Are richest Countries the most educated? The relation between wealth and education in countries

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Dataset(s)

Which dataset did you use of the following:

- Soccer Dataset
- IMDB Movie Dataset
- **World Development Indicators Dataset** ***V***

For this first project I’m using the well-known World Development Indicator Dataset.

Motivation

If we look at the level of wellness reached by several countries in the world, we can conclude that many factors have played a significant role to this, ranging from the more material to the less ones: the presence of water and commodities, the access to sea, the peace conditions, the quality of education, the “social capital”, etc.

Studying the relations between the above variables is one of my main interests. Of course, this is not ease and, at high level, advanced studies should be required.

In this project work I’ll focus my attention to the level of education: There is a significant number of studies about its ability to well explain why some countries are richer than other.

I’m aware that education cannot be the only variable that could be candidate to explain the richness of the nations, but the feeling that it can positively contribute, and the availability of good quality data take me to go on in this direction.

Research Question(s)

In this Mini project I'm trying to understand the relation between wealth of a country and education.

Without looking at the data, we can imagine that between **wealth** and **education** exist a **positive relation**: **rich countries** can be associated to **high level of education** and **poor countries**, instead, to a **low level of education**.

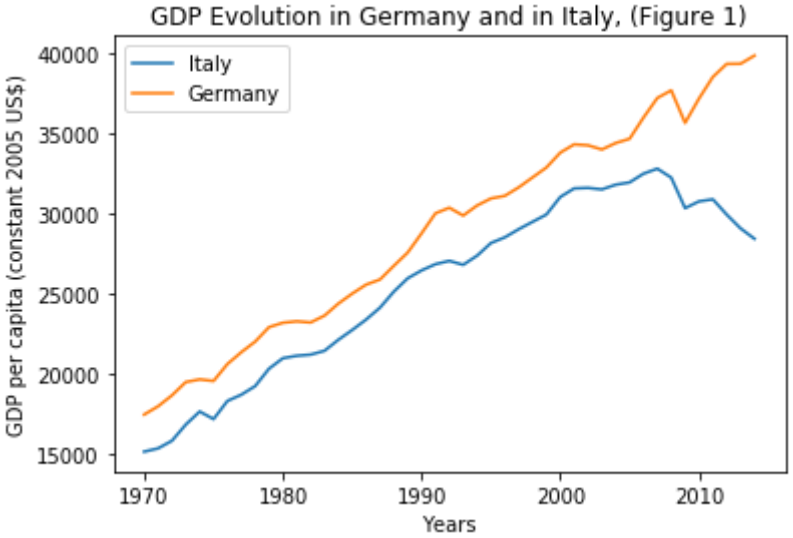
Through a correlation analysis I'll verify if wealth of a country and education are correlated and, if so, if it's positive.

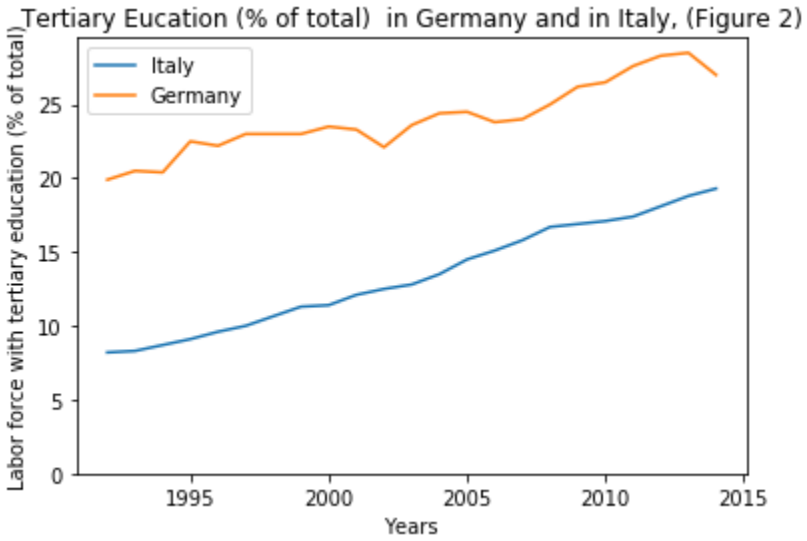
No answer will be provided to the causality question: at this stage of my analysis I'm not able to verify whether a higher level of education cause higher level of wealth or the opposite; that is, the richer countries are able to provide better education to their children.

Probably the above question could be answered by the competences and techniques to be acquired in the next course weeks.

In the next slide, will be shown some evidence for two selected Countries and, in the next one, a more general analysis will be provided.

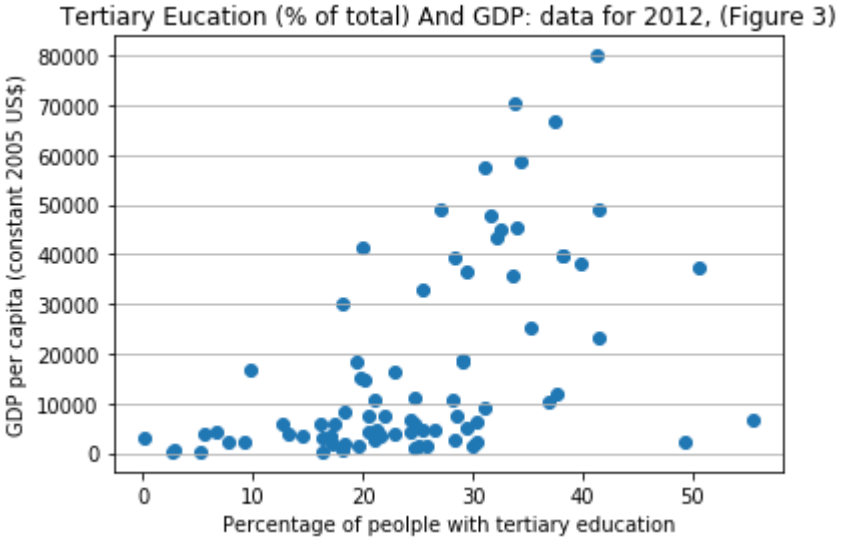
Findings - 1





In the figure 1 is shown the evolution of the GDP for Germany and Italy in the years 1970 – 2014.
In the figure 2 is shown the evolution of the Labor force with tertiary education (% of total) for Germany and Italy in the years 1992 – 2014.
In both images we can notice the **positive trend for GDP and for Skilled population**.
This trend should suggest the positive relation between GDP and Level of Education.

Findings - 2



Correlation between Tertiary Education and GDP, Figure (4)

	Value_x	Value_y
Value_x	1.000000	0.520758
Value_y	0.520758	1.000000

In the Figure 3 I have plotted the correlation between the level of the GDP per capita (constant 2005 US$) and the Tertiary Eucation (% of total population) for the year 2012.
The coutries considered in the sample are 81: Countries like US, European Countries, Japan, China, Russia, African Countries, Middle East and West Asia Countries are considered in the dataset.
As we can see, for very low level of GDP does not seem to be for the 2 variables a correlation.
For growing level of GDP, instead, the relation seem to be more significat, even if is not possible to say that a very well and established relation exists.
The value of the correlation is **.52**, as shown in the figure 4**.**
Of course a value of .52 is not bad and it can be a good starting point for additional analisys.

Findings – Final Remarks

- The relation between Wealth of the countries and Education has been analyzed.
- 81 countries are part of the sample.
- The year analysed is 2012.
- The coefficient of correlation is .52. It’s positive and means that to higher level of GDP are associated higher level of Education.
- However, I expected a higher level of correlation and a lower level of statistical dispersion.
- Additional analisys could be performed in order to make more robust the model and undestand if higher level of education cause higher level of GDP: at this level of analysis nothing can be said a priori.

Acknowledgements

Did you use other informal analysis to inform your work? Did you get feedback on your work by friends or colleagues? Etc.

All come from my effort.

References

If applicable, report any references you used in your work. For example, you may have used a research paper from X to help guide your analysis. You should cite that work here. If you did all the work on your own, please state this.

https://www.python.org/doc/

https://pandas.pydata.org/docs/

Learning Python, 5th Edition, Mark Lutz

Education at a Glance 2019, OECD.

In [296]:

```
import pandas as pd
import numpy as np
import random
import matplotlib.pyplot as plt
pd.set_option('display.max_rows', 100)
```

In [297]:

```
data=pd.read_csv('./files/world-development-indicators/Indicators.csv')
```

In [298]:

```
data.shape
```

Out[298]:

```
(5656458, 6)
```

In [299]:

```
data.columns
```

Out[299]:

```
Index(['CountryName', 'CountryCode', 'IndicatorName', 'IndicatorCode', 'Year',
       'Value'],
      dtype='object')
```

In [300]:

```
data.loc[0:1, 'CountryName':'Year']
```

Out[300]:

	CountryName	CountryCode	IndicatorName	IndicatorCode	Year
0	Arab World	ARB	Adolescent fertility rate (births per 1,000 wo...	SP.ADO.TFRT	1960
1	Arab World	ARB	Age dependency ratio (% of working-age populat...	SP.POP.DPND	1960

In [301]:

```
data.isnull().any()
```

Out[301]:

```
CountryName      False
CountryCode      False
IndicatorName    False
IndicatorCode    False
Year             False
Value            False
dtype: bool
```

In [302]:

```
data.columns
```

Out[302]:

```
Index(['CountryName', 'CountryCode', 'IndicatorName', 'IndicatorCode', 'Year',
       'Value'],
      dtype='object')
```

In [303]:

```
data.CountryName.describe()
```

Out[303]:

```
count     5656458
unique        247
top        Mexico
freq        37244
Name: CountryName, dtype: object
```

In [304]:

```
data.IndicatorName.describe()
```

Out[304]:

```
count                5656458
unique                  1344
top       Population, total
freq                   13484
Name: IndicatorName, dtype: object
```

In [305]:

```
data.IndicatorCode.describe()
```

Out[305]:

```
count          5656458
unique            1344
top        SP.POP.TOTL
freq             13484
Name: IndicatorCode, dtype: object
```

In [306]:

```
print('The First year of the serie is: ',data.Year.min(),
      'The Last year of the serie is: ',data.Year.max() )
```

```
The First year of the serie is:  1960 The Last year of the serie is:  2015
```

In [307]:

```
l=[]
for elem in data['CountryName']:
    if elem not in l:
        l.append(elem)
print(l[:30])
```

```
['Arab World', 'Caribbean small states', 'Central Europe and the Baltics', 'East Asia & Pacific (a
ll income levels)', 'East Asia & Pacific (developing only)', 'Euro area', 'Europe & Central Asia (
all income levels)', 'Europe & Central Asia (developing only)', 'European Union', 'Fragile and con
flict affected situations', 'Heavily indebted poor countries (HIPC)', 'High income', 'High income:
nonOECD', 'High income: OECD', 'Latin America & Caribbean (all income levels)', 'Latin America & C
aribbean (developing only)', 'Least developed countries: UN classification', 'Low & middle
income', 'Low income', 'Lower middle income', 'Middle East & North Africa (all income levels)', 'M
iddle East & North Africa (developing only)', 'Middle income', 'North America', 'OECD members', 'O
ther small states', 'Pacific island small states', 'Small states', 'South Asia', 'Sub-Saharan Afri
ca (all income levels)']
```

In [308]:

```
l=[]
for elem in data['IndicatorName']:
    if elem not in l and 'GDP per capita' in elem:
        l.append(elem)
l[:5]
```

Out[308]:

```
['GDP per capita (current US$)',
 'GDP per capita (constant 2005 US$)',
 'GDP per capita (current LCU)',
 'GDP per capita (constant LCU)',
 'GDP per capita growth (annual %)']
```

In [309]:

```
GDPpercapita=l[1]
GDPpercapita
```

Out[309]:

```
'GDP per capita (constant 2005 US$)'
```

In [310]:

```
Italiandatafilter=data[(data.CountryName=='Italy') & (data.IndicatorName==GDPpercapita)]
Italiandatafilter.head()
```

Out[310]:

	CountryName	CountryCode	IndicatorName	IndicatorCode	Year	Value
12578	Italy	ITA	GDP per capita (constant 2005 US$)	NY.GDP.PCAP.KD	1960	9326.657676
37642	Italy	ITA	GDP per capita (constant 2005 US$)	NY.GDP.PCAP.KD	1961	10024.890333
65230	Italy	ITA	GDP per capita (constant 2005 US$)	NY.GDP.PCAP.KD	1962	10575.003962
93724	Italy	ITA	GDP per capita (constant 2005 US$)	NY.GDP.PCAP.KD	1963	11087.051204
122523	Italy	ITA	GDP per capita (constant 2005 US$)	NY.GDP.PCAP.KD	1964	11303.862117

In [311]:

```
Germandatafilter=data[(data.IndicatorName==GDPpercapita)&(data.CountryName=='Germany')]
Germandatafilter.head()
```

Out[311]:

	CountryName	CountryCode	IndicatorName	IndicatorCode	Year	Value
324685	Germany	DEU	GDP per capita (constant 2005 US$)	NY.GDP.PCAP.KD	1970	17473.039645
389408	Germany	DEU	GDP per capita (constant 2005 US$)	NY.GDP.PCAP.KD	1971	17987.384810
458378	Germany	DEU	GDP per capita (constant 2005 US$)	NY.GDP.PCAP.KD	1972	18671.350796
528175	Germany	DEU	GDP per capita (constant 2005 US$)	NY.GDP.PCAP.KD	1973	19501.855695
597968	Germany	DEU	GDP per capita (constant 2005 US$)	NY.GDP.PCAP.KD	1974	19667.769739

In [312]:

```
yearFilter=Italiandatafilter['Year'].values
yearFiltertobeUsed=yearFilter[10:]
yearFiltertobeUsed
```

Out[312]:

```
array([1970, 1971, 1972, 1973, 1974, 1975, 1976, 1977, 1978, 1979, 1980,
       1981, 1982, 1983, 1984, 1985, 1986, 1987, 1988, 1989, 1990, 1991,
```

```
       1992, 1993, 1994, 1995, 1996, 1997, 1998, 1999, 2000, 2001, 2002,
       2003, 2004, 2005, 2006, 2007, 2008, 2009, 2010, 2011, 2012, 2013,
       2014], dtype=int64)
```

In [313]:

```
ValueItalianFilter=Italiandatafilter['Value'].values
ValueItalianFilter=ValueItalianFilter[10:]
```

In [314]:

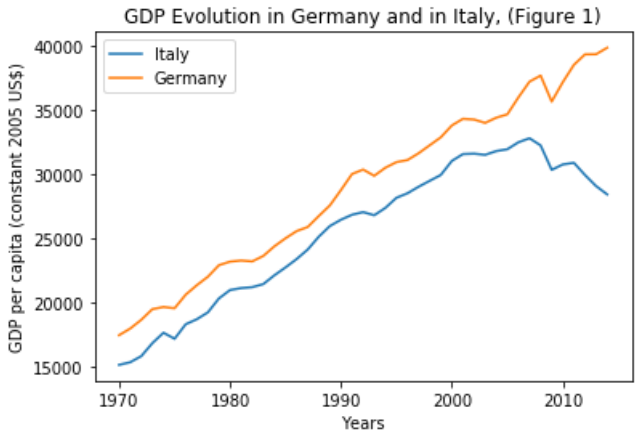
```
ValueGErmanyFilter=Germandatafilter['Value'].values
ValueGErmanyFilter
```

Out[314]:

```
array([17473.03964514, 17987.38481021, 18671.35079632, 19501.85569493,
       19667.76973855, 19570.1321962 , 20626.96084831, 21365.70247254,
       22027.65074577, 22931.73851754, 23206.61987543, 23293.93304539,
       23224.03778535, 23651.13577435, 24403.00235763, 25026.95871416,
       25587.696495  , 25906.64703778, 26762.30828674, 27590.91753195,
       28791.5746756 , 30042.63194867, 30388.65434655, 29900.87532684,
       30529.57329383, 30968.91466196, 31131.95890805, 31661.29271823,
       32283.17627509, 32903.41269729, 33832.17621024, 34347.96048955,
       34290.26035955, 34027.98745099, 34433.5794612 , 34696.62091671,
       36021.05920347, 37245.30916517, 37720.07476273, 35690.95689277,
       37204.07656109, 38555.96596732, 39372.51001742, 39382.15930877,
       39891.53772601])
```

In [315]:

```
#plt.figure(figsize=(10,5))
plt.plot(yearFiltertobeUsed, ValueItalianFilter)
plt.plot(yearFiltertobeUsed, ValueGErmanyFilter)
label_it = 'Italy'
label_de = 'Germany'
plt.ylabel('GDP per capita (constant 2005 US$)')
plt.xlabel('Years')
plt.title('GDP Evolution in Germany and in Italy, (Figure 1)')
plt.legend([label_it, label_de])
plt.show()
```



Calculating Education Italy vs Germany

In [316]:

```
TertiaryEducation=[]
for elem in data['IndicatorName']:
    if elem not in TertiaryEducation and 'education' in elem:
        TertiaryEducation.append(elem)
#TertiaryEducation
```

In [317]:

```
EducationIndicator=TertiaryEducation[58]
CountryIndicator='Germany'
#YearIndicator=2014

mask1=data['IndicatorName']==EducationIndicator
mask2=data['CountryName'].str.contains(CountryIndicator)
#mask3=data['Year']==2012
EducationInGermany = data[mask1&mask2]
EducationInGermany[:2]
```

Out[317]:

	CountryName	CountryCode	IndicatorName	IndicatorCode	Year	Value
2165546	Germany	DEU	Labor force with tertiary education (% of total)	SL.TLF.TERT.ZS	1992	19.9
2288494	Germany	DEU	Labor force with tertiary education (% of total)	SL.TLF.TERT.ZS	1993	20.5

In [318]:

```
EducationIndicator=TertiaryEducation[58]
CountryIndicator='Italy'
#YearIndicator=2014

mask1=data['IndicatorName']==EducationIndicator
mask2=data['CountryName'].str.contains(CountryIndicator)
#mask3=data['Year']==2012
EducationInItaly = data[mask1&mask2]
EducationInItaly[:2]
```

Out[318]:

	CountryName	CountryCode	IndicatorName	IndicatorCode	Year	Value
2176620	Italy	ITA	Labor force with tertiary education (% of total)	SL.TLF.TERT.ZS	1992	8.2
2299682	Italy	ITA	Labor force with tertiary education (% of total)	SL.TLF.TERT.ZS	1993	8.3

Education Evolution in Italy & Germany

In [319]:

```
EducationEvolution=EducationInGermany.merge(EducationInItaly, on='Year', how='left')
EducationEvolution[-2:]
```

Out[319]:

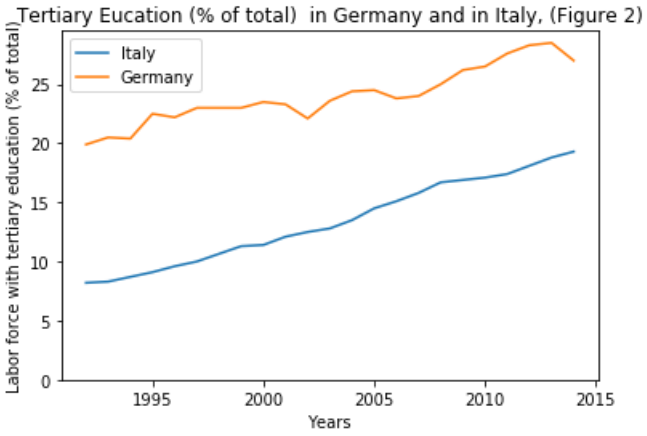
	CountryName_x	CountryCode_x	IndicatorName_x	IndicatorCode_x	Year	Value_x	CountryName_y	CountryCode_y	IndicatorName
20	Germany	DEU	Labor force with tertiary education (% of total)	SL.TLF.TERT.ZS	2013	28.5	Italy	ITA	Labor force w tertiary educat (% of to
21	Germany	DEU	Labor force with tertiary education (% of total)	SL.TLF.TERT.ZS	2014	27.0	Italy	ITA	Labor force w tertiary educat (% of to

In [320]:

```
#plt.figure(figsize=(10,5))
plt.plot( EducationEvolution['Year'].values,EducationEvolution['Value_y'].values) #Value for Italy
plt.plot( EducationEvolution['Year'].values,EducationEvolution['Value_x'].values) #Value for German
y
label_it = 'Italy'
label_de = 'Germany'
plt.ylabel('Labor force with tertiary education (% of total)')
```

```
plt.xlabel('Years')
plt.title('Tertiary Eucation (% of total)  in Germany and in Italy, (Figure 2)')
plt.legend([label_it, label_de])
plt.ylim(0)
plt.show()

#EducationEvolution['Value_x'].values
#EducationEvolution['Value_y'].values
#EducationEvolution['Year'].values
```



Finisco Education Italy vs Germany

In [321]:

```
TertiaryEducation=[]
for elem in data['IndicatorName']:
    if elem not in TertiaryEducation and 'education' in elem:
        TertiaryEducation.append(elem)
#TertiaryEducation
```

In [322]:

```
TertiaryEducation[58]
```

Out[322]:

```
'Labor force with tertiary education (% of total)'
```

Create dataframe with Skilled Labour 2012

In [323]:

```
EducationIndicator=TertiaryEducation[58]
CountryIndicator='Panama'
#YearIndicator=2014

mask1=data['IndicatorName']==EducationIndicator
mask2=data['CountryName'].str.contains(CountryIndicator)
mask3=data['Year']==2012
mask4=((data['CountryName']!="Central Europe and the Baltics") &
       (data['CountryName']!="Euro area") &
       (data['CountryName']!="Europe & Central Asia (all income levels)") &
       (data['CountryName']!="European Union") &
       (data['CountryName']!="High income") &
       (data['CountryName']!="High income: nonOECD") &
       (data['CountryName']!="High income: OECD") &
       (data['CountryName']!="Latin America & Caribbean (all income levels)") &
       (data['CountryName']!="North America") &
       (data['CountryName']!="Cayman Islands") &
       (data['CountryName']!="OECD members")
       )

EducationStage = data[mask1&mask3&mask4]
```

```
EducationStage = data[mask1&mask3&mask4]
```

In [324]:

```
EducationStage [:2]
```

Out[324]:

	CountryName	CountryCode	IndicatorName	IndicatorCode	Year	Value
5225022	Albania	ALB	Labor force with tertiary education (% of total)	SL.TLF.TERT.ZS	2012	13.3
5228305	Argentina	ARG	Labor force with tertiary education (% of total)	SL.TLF.TERT.ZS	2012	20.6

In [325]:

```
CountryList=[]
for elem in EducationStage['CountryName']:
    if elem not in CountryList:
        CountryList.append(elem)
CountryList[:5]
```

Out[325]:

```
['Albania', 'Argentina', 'Armenia', 'Austria', 'Azerbaijan']
```

Create Dataframe Gdp per Capita 2012

In [326]:

```
GDPIndicator='GDP per capita (constant 2005 US$)'
CountryIndicator='Panama'
#YearIndicator=2014

mask1=data['IndicatorName']=='GDP per capita (constant 2005 US$)'
mask2=data['CountryName'].str.contains(CountryIndicator)
mask3=data['Year']==2012
mask4=((data['CountryName']!="Central Europe and the Baltics") &
       (data['CountryName']!="Euro area") &
       (data['CountryName']!="Europe & Central Asia (all income levels)") &
       (data['CountryName']!="European Union") &
       (data['CountryName']!="High income") &
       (data['CountryName']!="High income: nonOECD") &
       (data['CountryName']!="High income: OECD") &
       (data['CountryName']!="Latin America & Caribbean (all income levels)") &
       (data['CountryName']!="North America") &
       (data['CountryName']!="Cayman Islands") &
       (data['CountryName']!="OECD members")
       )

GDPStage = data[mask1&mask3&mask4]
```

In [327]:

```
GDPStage[:5]
```

Out[327]:

	CountryName	CountryCode	IndicatorName	IndicatorCode	Year	Value
5202435	Arab World	ARB	GDP per capita (constant 2005 US$)	NY.GDP.PCAP.KD	2012	4519.077049
5202929	Caribbean small states	CSS	GDP per capita (constant 2005 US$)	NY.GDP.PCAP.KD	2012	7370.646067
5204014	East Asia & Pacific (all income levels)	EAS	GDP per capita (constant 2005 US$)	NY.GDP.PCAP.KD	2012	6069.417781
5204643	East Asia & Pacific (developing only)	EAP	GDP per capita (constant 2005 US$)	NY.GDP.PCAP.KD	2012	2885.936108

	CountryName	CountryCode	IndicatorName	IndicatorCode	Year	Value
5206703	Europe & Central Asia (developing only)	ECA	GDP per capita (constant 2005 US$)	NY.GDP.PCAP.KD	2012	4513.220095

SkilledLabourAndGDP is my main dataframe

List of countries in the dataframe analized for the correlation

In [328]:

```
SkilledLabourAndGDP = EducationStage.merge(GDPStage, on='CountryName', how='left')
del SkilledLabourAndGDP['CountryCode_y']
SkilledLabourAndGDP
```

Out[328]:

	CountryName	CountryCode_x	IndicatorName_x	IndicatorCode_x	Year_x	Value_x	IndicatorName_y	IndicatorCode_y	Year_y
0	Albania	ALB	Labor force with tertiary education (% of total)	SL.TLF.TERT.ZS	2012	13.300000	GDP per capita (constant 2005 US$)	NY.GDP.PCAP.KD	2012
1	Argentina	ARG	Labor force with tertiary education (% of total)	SL.TLF.TERT.ZS	2012	20.600000	GDP per capita (constant 2005 US$)	NY.GDP.PCAP.KD	2012
2	Armenia	ARM	Labor force with tertiary education (% of total)	SL.TLF.TERT.ZS	2012	49.200001	GDP per capita (constant 2005 US$)	NY.GDP.PCAP.KD	2012
3	Austria	AUT	Labor force with tertiary education (% of total)	SL.TLF.TERT.ZS	2012	19.900000	GDP per capita (constant 2005 US$)	NY.GDP.PCAP.KD	2012
4	Azerbaijan	AZE	Labor force with tertiary education (% of total)	SL.TLF.TERT.ZS	2012	16.299999	GDP per capita (constant 2005 US$)	NY.GDP.PCAP.KD	2012
5	Bahrain	BHR	Labor force with tertiary education (% of total)	SL.TLF.TERT.ZS	2012	9.800000	GDP per capita (constant 2005 US$)	NY.GDP.PCAP.KD	2012
6	Belgium	BEL	Labor force with tertiary education (% of total)	SL.TLF.TERT.ZS	2012	39.799999	GDP per capita (constant 2005 US$)	NY.GDP.PCAP.KD	2012
7	Belize	BLZ	Labor force with tertiary education (% of total)	SL.TLF.TERT.ZS	2012	5.600000	GDP per capita (constant 2005 US$)	NY.GDP.PCAP.KD	2012
8	Bermuda	BMU	Labor force with tertiary education (% of total)	SL.TLF.TERT.ZS	2012	33.799999	GDP per capita (constant 2005 US$)	NY.GDP.PCAP.KD	2012
9	Bosnia and Herzegovina	BIH	Labor force with tertiary education (% of total)	SL.TLF.TERT.ZS	2012	14.500000	GDP per capita (constant 2005 US$)	NY.GDP.PCAP.KD	2012
10	Brazil	BRA	Labor force with tertiary education (% of total)	SL.TLF.TERT.ZS	2012	12.700000	GDP per capita (constant 2005 US$)	NY.GDP.PCAP.KD	2012
11	Bulgaria	BGR	Labor force with tertiary education (% of total)	SL.TLF.TERT.ZS	2012	26.600000	GDP per capita (constant 2005 US$)	NY.GDP.PCAP.KD	2012
12	Cambodia	KHM	Labor force with tertiary education (% of total)	SL.TLF.TERT.ZS	2012	2.800000	GDP per capita (constant 2005 US$)	NY.GDP.PCAP.KD	2012
13	Canada	CAN	Labor force with tertiary education (% of total)	SL.TLF.TERT.ZS	2012	50.599998	GDP per capita (constant 2005 US$)	NY.GDP.PCAP.KD	2012
14	Colombia	COL	Labor force with tertiary education (% of total)	SL.TLF.TERT.ZS	2012	24.299999	GDP per capita (constant 2005 US$)	NY.GDP.PCAP.KD	2012
15	Costa Rica	CRI	Labor force with tertiary education (% of total)	SL.TLF.TERT.ZS	2012	24.799999	GDP per capita (constant 2005 US$)	NY.GDP.PCAP.KD	2012
16	Croatia	HRV	Labor force with tertiary education (% of total)	SL.TLF.TERT.ZS	2012	21.000000	GDP per capita (constant 2005 US$)	NY.GDP.PCAP.KD	2012

	CountryName	CountryCode_x	IndicatorName_x	IndicatorCode_x	Year_x	Value_x	IndicatorName_y	IndicatorCode_y	Year_y	
17	Cyprus	CYP	Labor force with tertiary education (% of total)	SL.TLF.TERT.ZS	2012	41.400002	GDP per capita (constant 2005 US$)	NY.GDP.PCAP.KD	2012	
18	Czech Republic	CZE	Labor force with tertiary education (% of total)	SL.TLF.TERT.ZS	2012	20.100000	GDP per capita (constant 2005 US$)	NY.GDP.PCAP.KD	2012	
19	Denmark	DNK	Labor force with tertiary education (% of total)	SL.TLF.TERT.ZS	2012	31.700001	GDP per capita (constant 2005 US$)	NY.GDP.PCAP.KD	2012	
20	Dominican Republic	DOM	Labor force with tertiary education (% of total)	SL.TLF.TERT.ZS	2012	21.299999	GDP per capita (constant 2005 US$)	NY.GDP.PCAP.KD	2012	
21	Ecuador	ECU	Labor force with tertiary education (% of total)	SL.TLF.TERT.ZS	2012	21.700001	GDP per capita (constant 2005 US$)	NY.GDP.PCAP.KD	2012	
22	Egypt, Arab Rep.	EGY	Labor force with tertiary education (% of total)	SL.TLF.TERT.ZS	2012	19.700001	GDP per capita (constant 2005 US$)	NY.GDP.PCAP.KD	2012	
23	El Salvador	SLV	Labor force with tertiary education (% of total)	SL.TLF.TERT.ZS	2012	0.100000	GDP per capita (constant 2005 US$)	NY.GDP.PCAP.KD	2012	
24	Estonia	EST	Labor force with tertiary education (% of total)	SL.TLF.TERT.ZS	2012	37.700001	GDP per capita (constant 2005 US$)	NY.GDP.PCAP.KD	2012	
25	Ethiopia	ETH	Labor force with tertiary education (% of total)	SL.TLF.TERT.ZS	2012	16.400000	GDP per capita (constant 2005 US$)	NY.GDP.PCAP.KD	2012	
26	Finland	FIN	Labor force with tertiary education (% of total)	SL.TLF.TERT.ZS	2012	38.200001	GDP per capita (constant 2005 US$)	NY.GDP.PCAP.KD	2012	
27	France	FRA	Labor force with tertiary education (% of total)	SL.TLF.TERT.ZS	2012	33.700001	GDP per capita (constant 2005 US$)	NY.GDP.PCAP.KD	2012	
28	Georgia	GEO	Labor force with tertiary education (% of total)	SL.TLF.TERT.ZS	2012	30.400000	GDP per capita (constant 2005 US$)	NY.GDP.PCAP.KD	2012	
29	Germany	DEU	Labor force with tertiary education (% of total)	SL.TLF.TERT.ZS	2012	28.299999	GDP per capita (constant 2005 US$)	NY.GDP.PCAP.KD	2012	
30	Greece	GRC	Labor force with tertiary education (% of total)	SL.TLF.TERT.ZS	2012	29.100000	GDP per capita (constant 2005 US$)	NY.GDP.PCAP.KD	2012	
31	Guatemala	GTM	Labor force with tertiary education (% of total)	SL.TLF.TERT.ZS	2012	7.700000	GDP per capita (constant 2005 US$)	NY.GDP.PCAP.KD	2012	
32	Hong Kong SAR, China	HKG	Labor force with tertiary education (% of total)	SL.TLF.TERT.ZS	2012	25.500000	GDP per capita (constant 2005 US$)	NY.GDP.PCAP.KD	2012	
33	Hungary	HUN	Labor force with tertiary education (% of total)	SL.TLF.TERT.ZS	2012	24.700001	GDP per capita (constant 2005 US$)	NY.GDP.PCAP.KD	2012	
34	Iceland	ISL	Labor force with tertiary education (% of total)	SL.TLF.TERT.ZS	2012	31.000000	GDP per capita (constant 2005 US$)	NY.GDP.PCAP.KD	2012	
35	Ireland	IRL	Labor force with tertiary education (% of total)	SL.TLF.TERT.ZS	2012	41.500000	GDP per capita (constant 2005 US$)	NY.GDP.PCAP.KD	2012	
36	Italy	ITA	Labor force with tertiary education (% of total)	SL.TLF.TERT.ZS	2012	18.100000	GDP per capita (constant 2005 US$)	NY.GDP.PCAP.KD	2012	
37	Jordan	JOR	Labor force with tertiary education (% of total)	SL.TLF.TERT.ZS	2012	28.299999	GDP per capita (constant 2005 US$)	NY.GDP.PCAP.KD	2012	
38	Kazakhstan	KAZ	Labor force with tertiary education (% of total)	SL.TLF.TERT.ZS	2012	29.500000	GDP per capita (constant 2005 US$)	NY.GDP.PCAP.KD	2012	
39	Kosovo	KSV	Labor force with tertiary education (% of total)	SL.TLF.TERT.ZS	2012	21.000000	GDP per capita (constant 2005 US$)	NY.GDP.PCAP.KD	2012	
40	Kyrgyz Republic	KGZ	Labor force with tertiary education (% of total)	SL.TLF.TERT.ZS	2012	18.200001	GDP per capita (constant 2005 US$)	NY.GDP.PCAP.KD	2012	
			Labor force with				GDP per capita			

	CountryName	CountryCode_x	IndicatorName_x	IndicatorCode_x	Year_x	Value_x	IndicatorName_y	IndicatorCode_y	Year_y
41	Latvia	LVA	tertiary education (% of total)	SL.TLF.TERT.ZS	2012	31.400000	US$)	NY.GDP.PCAP.KD	2012
42	Lithuania	LTU	Labor force with tertiary education (% of total)	SL.TLF.TERT.ZS	2012	36.900002	GDP per capita (constant 2005 US$)	NY.GDP.PCAP.KD	2012
43	Luxembourg	LUX	Labor force with tertiary education (% of total)	SL.TLF.TERT.ZS	2012	41.299999	GDP per capita (constant 2005 US$)	NY.GDP.PCAP.KD	2012
44	Macao SAR, China	MAC	Labor force with tertiary education (% of total)	SL.TLF.TERT.ZS	2012	27.000000	GDP per capita (constant 2005 US$)	NY.GDP.PCAP.KD	2012
45	Macedonia, FYR	MKD	Labor force with tertiary education (% of total)	SL.TLF.TERT.ZS	2012	21.400000	GDP per capita (constant 2005 US$)	NY.GDP.PCAP.KD	2012
46	Madagascar	MDG	Labor force with tertiary education (% of total)	SL.TLF.TERT.ZS	2012	5.200000	GDP per capita (constant 2005 US$)	NY.GDP.PCAP.KD	2012
47	Malaysia	MYS	Labor force with tertiary education (% of total)	SL.TLF.TERT.ZS	2012	24.400000	GDP per capita (constant 2005 US$)	NY.GDP.PCAP.KD	2012
48	Malta	MLT	Labor force with tertiary education (% of total)	SL.TLF.TERT.ZS	2012	22.799999	GDP per capita (constant 2005 US$)	NY.GDP.PCAP.KD	2012
49	Moldova	MDA	Labor force with tertiary education (% of total)	SL.TLF.TERT.ZS	2012	24.799999	GDP per capita (constant 2005 US$)	NY.GDP.PCAP.KD	2012
50	Mongolia	MNG	Labor force with tertiary education (% of total)	SL.TLF.TERT.ZS	2012	25.799999	GDP per capita (constant 2005 US$)	NY.GDP.PCAP.KD	2012
51	Montenegro	MNE	Labor force with tertiary education (% of total)	SL.TLF.TERT.ZS	2012	25.500000	GDP per capita (constant 2005 US$)	NY.GDP.PCAP.KD	2012
52	Morocco	MAR	Labor force with tertiary education (% of total)	SL.TLF.TERT.ZS	2012	9.200000	GDP per capita (constant 2005 US$)	NY.GDP.PCAP.KD	2012
53	Namibia	NAM	Labor force with tertiary education (% of total)	SL.TLF.TERT.ZS	2012	6.700000	GDP per capita (constant 2005 US$)	NY.GDP.PCAP.KD	2012
54	Netherlands	NLD	Labor force with tertiary education (% of total)	SL.TLF.TERT.ZS	2012	32.099998	GDP per capita (constant 2005 US$)	NY.GDP.PCAP.KD	2012
55	Norway	NOR	Labor force with tertiary education (% of total)	SL.TLF.TERT.ZS	2012	37.400002	GDP per capita (constant 2005 US$)	NY.GDP.PCAP.KD	2012
56	Panama	PAN	Labor force with tertiary education (% of total)	SL.TLF.TERT.ZS	2012	28.600000	GDP per capita (constant 2005 US$)	NY.GDP.PCAP.KD	2012
57	Paraguay	PRY	Labor force with tertiary education (% of total)	SL.TLF.TERT.ZS	2012	18.400000	GDP per capita (constant 2005 US$)	NY.GDP.PCAP.KD	2012
58	Peru	PER	Labor force with tertiary education (% of total)	SL.TLF.TERT.ZS	2012	22.900000	GDP per capita (constant 2005 US$)	NY.GDP.PCAP.KD	2012
59	Philippines	PHL	Labor force with tertiary education (% of total)	SL.TLF.TERT.ZS	2012	25.000000	GDP per capita (constant 2005 US$)	NY.GDP.PCAP.KD	2012
60	Poland	POL	Labor force with tertiary education (% of total)	SL.TLF.TERT.ZS	2012	28.200001	GDP per capita (constant 2005 US$)	NY.GDP.PCAP.KD	2012
61	Portugal	PRT	Labor force with tertiary education (% of total)	SL.TLF.TERT.ZS	2012	19.500000	GDP per capita (constant 2005 US$)	NY.GDP.PCAP.KD	2012
62	Romania	ROM	Labor force with tertiary education (% of total)	SL.TLF.TERT.ZS	2012	17.400000	GDP per capita (constant 2005 US$)	NY.GDP.PCAP.KD	2012
63	Russian Federation	RUS	Labor force with tertiary education (% of total)	SL.TLF.TERT.ZS	2012	55.500000	GDP per capita (constant 2005 US$)	NY.GDP.PCAP.KD	2012
64	Rwanda	RWA	Labor force with tertiary education (% of total)	SL.TLF.TERT.ZS	2012	2.700000	GDP per capita (constant 2005 US$)	NY.GDP.PCAP.KD	2012
65	Serbia	SRB	Labor force with tertiary education	SL.TLF.TERT.ZS	2012	20.600000	GDP per capita (constant 2005	NY.GDP.PCAP.KD	2012

	CountryName	CountryCode_x	IndicatorName_x	IndicatorCode_x	Year_x	Value_x	IndicatorName_y	IndicatorCode_y	Year_y
66	Singapore	SGP	Labor force with tertiary education (% of total)	SL.TLF.TERT.ZS	2012	29.400000	GDP per capita (constant 2005 US$)	NY.GDP.PCAP.KD	2012
67	Slovak Republic	SVK	Labor force with tertiary education (% of total)	SL.TLF.TERT.ZS	2012	19.799999	GDP per capita (constant 2005 US$)	NY.GDP.PCAP.KD	2012
68	Slovenia	SVN	Labor force with tertiary education (% of total)	SL.TLF.TERT.ZS	2012	29.000000	GDP per capita (constant 2005 US$)	NY.GDP.PCAP.KD	2012
69	South Africa	ZAF	Labor force with tertiary education (% of total)	SL.TLF.TERT.ZS	2012	16.200001	GDP per capita (constant 2005 US$)	NY.GDP.PCAP.KD	2012
70	Spain	ESP	Labor force with tertiary education (% of total)	SL.TLF.TERT.ZS	2012	35.200001	GDP per capita (constant 2005 US$)	NY.GDP.PCAP.KD	2012
71	Sri Lanka	LKA	Labor force with tertiary education (% of total)	SL.TLF.TERT.ZS	2012	17.299999	GDP per capita (constant 2005 US$)	NY.GDP.PCAP.KD	2012
72	Sweden	SWE	Labor force with tertiary education (% of total)	SL.TLF.TERT.ZS	2012	34.000000	GDP per capita (constant 2005 US$)	NY.GDP.PCAP.KD	2012
73	Switzerland	CHE	Labor force with tertiary education (% of total)	SL.TLF.TERT.ZS	2012	34.299999	GDP per capita (constant 2005 US$)	NY.GDP.PCAP.KD	2012
74	Thailand	THA	Labor force with tertiary education (% of total)	SL.TLF.TERT.ZS	2012	17.100000	GDP per capita (constant 2005 US$)	NY.GDP.PCAP.KD	2012
75	Turkey	TUR	Labor force with tertiary education (% of total)	SL.TLF.TERT.ZS	2012	18.299999	GDP per capita (constant 2005 US$)	NY.GDP.PCAP.KD	2012
76	United Kingdom	GBR	Labor force with tertiary education (% of total)	SL.TLF.TERT.ZS	2012	38.099998	GDP per capita (constant 2005 US$)	NY.GDP.PCAP.KD	2012
77	United States	USA	Labor force with tertiary education (% of total)	SL.TLF.TERT.ZS	2012	32.500000	GDP per capita (constant 2005 US$)	NY.GDP.PCAP.KD	2012
78	Uruguay	URY	Labor force with tertiary education (% of total)	SL.TLF.TERT.ZS	2012	21.900000	GDP per capita (constant 2005 US$)	NY.GDP.PCAP.KD	2012
79	Venezuela, RB	VEN	Labor force with tertiary education (% of total)	SL.TLF.TERT.ZS	2012	30.299999	GDP per capita (constant 2005 US$)	NY.GDP.PCAP.KD	2012
80	West Bank and Gaza	WBG	Labor force with tertiary education (% of total)	SL.TLF.TERT.ZS	2012	30.000000	GDP per capita (constant 2005 US$)	NY.GDP.PCAP.KD	2012

In [329]:

```
SkilledLabourAndGDP['Value_y'].isnull().any()
```

Out[329]:

```
False
```

Plot the correlation

In [330]:

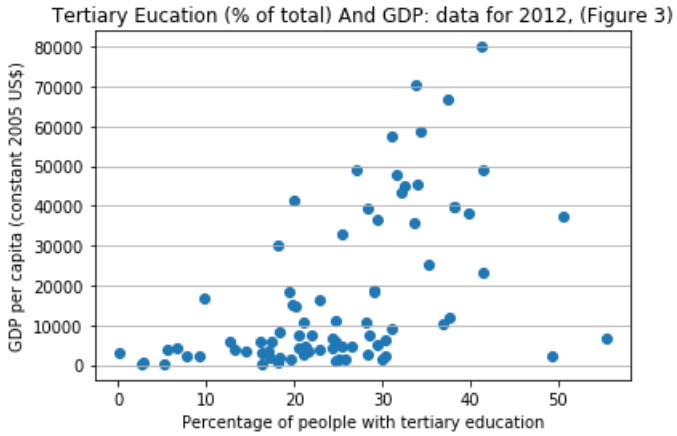
```
%matplotlib inline
import matplotlib.pyplot as plt

fig, axis = plt.subplots()
# Grid lines, Xticks, Xlabel, Ylabel

axis.yaxis.grid(True)
axis.set_title('Tertiary Eucation (% of total) And GDP: data for 2012, (Figure 3)')
axis.set_xlabel('Percentage of peolple with tertiary education',fontsize=10)
axis.set_ylabel('GDP per capita (constant 2005 US$)',fontsize=10)
```

```
X=SkilledLabourAndGDP['Value_x']
Y=SkilledLabourAndGDP['Value_y']

axis.scatter(X, Y)
plt.show()
```



Calculate the value of Correlation

In [331]:

```
SkilledLabourAndGDPCorrelation=SkilledLabourAndGDP[['Value_x','Value_y']]
SkilledLabourAndGDPCorrelation.corr()
```

Out[331]:

	Value_x	Value_y
Value_x	1.000000	0.520758
Value_y	0.520758	1.000000

In [ ]:

```

```