Unemployment Rates in Ann Arbour, Michigan, US

August 8, 2020

0.1 Background Information

0.1.1 Region and Domain

This report observes the Ann Arbour city in Michigan, US in the domain: Economic Measures or Activity

0.1.2 Research Question

How has the unemployment rate in Ann Arbour moved up or down in the past years, and how do they compare to the national figures?

0.1.3 Data

The data sets used in this report are obtained from the following sources: - US Bureau of Labor Statistics - FRED Economic Data

0.2 Summary

It is observed that over the last 30 years, the unemployment rate in Ann Arbour, Michigan, US is generally lower than the national figures, with a few exceptions. It is also seen that the rates in Ann Arbour follows a similar trend as the US rates, most notably a steady decrease in the period 1992 - 2000, an increase along the 2008 financial crisis, before trending down again after 2010.

0.3 Process

0.3.1 Importing Data

```
In [107]: import pandas as pd
          import matplotlib.pyplot as plt
          import seaborn as sns

          AnnArbour = pd.read_excel('AnnArbour.xls', skiprows = 10)
          US = pd.read_excel('USdata.xlsx', skiprows = 11)

In [108]: AnnArbour.head(n = 5)

Out[108]:    observation_date   ANNA426URN
          0       1990-01-01          5.7
```

```
          1           1990-02-01          4.7
          2           1990-03-01          4.4
          3           1990-04-01          4.2
          4           1990-05-01          4.3

In [109]: US.head(n = 5)

Out[109]:    Year  Jan  Feb  Mar  Apr  May  Jun  Jul  Aug  Sep  Oct  Nov  Dec
          0  1948  3.4  3.8  4.0  3.9  3.5  3.6  3.6  3.9  3.8  3.7  3.8  4.0
          1  1949  4.3  4.7  5.0  5.3  6.1  6.2  6.7  6.8  6.6  7.9  6.4  6.6
          2  1950  6.5  6.4  6.3  5.8  5.5  5.4  5.0  4.5  4.4  4.2  4.2  4.3
          3  1951  3.7  3.4  3.4  3.1  3.0  3.2  3.1  3.1  3.3  3.5  3.5  3.1
          4  1952  3.2  3.1  2.9  2.9  3.0  3.0  3.2  3.4  3.1  3.0  2.8  2.7
```

0.3.2 Tidying the Data - Ann Arbour

```python
In [110]: AnnArbour = AnnArbour.rename(columns = {'observation_date':'Date',
                                                  'ANNA426URN':'Ann_Arbour'})

          Years = [*range(1990,2020,1)]
          Years = [year for year in Years for i in range(12)]
          for i in range(6):
              Years.append(2020)
          Year = [str(year) for year in Years]

          Months = ['Jan','Feb','Mar','Apr','May','June',
                    'July','Aug','Sept','Oct','Nov','Dec']
          Month = Months*31
          Month = Month[:366]

          Time = [(month + " " + year) for (month,year) in zip(Month, Year)]

          AnnArbour['Time'] = [time for time in Time]
          AnnArbour_data = AnnArbour[['Time', 'Ann_Arbour']]
          AnnArbour_data = AnnArbour_data.set_index('Time')

          AnnArbour_data.head(n = 5)

Out[110]:           Ann_Arbour
          Time
          Jan 1990         5.7
          Feb 1990         4.7
          Mar 1990         4.4
          Apr 1990         4.2
          May 1990         4.3
```

0.3.3 Tidying the Data - US

```python
In [111]: US.loc[US['Year'] == 1990]
          US = US[42:]
```

```
In [112]: US_vals = []

          for i in range(0,31):
              for j in range(1,13):
                  US_vals.append(US.iloc[i,j])

          US_vals = US_vals[0:366]

In [113]: US_data = pd.concat([pd.DataFrame([Time]),pd.DataFrame([US_vals])],
                             axis = 0).T
          US_data.columns = ['Time', 'US']
          US_data = US_data.set_index('Time')
          US_data.head(n = 5)

Out[113]:           US
          Time
          Jan 1990  5.4
          Feb 1990  5.3
          Mar 1990  5.2
          Apr 1990  5.4
          May 1990  5.4
```

0.3.4 Joining the data

```
In [114]: Data = pd.merge(AnnArbour_data, US_data, left_index = True,
                         right_index = True, how = 'outer')
          Data = Data.reset_index()
          Data = Data[:360]
          Data.head(n = 5)

Out[114]:      Time  Ann_Arbour   US
          0  Jan 1990         5.7  5.4
          1  Feb 1990         4.7  5.3
          2  Mar 1990         4.4  5.2
          3  Apr 1990         4.2  5.4
          4  May 1990         4.3  5.4
```

0.4 Plotting the graph

```
In [115]: ax = plt.gca()
          plt.style.use('seaborn-pastel')
          Data.plot(kind = 'line', x = 'Time', y = 'Ann_Arbour',
                    color = 'coral', linewidth = 2, ax = ax)
          Data.plot(kind = 'line', x = 'Time', y = 'US', color = 'deepskyblue',
                    linewidth = 2, ax = ax)
          plt.title('Unemployment Rate (1990 - 2019)\n',
                    fontdict = {'fontsize': 22, 'fontweight': 'medium'})
          plt.xlabel('\nTime', fontdict = {'fontsize': 14, 'fontweight': 'medium',
                                          'fontstyle': 'italic'})
```

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```
plt.ylabel('Unemployment Rate in %\n',
           fontdict = {'fontsize': 14, 'fontweight': 'medium',
                       'fontstyle': 'italic'})
sns.despine()
plt.rcParams['font.family'] = 'serif'
plt.show()
```

Unemployment Rate (1990 - 2019)