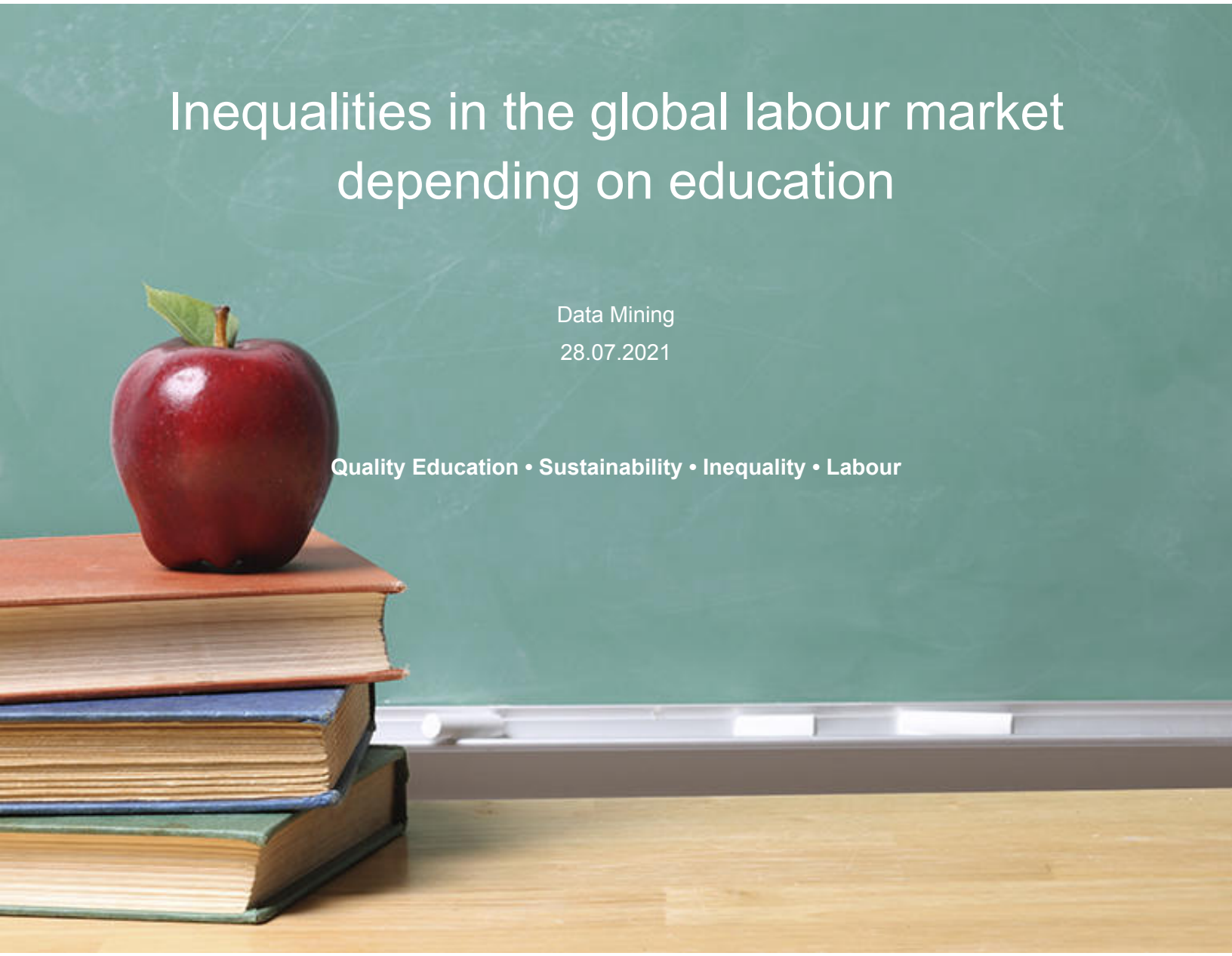
Inequalities in the global labour market depending on education



Data Mining

28.07.2021

Quality Education • Sustainability • Inequality • Labour

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Introduction

Quality Education is one of the 17 “Sustainable Development Goals”, which were set by the United Nations. The 17 Goals are a call for action by all countries to promote prosperity while protecting the planet. They recognize that ending poverty must go hand-in-hand with strategies that build economic growth and address a range of social needs including education, health, social protection, and job opportunities, while tackling climate change and environmental protection. (United Nations) The goal “Quality Education” is set to ensure inclusive and equitable quality education and promote lifelong learning opportunities for all. As the title “Inequalities in the global labour market depending on education“ suggests, this paper covers not only the quality education goal, but it also dips into the goals “Reduced Inequalities”, which is set to reduce inequality within and among countries. (United Nations)

Since these goals are from the United Nations, the achievement of those goals is a global effort. Every country has to pull in the same direction and work actively towards the goal even when different systems are used in different countries. (Barbier and Joanne S.2017ff.) Important is that the big countries take the first step and act as good examples for the other countries. Quality education is no exception here. With the help of strong economic countries, developing countries must do more to serve the needs of all children. Those who have traditionally been underrepresented in primary school - girls and children from poor and rural families - must have greater access to education, more encouragement to enroll and better chances to get a job after their graduation. (Lockheed and Verspoor S.1f.)

This paper focuses on the inequalities in the global labour market. The goal is to point out the different chances people have after they have graduated from school in their country and which factors play a role in job search. To reach this goal, different datasets with different attributes will be evaluated, analysed and compared afterwards. In the end, a conclusion will be drawn from the analysed data and fact checked with current literature.

Methodical approach

The Dataset

For the Analysis within the bounds of this paper there will be an analysis of the Dataset “Erwerbslosenanteile als Prozentsatz der Erwerbsbevölkerung im Alter von 25 bis 64 Jahren nach ISCED-Bildungsbereichen und Staaten” (en. Unemployment shares as a percentage of the labor force aged 25-64 by ISCED education level and country) which was published and provided by the Bundesministerium für Bildung und Forschung . This dataset contains information of the age group, the kind of bachelor, education levels, unemployment rate, master, oecd-average of the population. The information about education is given in the ISCED (International Standard Classification for Education) standard from ISCED-0 (Early Childhood Education) to ISCED-8 (Doctoral or equivalent). The categories OECD average and EU23 average reflect the status of OECD or EU membership of the countries in the respective reference year.

Additional info:

License openness: Restricted use
Terms of use: Data license Germany attribution non-commercial 1.0
Last change: 22.09.2021 (as of 25.09.2021)
Release date: -
Data provider: Federal Ministry of Education and Research
Publishing body: Federal Ministry of Education and Research

URL:
https://www.govdata.de/web/guest/suchen/-/details/erwerbslosenanteile-als-prozentsatz-der-erwerbsbevolkerung-im-alter-von-25-bis-64-jahren-nach-ic41db

Analyzing the dataset with python

```
6   # Dictionary for string (Country) - float (Value) Pairs
7   dic = {}
8
9   # First line which contains data
10  start_line = 8
11
12  # last line which contains data
13  end_line = 295
14
15  # Max number of values in the diagram
16  max_entries = 5
17
18  # Index of the csv table which is used for the value in the diagram
19  index = 3
20
21  # True  - Will show the max_entries highest values in the diagram
22  # False - Will instead display the max_entries lowest values in the diagram
23  highest = True
```

For analyzing the code we decided to use a simple dictionary with country: value pairs. The code also contains variables to configure the diagram and the reading process of the CSV file. First of all the start and end line can be specified. This allows us to skip introductory text and final notes in the CSV. Furthermore the max entries can be specified, this limits the diagram to a specific amount of either highest or lowest results. Whether the largest or smallest amounts are displayed can be selected by setting highest to True or False.

```
25  with open('./exec.csv', encoding="utf-8") as csv_file:
26      csv_reader = csv.reader(csv_file, delimiter=';')
27      line_count = 0
28
29      for row in csv_reader:
30
31          # only evaluate lines defined by star and end line
32          if line_count <= start_line: line_count+=1; continue
33          if line_count >= end_line: break
34
35
36          try:
37
38              country = row[0]
39              year = row[1]
40              val = float( row[index].replace(",", ".") )
41
42              # Only evaluate lines from the year 2019
43              if year != '2019': continue
44
45              print('%s - %f' % (country, val))
46
47
48              dic[country] = val
49              line_count += 1
50
51          except:
52              continue
53
54  print(dic)
```

After the config is initialised the exec.csv file is read. All lines that don't fall into the scope of the start and end line are ignored. The country and the value specified by the index variable are then read and if the year matches 2019 they are written into the dictionary. Furthermore the line counter is increased.

```
arr = []

for key in dic:
    arr.append([key, dic[key]])


arr2 = []
oecd_added = False

# Find the lowest or highest values
for ii in range(max_entries):

    current_country = ''
    current_value = ''
    current_index = -1

    for i in range(len(arr)):
        if arr[i][0] == 'OECD-Durchschnitt' and not oecd_added:
            arr2.append([arr[i][0], arr[i][1]])
            oecd_added = True
            continue

        if i == 0:
            current_country = arr[i][0]
            current_value = arr[i][1]
            current_index = i

        if arr[i][1] >= current_value if highest else arr[i][1] <= current_value:
            current_country = arr[i][0]
            current_value = arr[i][1]
            current_index = i


    arr2.append([current_country, current_value])
    del(arr[current_index])
```

The dictionary is now transformed into a 2 dimensional array. Which is then used to filter out the 5 highest or lowest values depending on the configuration set at the beginning. The OECD-Durchschnitt (OECD-Average) is added regardless of its value.

```
93   labels = []
94   values = []
95
96   for val in arr2:
97       labels.append(val[0])
98       values.append(val[1])
99
100  x = np.array(labels)
101  y = np.array(values)
102
103  plt.rcParams.update({'font.size': 16})
104  plt.bar(x, y,)
105
106  for index, value in enumerate(y):
107      plt.text(index, value, str(value))
108
109  plt.show()
```

At the end the filtered array is written into the labels and values arrays to be used when using the matplotlib library to draw the diagram.

ISCED scale

For measuring and rating the level of education, this paper uses the official ISCED scale by UNESCO. The different ISCED numbers are equivalent to different levels of education, as listed in the graphic below. (UNESCO Institute for Statistics)

Table 1. ISCED coding of levels (first digit)

ISCED-Programmes (ISCED-P)		ISCED-Attainment (ISCED-A)	
0	Early childhood education	0	Less than primary education
1	Primary education	1	Primary education
2	Lower secondary education	2	Lower secondary education
3	Upper secondary education	3	Upper secondary education
4	Post-secondary non-tertiary education	4	Post-secondary non-tertiary education
5	Short-cycle tertiary education	5	Short-cycle tertiary education
6	Bachelor's or equivalent level	6	Bachelor's or equivalent level
7	Master's or equivalent level	7	Master's or equivalent level
8	Doctoral or equivalent level	8	Doctoral or equivalent level
9	Not elsewhere classified	9	Not elsewhere classified

OECD states

The countries, which are compared in this paper, are part of the Organisation for Economic Co-operation and Development. All 38 OECD countries are represented in this paper, which is because the data stems from the OECD database. (Organisation for Economic Co-operation and Development) Other countries, like India and Russia and Saudi-Arabia, are also represented, but in some ISCED categories, there is no data submitted by those countries. Also, the data in this paper is always compared to the OECD average to put it in a context.

Execution

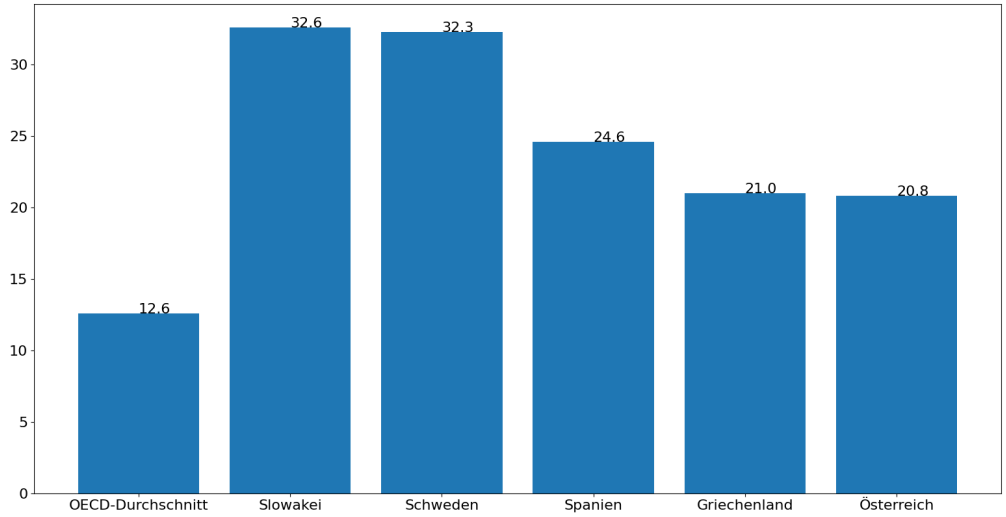
The following chapter is a comparison of the unemployment share as a percentage of the labor force between the ages of 25 and 64 according to ISCED levels of education. For that, we use the dataset which was mentioned in the methodical approach.

Different countries are compared to one another and the 5 countries with the highest and the lowest unemployment shares are displayed in bar diagrams. First, the low ISCED categories of countries are compared to each other, followed by the higher ISCED categories. The OECD average is always the first bar, followed by the 5 countries. Since the dataset is by the german government, the country names displayed in the graphics are german and translated below by the authors.

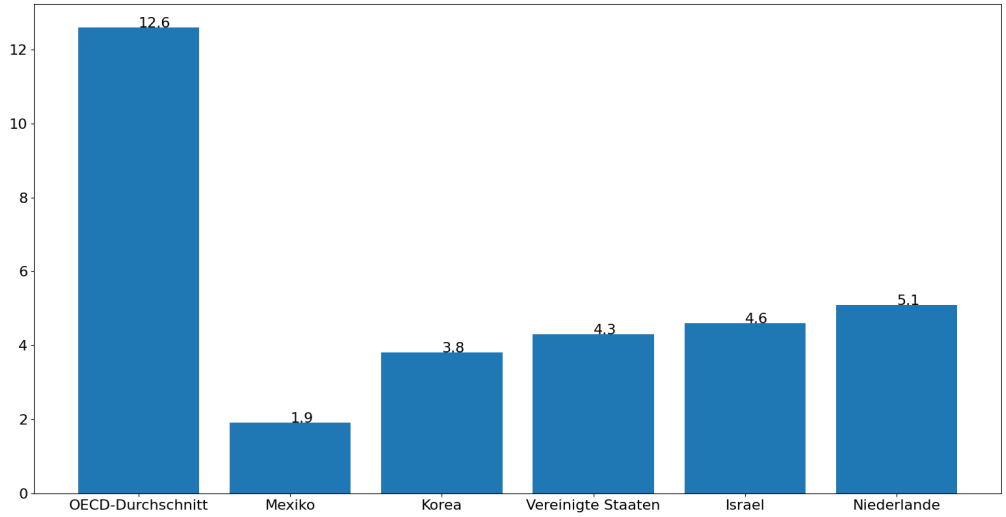
https://www.govdata.de/web/guest/suchen/-/details/erwerbslosenanteile-als-prozentsatz-der-erwerbsbevolkerung-im-alter-von-25-bis-64-jahren-nach-ic41db (Ed 25-64)
25-65

Low ISCED

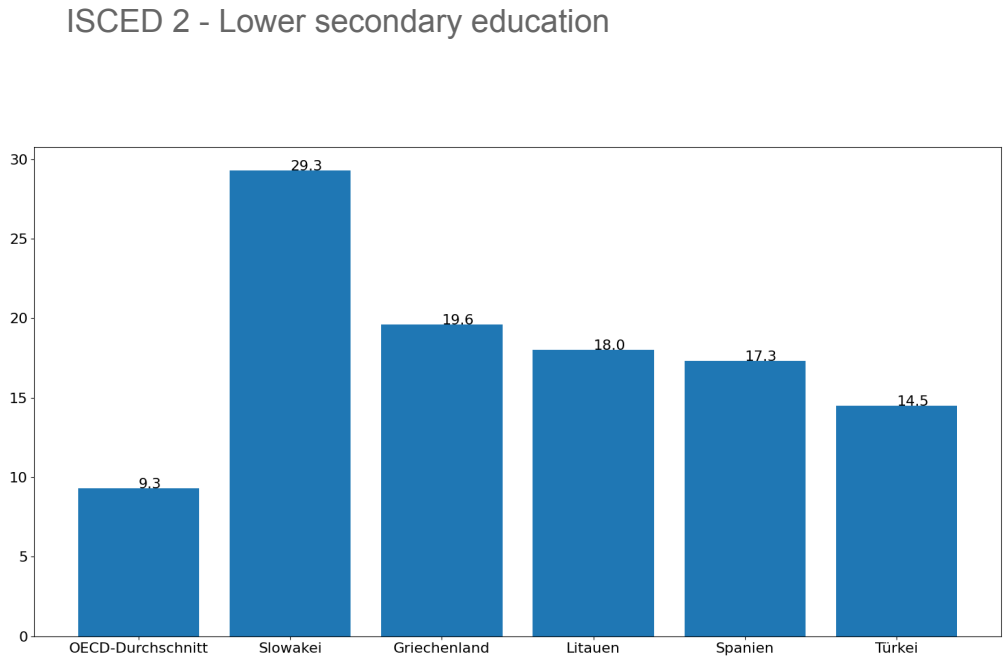
ISCED 1 - Primary education



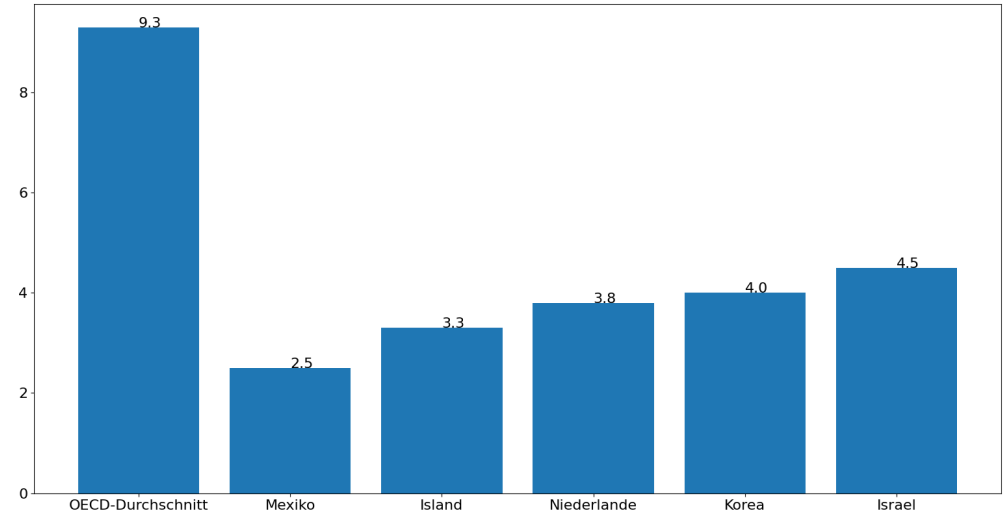
Countries from left to right: Slovakia, Sweden, Spain, Greece, Austria



Countries from left to right: Mexico, South-Korea, USA, Israel, Netherlands

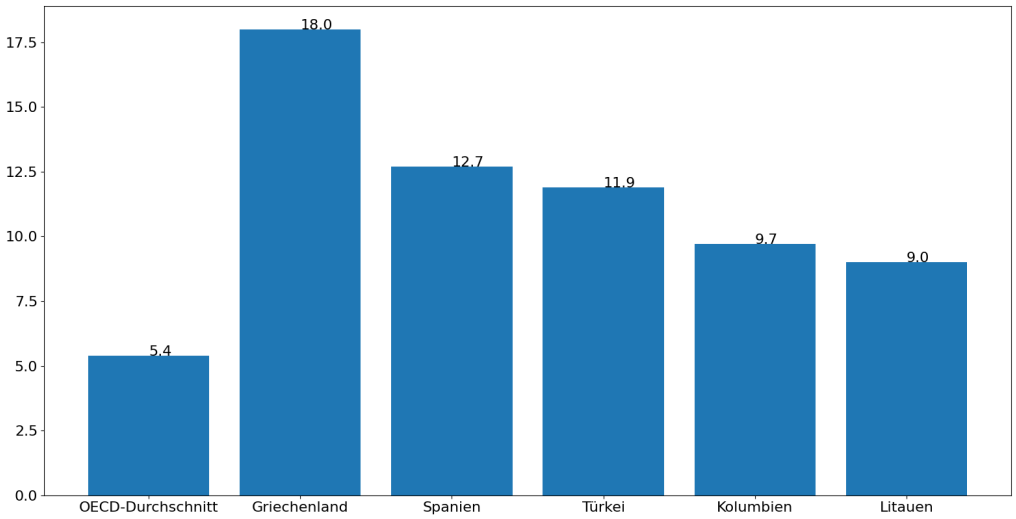


Countries from left to right: Slovakia, Greece, Lithuania, Spain, Turkey

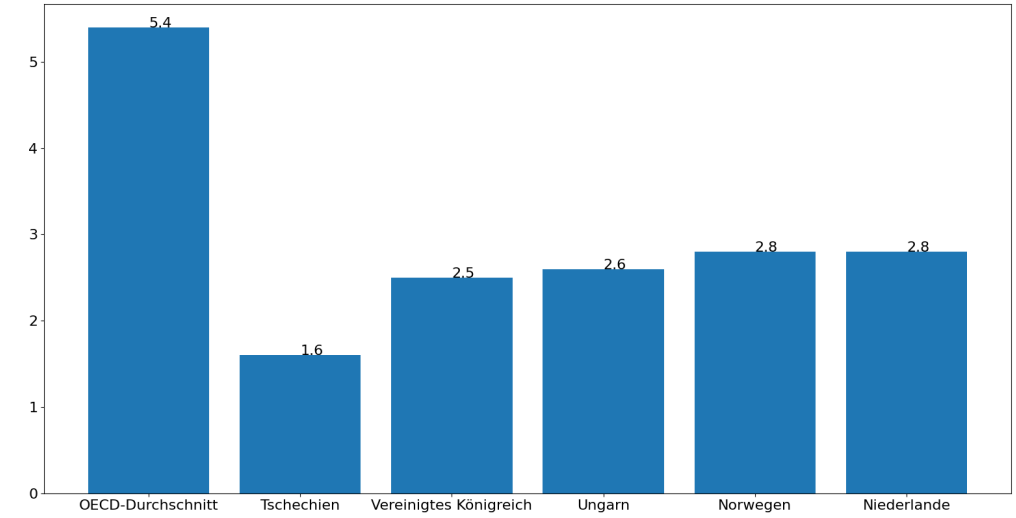


Countries from left to right: Mexico, Island, Netherlands, South-Korea, Israel

ISCED 3 - Higher secondary education



Countries from left to right: Greece, Spain, Turkey, Colombia, Lithuania



Countries from left to right: Czech Republic, UK, Hungary, Norway, Netherlands

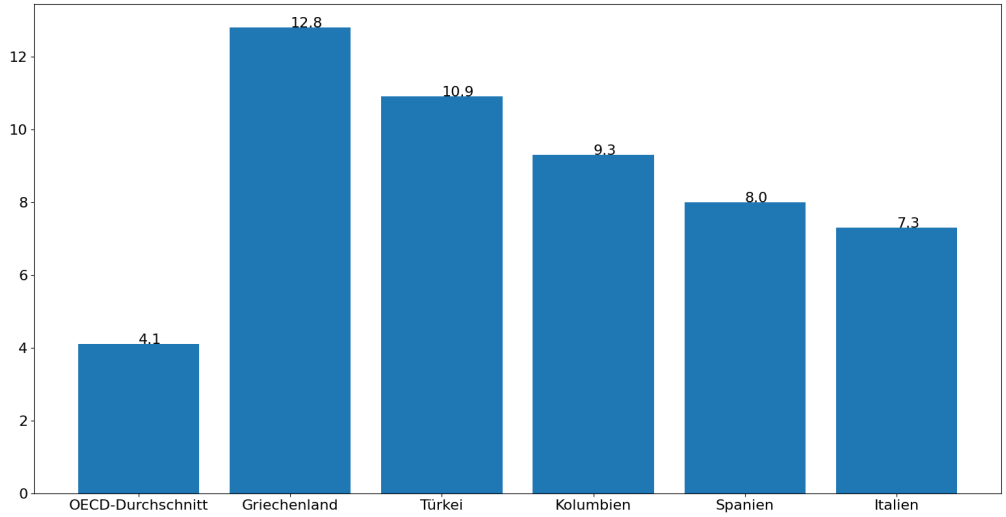
Summary

As seen in the bar diagrams above, in the low ISCED categories, the countries with a high unemployment rate are often Slovakia, Greece, Lithuania, Spain and turkey. In ISCED 1, Sweden and Austria are represented. This is due to the fact that Sweden and Austria have nearly no people older than 25, who only have a primary education, with only very few exceptions.

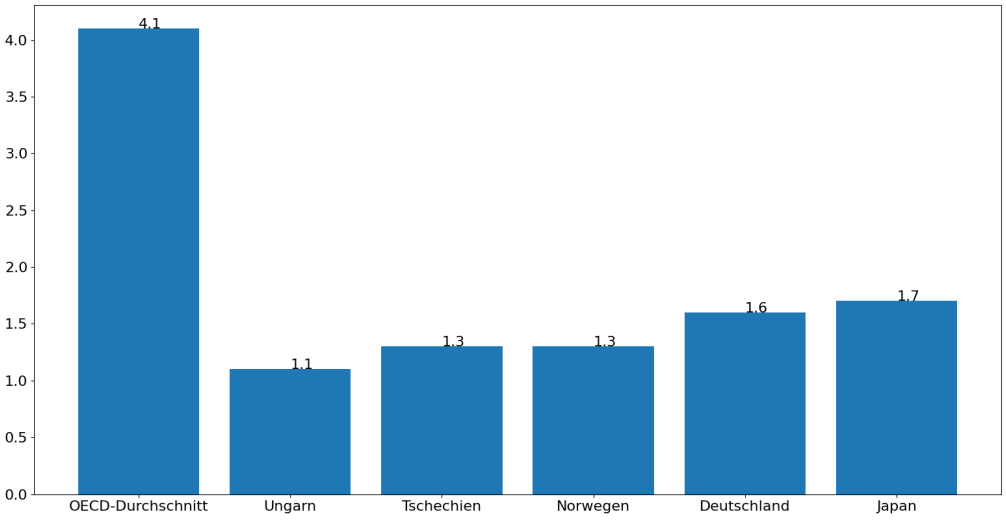
The countries with low unemployment rate are mostly Czech Republic, Mexico, Korea, Israel, UK and the Netherlands. While Czech Republic has a low unemployment rate overall, there are other countries like Mexico, who have a low share of unemployed people in this category, because a lot of people are in those low ISCED categories. Because of this, the number won't get inflated by a minority with low education.

High ISCED

ISCED 6 - Bachelor's or equivalent

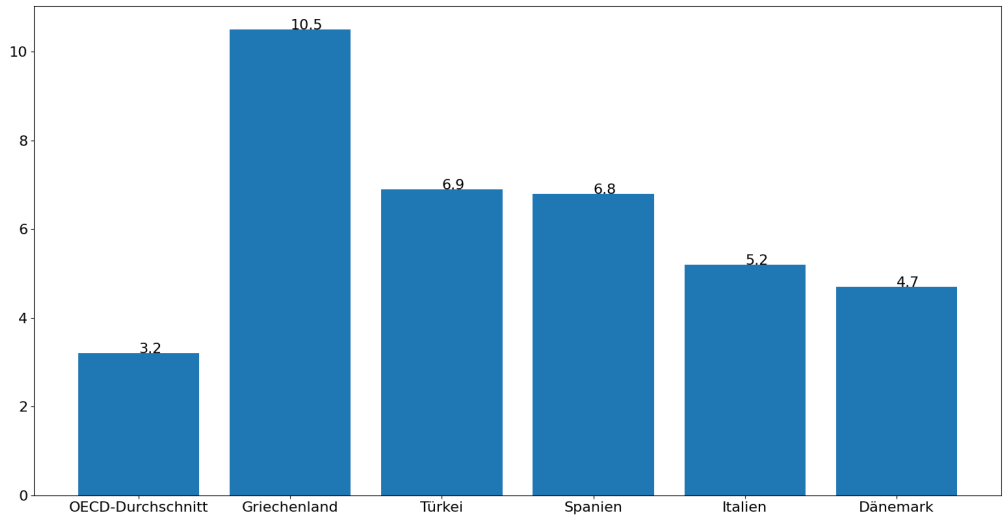


Countries from left to right: Greece, Turkey, Colombia, Spain, Italy

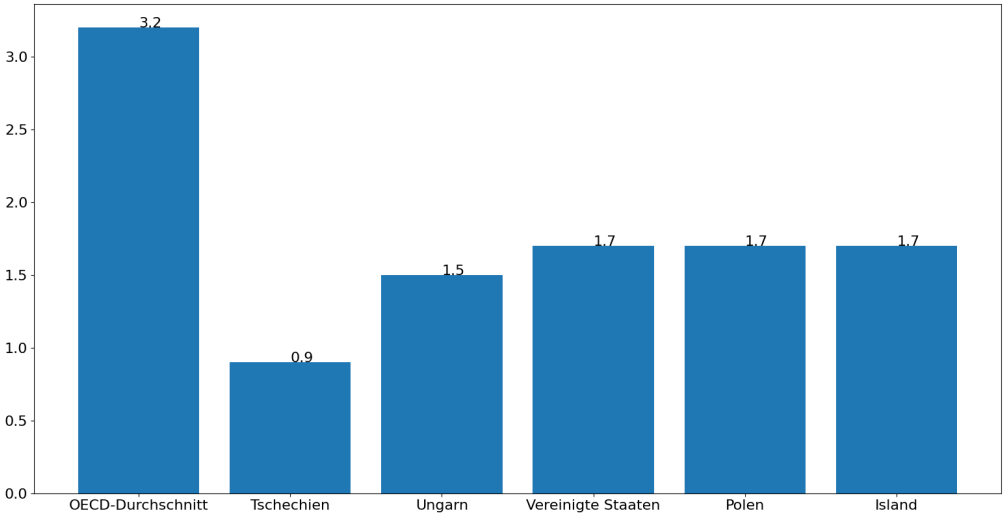


Countries from left to right: Hungary, Czech Republic, Norway, Germany, Japan

ISCED 7 - Master’s or equivalent

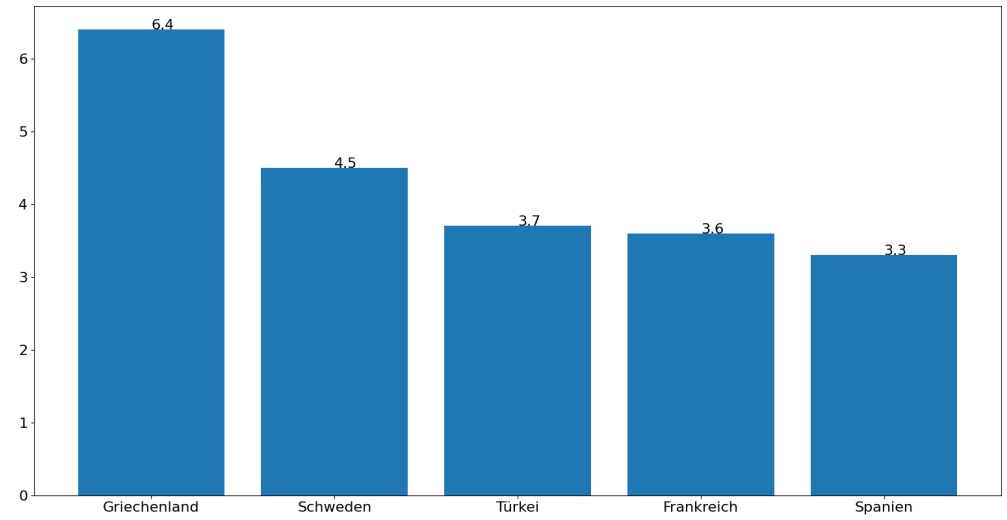


Countries from left to right: Greece, Turkey, Spain, Italy, Denmark

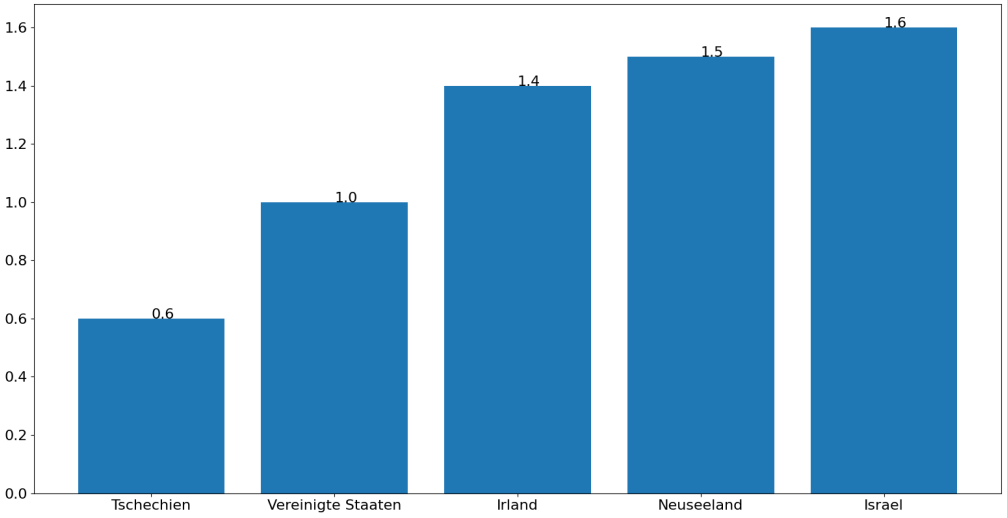


Countries from left to right: Czech Republic, Hungary, UK, Poland, Iceland

ISCED 8 - Doctoral or equivalent



Countries from left to right: Greece, Sweden, Turkey, France, Spain



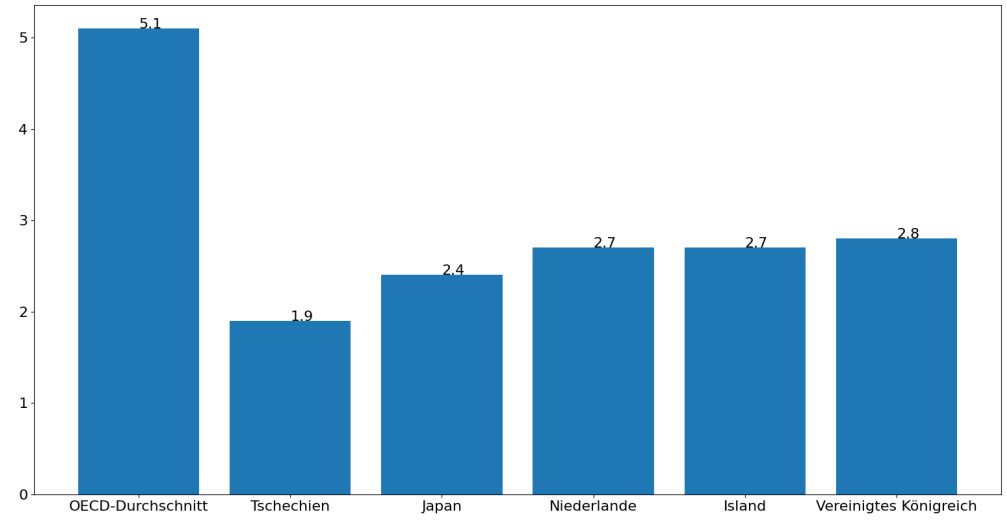
Countries from left to right: Czech Republic, USA, Ireland, New Zealand, Israel

Summary

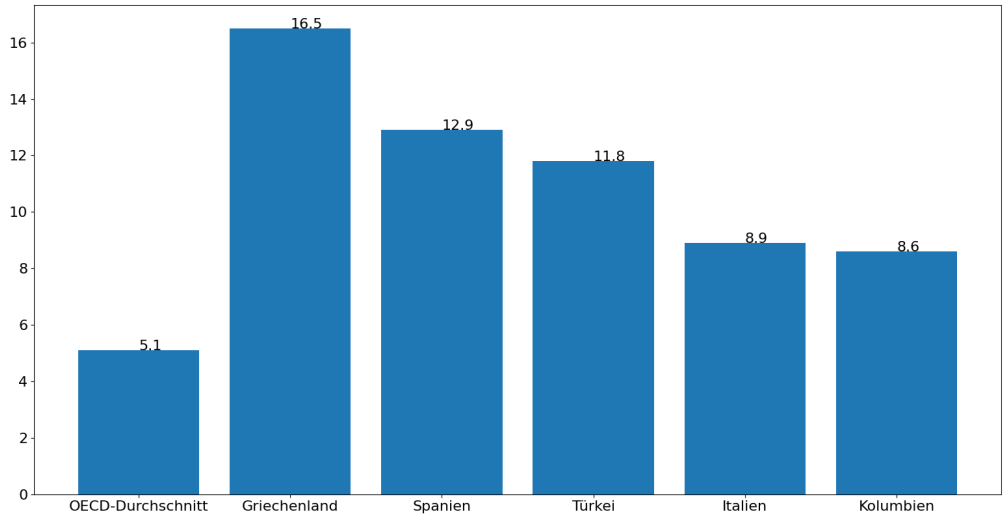
If we look at the countries in the high ISCED categories with a high unemployment rate, we often look at Greece, Spain and Turkey. A shocking 12.8% of people with a bachelor's degree and 10.5 % of people with a master's degree don't have a job in Greece, which is what stands out the most.

On the opposite site of the spectrum, we have, again, the Czech Republic, this time with industry-states like the USA, Germany and Norway. Those countries have a lot of highly educated people with Bachelor's Degrees or higher.

Overall



Countries from left to right: Czech Republic, Japan, Netherlands, Iceland, UK



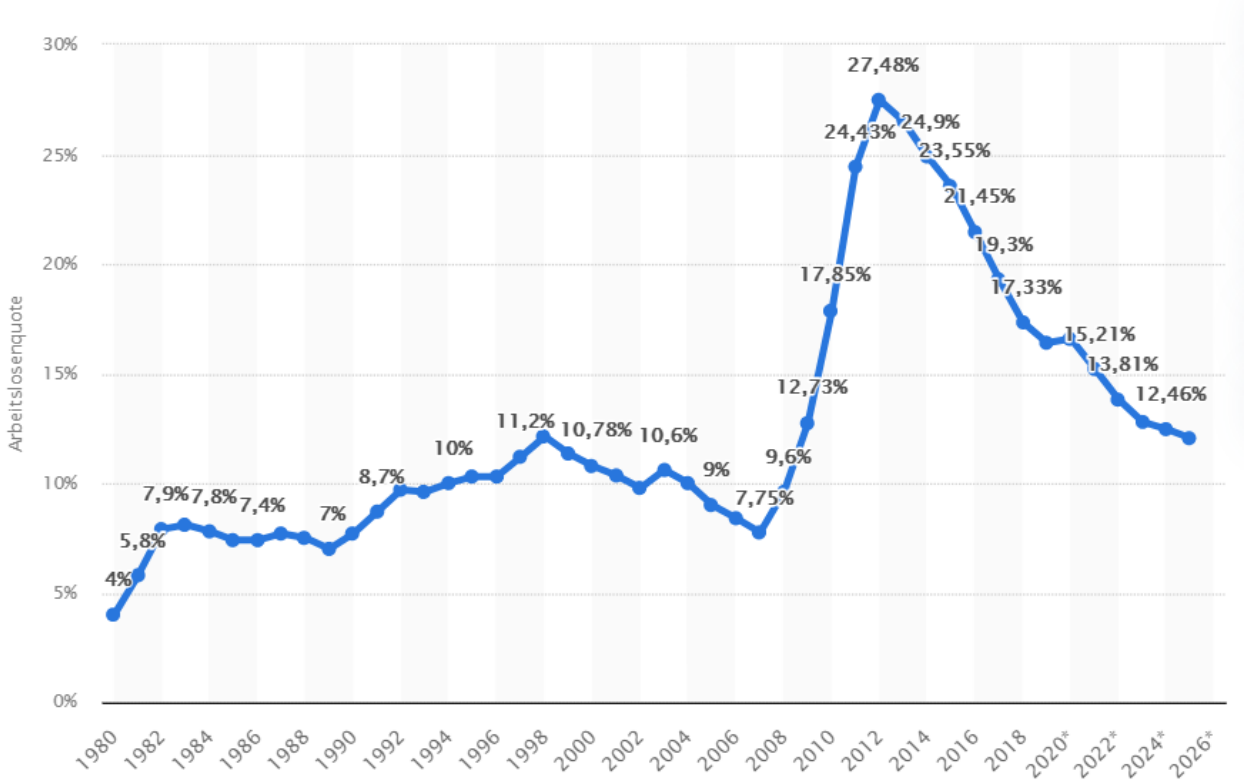
Countries from left to right: Greece, Spain, Turkey, Italy, Colombia

Analysis

In this chapter we analyse our findings with complementary stats and literature.

What we found out

The most obvious statistical outlier is Greece. The country is part of the EU and the OECD states but more than 10% of people with ISCED 6 or 7 can't find a job. This leads to a so called "Braindrain" where a lot of highly educated people leave the country, which is bad for multiple reasons. The most obvious reason is the possible economical power that gets lost in the process. It is expected that more than half a million people left Greece between 2008 and 2019, with most of them being professionals who couldn't find a job in their own country.(Höhler)
To counter that, Greece started a programm called "Rebrain Greece", where the state pays part of the monthly salary of the employee, but with little success.
The reason for the high unemployment rate is the financial crisis of 2012, from which Greece is still recovering. This can be seen in the graphic below, where the unemployment rate of Greece up to 2019 is shown, together with a prediction until 2026: (Statista)

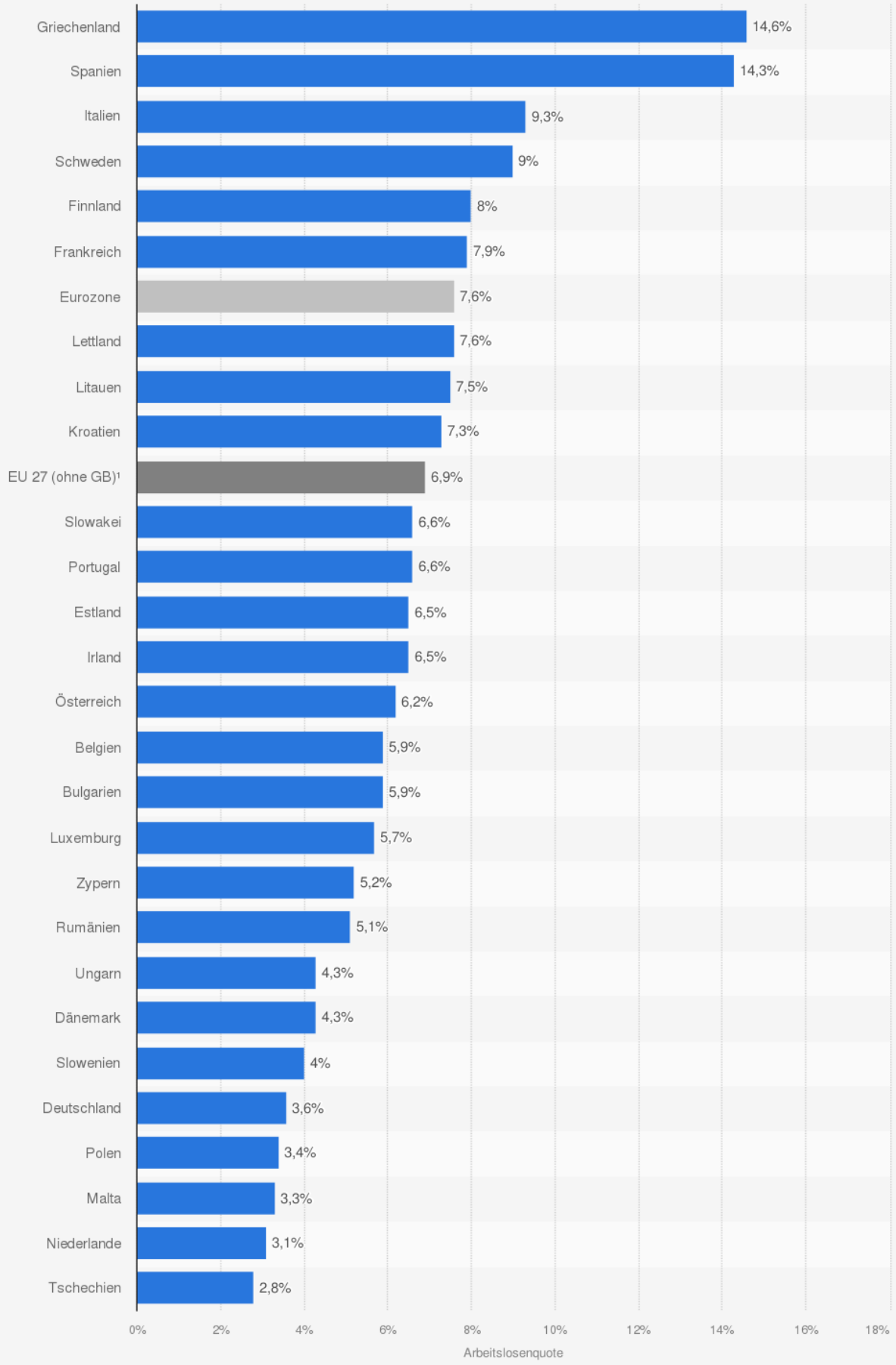


The other extreme is the Czech Republic. It has the lowest unemployment share of Europe and the OECD countries in nearly every category. Overall, the unemployment rate is more than one percent lower than in Germany, the neighboring country and the strongest economical country in europe. This is due to the low average salary in this country. A lot of car-manufacturers have settled here because of those low wages and given jobs to the people of Czech Republic. They chose the Czech Republic over other low-average-wage countries like Romania because of its central geographical position in europe. (OECD Jobs Strategy) The wages in Czech Republic have been on a constant rise over the past years and if this continues, some car manufacturers are expected to leave the country.
The other industry states with low unemployment shares in high education categories are often the goal of those who leave their country with high unemployment rate. For example 160.000 of those 500.000 specialists from Greece left for Germany.

The current situation

In the following graph, the current unemployment rate across Europe is displayed by statista. (Statista)

Europäische Union: Arbeitslosenquoten in den Mitgliedstaaten[1] im Juli 2021



Quelle
Eurostat

Weitere Informationen:
EU; Saisonbereinigt

Since 2019, the unemployment rates across the EU have changed a lot. Most notably the jump from Spain to 14.3% unemployment rate overall. The inflation of those numbers are mostly related to the Covid-19 pandemic crisis and are expected to calm down over the next few years. It is important to keep in mind that corona had different impacts on different countries. This is due to differences in industries. The tourism industry for example has been shut down due to the lockdowns while the information industry, in case the infrastructure exists, can continue to work remotely even if other businesses have to shutdown operation completely. This error margin has to be kept in mind when analyzing the unemployment rate in 2021.

Error margin

Besides the changes due to Corona furthermore the statistics do not reflect whether or not an employee job is related or adequate for the education. This means a person could have the required education to be working as a doctor but instead work as a cap driver.
Furthermore the values of the dataset might be under a reliability threshold which is disclosed on the publishers website. This means because only percentages are used, the number could be inflated due to the country having very few people in that respective ISCED category.

Conclusion

It is important to work against discrepancies especially when it comes to education and employment since they aren't just the basic foundation for a persons or families livelihood but also for the entire economy of a country. Therefore if a country has a high unemployment for well educated people, for example with a masters or bachelor degree, the country does not use their knowledge, skills or experience to increase economic growth. This can lead to reduced investments in important sectors like education, again decreasing the education level over time. Alternatively this can lead to "brain drain" (specialists leaving the country), leaving the country with missing professionals. This could for example be observed in greece. It is estimated that about 500.000 Greece specialists left the country from 2008 until today. Therefore it is not just important to provide the capability to archive higher education but also support businesses which require it. If not, it results in massive discrepancies between countries because professionals leave the country after obtaining the education they desire since they can not work in their preferred field. Therefore it is important in the future to implement solutions for the reduction of brain drain. This should be supported by other countries as well to reduce long lasting effects of brain drain.

Appendix

Code Repository: https://github.com/VincentMenzel/dhbwDatamining
Dataset:
https://www.govdata.de/web/guest/suchen/-/details/erwerbslosenanteile-als-prozentsatz-der-erwerbsbevolkerung-im-alter-von-25-bis-64-jahren-nach-ic41db

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