Assignment-short2

February 20, 2019

```
In [2]: import pandas as pd
        import numpy as np
        import random
        import matplotlib.pyplot as plt
```

```
In [3]: data = pd.read_csv('./world-development-indicators/Indicators.csv')
        data.shape
```

```
Out[3]: (5656458, 6)
```

0.1 Which of the countries are in 2001, but missing in 1989?

We expect 7 countries: Jugoslawienkrieg 1991-2001
Slowenien Kroatien Bosnien und Herzegowina Kosovo Mazedonien Serbia Montenegro

```
In [4]: hist_indicator = 'GDP per capita \(constant 2005'
        hist_year = 1989

        mask1 = data['IndicatorName'].str.contains(hist_indicator)
        mask2 = data['Year'].isin([hist_year])
```

```
In [5]: hist_indicator2 = 'GDP per capita \(constant 2005'
        hist_year2 = 2002

        mask3 = data['IndicatorName'].str.contains(hist_indicator2)
        mask4 = data['Year'].isin([hist_year2])
```

```
In [6]: GDP_1989 = data[mask1 & mask2]
        GDP_2002 = data[mask3 & mask4]
```

```
In [8]: GDP_1989.count()
```

```
Out[8]: CountryName      191
        CountryCode      191
        IndicatorName    191
        IndicatorCode    191
        Year             191
        Value            191
        dtype: int64
```

```
In [9]: GDP_2002.count()
```

```
Out[9]: CountryName      230
        CountryCode      230
        IndicatorName    230
        IndicatorCode    230
        Year             230
        Value            230
        dtype: int64
```

```
In [10]: GDP_1989=GDP_1989.set_index('CountryCode')
         GDP_2002=GDP_2002.set_index('CountryCode')
```

```
In [11]: new_countries=[]
         for i in GDP_2002.index:
             if i not in GDP_1989.index:
                 new_countries.append(i)
```

```
In [12]: # Slowenien check
         # Kroatien check
         # Bosnien und Herzegowina check
         # Kosovo check
         # Mazedonien check
         # Serbia check
         # Kosovo
         GDP_2002[GDP_2002.index.isin(new_countries)]
```

```
Out[12]:                                              CountryName  \
         CountryCode
         CEB                       Central Europe and the Baltics
         FCS            Fragile and conflict affected situations
         AFG                                           Afghanistan
         ARM                                               Armenia
         ABW                                                 Aruba
         AZE                                            Azerbaijan
         BLR                                               Belarus
         BIH                               Bosnia and Herzegovina
         KHM                                              Cambodia
         CHI                                     Channel Islands
         HRV                                              Croatia
         CZE                                       Czech Republic
         DJI                                             Djibouti
         ERI                                              Eritrea
         EST                                              Estonia
         HTI                                                Haiti
         HUN                                              Hungary
         KAZ                                           Kazakhstan
         KSV                                               Kosovo
         KWT                                               Kuwait
```

```
LVA                                        Latvia
LBY                                         Libya
LTU                                     Lithuania
MKD                                 Macedonia, FYR
MDV                                       Maldives
MNE                                    Montenegro
PLW                                         Palau
POL                                        Poland
QAT                                         Qatar
ROM                                      Romania
STP                          Sao Tome and Principe
SRB                                        Serbia
SVK                               Slovak Republic
SVN                                      Slovenia
SLB                                Solomon Islands
TMP                                    Timor-Leste
TUV                                        Tuvalu
WBG                           West Bank and Gaza
YEM                                  Yemen, Rep.

                                  IndicatorName   IndicatorCode  Year  \
CountryCode
CEB          GDP per capita (constant 2005 US$)  NY.GDP.PCAP.KD  2002
FCS          GDP per capita (constant 2005 US$)  NY.GDP.PCAP.KD  2002
AFG          GDP per capita (constant 2005 US$)  NY.GDP.PCAP.KD  2002
ARM          GDP per capita (constant 2005 US$)  NY.GDP.PCAP.KD  2002
ABW          GDP per capita (constant 2005 US$)  NY.GDP.PCAP.KD  2002
AZE          GDP per capita (constant 2005 US$)  NY.GDP.PCAP.KD  2002
BLR          GDP per capita (constant 2005 US$)  NY.GDP.PCAP.KD  2002
BIH          GDP per capita (constant 2005 US$)  NY.GDP.PCAP.KD  2002
KHM          GDP per capita (constant 2005 US$)  NY.GDP.PCAP.KD  2002
CHI          GDP per capita (constant 2005 US$)  NY.GDP.PCAP.KD  2002
HRV          GDP per capita (constant 2005 US$)  NY.GDP.PCAP.KD  2002
CZE          GDP per capita (constant 2005 US$)  NY.GDP.PCAP.KD  2002
DJI          GDP per capita (constant 2005 US$)  NY.GDP.PCAP.KD  2002
ERI          GDP per capita (constant 2005 US$)  NY.GDP.PCAP.KD  2002
EST          GDP per capita (constant 2005 US$)  NY.GDP.PCAP.KD  2002
HTI          GDP per capita (constant 2005 US$)  NY.GDP.PCAP.KD  2002
HUN          GDP per capita (constant 2005 US$)  NY.GDP.PCAP.KD  2002
KAZ          GDP per capita (constant 2005 US$)  NY.GDP.PCAP.KD  2002
KSV          GDP per capita (constant 2005 US$)  NY.GDP.PCAP.KD  2002
KWT          GDP per capita (constant 2005 US$)  NY.GDP.PCAP.KD  2002
LVA          GDP per capita (constant 2005 US$)  NY.GDP.PCAP.KD  2002
LBY          GDP per capita (constant 2005 US$)  NY.GDP.PCAP.KD  2002
LTU          GDP per capita (constant 2005 US$)  NY.GDP.PCAP.KD  2002
MKD          GDP per capita (constant 2005 US$)  NY.GDP.PCAP.KD  2002
MDV          GDP per capita (constant 2005 US$)  NY.GDP.PCAP.KD  2002
MNE          GDP per capita (constant 2005 US$)  NY.GDP.PCAP.KD  2002
```

```
PLW          GDP per capita (constant 2005 US$)  NY.GDP.PCAP.KD  2002
POL          GDP per capita (constant 2005 US$)  NY.GDP.PCAP.KD  2002
QAT          GDP per capita (constant 2005 US$)  NY.GDP.PCAP.KD  2002
ROM          GDP per capita (constant 2005 US$)  NY.GDP.PCAP.KD  2002
STP          GDP per capita (constant 2005 US$)  NY.GDP.PCAP.KD  2002
SRB          GDP per capita (constant 2005 US$)  NY.GDP.PCAP.KD  2002
SVK          GDP per capita (constant 2005 US$)  NY.GDP.PCAP.KD  2002
SVN          GDP per capita (constant 2005 US$)  NY.GDP.PCAP.KD  2002
SLB          GDP per capita (constant 2005 US$)  NY.GDP.PCAP.KD  2002
TMP          GDP per capita (constant 2005 US$)  NY.GDP.PCAP.KD  2002
TUV          GDP per capita (constant 2005 US$)  NY.GDP.PCAP.KD  2002
WBG          GDP per capita (constant 2005 US$)  NY.GDP.PCAP.KD  2002
YEM          GDP per capita (constant 2005 US$)  NY.GDP.PCAP.KD  2002
```

CountryCode	Value
CEB	7140.818649
FCS	742.571620
AFG	239.699451
ARM	1121.090518
ABW	22471.190965
AZE	1046.421451
BLR	2346.386271
BIH	2471.169449
KHM	365.971081
CHI	59476.043121
HRV	8937.990253
CZE	11523.524502
DJI	859.920570
ERI	286.212971
EST	8131.074721
HTI	494.948305
HUN	9741.219290
KAZ	2925.436719
KSV	1903.587128
KWT	27659.402974
LVA	5626.641188
LBY	6494.606362
LTU	5980.349635
MKD	2753.141769
MDV	3166.489635
MNE	3319.587181
PLW	9454.243540
POL	7062.528656
QAT	52809.961342
ROM	3851.665249
STP	744.217152
SRB	2912.756781

```
SVK           9844.456768
SVN          16327.173613
SLB            808.125190
TMP            526.058386
TUV           2497.587828
WBG           1190.475367
YEM            781.065453
```

```
In [ ]: #All 7 countries have not been there in 1989, but in 2002
```

0.2 Now check development since first year of each country

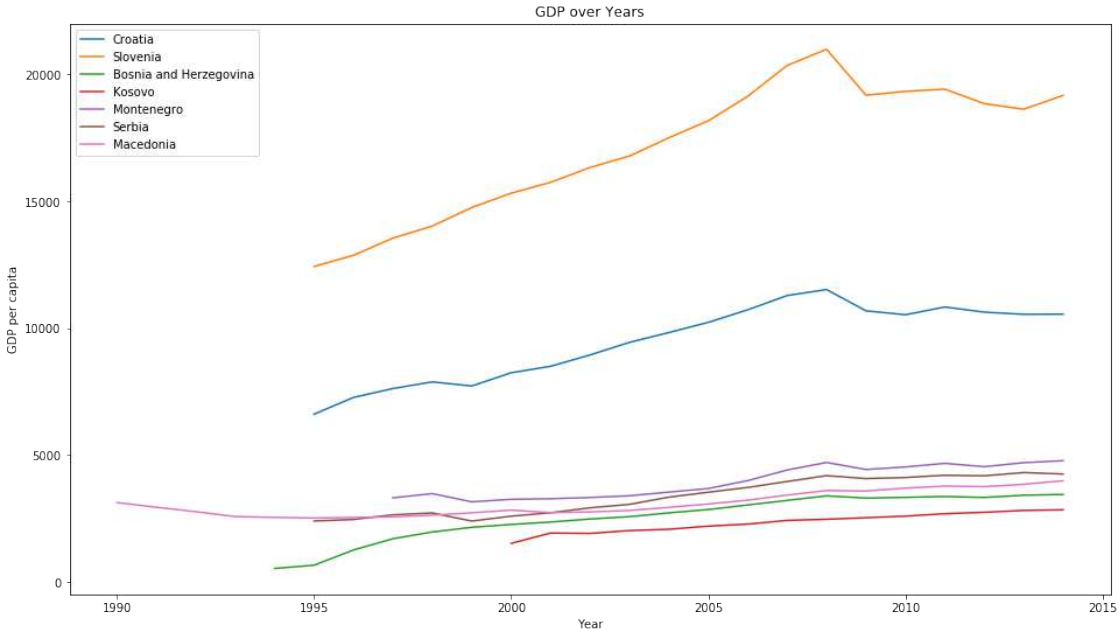
```
In [13]: def GDP(country):
             hist_indicator = 'GDP per capita \(constant 2005'
             hist_country = country

             mask5 = data['IndicatorName'].str.contains(hist_indicator)
             mask6 = data['CountryName'].str.contains(hist_country)
             return data[mask5 & mask6]
```

```
In [15]: Croatia=GDP("Croatia")
         Slovenia=GDP("Slovenia")
         Bosnia_and_Herzegovina=GDP("Bosnia and Herzegovina")
         Kosovo=GDP("Kosovo")
         Montenegro=GDP("Montenegro")
         Serbia=GDP("Serbia")
         Macedonia=GDP("Macedonia")
```

```
In [42]: countries=['Croatia', 'Slovenia', 'Bosnia and Herzegovina', 'Kosovo', 'Montenegro', '
```

```
In [17]: plt.figure(figsize=(16,9))
         plt.plot(Croatia.Year, Croatia.Value, label='Croatia')
         plt.plot(Slovenia.Year, Slovenia.Value, label='Slovenia')
         plt.plot(Bosnia_and_Herzegovina.Year, Bosnia_and_Herzegovina.Value, label='Bosnia and
         plt.plot(Kosovo.Year, Kosovo.Value, label='Kosovo')
         plt.plot(Montenegro.Year, Montenegro.Value, label='Montenegro')
         plt.plot(Serbia.Year, Serbia.Value, label='Serbia')
         plt.plot(Macedonia.Year, Macedonia.Value, label='Macedonia')
         plt.title("GDP over Years")
         plt.xlabel('Year')
         plt.ylabel('GDP per capita')
         plt.legend()
         plt.savefig("Yugoslavia_GDP.png")
```



1 Comparison 2002 to 2014

```
In [21]: hist_indicator4 = 'GDP per capita \(constant 2005'
         hist_year4 = 2014

         mask7 = data['IndicatorName'].str.contains(hist_indicator4)
         mask8 = data['Year'].isin([hist_year4])

In [22]: GDP_2014 = data[mask7 & mask8]

In [23]: GDP_2014=GDP_2014.set_index('CountryCode')

In [38]: GDP_2014.head()

Out[38]:                                              CountryName  \
         CountryCode
         ARB                                          Arab World
         CSS                              Caribbean small states
         CEB                    Central Europe and the Baltics
         EAS            East Asia & Pacific (all income levels)
         EAP              East Asia & Pacific (developing only)

                                          IndicatorName   IndicatorCode  Year  \
         CountryCode
         ARB          GDP per capita (constant 2005 US$)  NY.GDP.PCAP.KD  2014
         CSS          GDP per capita (constant 2005 US$)  NY.GDP.PCAP.KD  2014
```

```
CEB          GDP per capita (constant 2005 US$)  NY.GDP.PCAP.KD  2014
EAS          GDP per capita (constant 2005 US$)  NY.GDP.PCAP.KD  2014
EAP          GDP per capita (constant 2005 US$)  NY.GDP.PCAP.KD  2014

                      Value
CountryCode
ARB            4548.529662
CSS            7458.860004
CEB           10646.249820
EAS            6465.238232
EAP            3253.864486
```

```
In [25]: df = GDP_2002.copy()
```

```
In [26]: df = df.rename(columns={'Value': 'Value_2002'})
         df = df.drop(columns='Year')
```

```
In [27]: df2 = df.assign(Value_2014 = GDP_2014["Value"])
```

```
In [28]: df2.head()
```

```
Out[28]:                                          CountryName  \
         CountryCode
         ARB                                       Arab World
         CSS                           Caribbean small states
         CEB                 Central Europe and the Baltics
         EAS          East Asia & Pacific (all income levels)
         EAP            East Asia & Pacific (developing only)

                                      IndicatorName   IndicatorCode   Value_2002  \
         CountryCode
         ARB          GDP per capita (constant 2005 US$)  NY.GDP.PCAP.KD  3295.630878
         CSS          GDP per capita (constant 2005 US$)  NY.GDP.PCAP.KD  6223.496264
         CEB          GDP per capita (constant 2005 US$)  NY.GDP.PCAP.KD  7140.818649
         EAS          GDP per capita (constant 2005 US$)  NY.GDP.PCAP.KD  4253.315693
         EAP          GDP per capita (constant 2005 US$)  NY.GDP.PCAP.KD  1288.590391

                       Value_2014
         CountryCode
         ARB            4548.529662
         CSS            7458.860004
         CEB           10646.249820
         EAS            6465.238232
         EAP            3253.864486
```

```
In [50]: df2 = df2.assign(Trend = 100/ df2["Value_2002"]*df2["Value_2014"] -100)
```

```
In [30]: df2=df2.sort_values(by='Trend',ascending=True)
```

```
In [31]: df2 = df2.assign(Absolute = df2["Value_2014"]*df2["Value_2002"])
```

```
In [51]: df2 = df2.rename(columns={'Trend': 'Trend [%]'})

In [52]: Yugoslavia=df2[df2.CountryName.isin(countries)]
         Yugoslavia
```

Out[52]:

CountryCode	CountryName	IndicatorName	IndicatorCode	Value_2002	Value_2014	Trend [%]	Absolute
SVN	Slovenia	GDP per capita (constant 2005 US$)	NY.GDP.PCAP.KD	16327.173613	19170.204946	17.412881	3.129953e+08
HRV	Croatia	GDP per capita (constant 2005 US$)	NY.GDP.PCAP.KD	8937.990253	10547.221025	18.004392	9.427096e+07
BIH	Bosnia and Herzegovina	GDP per capita (constant 2005 US$)	NY.GDP.PCAP.KD	2471.169449	3440.804592	39.237906	8.502811e+06
MNE	Montenegro	GDP per capita (constant 2005 US$)	NY.GDP.PCAP.KD	3319.587181	4770.465055	43.706575	1.583597e+07
MKD	Macedonia, FYR	GDP per capita (constant 2005 US$)	NY.GDP.PCAP.KD	2753.141769	3979.188327	44.532634	1.095527e+07
SRB	Serbia	GDP per capita (constant 2005 US$)	NY.GDP.PCAP.KD	2912.756781	4245.538126	45.756699	1.236622e+07
KSV	Kosovo	GDP per capita (constant 2005 US$)	NY.GDP.PCAP.KD	1903.587128	2835.777118	48.970177	5.398149e+06

```
In [54]: df2['Trend [%]'].mean()
```

Out[54]: 39.67025975968281

```
In [55]: Yugoslavia['Trend [%]'].mean()
```

Out[55]: 36.80303777090556

```
In [56]: df2['Absolute'].mean()
```

Out[56]: 297286421.97153986

```
In [57]: Yugoslavia['Absolute'].mean()
```

Out[57]: 65760663.894860014

In [47]:
```
df2.describe()
```

Out[47]:

	Value_2002	Value_2014	Trend	Absolute
count	230.000000	212.000000	212.000000	2.120000e+02
mean	10802.519866	10590.113326	39.670260	2.972864e+08
std	17633.963807	15176.993888	38.568941	7.587924e+08
min	141.789713	152.652871	-35.481275	2.279846e+04
25%	810.108803	1129.209758	12.395542	9.129530e+05
50%	2924.106910	3995.374758	34.689324	1.128517e+07
75%	11368.716735	11696.294495	54.402326	9.773928e+07
max	124206.268293	82960.098918	213.039673	6.291824e+09

In [64]:
```
#jupyter nbconvert --to pdf Assignment-short2.ipynb
```

```
  File "<ipython-input-64-b85ad2c1801e>", line 1
    nbconvert --to html Assignment-short2.ipynb
                        ^
SyntaxError: invalid syntax
```

Development of former Yugoslavia countries

Michael Fiedler

Dataset(s)

For this project I used the following dataset:

- World Development Indicators Dataset

Motivation

The term former Yugoslavia is the territory that was up to 25 June 1991 known as SFRY - The Socialist Federal Republic of Yugoslavia .

Republics that made up the federation:

- Bosnia and Herzegovina
- Croatia
- Macedonia
- Montenegro,
- Serbia
- Slovenia
- Kosovo

Motivation

How did these countries develop since their independency?

Did some develop better than others?

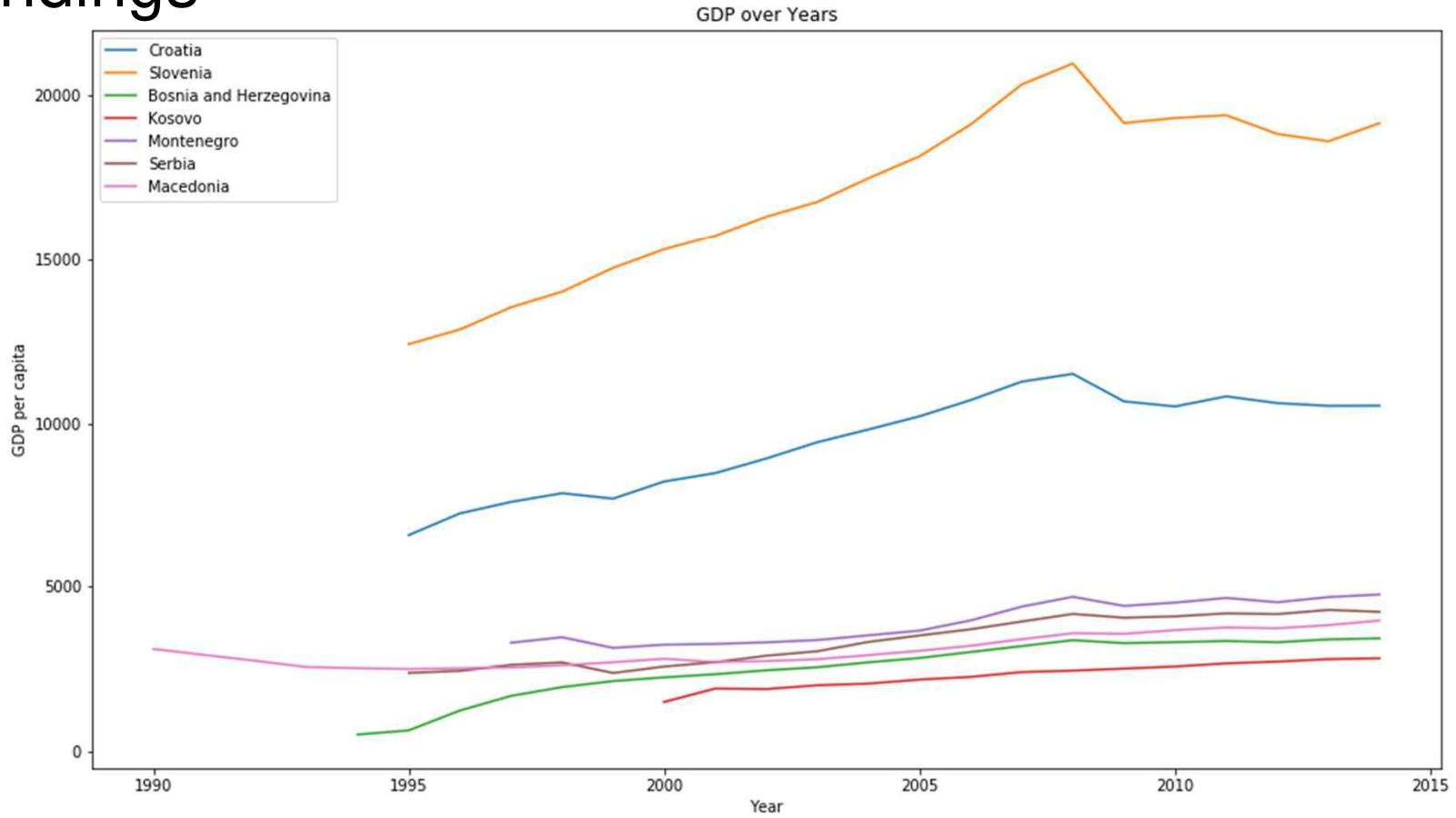
It would be interesting to know which countries have benefited the most from the split of Yugoslavia. Regions of other countries which are considering independency could be interested if a separation could lead to greater affluence, e.g. Catalonia in Spain.

Research Question(s)

Assuming GDP per capita (constant 2005 US$) as indicator for affluence:

How has the GDP of the former Yugoslavia countries developed since their independency?

Findings


GDP over Years
Croatia
Slovenia
Bosnia and Herzegovina
Kosovo
Montenegro
Serbia
Macedonia
GDP per capita
0
5000
10000
15000
20000
1990
1995
2000
2005
2010
2015
Year

Findings

CountryCode	CountryName	IndicatorName	IndicatorCode	Value_2002	Value_2014	Trend [%]	Absolute
SVN	Slovenia	GDP per capita (constant 2005 US$)	NY.GDP.PCAP.KD	16327.173613	19170.204946	17.412881	3.129953e+08
HRV	Croatia	GDP per capita (constant 2005 US$)	NY.GDP.PCAP.KD	8937.990253	10547.221025	18.004392	9.427096e+07
BIH	Bosnia and Herzegovina	GDP per capita (constant 2005 US$)	NY.GDP.PCAP.KD	2471.169449	3440.804592	39.237906	8.502811e+06
MNE	Montenegro	GDP per capita (constant 2005 US$)	NY.GDP.PCAP.KD	3319.587181	4770.465055	43.706575	1.583597e+07
MKD	Macedonia, FYR	GDP per capita (constant 2005 US$)	NY.GDP.PCAP.KD	2753.141769	3979.188327	44.532634	1.095527e+07
SRB	Serbia	GDP per capita (constant 2005 US$)	NY.GDP.PCAP.KD	2912.756781	4245.538126	45.756699	1.236622e+07
KSV	Kosovo	GDP per capita (constant 2005 US$)	NY.GDP.PCAP.KD	1903.587128	2835.777118	48.970177	5.398149e+06

Mean Trend [%] of former SFRY countries: 36.8030
Mean Trend [%] of all countries : 39.6703
Mean Absolute of all countries: 2.9729e+8
Mean Absolute of former SFRY countries: 6.5761e+7

Findings

The seven countries have developed differently.
Countries which had the highest GDP in 2002 had the least percentual increase from 2002 to 2014 (Trend [%]) :

- Slovenia: 17.41%
- Croatia: 18.00%
- Mean of all SFRY countries: 39.67

Still, they had the highest absolute increase (Absolute).

The reasons for these high differences in the development would need to be investigated in another project. Possible reasons:

- Natural ressources
- Level of education in the year 2002

Acknowledgements

I did not use other informal analaysis nor got feedback on my work.
One website was used for aquiring general information about former Yugoslavia.

References

http://www.icty.org/en/about/what-former-yugoslavia