INFLATION AND ITS IMPACT ON PROJECT CASH FLOW 8

8.1 Concept of Inflation

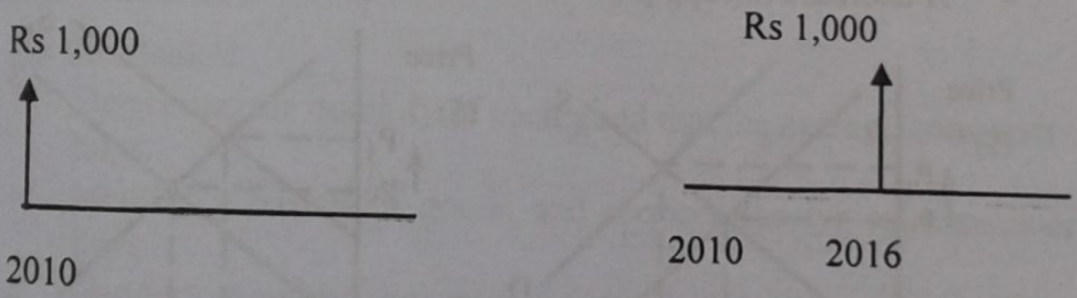
Inflation

Inflation is an increase in the average price paid for goods and services over time. It results in a reduction in purchasing power .i.e., one unit of money buys less goods or services.

Deflation

Deflation is a decrease in the average price paid for goods in services over time. It results in an increase in purchasing power.

Example 8.1



You can buy 5bags in year 2010

You can only buy 4 bags in year 2016

Rs 200/unit .....25% price change due to inflation .....Rs 250/units

The Rs 1,000 in year 2016 has only Rs 800 worth purchasing power in year 2010.

Inflation Terminology

Inflation-free Interest Rate (i')

- Money paid for the use of capital that does not include an adjustment for anticipated inflation.
- An estimate of the true earning power of money when the inflation effects have been removed

- It is also known as real interest rate.

Market Interest Rate (i)

- It is an interest rate which takes into account the combined effects of the earning value of capital and any anticipated changes in purchasing power.
- It also known as inflation adjusted interest rate.

Actual Dollars

- Number of dollars associated with a cash flow when it occurs.
- Synonyms: Nominal, current, inflated dollars.

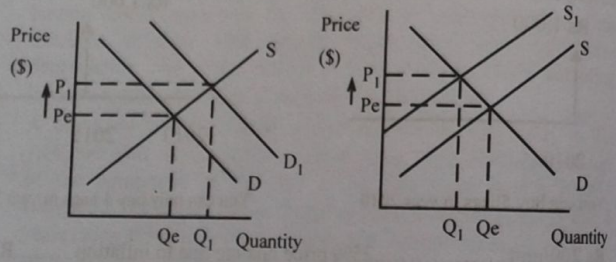
Real Dollars

- Dollars adjusted to a common purchasing power.
- Synonym: Constant.

Causes of inflation

Two shifts

- An increase in demand (a shift in the demand curve to the right).
- A decrease in supply (a shift of the supply curve to the left).



Demand-pull Inflation

An increase in demand is called demand-pull inflation. **This inflation is caused by following factors:**

- Increased incomes.
- Decreased income taxes.
- Increased optimism about the future.
- Decreased tendency to save.
- Consumers expect prices to rise in the future.
- More money in the economy.

Cost-pull Inflation

Any inflation that results from a decrease in supply is called cost-push inflation. **This inflation is caused by following factors:**

- Increased costs of raw materials.
- Increased wages.
- Failure to replace capital goods as they age, reducing its productivity, or increasing its maintenance costs.
- Falling productivity of workers.

8.2 Measuring Inflation

a. Consumer Price Index (CPI)

- It is a measure of the overall cost of the goods and services bought by a typical consumer. CPI is one way of measuring the price level.
- It is used to monitor changes in the cost of living over time.
- When the CPI increases, the average family has to spend more money to maintain the same standard of living.

Calculation of CPI

.1. Fix the Basket

- Determine the quantity of each good that the average consumer buys.
- Identify a basket of goods and services the typical consumer buys.
- Conduct monthly consumer surveys to determine the quantities of those goods and services.

2. Find the Prices

Find the prices of each of the goods and services in the basket for each period (month or year).

3. Calculate the Cost of the Basket

Use the data on prices to calculate the cost of the basket of goods and services at each period.

4. Choose a Base Year and Compute the Index

- Choose one year as the base year, so that we can compare across years more clearly.
- Compute the index by dividing the cost of the basket in one year by the cost of the basket in the base year and multiplying by 100.

4. Calculate the Inflation Rate

The inflation rate is the rate of change in the consumer price index between years (or months).

$$\text{Inflation Rat in Year 2} = \frac{\text{CPI in year 2} - \text{CPI in year 1}}{\text{CPI in year 1}} \times 100$$

$$\text{CPI} = \frac{\text{Current cost of the basket}}{\text{Base your cost of basket}} \times 100$$

Example 8.2

Step 1:

Survey consumers to determine fixed basket of goods.

Let us consider a basket contains 5 apples and 5 oranges

Step 2:

Find the price of each good in each year

Year	Price of apple (Rs)	Price of orange (Rs)
2013	20	10
2014	25	15
2015	30	20

Step 3:

Compute the basket of goods in each year

2013: 20× 5 apples+ 10× 5 oranges = Rs 150

2014: 25× 5 apples+ 15× 5 oranges = Rs 200

2015: 30× 5 apples+ 20× 5 oranges = Rs 250

Step 4: Choose one year as base year (2013) and compute the consumer price index (CPI).

2013: (150/150) ×100 = Rs100

2014: (200/150) × 100 = Rs 133.33

2015: (250/150) × 100 = Rs 166.67

Step 5: Use CPI to compute inflation rate

$$\text{Inflation in Year 2} = \frac{\text{CPI in year 2} - \text{CPI in year 1}}{\text{CPI in year 1}} \times 100$$

$$\text{Inflation in 2014} = \left(\frac{133.33 - 100}{100}\right) \times 100 = 33.33\%$$

$$\text{Inflation in 2015} = \left(\frac{166.67 - 33}{133.33}\right) \times 100 = 25\%$$

Example 8.3

Calculating the Consumer Price Index and the Inflation Rate:

Base Year is 2014.

Basket of goods in 2014 costs Rs 1,200.

The same basket in 2015 costs Rs1, 236.

Solution:

$$\text{CPI} = \frac{1236}{1200} \times 100 = 103$$ **Ans.**

Prices increased by 3 percent between 2014 and 2015. (Remember that base year CPI is always 100)

Producer Price Index (PPI)

- It measures the cost of a basket of goods and services bought by firms rather than consumers. PPI is used for predicting future CPI inflation.
- It is also known as Wholesale Price Index (WPI)

GDP Deflector

- It is a price index which is used to measure the changes in overall prices of final goods and services.
- It measures the prices of all goods and services produced in this country, whereas the CPI reflects the prices of all goods and services purchased by the average consumer.
- So CPI includes prices of imported goods, such as oil, natural gas, imported cars, etc. (deflator does not)

The GDP deflator is calculated as follows:

$$\text{GDP deflator} = \frac{\text{Nominal GDP}}{\text{Real GDP}} \times 100$$

Economists and policymakers monitor both the GDP deflator and CPI to measure how quickly prices are rising.

Calculation of GDP Deflator

There are two ways that GDP can increase:

1. An increase in the prices of goods and services.
2. An increase in the quantity of goods and services.

Example 8.4

Calculate the rate of inflation from the following information.

Product	2014		2015		2016	
	Price (P)	Quantity (Q)	Price (P)	Quantity(Q)	Price (P)	Quantity (Q)
Ball Pen	20	50	25	75	30	100
Pencil	10	50	15	75	15	100
Marker	30	50	35	75	40	100

Nominal GDP

Step 1:

Calculate Nominal GDP (The value of final goods and services evaluated at current-year prices) for each year:

$NGDP_{2014} = \sum(Q2014 \times P2014)$

$= 50 \times 20 + 50 \times 10 + 50 \times 30 = Rs\ 3,000$

$NGDP_{2015} = \sum(Q2015 \times P2015)$

$= 75 \times 25 + 75 \times 15 + 75 \times 35$

$= Rs\ 5,625$

$NGDP_{2016} = \sum(Q2016 \times P2016)$

$= 100 \times 30 + 100 \times 15 + 100 \times 40 = Rs\ 8500$

Step 2:

Calculate Real GDP (The value of final goods and services evaluated at base-year prices) for each year. For our example assume 2014 is the base year.

$RGDP_{2014} = \sum(Q2014 \times P2014)$

$= 50 \times 20 + 50 \times 10 + 50 \times 30 = Rs\ 3,000$

$RGDP_{2015} = \sum(Q2015 \times P2015)$

$= 75 \times 20 + 75 \times 10 + 75 \times 30 = Rs\ 4,500$

$RGDP2016 = \sum(Q2016 \times P2016)$

$= 100 \times 20 + 100 \times 10 + 100 \times 30 = Rs\ 6,000$

Step 3:

Calculate GDP Deflector by using the formula

$$GDP\ Deflector = \frac{Normal\ GDP}{Real\ GDP} \times 100$$

$$GDP_{2015} = \frac{3,000}{3,000} \times 100 = 100$$

$$GDP_{2015} = \frac{5,625}{4,500} \times 100 = 125$$

$$GDP_{2016} = \frac{8,500}{6,000} \times 100 = 141.67$$

Step 4:

Calculate rate of inflation between 2015 and 2016

Rate of inflation between 2014 and 2015

$$= \frac{GDP\ Deflector\ 2015 - GDP\ Deflector\ 2014}{GDP\ Deflector\ 2014} \times 100$$

$$= \left(\frac{125-100}{100}\right) \times 100 = 25\%$$

Rate of inflation between 2015 and 2016

$$= \frac{GDP\ Deflector\ 2016 - GDP\ Deflector\ 2015}{GDP\ Deflector\ 2015} \times 100$$

$$= \frac{141.67-125}{125} \times 100$$

$= 13.33\%$ **Ans.**

Example 8.5

Constant Value Dollars

How much would be required today to purchase an item that increased in cost by exactly the inflation rate? The cost 30 years ago was $1000 and inflation has consistently averaged 4% per year.

Solution:

Solve for future dollars

Future dollars = constant value dollars $(1 + f)^n$

$= 1,000(1 + 0.04)^{30} = \$3,243$

Note: This calculation only accounts for the decreased purchasing power of the currency. It does not take into account the time value of money

Example:8.6

PW with Inflation

A honing machine will have a cost of $25,000 (future cost) six years from now. Find the PW of the machine, if the real interest rate is 10% per year and the inflation rate is 5% per year using (a) constant-value dollars, and (b) future dollars.

Solution:

a. Determine constant-value dollars and use **i** in **PW** equation

$$CV = \frac{25,000}{(1+0.05)^6} = \$18,655$$

PW = 18,655(P/F, 10%, 6) = $10,530

b. Leave as future dollars and *use* i_f in PW equation

$i_f = 0.10 + 0.05 + (0.10)(0.05)$

$= 15.5\%$

PW = 25,000 (P/F, 15.5%, 6)

= $10,530

8.3 Equivalence Calculation under Inflation

Inflation and Cash Flow Analysis

For inflation analyses following cases are considered.

1. **Constant Dollar Analysis**
   - In the absence of inflation, all economic analyses up to this point is in fact, constant dollar analysis.
   - Constant dollar analysis is common in the evaluation of many long-term public projects, because government do no pay income taxes.
   - For private sector, income taxes are levied based on taxable income in actual dollars, actual dollar analysis is more common.
   - Estimate all future cash flows in constant dollars.
   - Use 'i' as an interest rate to find equivalent worth.

2. **Actual Dollars Analysis**
   - Estimate all future cash flows in actual dollars.
   - Use 'i' as an interest rate to find equivalent worth.

a. **Method 1: Deflation Method**

Step 1: Bring all cash flows to have common purchasing power.

Step 2: Consider the earning power.

Example 8.7

Step 1:

Convert actual dollars to constant dollars.

Years	Cash Flows in Actual Dollars	Multiplied by Deflation Factor	Cash Flows in Constant Dollars
0	-$75,000	1	-$75,000
1	32,000	$(1+0.05)^{-1}$	30,476
2	35,700	$(1+0.05)^{-2}$	32,381
3	32,800	$(1+0.05)^{-3}$	28,334
4	29,000	$(1+0.05)^{-4}$	23,858
5	58,000	$(1+0.05)^{-5}$	45,445

Step 2:

Convert Constant dollars to Equivalent Present Worth

N	Cash Flows in Constant Dollars	Multiplied by Discounting Factor	Equivalent Present Worth
0	-$75,000	1	-$75,000
1	30,476	$(1+0.10)^{-1}$	27,706
2	32,381	$(1+0.10)^{-2}$	26,761
3	28,334	$(1+0.10)^{-3}$	21,288
4	23,858	$(1+0.10)^{-4}$	16,295
5	45,445	$(1+0.10)^{-5}$	28,218
			$45,268

b. **Method 2: Adjusted-discount Method**

Combine Steps 1 and 2 into one step.

$$P = F_a \frac{1}{(1+i_c)^n}$$

Above equation can also be written in functional representation as follows:

$P = F_a (P/F, i_c, n)$

$$CV = \frac{25,000}{(1+0.05)^6} = \$18,655$$

PW = 18,655(P/F, 10%, 6) = $10,530

b. Leave as future dollars and *use* i_f in PW equation

$i_f = 0.10 + 0.05 + (0.10)(0.05)$

$= 15.5\%$

PW = 25,000 (P/F, 15.5%, 6)

= $10,530

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For inflation analyses following cases are considered.

1. **Constant Dollar Analysis**
   - In the absence of inflation, all economic analyses up to this point is in fact, constant dollar analysis.
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   - Estimate all future cash flows in constant dollars.
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b. **Method 2: Adjusted-discount Method**

Combine Steps 1 and 2 into one step.

$$P = F_a \frac{1}{(1+i_c)^n}$$

Above equation can also be written in functional representation as follows:

$P = F_a (P/F, i_c, n)$

Similarly the relationship between annual worth 'A ' and present worth 'P ' and that between 'A' and future worth 'F' of the cash flows considering the effect of inflation can be obtained as follows:

$$P = \frac{A_n}{(1+f)^n \times (1+i)^n}$$

From known values of combined interest rate 'i_c' and inflation rate 'f', the real interest rate 'i' is given as follows;

$i_c = i + f + f \times i = f + i\,(1 + f)$

$$i = \frac{i_c - f}{1+f}$$

The real interest rate '*i*' (inflation-free) in above equation represents the equivalence between cash flows occurring at different periods of time with same purchasing power.

Example 8.8

Calculate the equivalent present worth for the information given below

N	Cash Flows in Actual Dollars
0	-$75,000
1	32,000
2	35,700
3	32,800
4	29,000
5	58,000

Given cash flow are in actual dollars. Take f=10%, and i= 5%.

Solution:

Calculation of Combined (market) Interest Rate

$i_c = i + f + f \times i = f + i\,(1 + f)$

$= 0.1 + 0.05\,(1 + 0.1) = 0.155$

$= 15.5\%$

N	Cash Flows in Actual Dollars	Multiplied by Deflation Factor	Cash Flows in Constant Dollars
0	-$75,000	1	-75,000
1	32,000	$(1+0.155)^{-1}$	27,706
2	35,700	$(1+0.155)^{-2}$	26,761
3	32,800	$(1+0.155)^{-3}$	21,288
4	29,000	$(1+0.155)^{-4}$	16,295
5	58,000	$(1+0.155)^{-5}$	28,217
Total Present Worth =			**45268**

Example 8.9

Yearly and Average Inflation Rate

What are the annual inflation rates and the average inflation rate over 3 years?

Year	Cost ($)
0	5,04,000
1	5,38,400
2	5,77,000
3	6,29,500

Inflation rate during year 1 (f_1):

$$= \frac{(\$5,38,400 - \$5,04,000)}{5,04,000} = 6.83\%$$

Inflation rate during year 2 (f_2):

$$= \frac{(\$5,77,000 - \$5,38,400)}{\$5,38,400} = 7.17\%$$

Inflation rate during year 3 (f_3):

$$= \frac{(\$6,29,500 - \$5,77,000)}{\$5,77,000} = 9.10\%$$

The average inflation rate over 3 years is

$$= \frac{(f_1 + f_2 + f_3)}{3} = \frac{(6.83 + 7.17 + 9.10)}{3} = 7.7\%$$ **Ans.**

8.4 Impact of Inflation of Economic Evaluation

A modest inflation (2-4%) can be ignored in economic analysis (all proposals will be affected similarly and the difference between current and future dollars is too little) · When inflation is high or when cost of some goods services escalate higher than others, inflation should be considered · Two basic methods for considering the effect of inflation:

Example 8.10

FW with Inflation

An engineer invests $15,000 in a savings account that pays interest at a real 8% per year. If the inflation rate is 5% per year, determine (a) the amount of money that will be accumulated in 10 years, (b) the purchasing power of the accumulated amount (in terms of today's dollars), (c) the number of future dollars that will have the same purchasing power as the $15,000 today, and (d) the amount to maintain purchasing power and earn areal 8% per year return.

Solution:

(a) The amount accumulated is a function of the market interest rate, i_f

$i_f = 0.08 + 0.05 + (0.08)(0.05) = 13.4\%$

Amount Accumulated = 15,000(F/P, 13.4%, 10) = **$52,750**

(b) To find the purchasing power of the accumulated amount deflate the inflated dollars

$$\textbf{Purchasing power} = \frac{15{,}000\left(\frac{F}{P}, 13.4\%, 10\right)}{(1+0.05)^{10}} = \textbf{\$32,384}$$

(c) The number of future dollars required to purchase goods that cost $15,000 now is the inflated cost of the goods

Number of future dollars = 15,000(F/P, 5%, 10)

= **$24,434**

(d) In order to maintain purchasing power and earn a real return, money must grow by the inflation rate **and** the interest rate, or $i_f = 13.4\%$, as in part (a)

FW = 15,000(F/P, 13.4%, 10)

= **$52,750**

Capital Recovery with Inflation

The A/P and A/F factors require the use of i_f when inflation is considered.

Example 8.11

If a small company invests $1,50,000 in a new production machine, how much must it receive each year to recover the investment in 5 years? The real interest rate is 10% and the inflation rate is 4% per year.

Solution: Capital recovery (CR) is the AW value

$i_f = 0.10 + 0.04 + (0.10)(0.04) = 14.4\%$

CR = AW = 1,50,000 (A/P, 14.4%, 5)

= $44,115 per year **Ans.**

Additional Solved Examples

Example 8.1

Compute the equivalent present worth using deflation method. ***TU-2072***

EOY	0	1	2	3	4	5
Cash Inflow	-	5,00,000	5,60,000	6,20,000	6,80,000	7,40,000
Cash Outflow	-10,00,000	1,00,000	2,00,000	3,00,000	4,00,000	5,00,000

Given cash flow are in actual dollars. Take f=5%, and i= 10%.

Solution:

EOY	0	1	2	3	4	5
Cash Inflow (000)	-	500	560	620	680	740
Cash Outflow(000)	1,000	100	200	300	400	500
Net Cash Flow in Actual Dollars(000)	-1,000	400	360	320	280	240

Calculation of Combined (market) Interest Rate

$i_c = i + f + f \times i = f + i\,(1 + f)$

$= 0.05 + 0.1\,(1 + 0.05) = 0.155$

$= 15.5\%$

EOY	Cash Flows in Actual Dollars	Multiplied by Deflation Factor	Cash Flows in Constant Dollars
0	-10,00,000	1	-10,00,000
1	4,00,000	$(1+0.155)^{-1}$	3,46,320.35
2	3,60,000	$(1+0.155)^{-2}$	2,69,860.01
3	3,20,000	$(1+0.155)^{-3}$	2,07,684.47
4	2,80,000	$(1+0.155)^{-4}$	1,57,336.72
5	2,40,000	$(1+0.155)^{-5}$	1,16,761.95
Total Present Worth =			**97,963.50**

Therefore, equivalent present worth = 97,963.50 **Ans.**

Example 8.2

Choose the best project from the following alternatives.

Project	Machine X	Machine Y
First Cost	15,00,000	20,00,000
Life	7 Years	7 years
Salvage Value	2,00,000	3,00,000
Annual O and M Costs	3,00,000	2,50,000

Assume an average inflation of 5% for the next five years and interest rate is 15%/ year. ***TU-2072***

Calculation of Combined (market) Interest Rate

$i_c = i + f + f \times i = f + i(1 + f)$

$= 0.05 + 0.15(1 + 0.05)$

$= 20.75\%$

For next 5 years only. For other 2 years, assuming theire is no inflation, so interest rate is 15% only.

For Machine X

EOY	Cash Flows in Actual Dollars	Multiplied by Deflation Factor	Cash Flows in Constant Dollars
0	-15,00,000	1	-15,00,000
1	-3,00,000	$(1.2075)^{-1}$	– 2,48,447.20
2	-3,00,000	$(1.2075)^{-2}$	– 2,05,753.40
3	-3,00,000	$(1.2075)^{-3}$	– 1,70,396.20
4	-3,00,000	$(1.2075)^{-4}$	– 1,41,114.84
5	-3,00,000	$(1.2075)^{-5}$	–1,26,865.30
6	-3,00,000	$(1.15)^{-6}$	– 1,29,698.30
7	-100,000	$(1.15)^{-7}$	– 1,12,781.11
Total Present Worth (PW_X)=			**– 26,25,056.35**

For Machine Y

EOY	Cash Flows in Actual Dollars	Multiplied by Deflation Factor	Cash Flows in Constant Dollars
0	-20,00,000	1	-20,00,000
1	-2,00,000	$(1.2075)^{-1}$	– 1,65,631.47
2	-2,00,000	$(1.2075)^{-2}$	– 1,37,168,92
3	-2,00,000	$(1.2075)^{-3}$	– 1,13,597.45
4	-2,00,000	$(1.2075)^{-4}$	– 94,076.56
5	-2,00,000	$(1.2075)^{-5}$	– 77,910.20
6	-2,00,000	$(1.15)^{-6}$	–86,465.52
7	+50,000	$(1.15)^{-7}$	+ 18,796.85
Total Present Worth (PW_Y) =			**– 26,56,053.27**

Since, $PW_Y > PW_X$. Therefore, choose machine X Ans.

Example 8.3

The annual cost required to operate a small solid waste treatment plant are projected to be Rs 2,00,000 without considering any future inflation. The best estimate indicates that the annual inflation free interest rate i will be 6% and the general inflation rate f will be 5%. If the plant has the remaining useful life of four years, what is the present equivalent of its fuel costs? Use actual dollar analysis. **(TU-2070)**

Solution: Given,

A= Rs 2,00,000
General interest rate (f) = 6%
Inflation free interest rate (i_f) = 5%
Market interest rate = i
n= 4 years
$i = (1 + i_f)(1 + f) - 1 = (1 + 0.05)(1+0.06) - 1 = 11.3\%$
PW = 2,00,000 (P/A, 11.3%, 4) = Rs 6,16,535.54 **Ans.**

Example 8.4

Calculate inflation free interest rate when inflation rate is 5% and market interest rate is 13% per year. **(TU-2069)**

Solution: Given,

Inflation rate (f) =5%
Market interest rate (i) =13%
Inflation free rate of interest (i_f) =?
We know,
$i = (1 + i_f)(1 + f) - 1$
Or, $0.13 = (1 + i_f)(1 + 0.05) - 1$
Or, $1.05\ i_f = 0.13 - 0.05$
Or, $i_f = 7.61\%$
Therefore inflation (i_f) =**7.61% Ans.**

Example 8.5

A series of five constant dollar or (real dollar) income beginning with $ 5,000 at the end of the first year are increasing at the rate of 7% per year for five years. Inflation free interest rate is 5% and inflation is 8%. Is it feasible investment if investment cost is $20,000? ***TU-2069***

Solution: Given,

Inflation (f) = 8%, Inflation free interest rate (i_f) = 5%
Market interest rate = i

$i = (1 + i_f)(1 + f) - 1 = (1 + 0.05)(1 + 0.08) - 1 = 13.4\%$

N	Cash Flows in Constant Dollars	Multiplied by Discounting Factor	Equivalent Present Worth
1	5,000	$(1+0.134)^{-1}$	4,409.17
2	5,350	$(1+0.134)^{-2}$	4,160.33
3	5,724.5	$(1+0.134)^{-3}$	3,925.53
4	6,125.21	$(1+0.134)^{-4}$	3,703.98
5	6,553.98	$(1+0.134)^{-5}$	3,494.94
6	7,012.75	$(1+0.134)^{-6}$	3,297.69
Total Present Worth of Income =			**$22,991.64**

Since, PW of income > PW of investment. Therefore, it is feasible investment **Ans.**

Example 8.6

A TV manufacturing company finds that there is the relationship between the income of consumers and sales of television. Following information is collected by the company. Calculate cost of living index.

Years	Consumer Income Index (I_c)	TV Sold (Q)
2012	100	110
2013	110	130
2014	140	150
2015	150	160
2016	200	180

Solution:

Years	Consumer Income Index (I_C)	TV Sold (Q)	$I_C \times Q$
2012	100	110	11000
2013	110	130	14300
2014	140	150	21000
2015	150	160	24,000
2016	200	180	36,000
$\sum I_C \times Q =$			1,06,300

Cost of living index = $\frac{\sum I_C \times Q}{\sum Q}$ = **145.61**

Example 8.7

What changes in the cost of living in 2016 have been taken place compared to 2015?

Solution:

Expenses on	2015 (Rs)	2016 (Rs)	W	$P = \frac{P_1}{P_0} \times 100$	PW
Foods 35%	150	174	35	116	4,060
Clothes 20%	100	125	20	125	2,500
Energy 10%	20	25	10	125	1,250
Rent 15%	50	60	15	120	1,800
Miscellaneous 20%	60	90	20	150	3,000
			100		12,610

$$\text{Cost of living index} = \frac{\sum PW}{\sum W} = \frac{12,610}{100} = 126.1$$

Thus as compared to 2015 the cost of living index has risen by 26.1% in 2016 **Ans.**

Questions

1. What is inflation? Describe circumstances that causes price in economy to increase.
2. How do we measure inflation?
3. How do we incorporate the effect of inflation in equivalence calculation?
4. If the inflation rate is 5% per year and the market interest rate is 13% per year. What is the implied interest (inflation free) rate in inflationary economy?
5. Write short notes on :
   a. Actual dollar and constant dollar analysis.
   b. Market interest rates
   c. Inflation free interest rate.
   d. Causes of inflation.