consumer-price-index

March 31, 2025

1 CONSUMER PRICE INDEX

`Consumer Price Index (CPI)` Analysis involves tracking the average price change over time for a basket of goods and services typically consumed by households. It serves as a primary measure of inflation, which helps companies and governments understand purchasing power trends, inflationary pressures, and economic stability. So, if you want to understand how to analyze the Consumer Price Index, this article is for you. In this article, I'll take you through the task of Consumer Price Index Analysis with Python.

[131]:
```
import pandas as pd
import matplotlib.pyplot as plt
import seaborn as sns
from scipy.signal import detrend
import plotly.graph_objects as go
```

[107]:
```
df=pd.read_csv(r"C:\Users\Sai Rohit Basantam\Downloads\cpi.csv")
```

[108]:
```
df.head()
```

[108]:
```
        Sector  Year     Month  Cereals and products  Meat and fish    Egg  \
0        Rural  2013   January                 107.5          106.3  108.1
1        Urban  2013   January                 110.5          109.1  113.0
2  Rural+Urban  2013   January                 108.4          107.3  110.0
3        Rural  2013  February                 109.2          108.7  110.2
4        Urban  2013  February                 112.9          112.9  116.9

   Milk and products  Oils and fats  Fruits  Vegetables  …  Housing  \
0              104.9          106.1   103.9       101.9  …      NaN
1              103.6          103.4   102.3       102.9  …    100.3
2              104.4          105.1   103.2       102.2  …    100.3
3              105.4          106.7   104.0       102.4  …      NaN
4              104.0          103.5   103.1       104.9  …    100.4

   Fuel and light  Household goods and services  Health  \
0           105.5                         104.8   104.0
1           105.4                         104.8   104.1
2           105.5                         104.8   104.0
3           106.2                         105.2   104.4
```

```
4          105.7                         105.2   104.7

   Transport and communication  Recreation and amusement  Education  \
0                        103.3                     103.4      103.8
1                        103.2                     102.9      103.5
2                        103.2                     103.1      103.6
3                        103.9                     104.0      104.1
4                        104.4                     103.3      103.7

   Personal care and effects  Miscellaneous  General index
0                      104.7          104.0          105.1
1                      104.3          103.7          104.0
2                      104.5          103.9          104.6
3                      104.6          104.4          105.8
4                      104.3          104.3          104.7

[5 rows x 30 columns]
```

[109]:
```python
df.columns
```

[109]:
```
Index(['Sector', 'Year', 'Month', 'Cereals and products', 'Meat and fish',
       'Egg', 'Milk and products', 'Oils and fats', 'Fruits', 'Vegetables',
       'Pulses and products', 'Sugar and Confectionery', 'Spices',
       'Non-alcoholic beverages', 'Prepared meals, snacks, sweets etc.',
       'Food and beverages', 'Pan, tobacco and intoxicants', 'Clothing',
       'Footwear', 'Clothing and footwear', 'Housing', 'Fuel and light',
       'Household goods and services', 'Health', 'Transport and communication',
       'Recreation and amusement', 'Education', 'Personal care and effects',
       'Miscellaneous', 'General index'],
      dtype='object')
```

[110]:
```python
df.columns = [i.lower().replace(' ','_') for i in df.columns]
```

[111]:
```python
df.columns
```

[111]:
```
Index(['sector', 'year', 'month', 'cereals_and_products', 'meat_and_fish',
       'egg', 'milk_and_products', 'oils_and_fats', 'fruits', 'vegetables',
       'pulses_and_products', 'sugar_and_confectionery', 'spices',
       'non-alcoholic_beverages', 'prepared_meals,_snacks,_sweets_etc.',
       'food_and_beverages', 'pan,_tobacco_and_intoxicants', 'clothing',
       'footwear', 'clothing_and_footwear', 'housing', 'fuel_and_light',
       'household_goods_and_services', 'health', 'transport_and_communication',
       'recreation_and_amusement', 'education', 'personal_care_and_effects',
       'miscellaneous', 'general_index'],
      dtype='object')
```

[112]:
```python
df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 365 entries, 0 to 364
Data columns (total 30 columns):
 #   Column                             Non-Null Count  Dtype  
---  ------                             --------------  -----  
 0   sector                             365 non-null    object 
 1   year                               365 non-null    int64  
 2   month                              365 non-null    object 
 3   cereals_and_products               362 non-null    float64
 4   meat_and_fish                      359 non-null    float64
 5   egg                                362 non-null    float64
 6   milk_and_products                  362 non-null    float64
 7   oils_and_fats                      362 non-null    float64
 8   fruits                             362 non-null    float64
 9   vegetables                         362 non-null    float64
 10  pulses_and_products                362 non-null    float64
 11  sugar_and_confectionery            362 non-null    float64
 12  spices                             362 non-null    float64
 13  non-alcoholic_beverages            362 non-null    float64
 14  prepared_meals,_snacks,_sweets_etc.  359 non-null    float64
 15  food_and_beverages                 362 non-null    float64
 16  pan,_tobacco_and_intoxicants       359 non-null    float64
 17  clothing                           359 non-null    float64
 18  footwear                           359 non-null    float64
 19  clothing_and_footwear              359 non-null    float64
 20  housing                            243 non-null    object 
 21  fuel_and_light                     362 non-null    float64
 22  household_goods_and_services       359 non-null    float64
 23  health                             362 non-null    float64
 24  transport_and_communication        359 non-null    float64
 25  recreation_and_amusement           359 non-null    float64
 26  education                          359 non-null    float64
 27  personal_care_and_effects          359 non-null    float64
 28  miscellaneous                      359 non-null    float64
 29  general_index                      359 non-null    float64
dtypes: float64(26), int64(1), object(3)
memory usage: 85.7+ KB
```

[113]:
```
df['month'].unique()
```

[113]:
```
array(['January', 'February', 'March', 'April', 'May', 'June', 'July',
       'August', 'September', 'October', 'November ', 'November',
       'December', 'Marcrh'], dtype=object)
```

During the initial analysis of this dataset, I found that some of the month values contain extra whitespace, which can cause errors in parsing. So, I'll clean up the data before the data conversion to ensure smooth analysis. I also noticed a typo in the Month column, such as "Marcrh" instead of "March". I'll check for such inconsistencies, correct them, and then proceed with the analysis:

```
[114]: df['month']=df['month'].str.strip()
df['month']=df['month'].str.replace("Marcrh","March")
df['date'] = pd.to_datetime(df['year'].astype(str) + '-' + df['month'],␣
 ↪format='%Y-%B')
df['month'].unique()
```

```
[114]: array(['January', 'February', 'March', 'April', 'May', 'June', 'July',
              'August', 'September', 'October', 'November', 'December'],
             dtype=object)
```

2 Inflation Trend Analysis

Now, I will analyze the general CPI index over time for the Rural+Urban sector This will help identify periods when prices increased rapidly or remained stable.

```
[115]: rural_urban_cpi = df[df['sector'] == "Rural+Urban"].sort_values('date')
```

```
[116]: rural_urban_cpi
```

```
[116]:          sector  year     month  cereals_and_products  meat_and_fish    egg  \
2     Rural+Urban  2013   January                 108.4          107.3  110.0
5     Rural+Urban  2013  February                 110.4          110.2  112.8
8     Rural+Urban  2013     March                 111.4          109.7  111.2
11    Rural+Urban  2013     April                 111.6          110.9  106.6
14    Rural+Urban  2013       May                 112.3          111.3  104.7
..            …   …         …                   …            …    …
350   Rural+Urban  2022   October                 165.2          210.9  170.9
353   Rural+Urban  2022  November                 167.4          209.4  181.4
356   Rural+Urban  2022  December                 169.2          209.0  190.2
359   Rural+Urban  2023   January                 173.8          210.7  194.5
362   Rural+Urban  2023  February                 174.4          207.7  175.2

     milk_and_products  oils_and_fats  fruits  vegetables  …  \
2                104.4          105.1   103.2       102.2  …
5                104.9          105.5   103.6       103.2  …
8                105.1          104.9   105.3       102.2  …
11               105.7          104.4   108.9       105.5  …
14               106.8          103.9   109.3       112.9  …
..                 …            …     …         …  …
350              170.9          186.5   163.8       199.7  …
353              172.3          188.9   160.7       183.1  …
356              173.6          188.5   158.0       159.9  …
359              174.6          187.2   158.3       153.9  …
362              177.3          179.3   169.5       152.7  …

     fuel_and_light  household_goods_and_services  health  \
```

```
2              105.5                        104.8   104.0
5              106.0                        105.2   104.5
8              106.1                        105.6   104.9
11             106.5                        106.3   105.3
14             107.4                        106.9   105.9
..               …                          …      …
350            180.5                        170.4   178.7
353            181.3                        171.4   179.8
356            182.0                        172.1   181.1
359            182.0                        172.9   182.3
362            182.1                        174.2   184.4

     transport_and_communication  recreation_and_amusement  education  \
2                          103.2                     103.1      103.6
5                          104.2                     103.6      103.9
8                          105.1                     103.7      104.0
11                         104.7                     104.2      105.0
14                         104.0                     104.8      105.6
..                           …                          …        …
350                        162.9                     168.2      173.4
353                        163.0                     168.5      173.7
356                        163.4                     168.9      174.1
359                        163.6                     169.5      174.3
362                        164.2                     170.3      175.0

     personal_care_and_effects  miscellaneous  general_index       date
2                        104.5          103.9          104.6 2013-01-01
5                        104.5          104.4          105.3 2013-02-01
8                        104.3          104.7          105.5 2013-03-01
11                       102.9          104.8          106.1 2013-04-01
14                       102.3          104.8          106.9 2013-05-01
..                         …              …              …        …
350                      172.1          170.5          176.7 2022-10-01
353                      173.6          171.1          176.5 2022-11-01
356                      175.8          172.0          175.7 2022-12-01
359                      178.6          172.8          176.5 2023-01-01
362                      181.0          174.1          177.2 2023-02-01

[121 rows x 31 columns]
```

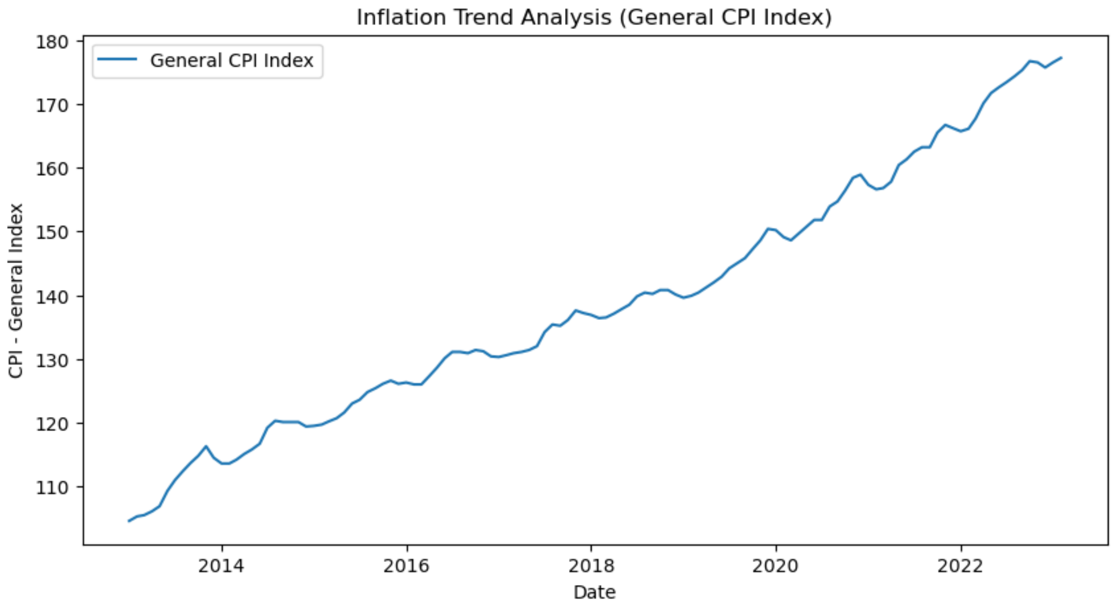
[117]:

```
import seaborn as sns
import matplotlib.pyplot as plt

# Create the plot
plt.figure(figsize=(10, 5))
sns.lineplot(data=rural_urban_cpi, x='date', y='general_index', label='General␣
↪CPI Index')
```

```
# Add labels and title
plt.xlabel('Date')
plt.ylabel('CPI - General Index')
plt.title('Inflation Trend Analysis (General CPI Index)')
plt.legend()

# Show the plot
plt.show()
```



From around 2013 to 2023, there is a steady increase in the CPI in India, which reflects a continuous rise in inflation. The general upward trend suggests that the cost of goods and services has gradually increased over this period, with occasional fluctuations. The sharp rise in the last few years points to a significant inflationary impact, especially around and after 2020.

3 Seasonal and Cyclical Patterns

- Now, I'll decompose the CPI data into seasonal, trend, and residual components to identify patterns:

[118]:
```
from statsmodels.tsa.seasonal import seasonal_decompose


rural_urban_cpi.set_index('date', inplace=True)
monthly_cpi = rural_urban_cpi['general_index'].resample('M').mean().
 ↪interpolate(method='linear')
```

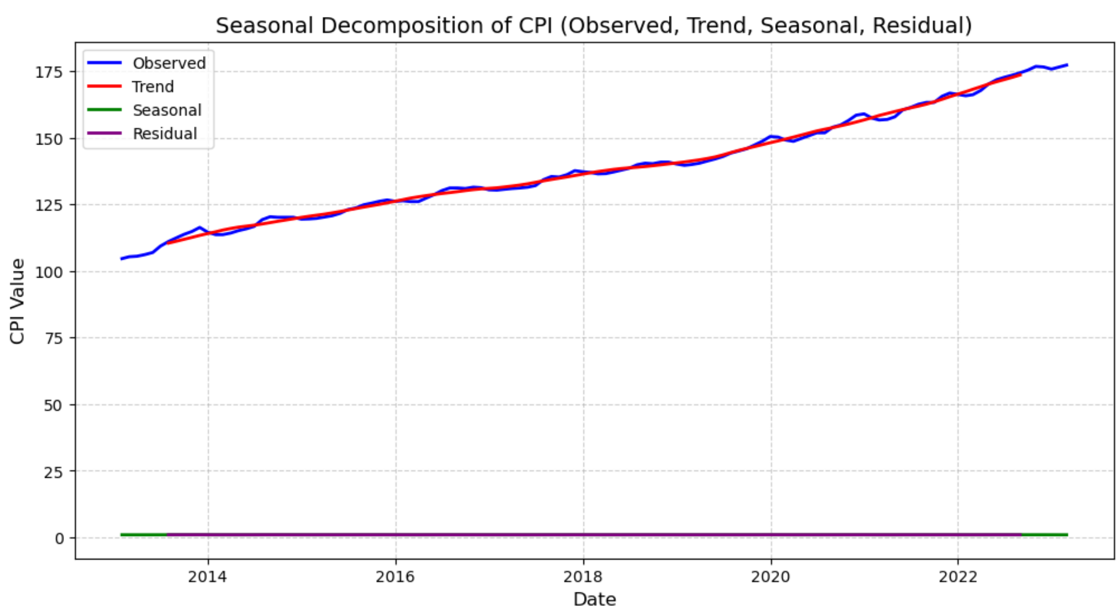
```
decomposition = seasonal_decompose(monthly_cpi, model='multiplicative',␣
  ↪period=12)
```

[119]:
```
plt.figure(figsize=(12, 6))

plt.plot(decomposition.observed, label="Observed", color='blue', linewidth=2)
plt.plot(decomposition.trend, label="Trend", color='red', linewidth=2)
plt.plot(decomposition.seasonal, label="Seasonal", color='green', linewidth=2)
plt.plot(decomposition.resid, label="Residual", color='purple', linewidth=2)

# Formatting the plot
plt.title("Seasonal Decomposition of CPI (Observed, Trend, Seasonal,␣
  ↪Residual)", fontsize=14)
plt.xlabel("Date", fontsize=12)
plt.ylabel("CPI Value", fontsize=12)
plt.legend()  # Show labels
plt.grid(True, linestyle='--', alpha=0.6)

plt.show()
```



The trend line (in red) closely follows the observed CPI values, which indicates a steady upward trend over time. The seasonal component (in green) is minimal, which suggests little seasonal fluctuation in the CPI. The residual component (in purple) is close to zero, which indicates minimal random variation, which implies that the CPI trend is consistent and primarily driven by long-term factors rather than seasonal or irregular influences.

4 Comparison Across Sectors or Regions

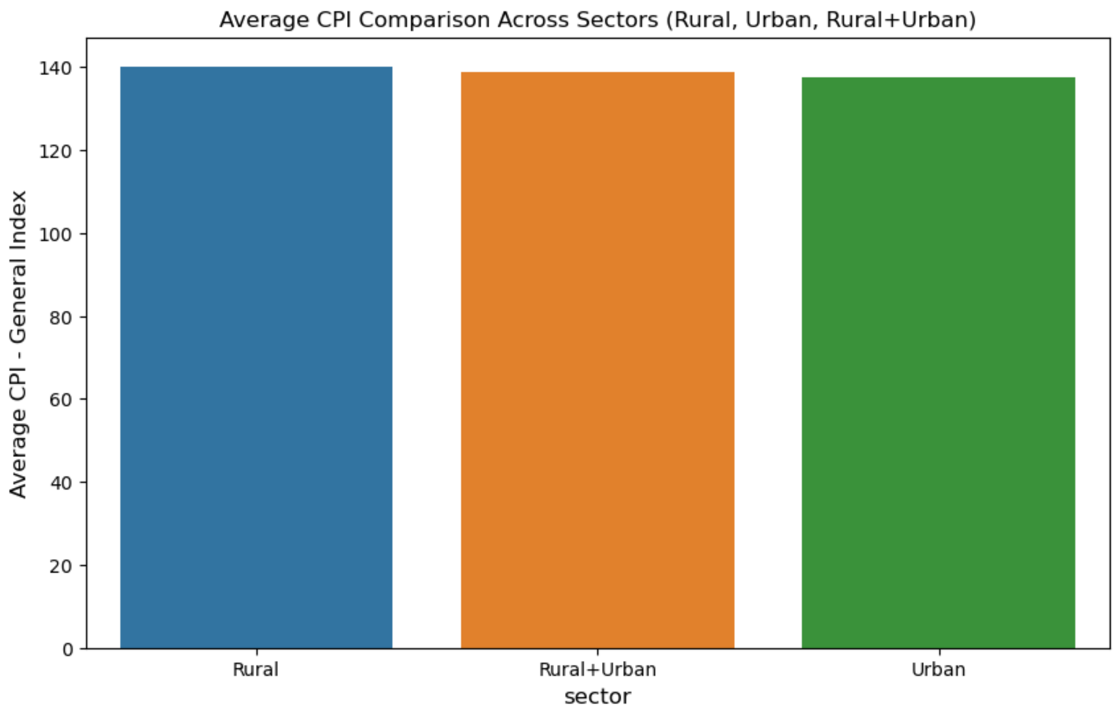
- Now, let's compare the average CPI across different sectors (Rural, Urban, Rural+Urban):

[120]:
```
sector_cpi_mean = df.groupby(['sector'])['general_index'].mean().reset_index()


plt.figure(figsize=(10, 6))
ax = sns.barplot(data=sector_cpi_mean, x='sector', y='general_index')

# Add labels and title
plt.xlabel("sector", fontsize=12)
plt.ylabel("Average CPI - General Index", fontsize=12)
plt.title("Average CPI Comparison Across Sectors (Rural, Urban, Rural+Urban)")

# Show the plot
plt.show()
```



The CPI values are relatively consistent across all sectors, with only slight differences, which indicates that inflation, as measured by the CPI, affects rural and urban areas similarly. This suggests that price changes in goods and services are fairly uniform across these regions.

[ ]:
```
```

[121]:
```
cpi_categories = df[['cereals_and_products', 'meat_and_fish', 'egg',␣
↪'milk_and_products', 'oils_and_fats',
                        'fruits', 'vegetables', 'fuel_and_light', 'housing',␣
↪'health', 'transport_and_communication',
                        'recreation_and_amusement', 'education',␣
↪'personal_care_and_effects', 'miscellaneous', 'general_index']]

cpi_categories = cpi_categories.apply(pd.to_numeric, errors='coerce')  #␣
↪convert to numeric
```

[122]:
```
cpi_categories
```

[122]:
```
     cereals_and_products  meat_and_fish    egg  milk_and_products  \
0                   107.5          106.3  108.1              104.9
1                   110.5          109.1  113.0              103.6
2                   108.4          107.3  110.0              104.4
3                   109.2          108.7  110.2              105.4
4                   112.9          112.9  116.9              104.0
..                    …              …    …                …
360                 174.2          205.2  173.9              177.0
361                 174.7          212.2  177.2              177.9
362                 174.4          207.7  175.2              177.3
363                 174.3          205.2  173.9              177.0
364                 174.7          212.2  177.2              177.9

     oils_and_fats  fruits  vegetables  fuel_and_light  housing  health  \
0            106.1   103.9       101.9           105.5      NaN   104.0
1            103.4   102.3       102.9           105.4    100.3   104.1
2            105.1   103.2       102.2           105.5    100.3   104.0
3            106.7   104.0       102.4           106.2      NaN   104.4
4            103.5   103.1       104.9           105.7    100.4   104.7
..             …     …         …             …      …     …
360          183.4   167.2       140.9           181.6      NaN   186.6
361          172.2   172.1       175.8           182.8    173.5   180.8
362          179.3   169.5       152.7           182.1    173.5   184.4
363          183.3   167.2       140.9           181.4      NaN   186.6
364          172.2   172.1       175.9           182.6    173.5   180.8

     transport_and_communication  recreation_and_amusement  education  \
0                          103.3                     103.4      103.8
1                          103.2                     102.9      103.5
2                          103.2                     103.1      103.6
3                          103.9                     104.0      104.1
4                          104.4                     103.3      103.7
..                           …                       …        …
360                        169.0                     172.8      178.5
361                        159.8                     168.4      172.5
```

```
362                          164.2                     170.3      175.0
363                          169.0                     172.8      178.5
364                          159.8                     168.4      172.5

     personal_care_and_effects  miscellaneous  general_index
0                        104.7          104.0          105.1
1                        104.3          103.7          104.0
2                        104.5          103.9          104.6
3                        104.6          104.4          105.8
4                        104.3          104.3          104.7
..                         …             …             …
360                      180.7          177.9          178.0
361                      181.4          170.0          176.3
362                      181.0          174.1          177.2
363                      180.7          177.9          178.0
364                      181.5          170.0          176.3

[365 rows x 16 columns]
```

[123]:
```
correlation_matrix = cpi_categories.corr()
```

[124]:
```
correlation_matrix
```

[124]:
```
                             cereals_and_products  meat_and_fish       egg  \
cereals_and_products                     1.000000       0.936088  0.920298
meat_and_fish                            0.936088       1.000000  0.958486
egg                                      0.920298       0.958486  1.000000
milk_and_products                        0.978281       0.948047  0.927769
oils_and_fats                            0.835740       0.929413  0.902606
fruits                                   0.904204       0.893158  0.846174
vegetables                               0.582257       0.614168  0.608180
fuel_and_light                           0.936357       0.932032  0.912386
housing                                  0.963590       0.944540  0.931014
health                                   0.952303       0.968236  0.946648
transport_and_communication              0.913571       0.961164  0.936133
recreation_and_amusement                 0.952961       0.966051  0.940178
education                                0.952354       0.941889  0.920434
personal_care_and_effects                0.965539       0.986152  0.964577
miscellaneous                            0.954863       0.972195  0.949330
general_index                            0.969758       0.975611  0.954838

                             milk_and_products  oils_and_fats    fruits  \
cereals_and_products                  0.978281       0.835740  0.904204
meat_and_fish                         0.948047       0.929413  0.893158
egg                                   0.927769       0.902606  0.846174
milk_and_products                     1.000000       0.856929  0.941188
oils_and_fats                         0.856929       1.000000  0.808059
```

```
fruits                               0.941188        0.808059  1.000000
vegetables                           0.577734        0.460572  0.553701
fuel_and_light                       0.945304        0.927878  0.891488
housing                              0.981278        0.851395  0.936356
health                               0.967199        0.920110  0.895997
transport_and_communication          0.918134        0.971347  0.853697
recreation_and_amusement             0.971093        0.917494  0.903154
education                            0.977767        0.847736  0.910832
personal_care_and_effects            0.964898        0.921764  0.891989
miscellaneous                        0.967568        0.931460  0.897843
general_index                        0.985070        0.914509  0.924992

                             vegetables  fuel_and_light   housing    health  \
cereals_and_products           0.582257        0.936357  0.963590  0.952303
meat_and_fish                  0.614168        0.932032  0.944540  0.968236
egg                            0.608180        0.912386  0.931014  0.946648
milk_and_products              0.577734        0.945304  0.981278  0.967199
oils_and_fats                  0.460572        0.927878  0.851395  0.920110
fruits                         0.553701        0.891488  0.936356  0.895997
vegetables                     1.000000        0.493003  0.634510  0.547994
fuel_and_light                 0.493003        1.000000  0.927042  0.976021
housing                        0.634510        0.927042  1.000000  0.974505
health                         0.547994        0.976021  0.974505  1.000000
transport_and_communication    0.524637        0.967982  0.907393  0.972382
recreation_and_amusement       0.548237        0.978188  0.973939  0.997594
education                      0.571334        0.942411  0.994764  0.981640
personal_care_and_effects      0.594531        0.955313  0.964413  0.985409
miscellaneous                  0.553092        0.977670  0.970385  0.998284
general_index                  0.616267        0.969113  0.980883  0.990248

                             transport_and_communication  \
cereals_and_products                            0.913571
meat_and_fish                                   0.961164
egg                                             0.936133
milk_and_products                               0.918134
oils_and_fats                                   0.971347
fruits                                          0.853697
vegetables                                      0.524637
fuel_and_light                                  0.967982
housing                                         0.907393
health                                          0.972382
transport_and_communication                     1.000000
recreation_and_amusement                        0.970701
education                                       0.919880
personal_care_and_effects                       0.970351
miscellaneous                                   0.981195
general_index                                   0.963198
```

	recreation_and_amusement	education	\
cereals_and_products	0.952961	0.952354	
meat_and_fish	0.966051	0.941889	
egg	0.940178	0.920434	
milk_and_products	0.971093	0.977767	
oils_and_fats	0.917494	0.847736	
fruits	0.903154	0.910832	
vegetables	0.548237	0.571334	
fuel_and_light	0.978188	0.942411	
housing	0.973939	0.994764	
health	0.997594	0.981640	
transport_and_communication	0.970701	0.919880	
recreation_and_amusement	1.000000	0.983323	
education	0.983323	1.000000	
personal_care_and_effects	0.981642	0.961293	
miscellaneous	0.997460	0.977121	
general_index	0.990422	0.979515	

	personal_care_and_effects	miscellaneous	\
cereals_and_products	0.965539	0.954863	
meat_and_fish	0.986152	0.972195	
egg	0.964577	0.949330	
milk_and_products	0.964898	0.967568	
oils_and_fats	0.921764	0.931460	
fruits	0.891989	0.897843	
vegetables	0.594531	0.553092	
fuel_and_light	0.955313	0.977670	
housing	0.964413	0.970385	
health	0.985409	0.998284	
transport_and_communication	0.970351	0.981195	
recreation_and_amusement	0.981642	0.997460	
education	0.961293	0.977121	
personal_care_and_effects	1.000000	0.988381	
miscellaneous	0.988381	1.000000	
general_index	0.988399	0.991833	

	general_index
cereals_and_products	0.969758
meat_and_fish	0.975611
egg	0.954838
milk_and_products	0.985070
oils_and_fats	0.914509
fruits	0.924992
vegetables	0.616267
fuel_and_light	0.969113
housing	0.980883

```
health                           0.990248
transport_and_communication      0.963198
recreation_and_amusement         0.990422
education                        0.979515
personal_care_and_effects        0.988399
miscellaneous                    0.991833
general_index                    1.000000
```

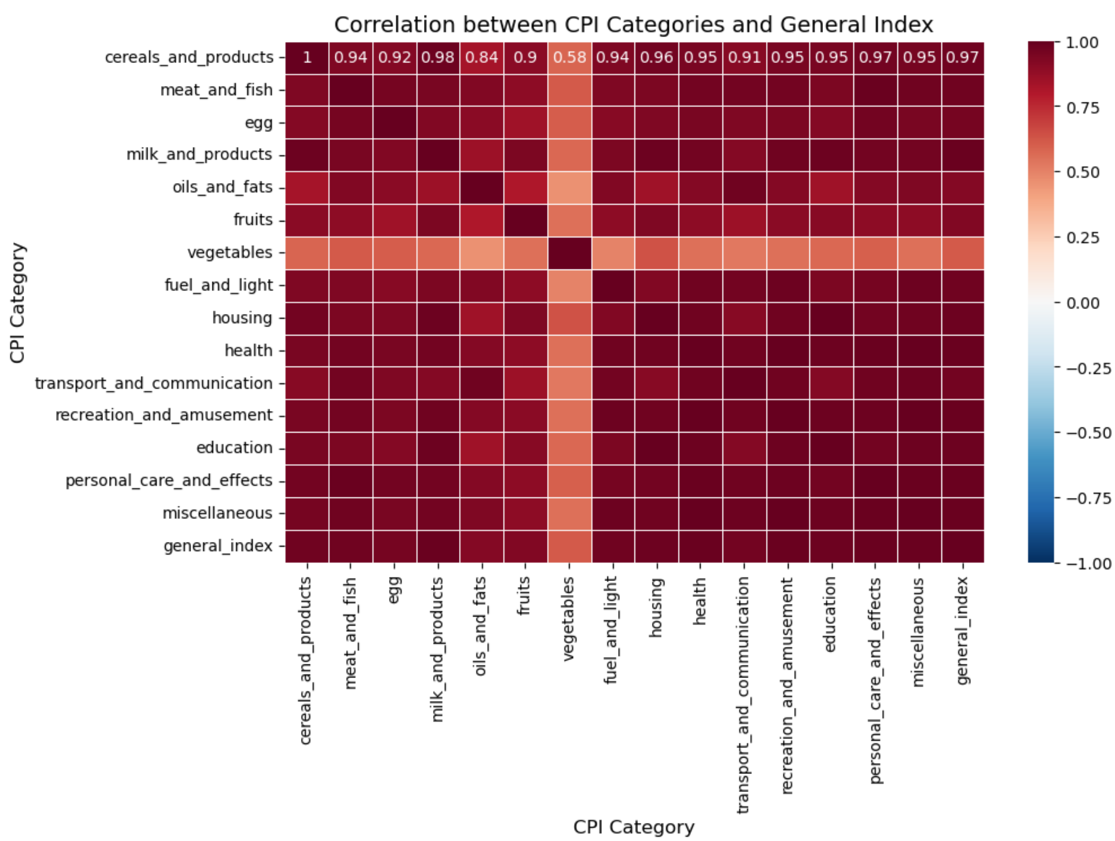
[125]:

```python
# Set the figure size
plt.figure(figsize=(10, 6))

# Create the heatmap
sns.heatmap(correlation_matrix, annot=True, cmap='RdBu_r', center=0, vmin=-1,␣
↪vmax=1, linewidths=0.5)

# Add labels and title
plt.xlabel("CPI Category", fontsize=12)
plt.ylabel("CPI Category", fontsize=12)
plt.title("Correlation between CPI Categories and General Index", fontsize=14)

# Show the plot
plt.show()
```



Categories such as Housing, Transport and communication, and Miscellaneous show high positive correlations with each other and with the overall index, which suggests that changes in these categories have a significant impact on the general CPI. Conversely, categories like Egg and Vegetables show relatively lower correlations with other categories, which indicates more independent or variable price movements in these areas.

5 CPI and Specific Sector Analysis

- Now, let's analyze the inflation trends within specific sectors over time:

[126]:
```
sectors_to_analyze = ['fuel_and_light', 'health', 'housing',␣
↪'cereals_and_products']
sector_data = rural_urban_cpi[sectors_to_analyze].fillna(method='ffill').
↪reset_index()
```

[127]:
```
sector_data
```

[127]:
```
           date  fuel_and_light  health housing  cereals_and_products
0   2013-01-01           105.5   104.0   100.3                 108.4
1   2013-02-01           106.0   104.5   100.4                 110.4
2   2013-03-01           106.1   104.9   100.4                 111.4
3   2013-04-01           106.5   105.3   100.5                 111.6
4   2013-05-01           107.4   105.9   100.5                 112.3
..          …               …     …     …                     …
116 2022-10-01           180.5   178.7   171.2                 165.2
117 2022-11-01           181.3   179.8   171.8                 167.4
118 2022-12-01           182.0   181.1   170.7                 169.2
119 2023-01-01           182.0   182.3   172.1                 173.8
120 2023-02-01           182.1   184.4   173.5                 174.4

[121 rows x 5 columns]
```

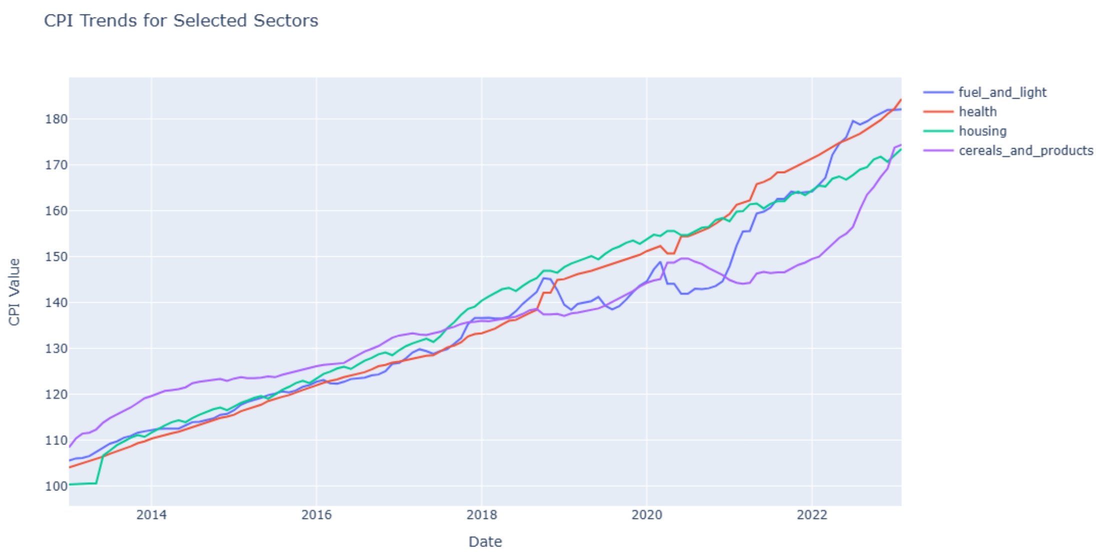
[130]:
```
fig = go.Figure()

# Loop through each sector and add a trace
for sector in sectors_to_analyze:
    fig.add_trace(go.Scatter(x=sector_data['date'], y=sector_data[sector],␣
↪mode='lines', name=sector))

# Update layout with increased figure size
fig.update_layout(
    title='CPI Trends for Selected Sectors',
    xaxis_title='Date',
    yaxis_title='CPI Value',
    width=1100,  # Increase width
```

```
    height=600   # Increase height
)

# Show the figure
fig.show()
```



Each sector shows a general upward trend over time, which indicates rising prices. Fuel and light have experienced the steepest increase, particularly after 2020, which reflectes higher inflation in this category. Health and Housing have followed a more gradual, steady increase over the years, with Health showing a relatively consistent rise. Cereals and products, while generally increasing, show more fluctuations, particularly around 2020, which indicates price volatility in this category.

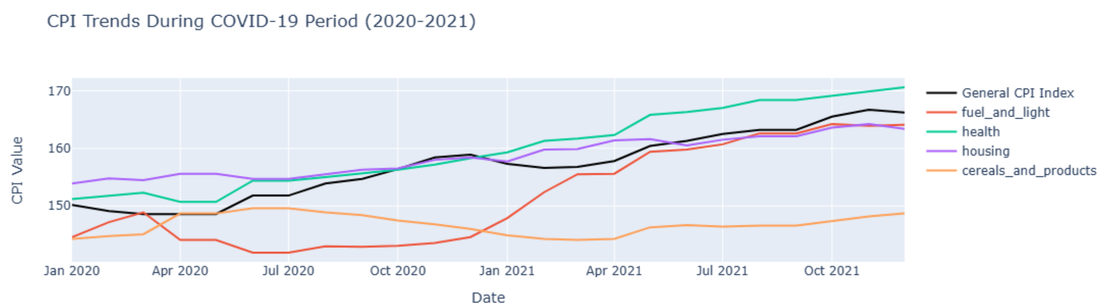
6 Event-Based Analysis (COVID-19 Periods)

- Now, let's analyze CPI trends specifically during the COVID-19 period (2020-2021):

[135]:
```
# event-based analysis (COVID-19 Period)
covid_period = rural_urban_cpi[(rural_urban_cpi.index >= '2020-01-01') &␣
 ↪(rural_urban_cpi.index <= '2021-12-31')][sectors_to_analyze +␣
 ↪['general_index']].fillna(method='ffill').reset_index()

fig = go.Figure()
fig.add_trace(go.Scatter(x=covid_period['date'],␣
 ↪y=covid_period['general_index'], mode='lines', name='General CPI Index',␣
 ↪line=dict(width=2, color='black')))
for sector in sectors_to_analyze:
```

```
    fig.add_trace(go.Scatter(x=covid_period['date'], y=covid_period[sector],␣
↪mode='lines', name=sector))
fig.update_layout(title='CPI Trends During COVID-19 Period (2020-2021)',␣
↪xaxis_title='Date', yaxis_title='CPI Value')
fig.show()
```



The Health and Housing sectors experienced notable increases, with Health showing a steady rise and Housing seeing a sharper increase from early 2021. Fuel and light saw a significant decline in early 2020, possibly due to reduced demand during lockdowns, followed by a steep rise in 2021 as economic activities resumed. Cereals and products remained relatively stable with minor fluctuations. Overall, the graph reflects the varied inflationary impacts of COVID-19 across these sectors, with essentials like health and housing showing resilience and growth.

The key findings from the CPI analysis are as follows:

- **Overall Inflation Trend** : There has been a steady increase in the CPI over the past decade, with inflation particularly rising after 2020.
- **Minimal Seasonal Effect** : The seasonal decomposition shows minimal seasonal fluctuations, indicating that CPI trends are mainly driven by long-term factors.
- **Rural vs Urban Impact** : Inflation levels are consistent across rural, urban, and combined sectors, suggesting uniform price changes in these regions.
- **Sectoral Correlations** : High correlations are observed between sectors like housing, transport, and miscellaneous, indicating their significant impact on overall inflation, while categories like eggs and vegetables show more independent price movements.
- **Sector-Specific Trends** : Fuel and light have experienced the steepest price increase, especially post-2020, while health and housing show steady inflation growth. Cereals and products display more volatility.
- **COVID-19 Impact (2020-2021)** : During the pandemic, fuel prices initially dropped due to lower demand, then surged in 2021. Health and housing sectors saw consistent price increases, reflecting inflationary pressures on essential services during this period.

[ ]:

```

```