. It answers the question: 'By how much has physical output changed?' The Index of Industrial Production (IIP) is an example. It uses a weighted mean of quantity relatives with value-added as weights.

Key difference: A price index holds quantities fixed and allows prices to vary; a quantity index holds prices fixed and allows quantities to vary. In this way, changes due solely to price or solely to quantity can be isolated.

Answer: A price index measures changes in prices of a fixed basket of commodities (e.g., CPI, WPI), while a quantity index measures changes in the physical volume of production or trade (e.g., IIP). Price index fixes quantities and varies prices; quantity index fixes prices and varies quantities.

Q12 Is the change in any price reflected in a price index number?

SOLUTION

No. A price index does not reflect the change in every price in the economy. Only those commodities that are included in the specified basket used to construct the index are reflected.

Reasons why not every price change is captured:

1. Selected basket: A price index is built on a pre-selected set of commodities representative of the spending pattern of the target group. Price changes of items not in this basket are not captured.
2. Weights determine impact: Even for included items, the impact of a price change on the index is proportional to the item's weight. A commodity with a very low weight contributes only a small change to the index even if its price rises sharply.
3. Different indices cover different goods: CPI covers retail consumer goods; WPI covers

wholesale goods; IIP covers industrial production. None of them covers all prices in the economy.

Therefore, a price index reflects only the weighted average price change of the selected basket of commodities, not every individual price change in the economy.

Answer: No. A price index reflects only the price changes of commodities included in its specified basket. Items outside the basket are not captured. Even within the basket, a commodity's impact is proportional to its weight — a low-weight item's price change has little effect on the index.

Q13 Can the CPI for urban non-manual employees represent the changes in the cost of living of the President of India?

SOLUTION

No. The CPI for urban non-manual employees cannot adequately represent the changes in the cost of living of the President of India. Here is why:

1. Different consumption basket: The President of India lives in Rashtrapati Bhavan, uses official transport, has access to state-provided housing, utilities, medical facilities, and staff. The actual personal expenditure basket is entirely different from that of a typical urban non-manual employee who pays rent, buys vegetables, and commutes by public transport.

2. Different weights: Even if some common items appear in both baskets, the weights (expenditure shares) would be vastly different. For instance, food may occupy 35-40% of a non-manual employee's budget but a negligible share of the President's personal expenditure.

3. CPI design principle: A CPI is designed for a specific target group with a representative consumption pattern. Using it for an individual whose lifestyle departs significantly from that group gives a misleading picture.

Conclusion: An index number is meaningful only when applied to the group for which it was designed. For the President, whose needs are largely met by the state, a standard CPI has no practical relevance.

Answer: No. The President of India's consumption basket (state-provided housing, transport, staff, and facilities) is entirely different from that of urban non-manual employees. An index designed for one group cannot represent cost-of-living changes for a person whose lifestyle and expenditure pattern are completely different.

Q14 The monthly per capita expenditure incurred by workers for an industrial centre during 1980 and 2005 on the following items are given below. The weights of these items are 75, 10, 5, 6 and 4 respectively. Prepare a weighted index number for cost of living for 2005 with 1980 as the base.
Items: Food, Clothing, Fuel & lighting, House rent, Misc
Price in 1980: 100, 20, 15, 30, 35
Price in 2005: 200, 25, 20, 40, 65

SOLUTION

Step 1: Identify given data.

Item	Weight (W)	Price 1980 (P_0)	Price 2005 (P_1)
Food	75	100	200
Clothing	10	20	25
Fuel & lighting	5	15	20
House rent	6	30	40
Misc	4	35	65

Step 2: Calculate price relatives $R = (P_1/P_0) \times 100$.
Food: $(200/100) \times 100 = 200.00$
Clothing: $(25/20) \times 100 = 125.00$
Fuel & lighting: $(20/15) \times 100 = 133.33$
House rent: $(40/30) \times 100 = 133.33$
Misc: $(65/35) \times 100 = 185.71$

Step 3: Calculate W × R for each item.
Food: $75 \times 200.00 = 15000.00$
Clothing: $10 \times 125.00 = 1250.00$
Fuel & lighting: $5 \times 133.33 = 666.67$
House rent: $6 \times 133.33 = 800.00$
Misc: $4 \times 185.71 = 742.86$

Step 4: Sum up.
$\Sigma W = 75 + 10 + 5 + 6 + 4 = 100$
$\Sigma WR = 15000.00 + 1250.00 + 666.67 + 800.00 + 742.86 = 18459.52$

Step 5: Apply the weighted price relative formula.
$CPI = \Sigma WR / \Sigma W = 18459.52 / 100 = 184.60$

Answer: The weighted cost of living index for 2005 (base 1980) = 184.60. This means the cost of living has risen by 84.60 per cent from 1980 to 2005.

Q15 Read the following table carefully and give your comments.

INDEX OF INDUSTRIAL PRODUCTION BASE 1993-94

Industry	Weight in %	1996-97	2003-2004
General index	100	130.8	189.0
Mining and quarrying	10.73	118.2	146.9
Manufacturing	79.58	133.6	196.6
Electricity	10.69	122.0	172.6

SOLUTION

The table shows the Index of Industrial Production (IIP) with base year 1993-94 for two periods: 1996-97 and 2003-04.

Observation 1 — Overall growth: The General Index rose from 130.8 in 1996-97 to 189.0 in 2003-04, indicating significant overall industrial growth. Compared to the base year, industrial production in 2003-04 was 89% higher.

Observation 2 — Manufacturing dominates: Manufacturing has the highest weight (79.58%) and also shows the highest index value — 196.6 in 2003-04, implying production almost doubled from the base year. This sector drives the General Index most strongly.

Observation 3 — Mining is the slowest growing sector: Mining and quarrying (weight 10.73%) has the lowest index — 146.9 in 2003-04 — indicating it grew only 46.9% from the base year, far less than manufacturing. Its relatively slow growth is a cause for concern since it provides raw materials for industry.

Observation 4 — Electricity: The electricity sector (weight 10.69%) shows an index of 172.6 in 2003-04. Since electricity is critical infrastructure for all industrial activity, its growth at 72.6% from the base year, while reasonable, lags behind manufacturing (96.6%).

Observation 5 — Acceleration between sub-periods: Between 1996-97 and 2003-04, all sectors show notable increases. Manufacturing grew from 133.6 to 196.6 — a rise of 47.1% within this sub-period — suggesting accelerating industrialisation.

Overall comment: The Indian industrial sector showed broad-based and accelerating growth from 1993-94 to 2003-04. Manufacturing was the engine of growth. However, the relatively slow expansion of mining poses a supply-side bottleneck risk for manufacturing.

Answer: Industrial production grew substantially from 1993-94 to 2003-04. The General Index rose to 189.0 (89% growth). Manufacturing (weight 79.58%) was the fastest growing sector (index 196.6); mining was the slowest (index 146.9). All sectors accelerated between 1996-97 and 2003-04.

Q16 Try to list the important items of consumption in your family.

SOLUTION

This is an open-ended activity question based on a student's own household. A typical middle-class Indian family's consumption items may include:

Food and beverages: Rice, wheat/atta, vegetables, fruits, milk, cooking oil, sugar, salt, lentils (dal), eggs.

Fuel and energy: LPG/cooking gas, electricity, petrol/diesel for vehicles.

Clothing and footwear: Clothing for all family members, footwear.

Housing: Rent (if not owned), maintenance, water charges.

Education: School/college fees, books, stationery.

Healthcare: Medicines, doctor visits, health insurance.

Transport: Bus/auto fares, fuel for personal vehicles.

Miscellaneous: Mobile/internet bills, newspapers, entertainment, personal care items (soap, shampoo, toothpaste).

Note: The relative importance (weight) of each category depends on the income level and lifestyle of the family. For lower-income families, food dominates. For higher-income families, education, housing, and healthcare get higher shares. This exercise illustrates why consumer price indices are constructed differently for different income/occupational groups.

Answer: A typical family consumes: food (rice, wheat, vegetables, milk, oil, lentils), fuel (LPG, electricity, petrol), clothing, housing (rent/maintenance), education (fees, books), healthcare (medicines), transport, and miscellaneous (mobile, entertainment). The relative weight of each group varies with income and lifestyle.

Q17 If the salary of a person in the base year is Rs 4,000 per annum and the current year salary is Rs 6,000, by how much should his salary be raised to maintain the same standard of living if the CPI is 400?

SOLUTION

Step 1: Find the salary required to maintain the base-year standard of living at current prices.
Salary needed = Base year salary × (CPI / 100)
Salary needed = 4,000 × (400 / 100) = 4,000 × 4 = Rs 16,000

Step 2: Current salary is Rs 6,000.
Additional raise required = Salary needed − Current salary
Additional raise = 16,000 − 6,000 = Rs 10,000

Interpretation: Although the person's salary has risen from Rs 4,000 to Rs 6,000 (a 50% increase), prices have risen 4-fold (CPI = 400, meaning prices are 4 times the base level). To maintain the same standard of living, the salary must be Rs 16,000. The current salary of Rs 6,000 falls far short — the person's real wage has actually declined.

Answer: Salary needed to maintain the same standard of living = 4,000 × (400/100) = Rs 16,000. Current salary is Rs 6,000. Therefore, the salary should be raised by Rs 10,000 (from Rs 6,000 to Rs 16,000).

Q18 The consumer price index for June, 2005 was 125. The food index was 120 and that of other items 135. What is the percentage of the total weight given to food?

SOLUTION

Step 1: Let the weight given to food = W (in %). Then the weight given to other items = (100 − W)%.

Step 2: The overall CPI is the weighted average of the two group indices.
CPI = [W × (Food index) + (100 − W) × (Other items index)] / 100
125 = [W × 120 + (100 − W) × 135] / 100

Step 3: Solve the equation.
125 × 100 = 120W + 13500 − 135W
12500 = 13500 − 15W
15W = 13500 − 12500
15W = 1000
W = 1000 / 15 = 66.67%

Verification: CPI = [66.67 × 120 + 33.33 × 135] / 100 = [8000.4 + 4499.55] / 100 = 12499.95 / 100 ≈ 125. Confirmed.

Answer: The percentage weight given to food = 1000/15 = 66.67% (approximately 66⅔%).

Q19 An enquiry into the budgets of the middle class families in a certain city gave the following information:
Expenses on items: Food 35%, Fuel 10%, Clothing 20%, Rent 15%, Misc 20%
Price in 2004: 1500, 250, 750, 300, 400
Price in 1995: 1400, 200, 500, 200, 250
What is the cost of living index during the year 2004 as compared with 1995?

SOLUTION

Step 1: Identify given data.

Item	W (%)	P_0 (1995)	P_1 (2004)
Food	35	1400	1500
Fuel	10	200	250
Clothing	20	500	750
Rent	15	200	300

Item	W (%)	P_0 (1995)	P_1 (2004)
Misc	20	250	400

Step 2: Calculate price relatives $R = (P_1/P_0) \times 100$.
Food: $(1500/1400) \times 100 = 107.14$
Fuel: $(250/200) \times 100 = 125.00$
Clothing: $(750/500) \times 100 = 150.00$
Rent: $(300/200) \times 100 = 150.00$
Misc: $(400/250) \times 100 = 160.00$

Step 3: Calculate W × R for each item.
Food: $35 \times 107.14 = 3750.00$
Fuel: $10 \times 125.00 = 1250.00$
Clothing: $20 \times 150.00 = 3000.00$
Rent: $15 \times 150.00 = 2250.00$
Misc: $20 \times 160.00 = 3200.00$

Step 4: Sum up.
$\Sigma W = 35 + 10 + 20 + 15 + 20 = 100$
$\Sigma WR = 3750.00 + 1250.00 + 3000.00 + 2250.00 + 3200.00 = 13450.00$

Step 5: Calculate cost of living index.
$CLI = \Sigma WR / \Sigma W = 13450.00 / 100 = 134.50$

Answer: The cost of living index for 2004 (base 1995) = 134.50. The cost of living has increased by 34.50 per cent from 1995 to 2004.

Q20 Record the daily expenditure, quantities bought and prices paid per unit of the daily purchases of your family for two weeks. How has the price change affected your family?

SOLUTION

This is an open-ended field activity. Students are expected to maintain a personal expenditure diary for two weeks. A suggested approach is as follows:

Step 1 — Data collection: Record for each item purchased on each day: the name of the commodity, quantity bought (kg, litre, piece, etc.), price paid per unit (Rs per kg, Rs per litre, etc.), and total expenditure = quantity × price.

Step 2 — Compile the data: At the end of two weeks, list the unique commodities purchased. Note the price paid in week 1 (base) and week 2 (current).

Step 3 — Construct a daily/weekly price index using the simple aggregative method or weighted method (using quantities as weights).
Laspeyres price index = $(\Sigma p_1 q_0 / \Sigma p_0 q_0) \times 100$
where p_0 = week 1 price, p_1 = week 2 price, q_0 = week 1 quantity.

Step 4 — Interpretation: If the index exceeds 100, overall prices have risen for the family's

basket. The difference between money expenditure and the real (quantity-adjusted) expenditure reveals the price effect.

Expected finding: A typical student may find that perishables (vegetables, fruits) show higher price volatility day-to-day compared to packaged goods. A price rise in staples (vegetables, milk) impacts low-income families more severely because food constitutes a larger share of their budget.

Answer: This is a personal field activity. Students collect daily expenditure data for two weeks and construct a price index (Laspeyres formula recommended). A rise in the index above 100 means prices have increased over the fortnight, effectively reducing the family's real purchasing power.

Q21 Given the following data for years 1995-96 to 2003-04: CPI of industrial workers (1982=100), CPI of agricultural labourers (1986-87=100), and WPI (1993-94=100).
(i) Comment on the relative values of the index numbers.
(ii) Are they comparable?

SOLUTION

(i) Comments on relative values:

CPI for industrial workers (1982=100): values range from 313 (1995-96) to 500 (2003-04). The index more than doubled from the base 100 (1982) to 500 in 2003-04, meaning prices faced by industrial workers rose 4-fold over about 22 years.

CPI for agricultural labourers (1986-87=100): values range from 234 (1995-96) to 331 (2003-04). The index shows substantial rise, meaning agricultural labourers also faced significantly higher prices, but the values look numerically lower because the base year is later (1986-87).

WPI (1993-94=100): values range from 121.6 (1995-96) to 175.9 (2003-04). These are numerically the lowest because the base year is the most recent (1993-94), so there are fewer years of price accumulation. The WPI measures wholesale prices and covers a broader range of goods (no services).

Trend observation: All three indices show a rising trend across the period, indicating general inflation. The rate of increase in CPI-IW was highest in 1998-99 (a notable jump from 366 to 414), possibly reflecting food and fuel price shocks.

(ii) Are they comparable?

No, these three index numbers are not directly comparable for the following reasons:

1. Different base years: CPI-IW uses 1982=100, CPI-AL uses 1986-87=100, and WPI uses 1993-94=100. The different base years mean the absolute values of the indices reflect different periods of price accumulation and cannot be compared directly.

2. Different target groups and baskets: CPI-IW covers the consumption basket of industrial workers; CPI-AL covers agricultural labourers; WPI covers wholesale prices of goods transacted at the wholesale level without reference to any consumer group.

3. Different commodity coverage: CPI indices include services (rent, medical care); WPI excludes services.

To make them comparable, they would all need to be rebased to the same base year. Even then, differences in basket composition would remain.

Answer: (i) All three indices show a rising trend, indicating general inflation. CPI-IW values are highest numerically because its base year (1982) is the oldest. WPI values are lowest as its base (1993-94) is most recent. (ii) They are NOT directly comparable because they have different base years, different target groups, and different commodity baskets.

Q22 The monthly expenditure (Rs.) of a family on some important items and the GST rates applicable to these items is as follows:
Cereals 1500 (0%), Eggs 250 (0%), Fish/Meat 250 (0%), Medicines 50 (5%), Biogas 50 (5%), Transport 100 (5%), Butter 50 (12%), Babool 10 (12%), Tomato Ketchup 40 (12%), Biscuits 75 (18%), Cakes/Pastries 25 (18%), Branded Garments 100 (18%), Vacuum Cleaner/Car 1000 (28%).
Calculate the average tax rate as far as this family is concerned.

SOLUTION

Step 1: Group items by GST rate and compute total expenditure per category.

Category 1 (GST 0%): Cereals (1500) + Eggs (250) + Fish/Meat (250) = Rs 2000
Category 2 (GST 5%): Medicines (50) + Biogas (50) + Transport (100) = Rs 200
Category 3 (GST 12%): Butter (50) + Babool (10) + Tomato Ketchup (40) = Rs 100
Category 4 (GST 18%): Biscuits (75) + Cakes/Pastries (25) + Branded Garments (100) = Rs 200
Category 5 (GST 28%): Vacuum Cleaner/Car = Rs 1000

Step 2: Total expenditure = 2000 + 200 + 100 + 200 + 1000 = Rs 3500

Step 3: Calculate weighted tax (w × x) for each category, where w = expenditure and x = GST rate (as %).
Category 1: 2000 × 0 = 0
Category 2: 200 × 5 = 1000
Category 3: 100 × 12 = 1200
Category 4: 200 × 18 = 3600
Category 5: 1000 × 28 = 28000

Step 4: Sum of weighted taxes = 0 + 1000 + 1200 + 3600 + 28000 = 33800

Step 5: Average GST rate = $\Sigma(w \times x) / \Sigma w = 33800 / 3500 = 9.657\%$

Rounding: Average GST rate ≈ 9.66%

Answer: The average GST rate for this family = 33800 / 3500 = 9.66% (approximately). Although the family purchases items across the 0% to 28% range, large expenditure on zero-rated items (cereals, eggs, fish) and moderate expenditure on 28% items brings the weighted average to about 9.66%.