How can Argentina's inflation between 2014 and November 2016 be predicted?

What is the impact of M2 growth on the demand for US dollars (USD) and the exchange rate in Argentina?

How effective has the new National Consumer Price Index been in combating inflation since its introduction in 2017?

In [1]:
```
import pandas as pd
import math
import numpy as np
import seaborn as sns
import matplotlib.pyplot as plt
```

DATA EXPLORATION

In [2]:
```
df = pd.read_csv('argentina merged - Arg_pt2 (1).csv')
df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 271 entries, 0 to 270
Data columns (total 5 columns):
 #   Column   Non-Null Count  Dtype  
---  ------   --------------  -----  
 0   year     271 non-null    int64  
 1   month    271 non-null    int64  
 2   ncpi     236 non-null    float64
 3   ex_rate  271 non-null    float64
 4   m2       271 non-null    float64
dtypes: float64(3), int64(2)
memory usage: 10.7 KB
```

In [3]:
```
pd.set_option('display.max_rows', df.shape[0]+1)
print(df)
```

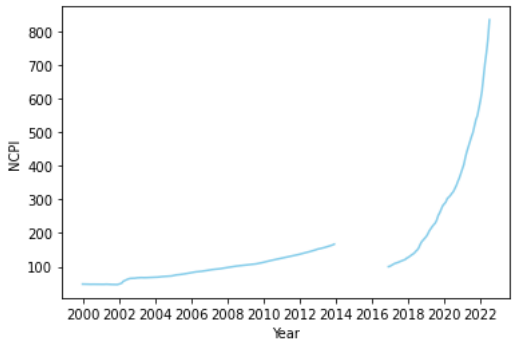
```
63   2005      4   75.54090    2.91330  8.617346e+04
64   2005      5   75.99470    2.88770  8.872180e+04
65   2005      6   76.69070    2.89080  9.125232e+04
66   2005      7   77.46080    2.86280  9.385427e+04
67   2005      8   77.79920    2.91170  9.324308e+04
68   2005      9   78.70400    2.91250  9.411585e+04
69   2005     10   79.31900    3.00970  9.736373e+04
70   2005     11   80.27590    2.97350  9.958538e+04
71   2005     12   81.16960    3.03150  1.072687e+05
72   2006      1   82.20520    3.06370  1.068263e+05
73   2006      2   82.53100    3.07280  1.061598e+05
74   2006      3   83.52580    3.08080  1.049756e+05
75   2006      4   84.33810    3.04380  1.069597e+05
76   2006      5   84.73280    3.08680  1.105204e+05
77   2006      6   85.14310    3.08480  1.125837e+05
78   2006      7   85.66850    3.07480  1.137599e+05
79   2006      8   86.15040    3.09720  1.125506e+05
80   2006      9   86.92520    3.10430  1.142835e+05
81   2006     10   87.66920    3.09330  1.155082e+05
82   2006     11   88.28960    3.06930  1.212572e+05
```

In [4]:
```
df['year'] = df['year'].astype(str)
df['month'] = df['month'].astype(str)
df['m2_usd'] = df['m2']/df['ex_rate']
df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 271 entries, 0 to 270
Data columns (total 6 columns):
 #   Column   Non-Null Count  Dtype  
---  ------   --------------  -----  
 0   year     271 non-null    object 
 1   month    271 non-null    object 
 2   ncpi     236 non-null    float64
 3   ex_rate  271 non-null    float64
 4   m2       271 non-null    float64
 5   m2_usd   271 non-null    float64
dtypes: float64(4), object(2)
memory usage: 12.8+ KB
```

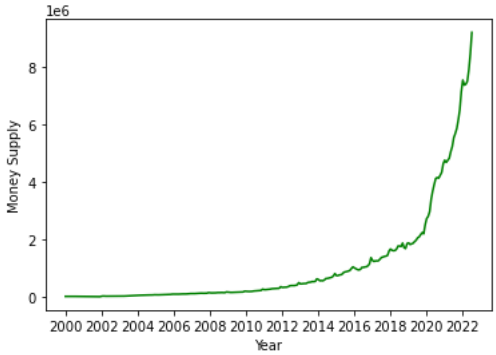
In [6]:
```
24,48,72,96,120,144,168,192,216,240,264], ['2000',"2002","2004","2006","2008","2010","2012","2014","2016","2018", "2020","2022"])
ar")
PI")
t(color="skyblue")
```

Out[6]: <AxesSubplot:xlabel='Year', ylabel='NCPI'>



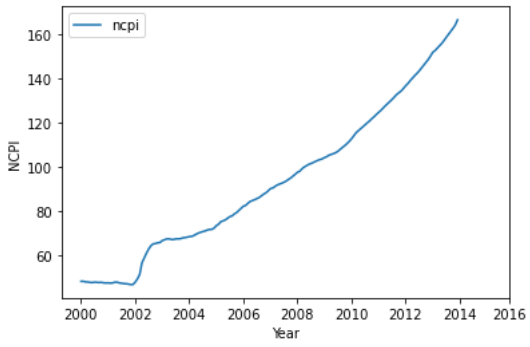
In [9]:
```
24,48,72,96,120,144,168,192,216,240,264], ['2000',"2002","2004","2006","2008","2010","2012","2014","2016","2018", "2020","2022"])
ar")
ney Supply")
color='green')
```

Out[9]: <AxesSubplot:xlabel='Year', ylabel='Money Supply'>



In [10]:
```
df["ncpi"].iloc[0:203].plot()
plt.xticks([0,24,48,72,96,120,144,168,190], ['2000',"2002","2004","2006","2008","2010","2012","2014","2016"])
plt.legend(loc='upper left')
plt.xlabel("Year")
plt.ylabel("NCPI")
```

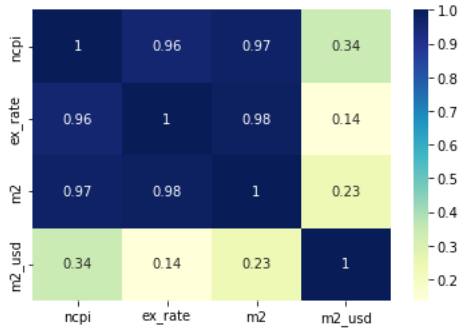
Out[10]: Text(0, 0.5, 'NCPI')



In [11]:
```
numeric_features = df.select_dtypes(include=[np.number])
corr = numeric_features.corr()
print (corr['ncpi'].sort_values(ascending=False)[:10], '\n')
```

```
ncpi       1.000000
m2         0.974690
ex_rate    0.955132
m2_usd     0.340189
Name: ncpi, dtype: float64
```

In [12]:
```
corr_matrix = df.corr()
sns.heatmap(corr_matrix, annot=True, cmap="YlGnBu")
plt.show()
```



ARGENTINA'S INFLATION WITH LINEAR REGRESSION

In [18]:
```
df["m2_pctchange"]=df["m2"].pct_change()+1
df["inflation"]=100*df["ncpi"].pct_change()
df["inflation"]=df["inflation"].round(decimals = 2)
df["m2_pctchange"]=df["m2_pctchange"].round(decimals = 2)
df["ncpi"]=df["ncpi"].round(decimals = 2)
df["ncpi"]=df["ncpi"].round(decimals = 2)
```

In [19]:
```
while df['ncpi'].isna().sum() > 0:
 df.loc[df['ncpi'].isna(), 'ncpi'] = df['ncpi'].shift(1) * df['m2_pctchange']
```

In [20]:
```
df
```

218	2018	3	133.50	20.14330	1.614611e+06	80156.222665	0.99	2.46
219	2018	4	136.90	20.69170	1.621339e+06	78356.954238	1.00	2.55
220	2018	5	139.60	24.94750	1.671509e+06	67001.070248	1.03	1.97
221	2018	6	145.10	28.86170	1.776575e+06	61554.767391	1.06	3.94
222	2018	7	149.10	27.34250	1.774780e+06	64909.201792	1.00	2.76
223	2018	8	155.20	37.12500	1.759405e+06	47391.390707	0.99	4.09
224	2018	9	165.50	40.89670	1.877613e+06	45911.118256	1.07	6.64
225	2018	10	173.90	36.19670	1.714008e+06	47352.597060	0.91	5.08
226	2018	11	178.90	38.02170	1.689885e+06	44445.281773	0.99	2.88
227	2018	12	183.90	37.80830	1.863686e+06	49293.035392	1.10	2.79
228	2019	1	189.10	37.03500	1.881943e+06	50815.251519	1.01	2.83
229	2019	2	196.40	38.99830	1.829648e+06	46916.107882	0.97	3.86

In [21]:
```
df=df.replace([-67.92], 0)
```

In [22]:
```
#Inf 2014
df["inflation"].iloc[168:180].sum()
```

Out[22]:
```
27.0
```

In [23]:
```
#inf 2015
df["inflation"].loc[180:191].sum()
```

Out[23]: 28.0

In [24]:
```
#inf 2016
df["inflation"].loc[192:202].sum()
```

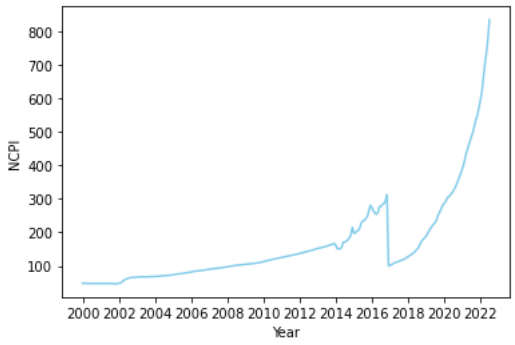
Out[24]: 11.0

In [25]:
```
#accumulative infl 2014-2016
df["inflation"].loc[156:202].sum().round(decimals = 2)
```

Out[25]: 76.45

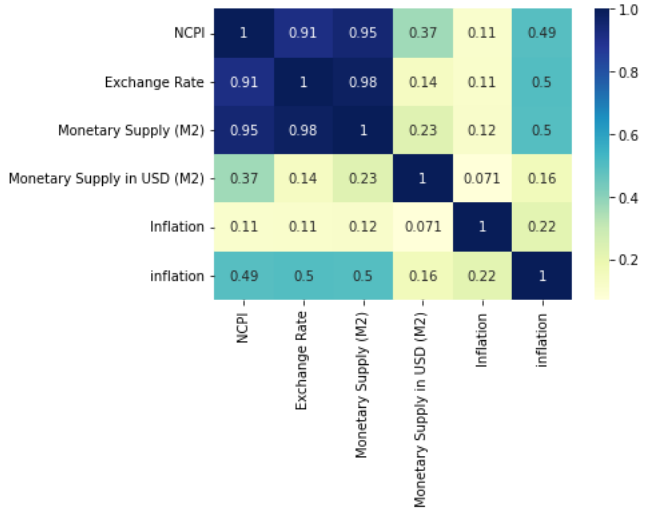
In [27]:
```
df["ncpi"].plot(color='skyblue')
plt.xticks([0,24,48,72,96,120,144,168,192,216,240,264], ['2000',"2002","2004","2006","2008","2010","2012","2014","2016","2018", '
plt.xlabel("Year")
plt.ylabel("NCPI")
```

Out[27]: Text(0, 0.5, 'NCPI')



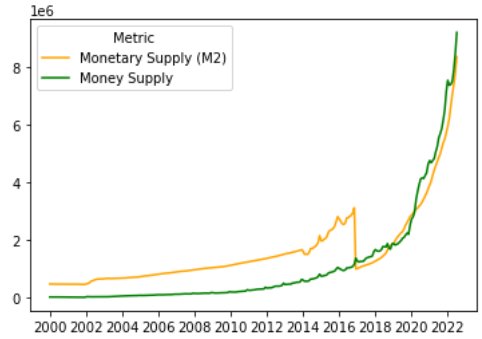
NEW VARIABLES RELATIONS

In [38]:
```
df = df.rename(columns={"ncpi": "NCPI", "ex_rate": "Exchange Rate", "m2": "Monetary Supply (M2)", "m2_usd": "Monetary Supply in U
corr_matrix = df.corr()
sns.heatmap(corr_matrix, annot=True, cmap="YlGnBu")
plt.show()
```



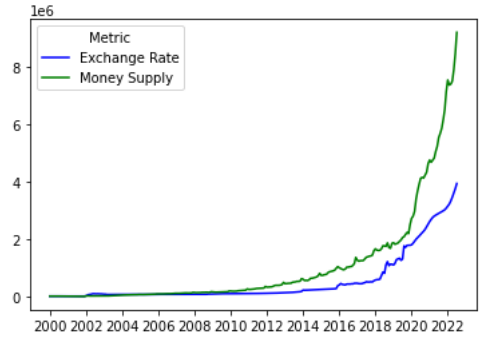
In [39]:
```
*df['NCPI'], label='Monetary Supply (M2)', color='orange')
onetary Supply (M2)'], label='Money Supply', color='green')
24,48,72,96,120,144,168,192,216,240,264], ['2000',"2002","2004","2006","2008","2010","2012","2014","2016","2018", "2020","2022"])
='upper left', title='Metric')
```

Out[39]: <matplotlib.legend.Legend at 0x2670091e4f0>



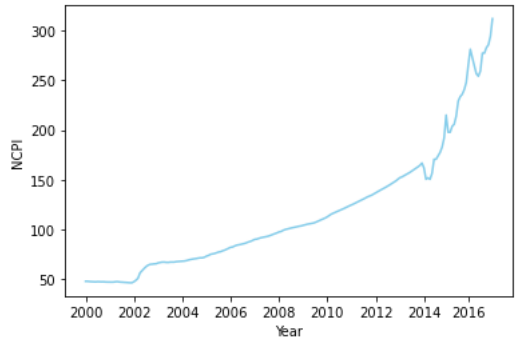
In [40]:
```
*df['Exchange Rate'], label='Exchange Rate', color='blue')
onetary Supply (M2)'], label='Money Supply', color='green')
24,48,72,96,120,144,168,192,216,240,264], ['2000',"2002","2004","2006","2008","2010","2012","2014","2016","2018", "2020","2022"])
='upper left', title='Metric')
```

Out[40]: <matplotlib.legend.Legend at 0x267009d6f70>



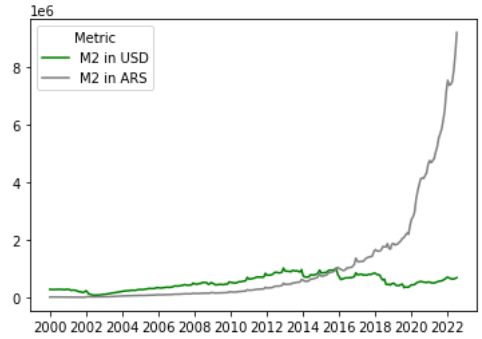
In [41]:
```
df["NCPI"].iloc[0:203].plot(color='skyblue')
plt.xticks([0,24,48,72,96,120,144,168,190], ['2000',"2002","2004","2006","2008","2010","2012","2014","2016"])
plt.xlabel("Year")
plt.ylabel("NCPI")
```

Out[41]: Text(0, 0.5, 'NCPI')



In [42]:
```
['Monetary Supply in USD (M2)'], label='M2 in USD', color='green')
onetary Supply (M2)'], label='M2 in ARS', color='grey')
24,48,72,96,120,144,168,192,216,240,264], ['2000',"2002","2004","2006","2008","2010","2012","2014","2016","2018", "2020","2022"])
='upper left', title='Metric')
```

Out[42]: <matplotlib.legend.Legend at 0x26701c2e4f0>



In [43]:
```
plt.plot(10000*df["NCPI"].iloc[203:], label='NCPI', color='skyblue')
plt.plot(df['Monetary Supply (M2)'].iloc[203:], label='M2 in ARS', color='grey')
plt.xticks([204,216,228,240,252,264], ["2017","2018","2019", "2020","2021","2022"])
plt.legend(loc='upper left', title='Metric')
```

Out[43]: <matplotlib.legend.Legend at 0x26701d19bb0>